INDUSTRIAL AWAKENING

A Geography of Australian Manufacturing 1788 to 1890

G. J. R. LINGE

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G. J. R. Linge

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To Jan and Susan

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Preface

This book represents the first fruits of a program of research designed to trace the development and spatial organisation of manufacturing in Australia from 1788 to the present day. Although, eventually, it is hoped to relate the processes of industrialisation and urbanisation into a wider conceptual context, the purpose of this volume is to set out a well-documented factual account of the emergence of manufacturing during the first hundred years of settlement. Industrial development took place in what, to all intents and purposes, were six autonomous political units in which there were significant differences in timing, policies and outlook. Any other approach, such as chapters devoted to particular topics, would not only have caused impossible—and largely unnecessary—complications, but would also have masked the essentially interrelated nature of the circumstances and events *within* each colony.

Some liberties have been taken within the formal structure. In particular, the discussion of some events has been taken beyond 1890 so as to round off episodes which would otherwise be left without any logical conclusion. Conversely, no attempt has been made to point up the origins and early signs of the depression that occurred during the last decade of the century. Despite these difficulties, 1890 represents, insofar as any one date *can* have validity from all points of view in a situation as diverse as that in Australia, a turning point in the development and geography of manufacturing.

The term 'manufacturing' has been used to embrace the broad range of activities that nowadays are normally conducted under factory conditions, but which during the nineteenth century were sometimes carried on in an ad hoc way without the aid of mechanical power. There is, indeed, no realistic alternative since one of the features of the industrialisation process in Australia during this period was the increasing formalisation of production—a spectrum of change that varied between industries and over space. Moreover, a narrower definition would imply a statistical and analytical precision which is unattainable on the basis of the information available. The term 'secondary industry' is used as a synonym for manufacturing: it does not include building and construction but does, of course, cover the preparation of building materials like bricks, cement and woodwork. The word 'industry' is never employed in the restricted sense, common in Australia, of a single factory. The main practical problem concerns the treatment of the tiny domestic workshops associated, in particular, with the manufacture of clothing in the capital cities and which form a shadowy fringe between one-man businesses and the smaller factories. Little quantitative information is available about these

and they have, therefore, been excluded from the estimates of factory employment detailed in Appendix 1: however, in the text itself some assessment has been made of the role they played.

It would be absurd, under Australian conditions, not to embrace the processing of agricultural, pastoral and mineral products in a study of this kind, although even here there are some fine points of definition. Thus activities like wool-scouring, chaff-cutting and ore beneficiation have been omitted while woollen-milling, flour-milling and smelting have been included. The definitions and industry classifications adopted in this book are basically those used by the Commonwealth Bureau of Census and Statistics (now the Australian Bureau of Statistics) from 1930 to 1967-8. It was not possible to reorganise the basic data into the Australian Standard Industrial Classification which was introduced in 1968-9.

There is even more room for disagreement when analysing trade data: butter, for example, can be treated as both a 'primary' and a 'secondary' product depending, as much as anything, on a point of view. Some writers have tried to overcome this by using classifications like 'seasonally affected commodities': these simply change the nature of, but do little to solve, the problems, not the least of which is that the 'seasons' of some commodities do not conform to the calendar year trade statistics available. In this book only goods that fairly definitely passed through a processing or fabricating stage have been included in the 'processed and manufactured' category: thus wooden ware, flour, leather and preserved meat have been included but tallow, timber, hides and salt meat have been regarded as the produce of primary industry. Originally it had been intended to include an appendix detailing the value by categories of manufactured and processed exports from each colony by major destinations for each year to 1890. In the event this has not been possible: however, these data are available from the author.

Many hundreds of hours have gone into the preparation of the statistical series used in this study, especially those relating to the metropolitan and other urban populations, factory employment and external trade. It must be recognised that each of these is worthy of full-scale analysis in its own right to refine and improve the resulting estimates, but clearly a balance had to be struck between further research of this kind and that necessary to distil information from newspaper, archival and literary sources. A general *caveat* is that the statistical series should be regarded as approximations only. Consequently these estimates do not form a sound or appropriate basis for more elaborate statistical manipulation: measures of association and significance, for instance, would suggest a degree of precision and reliability that is totally unrealistic.

From time to time attention has been drawn to results that do not accord with those of other research workers. In particular, Butlin's figures relating to factory employment and gross domestic output and product would appear to need some modification and this, in turn, would affect some of his other series. But these are, for the most part, disagreements at a very detailed level and do not seriously challenge his general assessment of the role of this sector of the economy: although some differences of view are noted in Chapter 15, his estimates—especially of

investment in factory structures, plant and equipment—have been quoted at various points in this book. All value figures, unless otherwise stated, are at current prices.

Considerable effort has been made to find and utilise primary literary, archival, statistical and cartographic sources, and this has enabled corrections to be made to some frequently repeated errors: as examples, the population of New South Wales in 1828 is usually understated and that of Tasmania in 1847 overstated. Regrettably, few business papers relating to the operations of firms engaged in manufacturing or processing activities during this period seem to have survived or are sufficiently complete to allow them to be used as case studies: some of the more useful sets of papers are listed in the Bibliography. A great deal of information can be found in papers relating to defunct companies which are deposited in State archives. Readers may also notice some anachronisms relating to the nomenclature of territorial divisions and places ('Tasmania', for example, was not legally adopted as the name of the island colony until 1 January 1856) but it would have been pedantic to retain long-discarded usage.

Finally, some comment must be made about the decision not to metricate this book. Technically, of course, there would have been no great difficulty, but it is considered that the use of dollars, tonnes and kilometres, and combinations like cents per tonne-kilometre, would have removed the study out of its nineteenth century context and introduced an unnecessary complication for readers wishing to make comparisons with the original sources. It should be noted that a short ton was 2,000 lb and a long ton was 2,240 lb.

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The endnotes indicate the extent to which I am indebted to a mass of published and unpublished material. Anyone writing about aspects of Australian economic development in the nineteenth century must be grateful to the many workers who have already painstakingly investigated and interpreted some of the data available. Among others, I have greatly benefited from reading the wide-ranging and impressive studies by T. A. Coghlan and N. G. Butlin, as well as the more specific work of G. Blainey (mining), S. J. Butlin (banking and the early monetary system), E. Dunsdorfs (wheat industry), R. B. Madgwick (immigration), H. Hughes (iron and steel industry), G. D. Patterson (tariffs), S. H. Roberts (land settlement), and G. P. Walsh (early manufacturing in New South Wales), and the regional studies by G. Serle and A. R. Hall (Victoria), D. Pike and J. B. Hirst (South Australia), F. K. Crowley (Western Australia), R. M. Hartwell (Tasmania) and T. M. Perry and D. N. Jeans (New South Wales). I have also read a large number of unpublished university theses and have made specific acknowledgment to these where appropriate. I am grateful to Dr M. E. Robinson and Mr P. J. Herborn for permission to quote some of their research results and to Mr R. Parsons who allowed me to make use of some privately published data on shipbuilding activity. If I have failed to acknowledge a specific point I hope a sincere apology will be accepted.

The New South Wales Archives Authority gave me permission to reproduce Figure 4.1 and the National Library of Australia to base Figures 7.1, 10.4 and 10.5 on maps in its collection. The National Library also gave me permission to

reproduce Plates 1–17 and 19 and 20 while Plate 18 was provided by the Archives Department of the State Library of South Australia.

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I alone, of course, bear the responsibility for any errors of fact or interpretation. I would be grateful if my attention could be drawn to any additional archival records, possibly in the hands of individuals or companies, that relate to the activities of manufacturers in Australia during the nineteenth century.

G. J. R. Linge
Canberra

Abbreviations

AEHR	<i>Australian Economic History Review</i>
AG	<i>Australian Geographer</i>
AIBR	<i>Australian Insurance and Banking Record</i>
ATCJ	<i>Australian Town and Country Journal</i>
ATR	<i>Australasian Trade Review</i>
BAH	<i>Business Archives and History</i>
CPPP	<i>Commonwealth Papers Presented to Parliament</i>
ER	<i>Economic Record</i>
HRA	<i>Historical Records of Australia</i>
HRNSW	<i>Historical Records of New South Wales</i>
HTG	<i>Hobart Town Gazette</i>
JPRAHS	<i>Journal and Proceedings Royal Australian Historical Society</i> [JRAHS beginning volume 51 (1965)]
JPWAHS	<i>Journal and Proceedings Western Australia Historical Society</i>
MM	<i>Maitland Mercury</i>
NMH	<i>Newcastle Morning Herald and Miners' Advocate</i>
NSWAO	<i>New South Wales Archives Office</i>
NSWBB	<i>New South Wales Blue Book</i>
NSWGG	<i>New South Wales Government Gazette</i>
NSWJLC	<i>New South Wales Journal of the Legislative Council</i>
NSWPD	<i>New South Wales Parliamentary Debates</i>
NSWPP	<i>New South Wales Parliamentary Papers</i>
NSWSR	<i>New South Wales Statistical Register</i>
NSWV&P(LA)	<i>New South Wales Votes and Proceedings (Legislative Assembly)</i>
NSWV&P(LC)	<i>New South Wales Votes and Proceedings (Legislative Council)</i>
PPTHRA	<i>Papers and Proceedings Tasmanian Historical Research Association</i>
QGG	<i>Queensland Government Gazette</i>
QPD	<i>Queensland Parliamentary Debates</i>
QSR	<i>Queensland Statistical Register and Statistics of Queensland</i>
QV&P(LA)	<i>Queensland Votes and Proceedings (Legislative Assembly)</i>
SAAO	<i>South Australia Archives Office</i>
SABB	<i>South Australia Blue Book</i>
SAGG	<i>South Australian Government Gazette</i>
SAPD	<i>South Australia Parliamentary Debates</i>

<i>SAPP</i>	<i>South Australia Parliamentary Papers</i>
<i>SAR</i>	<i>South Australian Register</i>
<i>SASR</i>	<i>South Australia Statistical Register</i>
<i>SG</i>	<i>Sydney Gazette and New South Wales Advertiser</i>
<i>SMH</i>	<i>Sydney Morning Herald</i>
<i>Tas.SR</i>	<i>Tasmania Statistical Register</i>
<i>TBB</i>	<i>Tasmania Blue Book</i>
<i>THAJ</i>	<i>Tasmania House of Assembly Journal</i>
<i>TJPPP</i>	<i>Tasmania Journals and Printed Papers of the Parliament</i>
<i>VAO</i>	<i>Victoria Archives Office</i>
<i>VGG</i>	<i>Victoria Government Gazette</i>
<i>VHM</i>	<i>Victorian Historical Magazine</i>
<i>Vic.SR</i>	<i>Victoria Statistical Register</i>
<i>VPD</i>	<i>Victoria Parliamentary Debates</i>
<i>VPPP</i>	<i>Victoria Papers Presented to Parliament</i>
<i>VV&P(LA)</i>	<i>Victoria Votes and Proceedings (Legislative Assembly)</i>
<i>VV&P(LC)</i>	<i>Victoria Votes and Proceedings (Legislative Council)</i>
<i>WABB</i>	<i>Western Australia Blue Book</i>
<i>WAV&P(LC)</i>	<i>Western Australia Votes and Proceedings (Legislative Council)</i>

1 Introduction

In contrast to agricultural, pastoral, mining and banking activities, the development of secondary industry in Australia has been poorly treated by geographers and historians, most of whom have simply touched on it as incidental to the period, politician or problem with which they were primarily concerned. Of all secondary sources Butlin¹ was the first to give due weight to the significance of industrialisation and urbanisation during the nineteenth century and to jolt economic historians (and geographers) away from the traditional view of the continent as little more than a vast sheepwalk.

This book traces the growth and spatial organisation of manufacturing in Australia to 1890 and tries to establish what occurred during this hundred-year period when the non-Aboriginal population grew to 3,183,000, the factory workforce reached 149,000, the coastal areas of the continent were settled and parts of the interior were tentatively explored. The immediate purpose was to establish the facts of what happened and obtain a clearer view as to when, why and how they happened; what emerges is a remarkable story of the way manufacturing in a new and remote country pulled itself up by the bootstraps and became enmeshed in changing world commerce and technology. Yet this volume should be seen as only the first fruits of a continuing program of research during which it is hoped to carry forward the story beyond 1890 and to set the events here described into their broader international and conceptual context including the vast and rapidly growing literature on the economics and geography of what is described as 'development'.

Some of the ground covered by Butlin has had to be considered again because his main purpose was not to analyse in any detail the forces encouraging or retarding the development of industry. But much of the material in the book is new or places a different emphasis on the literature available. Hitherto, for example, there has been little discussion of how railway investment raised issues about the allocation of government contracts to local or overseas producers, how freight rates distorted the space in which manufacturers operated, or how factory legislation, labour relations, and employers' organisations affected industrial development. Existing accounts analyse the changes in wages, hours and conditions resulting from particular negotiations or confrontations but seldom show how these influenced short-term fluctuations and longer-term swings in the stability and prosperity of significant industry groups.

That the course of Australian industrial development was affected by numerous, complex, and usually interrelated influences may seem too obvious to emphasise,

yet the failure to appreciate this has led to generalisations being piled one upon another without an adequate examination of the strength and reliability of the foundations. Much of the debate about tariffs and manufacturing in New South Wales and Victoria is, for example, simplistic in that it takes little account of the structure of the formal customs schedules, the incidence of drawback regulations, the host of administrative decisions and interpretations gazetted almost weekly by the customs departments, and even the relevance of the dates on which schedules came into effect (sometimes several months before the legislation concerned received formal assent). Conventional wisdom has labelled tariffs 'mildly' or 'highly' protective, depending on the level of ad valorem duties imposed, irrespective of whether producers' materials appeared on the free list or were lightly or heavily taxed. Seldom has any distinction been made between 'apparent' and 'real' protection, but it is impossible to appreciate circumstances in the woollen-milling, clothing or footwear industries in Victoria during the 1870s and 1880s without examining the duties on producers' materials or noting how drawback arrangements advantaged re-exports more than the export of goods made up locally from imported materials. Customs legislation sometimes affected the course of industrial development in unexpected ways. Hence the imposition of duties on raw materials after an industry had all but fully penetrated the domestic market prevented it from expanding external sales so as to avoid stagnation or even decline. Firms then tried to take a hard line on employees' requests for improved wages and conditions, and the labour unrest that followed not only reduced external sales but made it more difficult to maintain even those within the colony itself.

Tariff policy was, of course, only one way in which governments manipulated economic development: indeed they were so deeply involved in many significant fields, including immigration, overseas borrowing and public investment, that it led, as Butlin points out, to the contemporary description 'colonial socialism'. Yet it must be emphasised that, after the first few decades of settlement in New South Wales and Tasmania, colonial administrations themselves operated only a handful of industrial enterprises like government railway workshops and government printerries.

But official policies had a much greater influence on both the nature and timing of private investment in manufacturing than has generally been recognised. This is particularly true of decisions about the advertising, allocating and scheduling of contracts for new equipment and material required by public utilities. Butlin argues² that the stimulus given in this way was relatively slight but there is a good deal of evidence that during the 1870s and 1880s many metal cum wood-working firms in New South Wales and Victoria (and to a lesser extent in South Australia and Queensland) obtained much of their business in the form of government contracts to make locomotives, trucks, carriages, turntables, water-pipes, bridge piers, and indeed a miscellany of products ranging from armchairs to weighing machines. In fact some of the largest firms in these colonies reached prominence as a result of work of this kind. Work placed locally to the end of 1890, for example,

represented 13 per cent (by value) of locomotive and 64 per cent of other rolling stock contracts signed by New South Wales, and 74 and 78 per cent, respectively, of those signed by Victoria.

Several of the case studies in the book illustrate the way that contracts were won or lost, and reveal much about the processes of industrialisation and the problems faced by both governments and private enterprise. In particular, they provide insights into the way day to day circumstances moulded decisions and draw attention to the influential role of public servants, who were sometimes more radically or conservatively inclined than their political masters. Thus, the negative attitude of senior officials in the New South Wales Railways Department delayed and obstructed the progress of locomotive building in that colony, whereas in Queensland, by contrast, it was the advocacy of the Commissioner of Railways himself that led to the local construction first of rolling stock and later of locomotives as well. The detailed examination of decisions that influenced industrial development points up the inadequacy of labels like 'free trade' and 'protectionist' that have been so freely pinned on individual politicians, administrations and even whole colonies.

Government contracts also acted as a 'base' demand which enabled manufacturers to maintain their plant and labour force intact in readiness for sudden and more remunerative jobs from the private sector: this was true, for example, of heavy engineering works in Sydney which were thus enabled to repair large ocean-going vessels at short notice. Firms fortunate enough to win long-term contracts running over three to five years were thereby encouraged to invest in plant and buildings on a scale which would not otherwise have been justified.

Funds were also transferred to the private sector in yet another way. Each of the colonies except New South Wales offered lump-sum bonuses to the first firms to make various types of goods such as pig iron, woollen cloth, paper and glass bottles. Several establishments came into existence, especially in Victoria and South Australia, as a direct result of incentives of this kind. Even unsuccessful efforts contributed to the stock of knowledge about managerial, financial and technical problems faced in the colonies.

Considerable care must be taken when relating industrial development (usually measured, for want of a better alternative, in terms of factory employment) with other broad indicators of economic activity like interest rates, company registrations, public investment outlays, residential building and so forth. It has been found that some of the short-run coincidences and longer-run apparently parallel trends are less directly and immediately associated than is often supposed. As an example, it is usually taken for granted that manufacturing in New South Wales suffered in sympathy with the general downturn in activity during the early 1840s, whereas events in several industries—like flour-milling and shipbuilding—have to be explained in terms of longer-run and more fundamental structural, spatial and technological adjustments that were only partially related to the depression. Or again, the slump in the Victorian sawmilling industry in the 1890s coincides with, and has been seen as one measure of, the collapse in building activity especially

in Melbourne, but in fact the industry had been running into difficulties over a much longer period. While there is no gainsaying that conditions in the final decade of the century reinforced the sawmillers' problems, they were not the root cause of them.

A good deal of stress has here been laid on the importance of entrepreneurial leadership and managerial capacity. It is all too easy to see industrial development in Australia as some sort of inexorable process in which the human element counted for little, yet it is difficult to accept that the outcome of the play would have been the same if the actors themselves had been different. One of the striking features of the whole period covered by this book is, indeed, the importance of the role of perhaps a couple of hundred individuals, each of whom—to use a hackneyed but nonetheless apposite phrase—turned out to be the right man at the right spot at the right time. There are obvious examples, like Thomas Mort, William Sandford and Walter Duffield, as well as many others whose achievements are less well known but are recorded at the appropriate places in the story. All had some extra spark of enthusiasm, application and tenacity of purpose that enabled them to see and to seize opportunities, engineer relationships between the necessary human and material factors of production, and conceive 'genuine' innovations or introduce techniques and processes from overseas. Mort's determination to find a way of exporting frozen meat, Sandford's vision of a 'Commonwealth Iron and Steel Company' at Lithgow, and Duffield's introduction of roller flour-milling into South Australia are all examples of how particular individuals pointed to ways in which the existing order of things could be changed. By no means all innovators were successful: some were before their time, did the heavy pioneering work, received all the blows and reaped few of the rewards. With the benefit of hindsight it is easy to see how some went into things prematurely and, by themselves, did not have the resources to break through the multiplicity of technical, infrastructural and social barriers that hindered them. Once the initial plunge had been taken, however, few were willing or able to extricate themselves from the flow of events which relentlessly swept them into deeper water, thus making rescue attempts all the more futile. Yet even the failures, which the press often publicised in lengthy post-mortems, warned would-be imitators of problems and pitfalls and in this way formed enormously important links in the chain of development. The contribution of individuals was, of course, not something peculiar to this continent but the stages of development through which Australia was passing during the nineteenth century gave particular scope for considerable personal initiative especially as formal institutions of various kinds—like trade unions and stock markets—were only in their formative years.

Credence is also given to this view by the poor showing made by many of the firms registered under the Companies Acts (dating from 1864 in Victoria and South Australia and from 1874 in New South Wales) which had some sort of manufacturing or processing activity as their primary aim. There were four main types. Some were formed with speculative capital to cash in on what appeared to be new ways of making easy money. The majority of these were under-capitalised,

technically backward and incompetently managed, and dissipated their efforts in placating dissident directors and suspicious shareholders. The success of a few can, in almost all cases, be traced to the managerial and technical abilities of a particular individual. Other companies were formed to acquire the assets of existing ventures that had been built up by families or small partnerships. Where the original proprietors remained firmly at the helm, as majority shareholders or in key managerial positions, the businesses usually prospered, at least in the short-run, because they were no longer stultified by lack of capital. Not infrequently, however, manoeuvres of this kind were undertaken in optimistic circumstances, perhaps following the award of a large contract due to run over several years, which enabled the proprietors to attract capital by guaranteeing 10 per cent dividends for the first three years. Forward commitments of this kind along with the expansion of plant and workforce not only stretched managerial talents but made such firms increasingly dependent on external forces over which they had little or no control—decisions by bankers to call in overdrafts, the attitudes of unions, the reluctance of governments to commit themselves to further contracts and, ultimately, the votes of shareholders.

More successful was a third type of company in which the capital was held by only a handful of people, sometimes in single shares paid up to £100, £500 or even £1,250 compared with the more usual 10/- to 40/- units. Headed by a small group of men with proven ability and an intimate technical knowledge of the industry, such businesses usually expanded and, by amalgamations and take-overs, eventually captured a significant portion of the market in a particular colony or, occasionally, in much of southeastern Australia. At the opposite end of the spectrum was a fourth group of companies, by far the most important numerically, with a nominal capital of anything from £500 to £5,000. These ranged from co-operatives formed to set up flour-mills or butter factories through to groups prepared to back the development, manufacturing and marketing of a wide range of processes, inventions and 'remedies'. The failure rate was very high, not only because the nominal or paid-up capital was often ludicrously small for the objects in mind or because the gulf between an idea and its practical application was too wide, but also because the 'factory system' implied a fundamental change in traditional attitudes and methods. It took time for dairy farmers to realise that co-operative butter factories could not operate profitably until the quality of the milk was improved and regularity of supplies, especially between seasons, was ensured. In such cases, factory managers, even if competent technically, had to learn that success depended as much as anything on 'human engineering' to overcome frictions between non-producer and producer shareholders and to persuade the latter to pay more attention to better farming methods.

This commentary on corporate activity must not obscure the fact that throughout this period the great majority of industrial firms were owned by individuals, families or small partnerships. With a mere handful of exceptions this was true of complete industry groups like the manufacture of clothing, footwear, printing and sawmilling (which together employed more than two-fifths of the factory workers

in Victoria and New South Wales in the 1880s), as well as particular activities like biscuit-making, woollen-milling in New South Wales, and sugar refining in Queensland. Little primary material about the operations of these private firms has been unearthed in archival collections, and for this reason a considerable—perhaps even undue—proportion of the evidence presented in this book concerns the circumstances of the larger public companies whose affairs were placed on record at the bi-annual shareholders' meetings.

Direct overseas investment in manufacturing was of small importance during this period. Only about thirty companies were floated—all in Great Britain—with the object of establishing productive capacity in Australia, and most of these were interested in processing copper, iron or meat, generally with the British market in mind. Their main effect was to add to the number of ventures in these fields rather than to make significant contributions to the level of technology or commercial expertise being used. It is impossible to say, however, what funds from overseas (or, indeed, from local sources) ultimately found their way into the industrial sector through banks and other financial institutions. Almost every firm for which balance sheets are available sooner or later turned to the banking system for support, ranging from overdrafts to preferential debentures, which not infrequently exceeded the amount paid up by the shareholders themselves, and it is clear that the relationship between industrial development and the operation and attitudes of the banks remains an important topic yet to be explored.

Australian manufacturing during the nineteenth century relied heavily on technology imported from Great Britain and to some extent also from Europe and the United States. But it would be wrong to assume that, stage by stage in its industrial development, southeastern Australia was entirely a laggard or simply applied machinery, processes and skills that had been tried and tested overseas. Treadle and steam-driven sewing machines were in use in Melbourne clothing factories by 1859, less than a decade after the development of this equipment in the United States; and privately owned telephone systems were operating in Brisbane, Sydney and Melbourne in 1880 thus quickly applying the principles demonstrated by Alexander Graham Bell in 1876. In some fields, notably the canning of meat and other foodstuffs, the development and application of refrigeration, and the invention of certain specialised agricultural machinery and implements, Australia itself made important contributions to world technology. Moreover, manufacturers also had to devote a good deal of time to what nowadays would be more formally labelled 'research and development'. It was necessary to compile basic data about the qualities of raw materials on hand, such as the strength and durability of indigenous timbers, the suitability of flora for the production of tanning agents, dyes and volatile oils, and the properties of various deposits of coal for gas making and metallurgical applications. Since only embryo government or university laboratory facilities existed, even during the second half of the century, much of this investigatory work had to be done on the job by trial and error: imported iron and copper-smelting furnaces, for example, had to be altered to try to cope with little-known impurities in the ores and spinning machinery had to be adapted to

handle the finer merino wool. A further major difficulty faced by several industries was the effect on various processes of the hotter climate. Among other things, this led to over-violent fermentation during brewing, excessive heat when stone-grinding flour, lack of 'registration' in printing, and brittleness of fibres whilst being woven. Solutions were eventually found to all these problems but the actual and imputed costs involved should not be minimised. Some firms tried to meet difficulties of this kind by bringing out 'experts' or skilled hands from Britain but, ironically, many of these turned out to have such narrow and specialised abilities that their advice proved expensive, time-consuming and not infrequently valueless.

The Geography of Manufacturing

The emphasis throughout this book is on the spatial consequences of these influences. Conceptually, industrial development can be viewed at four spatial scales: in the continent as a whole vis-à-vis other countries, especially of course Great Britain; between the political units into which Australia became divided; within each of the colonies; and within each of the main urban areas. Although in practice these distinctions became blurred because of the interaction of the complex underlying processes involved and the considerable variations in the timing and sequence of events, it is nonetheless useful to comment on each of these levels in turn.

International relationships

Distance, isolation, and the uncertainty and high cost of ocean freight provided the initial incentives to produce everyday necessities, to provide shelter, and to assemble, fabricate and repair imported goods. In one sense the widening and deepening of these activities during the nineteenth century made this continent, as a whole, less dependent on the rest of the world. Towards the end of the period under review, Victoria and New South Wales in particular were well on their way to being self-sufficient over a wide range of consumer items including basic foodstuffs, clothing, textiles, and all but the more expensive kinds of footwear. By this time, too, local manufacturers were winning an increasing share of the domestic market for producers' goods like acids and for equipment such as railway rolling stock. But in order to do this Australia became, in another sense, more dependent on external sources for a growing array of relatively more sophisticated materials and finished and semi-finished products. Imports of stationary steam engines, for example, were replaced by imports of basic materials like brass and copper tubing and certain components such as valves and springs. Moreover, much of the manufacturing plant itself, ranging from drop hammers and presses to machine tools and dies, had to be bought overseas along with specialised control, gauging and measuring instruments, and a variety of lubricating, sealing and grinding compounds.

The coarseness of some of the more important categories used in the trade statistics (e.g. 'machinery') obscures these long-run trends and prevents their being

measured objectively. Indeed, it was largely the failure of colonial politicians to make adequate allowance for the changing nature of imports in their customs schedules which handicapped local producers: seldom was any distinction made between goods like oils and paints intended for final consumption and seemingly similar materials required by manufacturers.

The technological 'escalator' on which industry in southeastern Australia was climbing introduced another problem. In absolute terms the demand for producers' goods was expanding but, at the same time, the introduction of machinery from diverse sources brought about a fragmentation of the market for materials and minor components that were technically within the competence of local firms. This was true not only of obvious examples, such as the different sizes and threads of bolts and screws required by the metal trades, but of others like glassware suitable for various sorts of bottling plant, pegs and rivets appropriate for different kinds of boot-making appliances, and even nails that could be used with door and sash-making machinery. While there is plenty of evidence that during the 1870s firms in a broad range of final demand industries were beginning to specialise in certain fields, those supplying producers' goods had less opportunity to do so and hence achieve the economies of scale that would have assisted them to compete against imports.

This was one of the many factors influencing the size of firms. It *helps* to explain, for instance, why most of the establishments in the metal trades were, and remained, small while at the same time others expanded to the point where they employed anything from 100 to 500 hands and, exceptionally, even more. Nearly all the large firms grew by a process of grafting on sections and shops to make products and components that could not be obtained from local suppliers and sub-contractors. Thus much of the railway rolling stock was built by firms that operated their own sawmills, foundries, and wood and metal-working shops, and bought in only items like springs, axles and locks that it was not feasible or possible to make locally because of costs or patent restrictions. Some of the overheads were minimised by the common practice, adopted both by governments and private enterprise, of acquiring scale plans and unscrupulously purchasing samples from overseas firms to use as patterns. Once begun, this internalisation of activities tended to perpetuate itself as new firms entered the field. From the outset all the woollen-mills in Victoria (reaching a maximum of ten briefly in 1879-80) were vertically integrated: each undertook all the wool-scouring, spinning, dye preparation, dyeing, weaving and bleaching processes, and some even attempted to make their own bobbins, teazles and minor items of machinery. Similarly, all the meat canning works and the larger biscuit and confectionery factories had their own tinsmiths' shops, and some of the larger printeries established type-making foundries. In such cases integration stemmed, of course, from necessity and not from choice. Nor should the presence of large numbers of domestic workshops cloud the issue. Unlike those associated with some trades in Britain, domestic workshops were almost entirely confined to the clothing and footwear trades and, for the most part, simply replicated on a miniature scale the processes being

undertaken in the factories themselves: they developed as a device to boost output without incurring further investment costs in formal factory facilities.

Spatial influences and consequences were also important. The absence or weakness of inter-firm and inter-industry linkages in the sorts of cases mentioned helps to explain the setting up or survival of large establishments—woollen-mills, canneries and engineering works—in inland or remote locations depending on such factors as the sources of investment capital and raw materials. Concentrations of similar industries sometimes developed but this was mainly because the location offered each firm the same advantages, like the availability of labour, water, drainage for effluent, cheap land, transport services and final markets. The best example was the growth of a nest of noxious industries—wool-scouring, tanning, woollen-milling and meat canning—at Geelong where the common attraction was accessibility to the only reliable supply of fresh water not covered by anti-pollution legislation within reasonable reach of Melbourne. It is true that in such cases some fringe benefits accrued (such as the emergence of lobbies of manufacturers with similar interests and a labour force accustomed to certain kinds of work), but the real test was that the collapse or closure of any one firm did not directly threaten the viability of the others in the area.

The technical, structural and spatial ramifications of import replacement were thus more complex than is generally recognised. Moreover, taken together, the examples quoted in detail later indicate how the process was hastened or retarded by circumstances over which the manufacturers themselves had little control. Changes in shipping technology reduced the protection previously afforded by isolation and delays, and the last two decades of this period also witnessed a long-term fall in ocean freight rates.³ Even the opening of the telegraph link to Great Britain in 1872 proved to be something of a two-edged sword for it not only enabled Australian firms (including, of course, importers) to call up supplies more quickly but also allowed British manufacturers, directly or through the Agents-General in London, to respond more rapidly to tender notices. The reduction—averaging five months—of the delay between the calling and closure of tenders meant that Australian manufacturers had less time to prepare plant and train workers, and this led some Chambers of Manufactures to try to seek advance warning from governments about their future requirements.

Most colonial legislatures, whatever their attitude to protection and free trade, sooner or later resolved that contracts for goods required by the public sector should, whenever possible, be placed within the colony. Formally in South Australia and informally elsewhere, a margin of 10 per cent was allowed on tenders submitted by local manufacturers, but even so the arithmetic could be calculated harshly or sympathetically depending on whether comparisons were made with one exceptionally low overseas bid instead of the general run of prices over three to five years. In practice much depended on the circumstances and exigencies of the moment so that subjective political criteria remained at least as important as actual quotations or delivery dates. Colonial firms were thus forced to make long-term investment decisions in the face of considerable short-term uncertainties.

One further general point must be made about the process of import replacement. Little evidence has been found to support the view that tariff policies, even those of Victoria, stimulated the *introduction* of industrial activities new to Australia. In almost all instances developments of this kind came about as the result of the initiative of a firm, the offer of a bonus, or the award of a specific contract. Tariffs were almost always imposed—if at all—*after* the first investment decisions had been made thus helping in the short-run to prop up the pioneer ventures and to encourage other firms to follow suit.

No mention has been made so far of Australia's exports of manufactured and processed products. During the thirty years to the end of 1890 these made up about 5 per cent of the total value of *all* commodities (including wool and gold) shipped *overseas* from New South Wales, Victoria and South Australia. Sixty-two per cent of the £48,000,000 worth of exports involved were sent to Great Britain, 15 per cent to New Zealand, and the remainder to places like the Pacific islands, India, Mauritius, Cape Colony and the United States. There were three main components. About half was refined copper and tin in ingot form from South Australia and New South Wales. Most of this was produced by a handful of firms relying on imported technology and on both local and overseas capital. The workforce directly employed was small and the linkages with other industrial activities weak so that, apart from the use made of transport and port facilities and the multiplier effect of wages and dividends, the direct contribution to industrial development was small.

Another one-third was made up of processed primary products of local origin, especially flour, leather, canned meat, butter and cheese. Much of the plant and capital employed in these activities came from within Australia and the linkage and multiplier effects were thus more significant both absolutely and spatially. Other results were also important. In order to compete in overseas markets Australian producers were forced to raise standards and to adopt world technology and commercial practices. A few firms even saw advantages in establishing their own London agencies. During the 1880s a growing awareness of the potential offered by frozen meat and dairy exports and of the fact that the technical and marketing problems could not be quickly solved by private enterprise alone, led to a growing involvement of colonial governments in the affairs of these industries through bonus and subsidy schemes, extension and advisory services, and the provision of cool storage facilities and refrigerated railway vans. Moreover, the recognition of the advantages of co-operation as well as competition between the firms involved brought about far-reaching changes in scale, structure and organisation during the 1890s.

The remainder of the goods shipped abroad consisted of imported products that had been further processed or fabricated (such as refined sugar, metal goods and slop clothing) and articles like boots, beer and furniture which mainly used raw materials originating in Australia. New Zealand was the most important market although, as that country itself became more self-sufficient during the 1880s, its significance began to diminish. Only a small proportion of the Australian output of goods of this kind found its way overseas, but this trade helped to reduce the

surplus capacity that arose from time to time in such industries as footwear making and encouraged the growth of other activities (like the manufacture of fertilisers) despite the uncertainties of the local market exemplified by the more conservative attitude of Australian dairy farmers compared with their New Zealand counterparts.

Inter-colonial relationships

The process whereby Australia was divided into six main political units was completed late in 1859 with the separation of Queensland from New South Wales. Up to this time much of the effort had gone into nurturing embryo economies (still confined in effect to enclaves perilously perched on the edge of a 3,000,000 square mile continent), wresting political independence from the Mother Country, and establishing the forms of government. Apart from some straws in the wind, overt economic competition within Australia was of small consequence due to modifying rulings from London (relating, for instance, to tariff policies), the lack of overland transport and the uncertainty of seaward communications, and the similarity of the produce available for export. The separatist movements that had developed in Tasmania, Victoria and Queensland during the first half of the century largely resulted from what was considered to be the disproportionately small allocation of funds for basic capital works like roads, bridges and harbours, and the realisation that without self-determination such areas might well remain economic backwaters subservient to the political and commercial 'establishment' in Sydney. Old scores remained to be settled and new ones had emerged. Of particular importance was the rivalry for the trade of the pastoral districts lying north and northwest of the Murray River which were nearer Melbourne and yet within New South Wales, a problem exacerbated after 1853 when wool and station supplies started moving along this waterway to and from its mouth in South Australia. The long-term commercial roles of Melbourne, Sydney and, to a lesser extent, Adelaide, were seen to be at stake, and this rivalry was to influence directly or indirectly much of what occurred during the rest of the period. The concern was partly with the absolute volume of the trade and the orientation of pastoral finance, and partly with the benefits and multiplier effects to be gained from the use of these ports as the Australian headquarters of overseas shipping companies and associated institutions. Apart from 'aggrandisement' or 'prestige', there were practical considerations. Among others, the particular characteristics of wool as a light but bulky cargo largely determined the logistics of handling other freight: to obtain shipping space or the low rates offered for 'bottom' goods like ingot copper or leather, consignments had to be sent coastwise to the initial departure point, thus adding to its general port activity.

In the north, Queensland was faced with the task of breaking the nexus between New South Wales and its early settlers—many of whom had been financed by, and remained indebted to, Sydney agencies. Here, too, after gaining independence early emphasis was given to the reduction of the seaborne transshipment trade with its southern neighbour by providing accommodation for ocean-going vessels, a

problem made more expensive and time-consuming to solve because of the absence of natural deep-water harbours and the need therefore to survey and dredge river channels and establish navigational aids. Moreover, the long coastline, the west-east direction of the coastal rivers, the nature and spacing of natural resources (especially minerals), the (initially) small population, and the eccentric location of the capital Brisbane in the southeastern corner, all inhibited the speed at which this colony could chart a separate, much less a competitive, course. Even so, the industrial achievements of Queensland should not be lightly dismissed: less than thirty years after making the first casting of any kind in 1862, metal-workers there were building railway locomotives.

The position in the other three colonies can be summarised more briefly. The early promise shown by some activities in Tasmania (especially flour-milling and shipbuilding) quickly evaporated and this island colony became more concerned with problems of stagnation and survival than with mainland rivalries. After an unhappy start, South Australia was only important, from the present point of view, because of the development of copper-smelting, flour-milling and agricultural implement-making, and because of the unique concentration of economic power in Adelaide. Western Australia remained a small and remote outpost of empire with a population on gaining Responsible Government at the end of 1890 of less than 50,000.

Aside from the more general forms of competition like the sponsoring of immigrants (especially by Queensland and to a lesser extent by New South Wales and South Australia) and the raising of government loans on the London capital market, there were two in particular that affected industrial development. Customs duties always remained an important source of revenue for each colony but during the last twenty-five years of the period they were also used to try to protect farming and manufacturing activities (though less successfully than sometimes suggested). It should be noted that the duties were non-discriminatory (that is, they applied to all imports irrespective of origin), and no colony entered into a bilateral agreement with another or with countries outside Australia. In themselves tariffs were simply a defensive weapon but parallel legislation covering drawbacks and manufacturing in bond was introduced to prevent any diminution of entrepôt trade and, in the case of Victoria, to stimulate exports to southern New South Wales.

The other means of competition was through the nature, location and timing of public works including the investment in shipping facilities already mentioned. By far the most important, however, was the construction of railways which, except in Tasmania and Western Australia, was mainly undertaken by governments, and absorbed three-fifths of the public investment expenditures in New South Wales, Victoria and South Australia between 1860 and 1890. Railways were built without co-ordination between the colonies as to schedules, inter-connectivity, and even the choice of gauges, and purely economic criteria gave way to internal political pressures and the desire to divert traffic from their neighbours. The latter objective was also pursued, especially in Victoria and New South Wales, by focusing the

main railway system on the capital city and by manipulating freight rates to and from border areas.

Manufacturers were for the most part carried along in the mainstream of events over which they had little influence or control: any gains they made on the swings were, to a considerable extent, offset by losses on the roundabouts. Thus the massive investment in public works (£178,000,000 in the five eastern colonies from 1861 to 1890 excluding roads) led to competition with the private sector for finance and labour and forced manufacturers to accede to strengthening demands by unions for improvements to pay and working conditions, thus adding to overall costs. Deficits on current account (which in the Australian context excluded short- or long-term loan and interest repayments) made governments reluctant to free producers' materials from customs duties, while pauses, changes in policy, and bursts of investment (despite the apparent *overall* upward trend) to gain short-term political advantage added to the overheads involved in handling government contracts; one moment plant was lying idle for want of orders and the next it was expected to operate above capacity. Frequent amendments to freight rates, more often than not as part of inter-colonial competitive strategies, added to uncertainties since they advantaged firms in some locations and disadvantaged others elsewhere. External economies that might have resulted from a co-ordinated and planned attack on the transport problems of southeastern Australia were not fully realised or were needlessly delayed. Moreover, an obsession with immediate advantages diverted attention and funds from longer-run and more basic forms of investment like the conservation of indigenous forests, the establishment of softwood plantations, and the exploration, assessment and development of mineral resources including iron ore in New South Wales and coal in Victoria.

The emphasis on the competitive nature of economic and political policies should not, however, obscure the growing inter-dependence of the colonies. Labour moved freely between them: the sugar plantations and mills in Queensland, for instance, depended on seasonal labour drawn from New South Wales and Victoria. There was also a considerable trade in minerals: Victorian manufacturers relied heavily on coal from its northern neighbour and the copper-smelters at Newcastle were charged with ore shipped round from South Australia. Industrial investment also moved between the colonies in the form of speculative capital (such as the shares taken up in South Australian brewing and flour-milling companies by people in the eastern colonies) and by direct investment in branch or associated companies. Examples are given later of Victorian firms that set up subsidiaries in New South Wales and Queensland, of South Australian companies that established branches in Victoria and New South Wales, and of Victorian and South Australian timber-millers that exploited hardwood forests in Western Australia. The 1880s also saw a growing recognition by governments, trade unions, and Chambers of Manufactures that some of the problems faced by each were, in fact, common to all, and the resulting conferences began to prepare the ground for Federation in 1901.

Intra-colonial relationships

Much of the discussion of events within each of the colonies must focus on the course of manufacturing in the metropolitan and non-metropolitan areas, although it will be clear from what has been said already that this was only part of a much more complex story. The concentration of a substantial proportion of each colony's population and economic activity in its capital city is a well-known theme of Australian historiography and need not be reiterated here. The growth of manufacturing in, and its gravitation towards, these metropolitan areas is usually seen as a fairly 'natural' process explainable in terms of accessibility to imported raw materials, large markets, financial and commercial institutions and infrastructure; the fan-shaped pattern of overland communications; and the availability of external economies and those of scale. In the main this book concentrates on the other side of the coin and seeks to explain why manufacturing elsewhere in each colony failed to grow or sustain itself.

The initial sequences of events in each colony were not dissimilar. Following a period during which most manufacturing was concentrated in or near the capital city, the spread of settlement and the costs and difficulties of overland transport stimulated the growth of local-serving, small-scale activities like bakeries, flour-mills, blacksmiths' shops, tanneries, breweries and printeries. What happened then, however, must be related to the nature and basis of urban development. In Victoria, the gold-rushes of the 1850s and the development of geographically more stable quartz mining led to the rapid rise of some relatively large towns containing engineering and metal-working firms specialising in mining plant and machinery. The substantial investment in these communities caused them to seek alternative forms of support, such as the manufacture of railway rolling stock and woollen cloth, when gold-mining started to wane, and in the short-run the success of these moves enabled them to survive—albeit on borrowed time.

Elsewhere in Victoria and with few exceptions in New South Wales and South Australia, there was no similar stimulus to town development and few places at any time during this period had more than 5,000 inhabitants. Most were, and remained, essentially service centres whose hinterlands were confined by transport costs or truncated by topography: those that displayed longer-term growth generally did so by replicating existing functions rather than by acquiring new ones. Manufacturing usually remained geared to local needs (such as the repair of agricultural machinery, the building of carts and wagons and the fashioning of harness-ware and saddlery) although brewers and bootmakers were sometimes given a temporary boost by the presence of construction gangs engaged on public works. Many towns also contained works processing local commodities (wheat, sugar, leather, meat and dairy produce) for more distant markets, but since their linkage effects were weak these activities seldom induced other forms of industrial activity in the area. Apart from coal-mining near Newcastle, other mineral-based operations in New South Wales (gold, copper and tin) tended to be transitory and provided little incentive for investment in foundries or other metal-working establishments. Attempts to develop iron ore deposits here and in other colonies turned out to be

expensive failures. In South Australia copper processing took place in what were, to all intents and purposes, company towns whose fortunes depended on those of the enterprise concerned: all suffered from the slump in world copper prices during the 1870s and 1880s. Only in Queensland, where a series of centres with elongated hinterlands grew up at river ports along the extended coastline, and in Tasmania, where Launceston benefited from the later but more rapid development of the northern part of the island, was the capital city economically less dominant even if still politically prominent.

The consequences were important. Butlin and others have emphasised that the Australian colonies were among the most highly urbanised societies in the world. Of the 2,273,000 people enumerated at the 1891 census in New South Wales and Victoria, 38 per cent were in Melbourne (447,000) and Sydney (386,000), and 27 per cent in other places with 500 or more population. But a somewhat different view is obtained when it is realised that only two out of every five non-metropolitan inhabitants in these colonies lived in towns, and only 14 of the 274 places had more than 5,000 inhabitants, the largest being Newcastle (51,000), Ballarat (44,000), Bendigo (35,000) and Geelong (25,000). Thus no centre emerged, except fleetingly, as a viable alternative growth point that could seriously compete with the metropolitan areas, each of which was able to capitalise on its initial advantages as the original point of settlement, the effective seat of political and financial power, and the main focus for overseas trade. Nonetheless Launceston (18,100 inhabitants in 1891) might have offered a serious industrial-commercial challenge to Hobart (30,000) but for the limited growth potential of Tasmania as a whole.

By itself this is not an adequate explanation since ambitions were thwarted and space distorted as a result of political and commercial intervention. Mention has been made already of the way in which official policies were influenced by inter-colonial rivalry and expressed most clearly by railway building and freight policies. The point to be noted here is that freight rate structures *designed* to promote and protect border trade had the *effect* not only of enhancing the long-run growth of the metropolitan areas but also of altering the real space within colonies so that, in cost-distance terms, even neighbouring towns were arbitrarily advantaged and disadvantaged. Tapering (regressive rates for longer distances adopted by New South Wales and Victoria in 1876 and 1885 respectively), differential 'up' and 'down' charges on some commodities (sometimes abandoned or reversed overnight), rebates or additional discounts on freights consigned to certain places or for more than stipulated distances, concessions on some raw materials and finished products, processing-in-transit privileges, and the constant shuffling of items between classifications make the picture extremely complicated. But, in general, the combined effect was to handicap manufacturers in some of the leading country centres (like Goulburn and Orange in New South Wales and Ballarat and Bendigo in Victoria) when they tried to compete against local producers and metropolitan firms for inland markets.

In addition governments were forced to pay some heed to, or were able to take advantage of, jealousies and rivalries between towns and regions when making

investment decisions relating to branch railways, bridges, water schemes, harbour works and so forth, with the result that the cake was sliced finely and distributed widely. This was reinforced in other ways by capital city commerce and industry, the most blatant example being the control exercised by metropolitan stock and station agents over the produce of the Hunter Valley and northern parts of New South Wales which continued to be sent coastwise to Sydney for the best part of forty years after Newcastle had gained the legal right to ship goods overseas direct. In Victoria importers kept a firm grip on the wholesale trade and prevented woollen manufacturers in country towns from distributing their wares even to nearby retailers, and towards the end of the 1880s Melbourne butter exporters deliberately defrauded local dairy factories and then bought them out cheaply when they were on the brink of bankruptcy. There is more than a grain of evidence, too, that metropolitan manufacturers, when—or even before—acceding to union claims for improved pay and conditions, encouraged employees to press similar demands on their inland competitors.

During the 1880s another important influence emerged. Prior to this time in New South Wales and Victoria there was little direct financial connection between metropolitan and non-metropolitan manufacturing. Most of the factories in the latter areas were set up privately or with capital derived from local residents. Only a few country concerns set up branches at other locations, and metropolitan firms had mainly used this type of investment as a device for penetrating other capital city markets. Towards the end of this period, however, metropolitan firms began to merge with or take over ventures operating elsewhere within the colony, and proprietors of country concerns showed a growing propensity to shift entirely into the metropolis or to convert agencies there into full-scale productive units. In South Australia alone the story was different for there much of the non-metropolitan industry had been sponsored from the outset in the form of branches of Adelaide firms: in this colony the emphasis during the 1880s was on the amalgamation of the spatially widespread assets of large firms into even more powerful organisations with headquarters in or near the capital.

These structural changes largely stemmed from technological developments such as those occurring in the flour-milling and brewing industries. Roller-milling, rapidly adopted in southeastern Australia during the 1880s, required almost double the initial investment per unit of output compared with stone-milling and was economical only when the annual throughput was substantially greater. On the one hand, local financial resources—especially in the newer wheat-growing areas—were too small; on the other, metropolitan firms had the commercial expertise and connections to handle the greater internal and external transport and distribution logistics involved. Brewing had been closely adjusted to local demand because of the chemical instability of the colonial products due largely to the warmer climate and the tendency of fermented liquors to deteriorate rapidly when carried any distance. When these problems were overcome—partly by investment in properly built and ventilated breweries with an emphasis on quality control and cleanliness, and partly by the more rapid and reliable means of transport becoming avail-

able—metropolitan firms were able to take full advantage of their position at the centre of the transport ‘fan’ and of the economies of scale to penetrate even the most distant internal markets. Moreover, their greater financial resources and changes in licensing laws enabled them to establish chains of ‘tied’ houses which, at one and the same time, assured them of outlets and deprived local competitors of theirs. Nor should it be overlooked that metropolitan penetration was also fostered by the growing use of commercial travellers, advertising and mail order catalogues, and the emergence and promotion of widely known brand names. These structural and spatial changes did not of course occur simultaneously in each colony. As a particular example, chains of tied pubs appeared in South Australia more than a decade before they became significant elsewhere. Similarly, the peak of non-metropolitan development (measured in terms of the numbers of establishments operating in industries like brewing, flour-milling, tanning and metal-working) occurred in the 1870s in Victoria and in the 1880s in New South Wales—a differential largely explainable in terms of the greater area of the northern colony over which settlement and new town formation ran its course.

Intra-urban relationships

There is little discussion in this book of the spatial organisation of manufacturing *within* urban areas which, to all intents and purposes, would embrace the metropolitan areas and a few larger provincial centres. Even though the processes whereby industrial activity was developing away from the central areas were only just emerging, a worthwhile examination of causes and effects would have added considerably to the length of this book. Nonetheless, examples are given of the way the legislation designed to curb water and air pollution was forcing firms to seek alternative sites away from the inner built-up areas which were, in any case, becoming less attractive because of congestion, rising land values, building restrictions, and in some cases factory regulations. Simultaneously, the extension of the railway, gas, and water systems and the emergence of tram and telephone services were widening the range of locational possibilities. The changing geography of manufacturing within urban areas was, of course, part and parcel of the more fundamental spatial, structural and technological developments that have already been mentioned, including the internalisation of activities by larger firms, the growing interest by metropolitan manufacturers in intra-colonial markets, and the development of new export industries. At a detailed level, too, circumstances were changing: a case in point was the dwindling importance of outworkers in the footwear trade which altered the nature of the association between residence and workplace since it was no longer necessary to push barrow-loads of partially made products from one to the other. The lack of formal discussion of intra-urban relationships in this book in no way implies that they are regarded as a distinct and separate phenomenon.

During the hundred years or so covered by this book, manufacturing in Australia

developed from a few small ventures to one of the leading sectors of the economy, contributing in 1890 about 11 per cent to gross domestic product, a point taken up in Chapter 15. By 1890 rather more than one in ten of the Australian labour force was employed in formal factory conditions and perhaps half as many again earned a livelihood in hundreds of tiny workrooms or in retail establishments where making was combined with dealing. The period also witnessed the spread of industrial activity from the early separate coastal nuclei to inland settlements and then—with some differences in timing—the beginning of its retreat back to the capital cities. By 1890, for instance, 68 per cent of the factory workforce of Victoria and New South Wales was concentrated in Melbourne and Sydney, or in an area of only 270 square miles. In these two colonies, in particular, country people were beginning to react against this metropolitan dominance. Simmering resentment about inadequate political representation, the maintenance of distorting freight rates, continued large-scale investment (such as in new railway workshops) in the capital cities, and what was seen as favouritism to metropolitan-based contractors, found expression in the form of 'decentralisation' leagues, a movement that in various guises has become ingrained in the Australian political and economic environment. At this stage, however, these protests were too late and ineffectual to alter or resist trends that stemmed from long-term internal policies and also the changing economic and technological circumstances in which Australia as a whole was becoming involved.

PART A

The Early Years

1788 to 1814

Prologue to Part A

It is appropriate to pause for a moment to consider the state of technology in Great Britain when the eleven ships of the First Fleet sailed from Spithead on 13 May 1787. They left a country in the throes of industrial change—in reality a quickening of a process that had been gaining impetus for two centuries or more. Many of the technical developments were still in their infancy and much remained to be done to apply the new discoveries to actual operations in workshops and factories.

Although the Newcomen engines had been working since 1712 it was some years before a satisfactory way could be found to convert reciprocating into rotary motion. Probably the first direct application of atmospheric engine-power by a mechanical linkage was to Jamaican sugar crushing mills in 1767. The Boulton and Watt partnership set their 'improved fire engine' to work in 1776 but it was only in the 1780s that rotative engines were used to drive industrial machinery. One of the first establishments to be thus equipped was the Albion flour-mill in London which, when it opened in 1786, 'created a great sensation and it became the fashion to go and see it'. These early steam engines were expensive, cumbersome, inefficient in fuel consumption, and relatively weak with an average rating of only about 16 horse-power; development was hindered by the secrecy associated with innovations and the protection of jealously guarded patents. At this time, moreover, improvements were being made to existing forms of power, such as the water wheel and the more sophisticated water-driven turbine, and this delayed the spread of steam power in country areas.

The devices being applied in the main industries during the late eighteenth and early nineteenth centuries were still, for the most part, crude and imperfect. Although there is some doubt about the precise dates, it is generally accepted that Hargreave's spinning jenny was invented in 1764, Arkwright's water frame patented in 1769, Crompton's mule perfected in 1779, and Cartwright's power loom operated in 1787. Not surprisingly, then, people in 1794 were still talking about 'the great and extraordinary discoveries that were beginning to be introduced into Manchester for spinning cotton by new and curious machinery'. Even so, the power loom did not seriously threaten the hand loom in the cotton weaving industry until the 1830s and in the woollen industry until the 1860s. Most industries in Britain were being affected to a greater or lesser extent by technical change but there was still much developmental work to be done: Ransome's first all-iron plough was not made until 1789, machines for making bricks were not developed until after 1800, coal gas was not employed commercially (to light a cotton mill at Salford) until 1806–7, and the first cannery did not begin operations until 1812. The usefulness

of many of the eighteenth century inventions was reduced because it was difficult to make machinery to the required precision. James Nasmyth indicated the problem in 1841 when (according to A. E. Musson) he wrote:

Up to within the last thirty years nearly every part of a machine had to be made and finished . . . by mere manual labour; that is, on the dexterity of the *hand* of the workman, and the correctness of his *eye*, had we entirely to depend for accuracy and precision in the execution of such machinery as was then required; consequently, the enormous expense . . . proved a formidable barrier.

Other developments were taking place in transport. The creation of turnpike roads was leading to a slow improvement in road surfaces, but it should be noted that well over half the Road Acts in England were passed in the four decades after 1791, and men like Thomas Telford and John Macadam were only just beginning to influence the standard of road construction. Such railways as existed were merely tramways linking coalpits with wharves or ironworks, and another four decades had yet to pass before the Liverpool and Manchester Railway—the first public carrier of passengers and freight on rail by mechanical traction under statutory authority—was opened in 1830. Canal building had started in Britain early in the eighteenth century but was at first confined to the widening and deepening of rivers: the first canal built independently of a river—a 10 mile stretch—was not opened until 1761. The first iron vessel was a canal barge built in Lancashire in 1787, and although the first ocean-going vessel made of iron was launched in 1821 this form of construction was neither common nor highly regarded even as late as 1850.

The first effects of these industrial changes were to arouse fear and mistrust among manual workers whose instinctive reaction was to fight the factories and destroy machinery: a violent riot took place in 1779, for instance, in Lancashire, and this was followed by attempts to prohibit the use of spinning machinery by legal means. Along with the grievances against machinery and the fear of unemployment that it was expected to create was the hatred of the factory system and the discipline it imposed. In turn, this led wage-earners to combine to resist the power of capital by strength of numbers, but in 1799 the Workmen's Combination Act (39 George III c. 81) made it illegal for workers to form associations for the purpose of obtaining higher wages or shorter hours.

During the latter part of the eighteenth century the words 'mill' and 'factory' were used interchangeably, and it was not in fact until 1844 that a factory was legally defined for the first time in Britain (8 Vic. c. 15) as 'all buildings and premises . . . wherein or within the close or curtilage of which steam or any other mechanical power shall be used to move or work any machinery employed in preparing, manufacturing, or finishing, or in any process incident to the manufacture of cotton, wool, hair, silk, flax, hemp, jute, or tow. . . .' Even then, it will be observed, the definition only applied to textile factories.

It is against this background, then, that the early development of manufacturing in Australia should be viewed: if the first attempts were crude, uncertain, and on a small scale they were no less so in many country areas of Britain at about this

time. In these circumstances it is hardly surprising that the first steam engine on this continent was not set to work until 1815. After all, who would expect the early settlers in a new continent nowadays to take along a Concorde aeroplane in case it might prove useful?

2 Origins: 1788 to 1814

The emphasis to be placed on the various motives—penal, commercial and strategic—for founding a settlement at Botany Bay in 1788 has in recent years stirred the enterprise, not to say the emotions, of historians.¹ Yet no one has suggested that any form of manufacturing activity was seriously contemplated except perhaps to process crops of flax ready for shipment, to cut and shape timber for masts and spars, to repair and refit ships, and to provide the elementary necessities of life for the inhabitants. In the event, however, attempts were made to begin various manufacturing activities during the first two or three decades, and the reasons for these endeavours and their lack of success form the intertwined themes of this chapter.

The general outline of the development of New South Wales and Tasmania has been told often enough so that all that is needed here is a brief background to the more detailed consideration of manufacturing.² On 1 February 1793, only five years after the First Fleet arrived in Sydney Cove, Britain became involved in a war with France that dragged on (with a brief intermission in 1802–3) until 1815. This had several important consequences: it distracted the attention of the British government away from the affairs of an insignificant and distant colony; it made the transportation of convicts less easy and, to some extent, less necessary; it reduced the flow of free immigrants still further; it enabled an élite of officers and civilians to establish itself in a monopoly position; and it gave an excuse for the development of a one-sided trade with the American colonies (despite the Navigation Acts). These circumstances combined together to bring wealth to a handful of colonial merchants who at first had eyes only for openings in trade, commerce and farming.³

The importance of government activities during the whole of this first period can hardly be overstressed. To a considerable extent the administration controlled the factors of production; it regulated, restricted, and occasionally encouraged the private sector; it ran its own farms, herds and workshops; and above all it was the main consumer of the goods produced. Several writers, including McCarty and Abbott,⁴ have rightly stressed the operation of the Commissariat as the mainspring of the early colonial economy, as is indicated by the fact that during much of this period a considerable proportion of the population depended on it for rations (Fig. 2.1). Apart from foodstuffs, the Commissariat also bought timber for building, leather for boots and shoes, wool (hair) for blankets, and from time to time other supplies such as barley for brewing beer. The level of Commissariat demand, although always important, varied according to the numbers of convicts arriving which in turn depended on the economic and military circumstances in Europe, the

Fig. 2.1: Number and percentage of inhabitants of New South Wales 'on' and 'off' store 1793–1814. (Sources: reports published in *HRNSW* and *HRA*.)

pressure from the home government to reduce expenditure by turning people off store, and the level of spending on public works.

The Commissariat received its supplies from four sources: from imports, from government farms and workshops, from civil and military officers, and from private individuals. The proportion of the area under grain held by the Crown never rose much above 10 per cent of the total and was insignificant by 1808; its holding of cattle increased absolutely but represented a decreasing proportion of the total, falling from 70 per cent in 1800 to 12 per cent in 1814, while its holding of sheep in the same period fell from about 10 to about 2 per cent of those in the colony. The Commissariat thus depended for its grain and meat on imports and on the private sector. Grain, the supply of which was reasonably adequate from about 1804 (except during floods and droughts), was after 1800 grown mainly by the small settlers, while the running of cattle and sheep tended to be in the hands of the military and civil officers and other settlers with larger holdings.

Several circumstances combined to prevent the real income and output of the small settlers from rising—they may even have fallen but the evidence is unclear. Although the government set basic rates of pay these were often exceeded because of the general shortage of labour.⁵ The Commissariat offered fixed prices for grain but the settlers found themselves having to sell it at lower rates to influential middlemen who then obtained the fixed price. Adding further to the plight of the small settlers was the practice whereby a small clique was able to buy up ships' cargoes and resell them at ten times the price and more. After 1800 Governor King tried to break the monopoly position of the officers but his efforts brought only temporary relief to the small settlers, many of whom were in debt (17 per cent of

the farmers in 1801 were in gaol or on farms under execution for debt)⁶ and most of whom had neither the knowledge nor the capital to improve their farming techniques or to buy stock and equipment. Moreover, circumstances like the mounting cost of running the colony and hence the need to take people off store, the expiration of sentences, the arrival of only a handful of free immigrants, and the transportation of a large body of convicts (more than 2,000 during 1801–3) led to an increase in the number of small farms allotted. Excluding the holdings of civil and military officers, the number of farms grew from 400 in 1800 to 600 in 1804 and 700 in 1807. Thus, even though grain production had reached a reasonably satisfactory level by 1804 and 40 new farms were coming into production each year, the number of mouths to be fed was increasing at this time by only a few hundred annually (Fig. 2.1). Meat, however, remained scarce. Cattle were preferred to sheep because they were less often attacked by wild dogs, thrived better in the wet and humid climate, and were more suitable for salting down; whereas in 1801 there were about one-sixth as many cattle as sheep, by 1809 there were about one-third as many.⁷ Small settlers were disadvantaged because cattle rearing required a level of investment which they could ill afford, and disproportionate benefits accrued to the civil and military officers and large landholders.

This sketch of events before about 1810 draws attention to a number of circumstances that are of fundamental importance to an understanding of early industrial development. By 1800, if not sooner, the peasant community concept of New South Wales had become greatly distorted. A civil and military junta had been able to make money quickly: while profits fattened and terms of service shortened there was neither the need nor the opportunity for these officers to make longer-term investment plans. But times were changing. A new Governor, taking charge of the colony in September 1800, was attempting to take more forceful action against the monopolists; a few of the emancipated convicts were accumulating capital and searching for business openings; some overseas mercantile houses were beginning to show an interest in the colony; and American whalers were operating in nearby waters. Even so, for the first decade of the nineteenth century surplus capital tended to be invested in trade—and in the ships, warehouses and wharves that went with it—despite the restrictions stemming from the Navigation Acts and the East India Company's charter. Much of this early trade was concerned with oil and skins from seals, timber, and sandalwood but, officially and privately, sample cargoes of local and Pacific island produce, such as coal, iron ore, wool, flax and *bêche-de-mer*, were shipped overseas in the hope that the export base could be widened.⁸ A further outlet for enterprise was provided by the growing local shipping services that linked the settlements on the Cumberland Plain with the more distant ones at Newcastle and in Tasmania. There was also investment in land, dwellings, buildings and barns: those already on the land could turn their mercantile profits to enlarging and stocking their estates, and it did not take long for some of the newly arrived free immigrants (such as the Blaxlands who came in 1806 and 1807) to realise that cattle and sheep raising for meat could be a profitable speculation.

From 1811 to 1815, however, there was a commercial depression in the colony brought about by a number of internal and external factors. Sealing vessels were having to sail further to find grounds not already picked bare by colonial, British and American gangs, and early in 1810 news reached Sydney that the British government had levied a duty of £20 per ton on colonial-caught oil; simultaneously the price of a sealskin in England fell from 30/- to between 3/- and 8/-.⁹ Britain itself from 1810 to 1812 was suffering from a downturn in business activity brought about by the effects of speculation in South America, the interruption of trade with America and Europe, the costs of the long drawn-out war, and a series of poor harvests. These financial troubles were soon transmitted to New South Wales when English and Indian merchant houses called up debts and refused to underwrite further speculations and the British government pressed the colonial administration to reduce running costs. Locally, floods and droughts and the operations of the Commissariat all helped to intensify the shortage of money in the community as a whole and, to make matters worse, colonial duties were imposed in July 1813 on sandalwood, pearl shell, *bêche-de-mer*, sperm oil, black oil, skins and timber whether intended for home consumption or for export. Meanwhile, too, the number of soldiers and their dependants stationed in New South Wales was reduced from 1,600 in September 1813 to 900 in November 1815. Steven has given a detailed account of the way these and other circumstances entangled most colonial merchants in a web of problems so that by 1815 Sydney's commerce had almost totally collapsed. It is not known how much this depression immediately affected industrial activity—though shipbuilding was undoubtedly curtailed—but in the longer-run it probably gained significantly because funds were invested by individuals and partnerships who could no longer see easy openings in trade, commerce, land and livestock.¹⁰

Resources

During these early years most of the industrial ventures were small handicraft affairs turning out such necessities as flour, bread, salt and beer; clothing and footwear; soap and candles; leather; coarse pottery; and a range of blacksmith's wares like horseshoes, hinges and hoes. Someone would see a need, try to meet it—usually building and operating the machinery himself—more often than not fail, and then turn his hand to something else. In one sense this was not altogether a waste of effort. Even in Europe industrial progress was still largely being made by trial and error with the interplay between theory and practice just beginning to make itself felt in technical advances. In English country breweries, for example, the 'temperature the elbow can tolerate' test was only slowly being replaced by the thermometer, and few had installed the newly developed temperature control devices that allowed brewing to continue through the summer months without over-violent fermentation.¹¹ If summer temperatures were recognised as a problem in England, it is hardly surprising that they caused difficulties in Sydney where mean monthly recordings were some 5° to 8°C higher. Successes and failures were

gradually building up a body of information about the properties of indigenous materials and the effects of local conditions on imported ones.¹² Some idea was being obtained about the suitability of local timbers for shipbuilding, dwellings, furniture, and even cogs for machinery; of seal oil for paint for external use; of various barks for tanning; of local iron for smelting; and of local clays for brickmaking and pottery. Experimentation was beginning to indicate whether flax, hemp, hops and vines could be grown and whether under local conditions they could be made into linen, rope, beer and wine. The Tasmanian settlers who made shoes out of kangaroo skins in 1805 did so simply because there was a shortage of hides from other animals; they found it answered 'reasonably well' as leather for uppers but presumably they were unaware that kangaroo skin has a particularly tightly woven structure with intertwined fibres running in all directions so that the resulting leather 'is the strongest known for a given weight and thickness'.¹³

Occasionally one activity led to another: casks, rope, and vessels were made in the workshops and shipyards of merchants; a few hogsheads of beer were brewed by publicans; and some of the larger landholders operated their own grain-mills. But the embryonic economy allowed only simple relationships within the manufacturing sector and between this sector and others. There was, of course, a need for ships by sealers, for carts by settlers, and for boots by soldiers, but these sorts of demands contained few of the seeds for growth. There was no mineral being worked in any quantity to encourage machinery to be made or maintained; farming had barely started to use basic implements like the plough; ships could be built and careened on almost any stretch of beach; the lack of any steam engines minimised the need for engineering skills; and even the salt needed to preserve meat or pack sealskins could be made by evaporating sea-water and by scraping natural deposits found in some of the sealing areas such as on Kangaroo Island.

This general outline has suggested some of the reasons why there was relatively little manufacturing during the first twenty-five years of settlement in Australia. The accounts that now follow of the growth and quality of the population and the spread of settlement, the development of transport and trade, the availability of capital and materials, and government regulation and control indicate the details of the circumstances in which some industrial ventures succeeded while others failed.

Population and settlement

On 6 February 1788 the non-indigenous population of the Australian continent, including officials, militia and 700 or so convicts, totalled about 1,030 souls.¹⁴ At first the number of inhabitants rose and fell erratically with the arrivals and departures of vessels and the deaths of convicts soon after landing. Excluding the settlement at Norfolk Island, the total population of mainland Australia reached 2,000 in 1790, 5,000 in 1799, 10,000 in 1809 and nearly 13,000 by the end of 1814 (Fig. 2.2). Settlement in Tasmania commenced on 7 September 1803 and the population numbered 1,000 by 1808 and 1,900 by the end of 1814. During the first two or three decades, then, the European population in the whole of Australia was

Fig. 2.2: Population of New South Wales and Tasmania 1788–1814. The graph begins with the number of people who disembarked from the First Fleet (25 January to 6 February 1788) and then represents the estimated population as at 31 December each year. (Source: Commonwealth Bureau of Census and Statistics, *Demography Bulletin*, no. 67, 1949, p. 154.)

less than that in a score or more of English towns like Chester, Shrewsbury, Stockport and Yarmouth.

For the first ten years convicts outnumbered all other persons. Shaw has calculated that 10,231 male and 3,259 female convicts had arrived in New South Wales by the end of 1814, and 493 males but no females had reached Tasmania.¹⁵ The difficulties experienced by the early colonial administrations with labour that was, on the whole, in short supply and neither willing nor able is a well-documented theme of this early period.¹⁶ There was little, if any, attempt to select the convicts most suitable for, or most needed in, a new and distant destination. The problems of Britain and its penal outpost were not easily reconcilable; in Clark's words 'the interest of the mother country lay in the reduction of crime and in protecting citizens from harm, while the interests of the colony lay in the supply and quality of labour'.¹⁷ Free settlers were sought by the Governors but the British government did not very actively encourage such people to go to the colony, and indeed there is some doubt about how many folk were prepared to undertake a voyage that was both lengthy and dangerous. Apart from civil and military personnel only about twenty free male immigrants (some with families) came out during the 1790s and, even though the rate increased somewhat during the first decade of the nineteenth century, no more than 400 civilians could claim by 1810 to have arrived free. From then on sixty or seventy free immigrants arrived each year.¹⁸ In effect the great bulk

of the workforce during this first period consisted of convicts or ex-convicts, a sprinkling of people who had arrived of their own free will, and some soldiers and sailors who had taken their discharge in the colony. Successive Governors continued to complain about the quality of both the convict and free arrivals but their comments can only be accepted on the basis that then, as now, miscreants received an unduly large share of the publicity compared with the honest, hard-working citizen.

At first most of the convicts worked for the government, but from late 1792 some were assigned to officers as agricultural labourers.¹⁹ This assignment system and the dearth of new arrivals between 1794 and 1796 (because of the war in Europe and on the high seas) led to a shortage of men for government work as well as high daily wages for free labourers and overtime rates for convicts who, after completing their daily work quota, were allowed to work privately. Although the need for labour-saving devices was acute there is no record of even a plough being used before September 1798 and even then this may have been a solitary exception.²⁰ Ploughs could not generally be substituted for hoes because of the scarcity and high price of draught animals and the abundance of tree-stumps, to say nothing of sheer ignorance and apathy; when they were introduced the saving of labour was considerable; the *Sydney Gazette* on 3 July 1803 said that on one Hawkesbury farm 300 acres had just been prepared for wheat by fifteen men instead of the usual one hundred. It was difficult, too, to introduce labour-saving devices of other kinds: Hunter himself brought out the machinery for the colony's first windmill in September 1795 but the problem then was to find anyone able to put it together. Despite the influx of over 2,000 convicts during 1801–3 and an average of about 350 more during each of the following years the general shortage of labour remained; every spread of settlement created the need for more labour to construct and maintain additional public works and provided openings for people to set up as retailers, publicans and carters. Some of the existing activities also expanded—employment in whaling and sealing, for instance, increased from 120 in 1804 to 280 a couple of years later.

The lack of skilled tradesmen was a considerable handicap to the initiation of manufacturing. For the most part the presence of someone with a particular skill depended not on any rational system of selection but on the criminal bent of craftsmen in Britain. Englishmen with entrepreneurial or technical skills had little need to seek more distant horizons since they were in demand, despite wars and revolutions, across the Channel (often at relatively high wages and on the basis of long-term agreements) to instal and demonstrate British engineering and textile machinery and to run the factories containing it.²¹ Many examples can be culled from the dispatches of the Governors which illustrate their seemingly never-ending difficulties. Forty iron grinding mills deteriorated because no one knew how to resharpen the cutting edges—a simple but skilled process involving softening, recutting, and rehardening the flukes; a printing press shipped out in 1788 was not brought into use until 1795; the first water-driven mill, built at Parramatta in 1800 or 1801, was so badly constructed as to be virtually useless; a partially built

Fig. 2.3: Total population of the main early settlements (meaning, usually, 'muster districts' rather than 'towns'). It must be emphasised that the data are very incomplete and that some of the more extreme fluctuations simply reflect the arrival or departure of ships. (Source: derived from many reports published in *HRNSW* and *HRA*.)

windmill was abandoned in 1800 because there was 'no other person to go on with the machinery than a man very unequal to the task'; a master weaver was drowned on his way out from England leaving the government's embryo linen and woollen weaving workshop in the Female Factory at Parramatta in the hands of some convicts claiming to know something of these trades; and the wheelwrights

instead of making wheels upon the modern method of running nearer upon the ground and wider upwards . . . entirely reverse it. The wood is not so good for such purposes as could be wished, yet that does not prevent them from running upon the modern plan, but merely from the want of knowing how.²²

Aggravating this problem was the inefficiency of the people specially recruited in England—a master millwright, master blacksmith, master miller and master carpenter were at various times dismissed for incompetence. Nor did the government have much luck with some of its convict appointments: one put in charge of the Parramatta linen workshop was found to be 'worthless', and another appointed as government miller proved to be dishonest.

Yet this catalogue of catastrophe has to be balanced with other evidence. A ship's carpenter put together a 41 ton vessel (imported in frame) that was launched in July 1793, and about this time a convict blacksmith was making one iron

hand-mill a week. Returns of work done by government labour from 1797 to 1799 indicate the diversity, if not the quality, of the goods being turned out, ranging from coats to kettles, from shoes to sledgehammers and from trousers to tomahawks. And a large government vessel was constructed between September 1802 and January 1804 simply to find out how quickly it could be done.

About the turn of the century a sprinkling of skilled people began to reach the colony: a convict who had worked on the *Times* arrived late in 1800 and was made government printer soon afterwards, Irish women brought their knowledge of working with flax, and English country girls made use of their skill at wool spinning. In addition, the problems of illiteracy (nearly half the 244 Hawkesbury settlers who supported a petition in 1806 identified themselves with a cross) and lack of technical training were slowly being overcome by setting up schools and by employing lads as apprentices (or perhaps as cheap labour). In 1807 about 400 children were receiving some basic schooling, and apprentices were learning how to be shipwrights, wheelwrights, potters, carpenters and blacksmiths.

The number and quality of the population tell only part of the story. By the end of 1814 the settlements at Tasmania and Newcastle together contained only about 2,200 people (Fig. 2.3).²³ The other 13,000 were located on the Cumberland Plain; perhaps 5,500 of these were concentrated in and around Sydney, a further 2,500 in and around Parramatta, and the remainder were scattered over some 550 square miles bounded by the Georges River in the south, the Nepean and Hawkesbury Rivers in the west and the rugged bush country in the north (Fig. 2.4). The Hawkesbury-Nepean farms were the main source of the colony's grain but settlement was spread out along the banks of these rivers and their tributaries, and the townships of Windsor, Richmond, Pitt Town, Wilberforce, Castlereagh and Liverpool—the permanent sites for which were selected by Macquarie late in 1810—had as yet developed into only small, local service centres.

Transport and trade

From the beginning transport and communications were of critical importance at three levels. First, there was the need to link the settlements on the Cumberland Plain itself: from Sydney to Parramatta it was 16 miles by land and 18 miles by water, while from Sydney to Windsor it was 35 miles and 140 miles, respectively. Parramatta could be reached by craft of up to 15 tons and Windsor, on the Hawkesbury River, by vessels of 100 tons and more. The differential between the land and water transport rates was considerable as instanced by the fact that Hawkesbury wheat sent to Sydney in 1800 was paying about 22.0d per ton-mile by land but only 1.5d by water. Freight rates varied, of course, with distance: on 27 January 1805 one road carrier advertised in the *Sydney Gazette* charges equivalent to 20.5d per ton-mile from Windsor to Parramatta or 17.0d for the complete journey to Sydney. The actual charge made for carting produce and goods from the Hawkesbury settlements to Sydney by road was always two or three times more than by water (rates reported in the *Sydney Gazette* on 8 August 1812 were the equivalent of 32d per ton-mile by road and 3.2d per ton-mile by water), but the

Fig. 2.4: Land granted to 1796 and to 1813. (Sources: based on C. Grimes, 'Plan of the Settlements in New South Wales 1796', *HRNSW*, iii, frontispiece map; and J. F. Campbell, 'The Dawn of Rural Settlement in Australia', *JPRAS*, 11(1925), p. 134.)

boatmen got a reputation for mixing up good and inferior wheat so that some Sydney bakers would only buy loads brought overland. Later, road transport became even more attractive when flour-mills established at Parramatta bought grain at Sydney prices. No way has been found of estimating the quantity of freight carried by road, but harbour returns show that from mid-1810 through 1814 colonial vessels carried into Port Jackson 1,988 tons of wheat, 2,290 tons of maize and 102 tons of barley from the Hawkesbury settlements, and 28 tons of lime from Broken Bay (at the mouth of the Hawkesbury River).²⁴ The roads, which went from bad to worse during the early years of the nineteenth century as a result of the increased cart traffic, began to improve as a result of Macquarie's rebuilding program commenced in 1811. Even so the Hawkesbury grain boats were still active in the 1840s (Fig. 3.4).

Second, there was the problem of keeping contact with the convict station at Newcastle (69 nautical miles) and the Tasmanian settlements at the Derwent (633 nautical miles) and at Port Dalrymple (530 nautical miles). In addition, colonial vessels were engaged in whaling and sealing activities in Bass Strait, off Tasmania, and around New Zealand. By August 1806 twenty locally built vessels were operating commercially: eleven (ranging from 6 to 20 tons burthen and averaging 13 tons) were sailing between the New South Wales settlements, while eight (of from 13 to 45 tons burthen and averaging 27) and the *King George* (of 185 tons) were engaged in the sealing industry. Some freight was also moved by government vessels: an official return showed that 88 of the 320 tons of coal and 18,000 of the 154,000 feet of cedar that went from Newcastle to Port Jackson between March 1805 and August 1806 were carried by naval ships. An appreciation of the work undertaken by the colonial fleet (excluding naval vessels) can be gained from data for the period from mid-1810 through 1814 when into Port Jackson came 2,772 tons of coal and 82,000 feet of cedar from Newcastle (including Port Stephens); 800 skins from the Derwent; 1,900 skins and 31 tons of wheat from Port Dalrymple; and 287 tons of oil and 158,000 skins from the South Sea Islands, Macquarie Island, Bass Strait, Kangaroo Island and New Zealand. The movements between Sydney and Tasmania remained for many years one-sided as, apart from oil and skins, the southern settlements had little to offer in exchange for stores and provisions until 1813 when wheat and potatoes were shipped to the mainland.

Sailing between the settlements was a hazardous and uncertain business. The cockle-shell colonial coasters were frequently wrecked or swamped and cargoes sometimes had to be jettisoned during storms; since all were sailing-ships (the first steamships did not come into service until 1831) many days were spent simply standing by for suitable winds. It is hard to improve on Bigge's later summing up of the state of the colonial fleet:

The vessels are both badly equipped and badly navigated, and are little qualified to resist the heavy gales of wind with which the coast of New South Wales is visited during many seasons of the year. The coast is bold, and little danger exists in approaching it too nearly, but the

currents are so strong that they disappoint the calculations of the most skilful and vigilant navigators.²⁵

Third, there was a growing import and a small export trade despite the privileges of the East India Company which inhibited movement between the colony and England, and the Navigation Acts which forbade the use of foreign ships.²⁶ Although some fragmentary reports are available, reasonably complete import and export data do not become available until the 1820s. In any case, exports were at first negligible: some timber was dispatched to India in 1795 and some coal was sent there in 1799 and to the Cape in 1801. Oil and skins from the sealing grounds off Tasmania and New Zealand and the whaling areas in the southern waters were shipped overseas but not in any quantity until after 1801. For the whole of this first period—and beyond it—sealskins and oil remained the main export commodities with only small quantities of timber, coal and whalebone being noted in the port records of vessels cleared outwards. A few, very small, consignments of wool were shipped during the early years of the century but it was not until 1814–5, when nearly 15 tons produced in New South Wales passed through English customs, that this commodity started to emerge as a more significant item.²⁷

Nonetheless, Sydney was becoming the focus of a considerable internal and external trade which, in turn, stimulated the development of commercial enterprise and the construction of facilities like wharves and warehouses. Colonial vessels alone brought into Port Jackson between mid-1810 and the end of 1814 more than 5,500 tons of grain, over 3,000 tons of coal, lime and salt, and possibly 2,300 tons of timber. On top of this there were overseas imports and exports, merchandise and supplies sent from Sydney to the outlying settlements, produce from the whale and seal fisheries, and provisions for ships' crews.

There was a further reason for Sydney's advancement. Overseas trade was largely concentrated in this port and stifled elsewhere because of Bligh's instruction on 1 March 1807 that

No Ship or Vessel, Colonial or otherwise, when coming laden to this Country from England or the Fisheries in these Seas, is to proceed to any other Harbour to discharge but this of Port Jackson. . . .²⁸

Bligh had introduced this order, in Macquarie's opinion, to prevent smuggling and illicit trade, and 'with a View of preventing the principal Settlement of Port Jackson from being Entirely dependent for its Foreign Supplies on these two Subordinate Settlements'. Macquarie incorporated the substance of this order into his own set of port regulations dated 1 October 1810 but, on instructions from London, they were rescinded in June 1813.²⁹ The Tasmanian ports were then open to merchant ships on the same basis as Port Jackson (although, because of the monopoly granted to the hospital building contractors, the restrictions on the importation of spirits were not lifted until the beginning of 1815).³⁰ There is no way of knowing how much significance to attach to Bligh's worry, and by implication Macquarie's too, that 'no trading Ships or Vessels would ever think of Coming on to Port Jackson, if they could find a ready Market for their Goods at the Ports on Van Diemen's Land'

although it is certainly true that sailing-ships found it difficult to beat up the coast from Tasmania to Sydney.³¹ Even though the regulations were disregarded on a number of occasions, it is reasonable to suppose that the near-monopoly gave a further boost to Sydney's commercial development while adding to the problems of this island. First, the extra freight charged on goods sent from Port Jackson to Hobart, along with the additional handling and insurance margins, provided a source of profit to Sydney merchants and raised the cost of goods in Tasmania—the freight on a pipe of wine (about 105 gallons) from Port Jackson to Hobart, for instance, was £10, or £2 to £3 more than from England to Port Jackson. Second, Tasmania was deprived of duties, levied and paid in Sydney, on goods consigned to it. Third, public works were retarded because settlements on the island were prohibited for an even longer period from importing spirits.³² Fourth, Hobart in any case suffered another disability because, between 1811 and 1821, the Commissary there had to draw bills on the Commissary at Sydney rather than direct on London; as a result the masters of some ships anchoring in the Derwent were unwilling to land their cargoes when they found that the inhabitants had no London bills with which to pay them.

One further transport problem still has to be mentioned. Throughout this period the northern and southern settlements in Tasmania were linked, for most practical purposes, only by coastal vessel. In 1807 a journey blazing the trail between Port Dalrymple (the entrance of the River Tamar) and Hobart took eight days for the southern journey and six days for the return. Macquarie who traversed the 124 miles five years later wanted three or four military posts set up to maintain communications throughout the year and to protect anyone prepared to settle in the interior. Although no proper road was opened between the northern and southern settlements until 1829, supplies landed at Hobart were by 1815 being overlanded to Port Dalrymple, and three years later it was reported that a winding track, about 160 miles long, had been formed by carts and the droves of cattle and sheep passing through the island.³³

Capital and materials

Most of the colony's income came from British government funds in the form of Commissariat and paymaster's bills, private salary bills, or funds transferred by settlers and convicts.³⁴ Exports, as has been mentioned already, were trifling. For many years there was very little actual money in circulation: most payments were made in kind, on the strength of Commissary store receipts, or by means of promissory notes that were issued and sometimes dishonoured by all and sundry. There are numerous examples of the way in which valuations were set in terms of a stated price but actually paid in kind. People in 1797 gave almost half their grain to have the other half milled; the Parramatta Female Factory was paying for wool in 1801 by giving suppliers a quarter of the cloth it made; ships' captains exchanged iron for Newcastle coal, took timber in lieu of payment for chartered voyages, and delivered official letters in return for empty meat casks. The government sold beer for wheat, barley, hops, casks and iron hoops; allowed, even encouraged, Crown

debts to be discharged with produce—in barley, for instance, so as to keep up a supply for making beer; received rent for a brewery and a salt-works in the form of beer and salt; exchanged surplus stores for oil; and paid for the construction of an 8 mile stretch of road with a cow.

During this first period a good deal of the private investment capital came from military and civil personnel. Much has been written about the evils and hardships caused by the officer monopoly but there is a great deal to be said for the argument that no other group during the first fifteen years of settlement had the wealth and ability to act as entrepreneurs or to combine effectively and thwart the profiteering activities of the masters of trading vessels.³⁵ Although most officers invested in property, commerce, land and livestock, some put their capital into modest industrial ventures: for example, Arndell, Blaxcell, Marsden and Palmer each operated a windmill, and Wilshire had a tannery. Eventually, however, civil officers were ordered in 1812 to choose between carrying on a private business or conducting a public office.

A substantial contribution was also made by men who had arrived as convicts. Provident habits being uncommon, it was not hard for convicts and ex-convicts to accumulate capital by setting up as dealers, smugglers and illicit still operators. The pickings were rich and relatively easy particularly when a sawyer would cut 100 feet of timber for a 2/6d bottle of spirits and a farmer would hand over an acre of wheat for 2 gallons. Not a great deal is known about how much capital was put together in such ways but it was claimed that £5 could be turned into £500 in six months by dealing in spirits.³⁶ The careers of men like Thompson, Lord, Underwood and Lawrence illustrate the way in which some convicts seem to have had a Midas touch. Thus Thompson, convicted of housebreaking and burglary, arrived in New South Wales in 1792, was pardoned in 1797, obtained land in 1799, and during the next decade operated ferries, built bridges, launched ships, operated a salt-works and possibly an illicit distillery, and from 1806 until his death in 1810 ran a brewery at Windsor.³⁷ Underwood, a shipwright transported in 1787 for stealing, began shipbuilding in Sydney Cove in 1798, became involved in whaling and sealing ventures, obtained a hotel licence in 1813 and established a distillery in 1824. Robson has emphasised that the convicts who made good are noteworthy rather than typical; nevertheless, his examination of the convict statistics has shown that 16 per cent of the 20,000 or more convicts transported before 1821 became something more than labourers—that is they became shopkeepers, brewers, tailors, tinsmiths and so on.³⁸ One further point must be stressed: emancipated convicts played a much more important role in the early commercial and industrial development of New South Wales than of Tasmania. In the former settlement, ex-convicts had a chance to make good before a significant number of free immigrants arrived and while varied opportunities remained, whereas few Tasmanian convicts could become much more than smallholders and certainly none became as prominent and wealthy as men like Samuel Terry.³⁹

Hardly any of the free immigrants who arrived during the first three decades were prosperous—indeed ‘many of this class brought no other property to the colony

other than their own large families'. The lack of immigrants with capital is not altogether surprising in view of the investment and trade opportunities in Britain and Europe at this time. The considerable agricultural and industrial expansion taking place in Britain in the late eighteenth and early nineteenth centuries provided profitable outlets for local enterprise and capital and a safe refuge for capital from the Continent torn by revolutions and wars. Imlah has made the guess that the total value of British holdings abroad before 1815 was no more than perhaps £10,000,000.⁴⁰ With investment opportunities available close at hand and in the better-known parts of the world it is hardly surprising that little interest was shown in the limited possibilities for manufacturing in this remote, puny, penal colony. Emphasis is usually placed on free immigrants like Robert Campbell who reached Sydney in June 1798 and became one of Australia's first merchants,⁴¹ or on the Blaxland brothers who arrived, as mentioned, in 1806 and 1807 as the first products of the policy whereby free passages, land and convict labour were provided in order to attract 'a certain number of Settlers of responsibility and Capital'.⁴² More typical, however, was the free settler who in 1793 was turning his grain into spirits and enhancing its value threefold compared with the Commissary price for wheat, or the settler who was given a free passage in 1794 on the strength of a proposition to make salt and cure fish, but in successive years dabbled in salt-making, brewing, soap-making and flour-milling but ended up with little to show for his efforts.

Enterprise was not only retarded by scarcity of capital and skill but also by the lack of tools, equipment and materials. One difficulty was the poor quality of goods reaching New South Wales; the axes, spades and shovels that accompanied the first settlers were said to be the worst ever seen; sixteen years later history repeated itself when Collins surveyed the goods which had arrived at the newly established Derwent settlement:

The Axes in general are so soft that the commonest Wood will turn their Edges. Of the Gimblets, scarce one in a dozen will stand boring twice. The Iron is mostly rolled, not wrought, as it ought to have been. The Materials for making and mending the Convicts Cloathing are both very bad. The thread is nearly all rotten, and none of the Twist mentioned in the Invoice appears to have been sent out . . . The Shoes are of a bad Quality, and to add to this Grievance, they have been sent all of a Size . . . As we have neither Glue, Borax, Resin, or a Bar of Steel, Articles that are indispensably necessary, I should hope a supply of each may be sent by the next conveyance.⁴³

Not only did an enormous time elapse between a request for supplies and a reply (Phillip had to wait twenty-three months for a response to his first five dispatches) but, as Collins's complaint shows, there was no certainty that the demands would be met or that food, clothing and implements would be usable when they did eventually turn up. Some basic necessities like salt, iron, paper and pitch remained permanently in short supply, and had to be bought from vessels that chanced to call or be salvaged from ships that mischanced to run aground. There are many records of the problems created by shortages and the parsimony with which stocks

had to be rationed. Ships deteriorated, for instance, because of the lack of pitch and tar for their seams and copper for their bottoms; Bowen at the Risdon (Tasmania) settlement was given detailed instructions about the use of nails; and the *Sydney Gazette* sometimes did not appear at all because of a scarcity of printing paper.

Another source of difficulty was the quality or deficiency of local materials. In particular, the shortage of lime (which had to be overcome by burning seashells) restricted the height of walls to no more than 12 feet, and the use of unseasoned timber made buildings insecure. Mills powered by man, wind or water used cogs fashioned from wood but the cogs split because the timber was green.⁴⁴ Supplies of some materials became available only gradually: the development of wool and linen weaving, slaughtering, tanning, brewing, saddlery and harness-making, soap and candle-making and so on depended on the progress of the agricultural and pastoral industries which were themselves competing for scarce resources. The shortage of meat in New South Wales led, as has been explained, to a concentration on cattle raising and on breeding sheep for mutton rather than for fine wool⁴⁵ so that early attempts at cloth-making were based on hair (utilised nowadays for stuffing mattresses), and the first linen was woven from threads spun from the fibres of *Phormium tenax*, the bark of trees, and hair from sheep.

Government regulation

As might be expected in a penal colony, private enterprise had to operate within a framework of general regulations as well as particular orders affecting individual activities. Rules about hours of labour, wages, rates of interest, Sunday observance and so forth affected the whole spectrum of business activity but there is evidence suggesting that they were not always observed or were bent to suit particular needs.⁴⁶ Some of the more specific regulations were designed to preserve resources: at various times people were forbidden to slaughter female animals, to cut indiscriminately timber suitable for shipbuilding, or to bake biscuits above a certain quality for provisioning merchant ships. But the prevention of fraud, overcharging and other malpractices lay behind most of the orders licensing or regulating butchers, brewers and millers. Few regulations went so far as to prohibit absolutely a particular industrial activity, though some were temporarily forbidden such as brewing in Tasmania in 1806 when there was a shortage of grain. Shipbuilding and distilling can be examined more closely as exemplars of the interplay between regulations and development.

Shipbuilding. Before leaving England in 1787 Phillip was instructed not to allow 'craft of any sort to be built for the use of private individuals'. Similar instructions were issued to his successors and to Collins before he sailed from England to found a settlement in Bass Strait. Nor did the Governors fail to pass these orders on: in 1788 Phillip told King when he was sent to take charge of the Norfolk Island settlement that no decked boats and no open boats with a keel exceeding 20 feet were to be built, and fifteen years later King gave similar instructions to Bowen when he was setting off to form the settlement on the River Derwent. There were

two main reasons for these regulations: first, the East India company controlled the overseas trade of the Australian colonies—at least in theory—and this was a privilege that both it and other interests were anxious to preserve;⁴⁷ and, second, there was a need—borne out by the number of escape attempts—to regulate the building, licensing, mooring, guarding and use of vessels of all sizes.

Successive administrations had to relax these restrictions on shipbuilding because vessels were needed to carry supplies between the settlements and to develop the whaling and, more especially, the sealing industries. The government itself was forced to build ships not long after settlement began, including a wooden barge in 1789 to carry supplies between Sydney and Parramatta. The establishment of a settlement at Norfolk Island, lying 1,035 nautical miles northeast of Sydney, caused Phillip to plead several times between 1788 and 1791 for two vessels of 30 or 40 tons to be sent out from England, if necessary in frame, and in the meantime visiting whalers and merchant ships had to be chartered to convey the stores and provisions. Eventually a vessel of 41 tons arrived from England in frame and was built in 1792–3, but even this gesture was ill-considered because copper then had to be obtained from India to protect her bottom. The lack of adequate means of communication also stimulated the Norfolk Islanders to build a sloop of 16 tons which reached Sydney in June 1798. Between 1800 and 1806 the seizure of some vessels by convicts and the wrecking of half a dozen more meant that the government shipyard was seldom at a loss for work over and above the repair and maintenance of locally built ships and the refitting of English vessels seconded to the colony.⁴⁸

Beginning in 1798 the local administration started to give permission for ships to be constructed for private use—to encourage the sealing industry and because the colonial navy was completely inadequate to carry out the multifarious tasks that arose—on condition that they did not stray beyond defined limits. In 1804 King reported that he had given permission for the construction of a 130 ton vessel and sought guidance about how far the restrictions on trade could be relaxed without interfering with the East India Company. He raised this question again in August, and in December added the suggestion that three locally built vessels of not more than 200 tons each should be allowed to take colonial produce such as oil, sealskins, sandalwood and *bêche-de-mer* to China and England and even surplus English manufactured goods to Spanish possessions in the Americas. While this dispatch was on its way to England, the directors of the East India Company were considering the suggestions he had made in August, although they carefully refrained from saying very much at this stage, twenty months later they suggested that the building of ships in New South Wales exceeding 400 tons should not be encouraged. As Dunsdorfs has pointed out, this was a meaningless comment because no ships even approaching this size had been built in New South Wales or had, so far as is known, ever been contemplated.⁴⁹

Nor did colonial shipbuilders receive much encouragement from legislation in 1813 which limited trade between England and New South Wales to large vessels.⁵⁰ By 53 George III c. 155 (21 July 1813) it was enacted (Section 32) that

no such Ship or Vessel, the registered Measurement whereof shall be less than Three hundred and fifty Tons, shall sail or pass in any of the Seas to the Eastward of the *Cape of Good Hope*, or to the Westward of the *Streights of Magellan*, without a Licence from the said Board of Commissioners [for the Affairs of India] specially authorizing the same. . . .⁵¹

A protest meeting subsequently held in Sydney, noted the *Sydney Gazette* on 23 January 1819, resolved that 'few mercantile Adventurers here are willing or able to employ the large Capital necessarily required for the Cargoes of Vessels of this Magnitude'. Up to this time most English ships on the Australian run had averaged no more than about 300 tons and larger vessels were employed only on the more lucrative routes such as to the East Indies. Colonial shipbuilders did not have the capital or facilities to contemplate construction on this scale even if the vessels had been needed and, in any case, it required considerable experience to build wooden ships of more than 200 tons with sufficient longitudinal strength to withstand stresses and to remain watertight. Moreover, the bigger the ship the more restricted was its manoeuvrability in harbours and rivers and the greater the skill required for its navigation and management. Eventually, in January 1820, Macquarie learned that under 59 George III c. 122 (12 July 1819) trade between New South Wales and England was to be permitted without reference to the tonnage of ships.

The exact number of vessels constructed in the colony in these early years is not known. It is probable that between thirty and forty ships had been launched for private owners by 1805, but as vessels built to replace wrecks were given the same name and others had their names changed when they were salvaged or sold the evidence is conflicting. In Tasmania, which later became the main shipbuilding colony, the construction of ships was prohibited except by special permission, and the first ships to be launched there were a schooner of 40 tons in 1812 and a brig of 130 tons in 1813.⁵²

Distilling. Another activity suppressed with considerable vigour was the distillation of spirits. The insatiable demand for spirits and the drunkenness and corruption that resulted from its actual or attempted fulfilment soon became, and long remained, a problem apparently incapable of solution. Stills, being operated more or less openly at the beginning of 1794 and no doubt earlier, were prohibited in January 1796: then followed a long series of threats to the disobedient and blandishments to the informant but, despite swift retribution and the seizure of stills, no administration seemed able to suppress this activity—a policy regarded as essential both because the spirits made were crude, unrefined, and therefore actually harmful and because the grain and sugar were needed, sometimes desperately, to feed the people. The significance of this becomes clear when it is appreciated that 6 pounds of wheat would make either 1 pint of spirits or 6 pounds of bread: the former might last for a couple of hours while the latter in 1795 was a convict's ration for ten days.⁵³

It is thus hardly surprising that in 1804 King dismissed a proposal from a distiller in India who wanted to set up a works in New South Wales. Five years later, before

Macquarie had even left England, the idea of a distillery was again being mooted. There were three arguments for such an establishment. First, by operating during gluts and lying idle during shortages it would help to ensure a steady and encouraging market for grain; second, the grain in store for the distillery as well as the capital invested in the plant itself would act as ample backing for a colonial bank note issue; and, third, the production of spirits in New South Wales would replace imports which by 1820 amounted to about 100,000 gallons a year.⁵⁴ The British government was not enamoured with the idea and took little notice of Macquarie's repeated suggestions, and only changed its mind when these were supported by Bigge. Distilling was legalised in 1822 and the first works came into operation in 1824 (see Chapter 4).

There was a further way in which government restrictions and regulations affected manufacturing. Shortly after settlement began Phillip had a plan for Sydney drawn up by the Surveyor-General which was sent to Lord Sydney in July 1788. This scheme not only disregarded topography but its grandiose scale (with main streets 200 feet wide) was far beyond the resources of a meagre workforce which at first was not even supplemented by draught animals. In any case, within a few months settlement was spreading far beyond the original confines and Sydney was being regarded very largely as a depot for stores; the plan was ignored and buildings were set up with little regard for formal alignments. Streets were impassable because of mud, debris and tree-stumps, and the water of the Tank Stream was polluted with excrement and refuse. From 1795 a few desultory attempts were made to produce some order out of the chaos, but it was not until Macquarie took charge at the beginning of 1810 that any effective planning took place in Sydney which by then had a population in and around it of some 5,000. During 1810 and 1811 streets were widened, awkwardly placed buildings removed, sign-posts erected, open spaces and common pasture land designated, traffic rules introduced, houses numbered, a pound established, and rudimentary building regulations enforced. A further important change of policy occurred when Macquarie permitted land to be granted rather than merely leased for a period of not more than fourteen years, thus encouraging the construction of more permanent dwellings.⁵⁵

As part of these awakening attempts at town planning, Macquarie also gave some attention to industrial nuisance by ordering that no slaughter-houses, tanneries, dye-works or breweries should be built on streams or near the water tanks at Sydney, and that no brickmakers should encroach on the newly named and defined Hyde Park. Apparently some manufacturers themselves realised the need for some elementary zoning: in 1813, for example, one manufacturer sought permission to erect a mill on the Botany Bay road 'where the Furnaces and Smell may not prove a Nuisance'.⁵⁶ Nor were other towns neglected. After May 1811 no one could build at Parramatta or Windsor without the plans being approved by the Governor. Macquarie also gave detailed instructions about the layout of Hobart where, in some streets, the area of the allotment and the length of lease granted were made

to depend on the height of the building to be erected. Even so bricks were still being baked in some thoroughfares as late as 1815.

Development of Manufacturing

An indication has been given already of the way in which the government tried to solve some of its difficulties by increasing the range of its activities. The establishment of distant settlements led to the construction of ships; the scarcity of lime and salt led to the operation of works to produce them; the enforcement of law and order was facilitated by a printery; the shortage of clothing and blankets and the need to employ women convicts led to the establishment of a primitive textile workshop as part of the Parramatta Female Factory; and the high charges and theft of stock caused the government to erect a slaughter-house. There is neither the space nor the need to dwell on the details of all these activities; an account of the government's grain-milling and brewing ventures will suffice to exemplify its fumbling attempts to meet problems as and when they emerged.

Grain-milling. The amount of grain to be processed was at first small and it was practical to use the hand-mills brought from England or made locally. These mills deteriorated quickly and were grossly inefficient: it took four men an hour to grind 1 bushel of wheat (a production rate of 1 hundredweight of flour per man in a ten-hour day)⁵⁷ so it is small wonder that Bigge considered them useful for punishment but too severe for ordinary employment.⁵⁸ The government soon faced two problems: first, there was a shortage of labour and, second, the ravages of vermin and the damage by heat to the grain in store made it desirable to process harvests as quickly as possible. During 1793 and 1794 experiments were made with man-powered mills one of which was able to produce about 15 hundredweight of flour per day.⁵⁹ The problem facing the administration was no small one. The wheat harvest in 1794-5 was some 35,000 to 40,000 bushels: assuming that the two successful man-powered mills were both operated for ten hours a day (an optimistic assumption even if several teams of men had been used to push the capstan bars), the task would have taken from 470 to 535 days.⁶⁰ In these circumstances it is hardly surprising that wheat was being quoted in September 1796 at 12/- per bushel whereas in the form of flour it was worth 26/6, or that people were paying from one-third to one-half of their grain to have the remainder ground.⁶¹

Machinery for a windmill arrived in Sydney in September 1795; when it began operations in February 1797 it could produce 25 hundredweight of flour during a windy ten-hour day. One government mill was inadequate (even though a private mill also began operating in 1797), and work began on another but this did not come into full operation until about 1802. Work also started on a water-driven mill at Parramatta in November 1798; in fact this operated briefly as a horse-mill that quickly 'knocked-up' the teams while producing only as much as a couple of men with a hand-mill. Another attempt to build a water-mill was made in the summer of 1803-4 but the dams collapsed during the winter; when reconstructed in 1805 the mill could barely grind (when there was enough water) 27 hundredweight of flour

in a ten-hour day and it was thus deemed necessary to build another windmill at Sydney which was finished in 1807. Then the position becomes less clear. The first (1797) windmill was 'useless' by the middle of 1806; the second (1802) windmill had been repaired by 1810 and, together with the third (1806-7), was leased to a private individual until the end of 1814.⁶² The second mill then passed into the hands of the military which ground wheat for its own use, for private individuals, and sometimes for the government, while the third mill produced less than 2 tons of inferior flour a week and did not even cover costs. It is hard to know who was to blame for the ineptitude with which the milling problem was tackled by the administration (although, to be fair, there was no lack of gales, floods, droughts and crime to frustrate its efforts), but at the root of everything was the lack of skill.

Brewing. As part of its efforts to suppress the distillation of spirits, the local administration enlisted the support of the British government in a scheme to erect a brewery which it was thought would provide a cheaper and more wholesome substitute.⁶³ Brewing utensils and hops were obtained from England early in 1803 and a brewer was found in Tasmania;⁶⁴ the brewery, at Parramatta, came into operation late in 1804 with, according to the *Sydney Gazette* of 21 October, a capacity of 1,800 gallons of beer weekly and a potential capacity when finished of 3,000 gallons. But, like most ventures of the government, the scheme was ill-considered. Output never rose above a few hundred gallons a week and the income from sales did not cover operating costs let alone interest on the £1,600 invested. After eighteen months or so King came to the conclusion that the government was 'at a great loss and Expence in carrying on that Object . . .' for which he blamed 'the description of People it was necessary to employ'.⁶⁵ It is hard to see what good came from this well-intentioned venture: the quantities of beer produced were too small to have influenced tastes or to have encouraged other activities like coopering. It was perhaps doomed to failure from the start because it faced the same problems as the handful of private ones operating in the colony at this time—farmers reaped their weed-infested barley before it was ripe which made it unsuitable for malting, there were hardly any hops, and the equipment was too primitive to allow the rate of fermentation to be controlled.⁶⁶

In the Tasmanian settlements the government became involved in only the simplest kinds of industrial activity like manufacturing bricks and tiles, tanning cattle and kangaroo skins, making shoes, and burning shells for lime and timber for charcoal. Development of this kind was slow during the first decade of settlement but this is hardly surprising given the primitive nature of the other sectors of the economy (the first cart for carrying timber was made in Launceston in 1808 or 1809—and even then leg irons were used instead of chains, and no plough was used anywhere in Tasmania until 1813).⁶⁷ Even though Collins asked for materials with which to build a water-mill in 1805 and a pair of grindstones reached Hobart in 1810, the government did not undertake any milling until 1818 in Hobart and 1819 in George Town (see Chapter 5). Collins took with him a printing press to churn out government orders, but otherwise no effort appears to have been made to duplicate the range of industrial activity carried out by the government on the

mainland: no attempt was made to weave cloth, brew beer or build vessels (apart from one or two small craft).

Private enterprise

Much less need be said about private industrial ventures in New South Wales both because they were less significant than those attempted by the government and because little more can be learned by detailing them here. During the first decade of settlement attempts were made by individuals to brew beer from imported malt, to boil salt from sea-water, to make soap and to grind wheat. Evidence of local initiative becomes clearer when the *Sydney Gazette* appeared for the first time on 5 March 1803 and began to record new developments and print advertisements: during its first three years there are references to tanners, flour-millers, potters, shoemakers, dressmakers, blacksmiths, soap and candle-makers, brewers and bakers. These people operated what, for the most part, were small insignificant businesses that began to emerge because of the growing availability of materials (the increase in stock numbers, for instance, provided materials for tanning and bootmaking), the expansion of the market which included demands for ships' stores, and the increasing numbers of free men. Most were ephemeral; the ventures that lasted any length of time were the ones in which a reasonable amount of capital had been invested like Wilshire's tannery which operated from 1803 to 1861, Blaxland's salt-works from 1807 until the 1880s, and several of the flour-mills from the 1810s until the 1820s and 1830s.⁶⁸ Towards the end of this period small nests of industry, consisting of weavers, tailors, millers and blacksmiths, began to appear as part of the relatively self-contained operations of some of the larger estates, and some merchants set up workshops to make rope, casks and so forth as an adjunct to their other activities.

Private enterprise received little official encouragement⁶⁹ although it is true that the government gave licences to individuals to build ships, bake bread and brew beer; provided land and convict workers which were used by some of the free settlers for such purposes as salt-making; and, on occasion, made available materials such as iron for ploughs and hops and utensils for brewing. In a few instances, too, industrial undertakings (such as the Parramatta brewery) were leased to private operators who were game enough to try to make a success of government white elephants. Direct encouragement in the form of premiums, such as those offered for the successful manufacture of flax and cider, were of small consequence. Formal government contracts do not appear to have become important until after 1810 although from then on firms started to enter into agreements to supply leather for military boots, and flour, bread and biscuit for prisoners and patients.

Details about early private enterprise manufacturing in Tasmania are meagre, due partly to the lack of a regular newspaper until the appearance of the *Hobart Town Gazette and Southern Reporter* (a semi-official production) on 11 May 1816.⁷⁰ But this hardly matters because industrial progress, as emphasised already, was very slow and, for the most part, the islanders depended on supplies sent from

Britain or Sydney. Most of the grain was ground by hand or animal-power: the first water-mill, built near Hobart by a Norfolk Island evacuee in 1809, was soon swept away by floods and its replacement built the following year was apparently not very successful.⁷¹ No other mill was built anywhere on the island until 1817. Tasmania's limited progress pales even further when it is borne in mind that by 1795 Norfolk Island had a water-mill producing 8 hundredweight of flour per day and two private windmills which were more than adequate to meet the island's needs and even allowed some flour to be sent to Sydney and Hobart.

Location of Manufacturing

During the whole of this first period most industrial activities were located in Sydney and its environs or at the settlements scattered in the more developed parts of Cumberland County. In Tasmania there was little industrial progress; Norfolk Island had been completely deserted by March 1814; and at Newcastle the main activity, apart from coal-mining and timber-cutting, was the boiling of sea-water for salt (1804 to 1808) which was superseded by the burning of shells for lime. By 1812 the more accessible stands of timber (especially cedar) alongside the Hawkesbury River, the lower part of the Hunter River and around Port Jackson (such as in Lane Cove) had been cut over, and attention had turned to the Shoalhaven coast. Sea-borne logging gangs put ashore to cut some 75,000 feet of timber there from late in 1811 to late in 1814 when, probably because of skirmishes with Aborigines, Macquarie forbade further visits to this area.⁷² Here and there other temporary camps were set up. A boiling down works was operated by sealers on Cape Barren Island (off the northeast coast of Tasmania) as early as 1798; a party of Americans built a vessel at Kents Bay on Cape Barren Island in 1804 out of the remains of the *Sydney Cove* which had been wrecked there in 1797; an American sealing party built a schooner on Kangaroo Island in 1803 or 1804; and seaweed was burned for alkali (used for soap-making) during the brief stay by Collins's party at Port Phillip in the summer of 1803-4.⁷³

Sydney was, as indicated already, the main focus of industrial activity: here were built the government dockyard, lumber yard and blacksmith's shop; three government windmills; five or six private windmills and one water-driven mill; two or three tanneries; brickworks; the government printery; private shipyards; a salt-works; and the workshops of most of the small butchers, bakers and candle-makers. At Parramatta there was the government textile workshop (part of the Female Factory), a flour-mill, a tannery, a slaughter-house and a salt-works; this town had also been the scene of the abortive attempts by the government to brew beer and operate a water-mill. Elsewhere in Cumberland County industrial activity was negligible: a few ships had been built along the Hawkesbury and a salt-works operated for a time on Scotland Island near its mouth; a brewery operated at Kissing Point on the North Shore⁷⁴ and another at Windsor; and a small windmill was erected at Cattai (near Windsor) in 1809.

It is futile to try to make much of such an embryonic locational pattern: the

relationships were simple and obvious with windmills on high ground, salt-pans in shallow water close to timber or coal, and so on. Nevertheless, the significance of water as a locational influence should be noted. It was required among other things for transport, for the operation of salt-pans and breweries, and the discharge of effluent from tanneries. And yet, throughout this period, water-power was unimportant although not totally untried. The only industrial distribution worth commenting on is the location of flour-milling. By the beginning of the nineteenth century the Hawkesbury River district had become the main source of colonial grain. The needs of the settlers here, however, were satisfied by hand-mills and most of the remaining grain was delivered into government stores at the Hawkesbury, or at Parramatta and Sydney. There were several reasons for this. There were few streams which were adequate for water-power and millers preferred to locate their premises on the headlands facing Port Jackson where winds were likely to be strongest and most certain. Then again the weight and volume of flour in sacks or barrels was probably not much less than the original grain. The main domestic market was in Sydney and to this was added the demand for breadstuffs for victualling local and overseas vessels (such as 7 tons of biscuits for *H.M.S. Buffalo* in July 1805), and for the supplies needed by the outlying settlements. This emerging pattern was further reinforced when, after 1812, grain started to arrive in Port Jackson from Tasmania.

During the next few years three circumstances began to affect the development of manufacturing and its location. In 1815 the first steam engine commenced operations and about this time, too, colonial capitalists began to turn to manufacturing as a form of investment. Little economic activity of any kind existed away from the coast or nearby rivers but the opening up of the inland areas and the districts north and south of Cumberland County was about to start and with this was associated the development of some processing establishments—the first grain-mill away from Cumberland County began operations at Newcastle in 1821. Similarly, in Tasmania there was a gradual movement of activity away from the coastal fringe around the northern and southern settlements; the first mill away from the lower Derwent area was set up at Bagdad in 1822. The geographical themes of the period from 1815 to 1850 now to be explored are the growing concentration of some activities in the main coastal towns and the spread of others inland.

PART B

Manufacturing in the Australian Colonies

1815 to 1850

Prologue to Part B

In 1815 there were only 15,000 Europeans in Australia and all were concentrated in limited parts of New South Wales and Tasmania; thirty-five years later there were more than 400,000 spread over considerable areas in the southeast of the continent and in smaller pockets elsewhere. At the beginning of this period local authority was vested in the Governor in Sydney. Although the Tasmanian settlements at Port Dalrymple in the north and Hobart in the south had been united under one administration in 1812 this itself remained subservient to Sydney: decisions not of policy alone but also of detail, such as the erection of a public building or the granting of permission for someone to build a small ship, had to be referred to the mainland. At the end of 1820, however, Sorell received authority from the Colonial Office to make land grants on the island, a first step in the process that culminated on 14 June 1825 in the signing of an Order in Council whereby Tasmania was constituted a separate colony, a step proclaimed in Hobart itself on 3 December 1825. The lieutenant-governors became directly responsible to the Secretary of State for the Colonies. A nominated Legislative Council and an executive council were established.

New South Wales was itself passing through an intermediate stage between autocracy and self-government. Until 1823 the Governor was all-powerful, but under 4 George IV c. 96 (19 July 1823), 'An Act to provide . . . for the better Administration of Justice in *New South Wales* and *Van Diemen's Land*, and for the more effectual Government thereof . . .', a Legislative Council, consisting entirely of nominated members, was set up and convened for the first time on 25 August 1824. Then late in 1825 it was announced that an executive council would also be established. The Legislative Council remained a wholly nominated body (consisting, from 1828, of eight official and seven non-official members) until 1842 when it was reformed under 5 and 6 Vic. c. 76 (30 July 1842), 'An Act for the Government of *New South Wales* and *Van Diemen's Land*'. This altered the composition to twelve nominated members and twenty-four members elected under a very restricted franchise: no longer could the Governor rely on a majority view in his favour.

The change was important in another way because the Port Phillip District (Victoria) gained the right to elect six of the members. Thus the people in this 'southern appendage' began, at least in principle, to have some say in its destiny though in fact, because of the practical problems of time and distance, most of its opinions had to be voiced by 'a scratch list of volunteers from the enemy's camp'. The first permanent settlement in the Port Phillip District had begun in 1834,

Governor Bourke had proclaimed jurisdiction over the area in 1836, and C. J. La Trobe had been appointed 'superintendent' (whose decisions were subject to approval by the Governor in Sydney) in January 1839. Soon afterwards a separation movement developed, largely as a result of concern at what was regarded as an inadequate allocation of funds for public works in the district. The 1842 legislation was notionally a step in the right direction but made little difference to the realities of the situation: agitation thus continued throughout the 1840s and separation was eventually granted, under 13 and 14 Vic. c. 59 (5 August 1850), 'An Act for the better Government of Her Majesty's *Australian Colonies*', from 1 July 1851. The so-called 'Northern District' of New South Wales (Queensland), which was simply a penal settlement from 1824 to 1839, remained part of New South Wales until 1859.

Settlement of Western Australia began late in 1826 when a party was sent from Sydney to King George Sound (Albany) to set up a temporary military outpost. Formal possession was taken of the western third of the continent on 2 May 1829 by an official expedition dispatched from Great Britain and it was constituted a colony on 18 June. This permanent settlement was always independent of New South Wales.

Following 4 and 5 Will. IV c. 95 (15 August 1834), 'An Act to erect *South Australia* into a *British* Province or Provinces, and to provide for the Colonization and Government thereof', 309,850 square miles, bounded in the west by the 132nd meridian east (extended to the 129th meridian in 1861) and in other directions by similar boundaries to those existing now, became the territory of South Australia. Settlement began in July 1836 and the colony was proclaimed on 28 December. Authority was divided; the Governor was responsible for all matters except land sales and immigration which were reserved to a Board of Commissioners. It soon became clear from the constant squabbling between the first Governor (J. Hindmarsh) and the first resident commissioner (J. H. Fisher) that such divided authority was impractical and the next Governor (G. Gawler), who took up office in October 1838, was authorised to represent both the Crown and the Commissioners.

Throughout this period of spreading settlement and constitutional change New South Wales held the centre of the industrial stage, and in 1850 had perhaps 4,700 of the estimated 10,800 'factory' workers in Australia. Chapter 3 considers the spatial setting in which its industrial development took place and thus provides a background for the discussion of manufacturing itself in Chapter 4. But while New South Wales remained head and shoulders above the others, Tasmania and South Australia both achieved remarkable progress, largely by using their restricted range of resources to best advantage. As will be shown in Chapter 5, which deals with all these colonies seriatim, the same cannot be said of Victoria and Queensland, which were not yet masters of their own affairs, or of Western Australia.

3 Manufacturing in New South Wales 1815 to 1850: The Spatial Setting

The economic geography of New South Wales between 1815 and 1850 is usually discussed in terms of the spread of livestock grazing, and to a lesser extent agriculture, beyond Cumberland County following the discovery of a way across the Blue Mountains in 1813. This has diverted attention from the significance of the agglomerative forces that were concurrently influencing other sectors of the economy; yet it was the continuing concentration of much of the colony's non-agrarian activity in and around Sydney which affected not merely the location of manufacturing but also the range and scale of industrial enterprise that could be sustained in the colony as a whole. The following discussion summarises the spatial setting in which the events recorded in the next chapter took place by focusing on the growth and composition of the population, on the formation and functions of towns, and on the development and cost of transport.

Growth, Composition and Spread of Population

The population of New South Wales (excluding the areas that later became parts of Victoria or Queensland) increased fourteenfold between 1815 and 1851, that is from 12,900 to 181,400. The contribution made by natural increase was at first small since there were only 2,700 women of child-bearing age in the colony in 1815.¹ Much more important was the growth due to immigration and transportation, each of which can be discussed in turn.

Immigration

Madgwick has suggested that some sixty to seventy-five free people arrived annually between 1810 and 1821 and perhaps half of these were the families of convicts coming to join their loved ones in exile.² At first these immigrants were drawn from diverse social and occupational backgrounds but after 1814, with some exceptions, free passages were no longer provided and land and indulgences were granted—at least in theory—only to people with some capital behind them. From 1822 onwards immigration increased; although precise figures are not available for those who disembarked in New South Wales,³ some 500 to 750 people probably arrived each year for the remainder of that decade. They were mainly officers, merchants, graziers, and farmers, and their families, since people without financial resources were actively discouraged. Thus, paradoxically, at a time when the wealthier arrivals were seeking labour to run stations, farms, households and even dairies, the supply was being curtailed. Some of this demand was met by

emancipated convicts and by the assignment of prisoners to individuals: in 1819 about two-thirds of the 9,000 convicts in New South Wales were in private service, and a similar fraction of the 17,100 convicts in 1828 were either assigned or free to work for wages by virtue of a 'ticket of leave'.⁴ The demand for labour fluctuated: figures for 1827, 1830 and 1833 show that the requests for assigned servants were double the available supply but soon afterwards the requests halved and nearly all could be fulfilled.⁵ In part this can be explained by the growth of the locally born and emancipist labour force but it also resulted from an active immigration program, under the influence of systematic colonisers like Wakefield, which brought 32,000 assisted and unassisted migrants to New South Wales and the Port Phillip District during the 1830s and a further 76,000 during the 1840s.⁶

An analysis by Shultz⁷ has shown that the various schemes brought about 69,000 assisted immigrants to New South Wales (of whom 42,000 were over fourteen years of age) from 1837 through 1850. Although a considerable proportion of the 18,900 adult male immigrants whose occupations are recorded were unskilled (56 per cent described themselves as agricultural labourers), Shultz has classified 2,400, or nearly 13 per cent, as 'skilled, handicraft, and factory workers'. Such occupational data must be regarded cautiously for three reasons. First, the chances are that then, as now, people claimed an elevated status whenever possible. Second, in Britain the distinction between 'artisan' and 'labourer' was becoming blurred, especially in trades like brewing and soap-making where a journeyman no longer had such a marked wage advantage. Third, there must, a priori, be some doubt about whether very many *good* craftsmen and skilled operatives would have uprooted themselves and ventured to a distant and relatively unknown environment when there were opportunities available locally and on the Continent; in the mid-1830s, for example, it was reckoned that 'in most skilled London trades wages had not fallen since the highest war level'.⁸ In any event it is clear that some entrepreneurs were unable to recruit skilled operatives locally for in the late 1830s and early 1840s no fewer than three woollen-mill owners made arrangements to bring weavers out from England,⁹ and forty engineers and workmen accompanied the consignment of plant and machinery imported for the Australian Sugar Company's works.

Transportation

The other source of population was transportation which proceeded with renewed vigour after 1815 and continued until the last convict ship to sail direct for Sydney dropped anchor at Port Jackson on 18 November 1840. From 1815 to 1820 a total of 12,400 convicts reached New South Wales, from 1821 to 1830 some 21,800 arrived, and a further 30,800 from 1831 to 1840.¹⁰ During the Macquarie period a considerable proportion of the convicts (29 per cent of the males in 1819) was employed by the government: it kept 1,760 of the 4,760 'ordinary' male convicts who arrived between 1814 and 1820 as well as 1,590 of the 2,420 'mechanics' and used them on public works and in the government dockyard, lumberyard, brick-yards and lime-burning works. Criticism of the system led to a reduction in the manpower retained in this way and by 1826 the government was employing only

Table 3.1 Composition of New South Wales population, census years 1821-46^a
(percentages in brackets)

Status	1821	1828 ^b	1833	1836	1841	1846
Free adults ^c						
Male	7,843 (24.8)	10,621 (27.3)	17,532 (29.4)	22,926 (30.5)	45,724 (39.2)	63,023 (40.9)
Female	3,949 (12.5)	4,538 (11.7)	8,511 (14.3)	11,946 (15.9)	21,943 (18.8)	33,446 (21.7)
Sub-total	11,792 (37.3)	15,159 (39.0)	26,043 (43.7)	34,872 (46.4)	67,667 (58.0)	96,469 (62.6)
Bond adults						
Male	11,342 (35.9)	16,284 (41.9)	20,717 (34.8)	23,761 (31.6)	15,649 (13.4)	2,669 (1.7)
Female	893 (2.8)	1,655 (4.3)	2,659 (4.4)	2,499 (3.3)	2,808 (2.4)	452 (0.3)
Sub-total	12,235 (38.7)	17,939 (46.2)	23,376 (39.2)	26,260 (34.9)	18,457 (15.8)	3,121 (2.0)
Children ^d						
Male	3,934 (12.4)	2,835 (7.3)	5,228 (8.8)	7,139 (9.4)	15,403 (13.2)	26,995 (17.5)
Female	3,674 (11.6)	2,936 (7.5)	4,929 (8.3)	6,973 (9.3)	15,204 (13.0)	27,620 (17.9)
Sub-total	7,608 (24.0)	5,771 (14.8)	10,157 (17.1)	14,112 (18.7)	30,607 (26.2)	54,615 (35.4)
Total ^e	31,635 (100.0)	38,869 (100.0)	59,576 (100.0)	75,244 (100.0)	116,731 (100.0)	154,205 (100.0)

^a Excludes Port Phillip District, Norfolk Island and Moreton Bay, but includes Port Macquarie penal settlement.

^b 1828 figures adjusted to take account of shortfall of convicts in returns (see Darling to Goderich, 11 June 1831, *HRA*, I, xvi, pp. 270-1).

^c 'Free adults' include those who came free, were born free, were free by servitude, absolutely pardoned, conditionally pardoned, and those holding a 'ticket of leave'.

^d In 1821, 1828, 1833 and 1836 'children' defined as those twelve years or less; in 1841 and 1846 defined as those under fourteen.

^e Colonial marine, travellers, etc. included. The 1846 census omitted 2,196 mariners (cf. 1846 totals and 1851 census Table 46).

Sources: Macquarie to Bathurst (30 November 1821), *HRA*, I, x, pp. 575-6 for 1821 figures; *NSWBB* for other years, 1828 data being adjusted by figures in *HRA*, I, xiv, p. 72. The remaining censuses were taken on 2 September 1833, 2 September 1836, 2 March 1841 and 2 March 1846. Several arithmetic slips in original documents have been corrected.

370 mechanics and 1,580 labourers, and more men were being made available to settlers as assigned servants. Skilled men were also allocated to those without land; in November 1824 over 400 artisans were being hired at the rate of 3/6d per week (payable to the government) plus keep, and three-quarters of these were said to be engaged in some form of 'industrial' activity. As a case in point, it was later claimed that 'an average of about twenty of these men [were] in constant employment between the years 1823 and 1840' at Wilshire's tannery in the City of Sydney.¹¹ The treatment meted out depended on the disposition of the employer. Some regarded them as little more than slaves, while others paid skilled men almost the same wages as free people: it is said, for instance, that ten assigned convicts working as compositors on the *Sydney Gazette* were paid on average only a few pence per week less than the rest of the staff.¹² During the 1820s the British government repeatedly told the local administration to ensure that as many as possible of the assigned convicts were sent to jobs in the country even though 'they may happen to be very skilful Mechanics and capable of being very profitably employed at Sydney'.¹³ There is no space to discuss the detail of the regulations but it should be noted that after 1836 mechanics could not be assigned in respect of land held in the districts of Sydney, Parramatta, Windsor or Liverpool, although people with special skills could be sent to any part of the country. As Table 3.1 shows, convicts formed an increasing proportion of the population until 1828 but from then on their importance declined until by 1846 they made up a mere 2 per cent of the total.

The significance for industrial development of this large and rapid growth of population, averaging about 7.8 per cent a year, in terms of expanded markets and labour supply and the general diversification of the economy it encouraged and facilitated, is obvious enough. It must not be overlooked, however, that women and children formed an increasing component of the population after 1828 whereas the proportion of adult males diminished from nearly 69 to less than 43 per cent in 1846 (Table 3.1).¹⁴

The distribution of population

Most of the population growth took place in a relatively small part of the colony, as can be made clear by a brief discussion of the progress of settlement. Some flocks and herds were allowed to graze west of the Blue Mountains within a couple of years of the discovery of a way through them but it was not until November 1820 that Macquarie authorised permanent settlement outside Cumberland County.¹⁵ Six years later Darling endeavoured to keep a check on the selection of land by establishing 'limits of location' which, after some alterations, became divided in 1829 into nineteen counties covering about 38,000 square miles. A twentieth county, Macquarie, of some 2,200 square miles was added in 1830. Yet settlement had already spread beyond these boundaries and stockmen continued to pick out the better country to the south, west and north, and eventually pushed into the Port Phillip District (Victoria) towards the end of 1835 and north on to the Darling Downs (Queensland) in 1840. This pastoral and agricultural expansion is

Table 3.2 Livestock and acreage cultivated in New South Wales, 1825 and 1850^a
(000)

Area	Sheep		Cattle		Wheat acreage		Cultivated acreage	
	1825	1850	1825	1850	1825	1850	1825	1850
Cumberland County	105	7	86	26	23	9	40	28
Other nineteen counties	133	2,022	49	396	3	52	6	98
Rest of New South Wales	—	3,537	—	961	—	5	—	9
Total New South Wales	238	5,566	135	1,383	26	66	46	135

^a Excluding territory which later formed part of Victoria or Queensland.

Source: NSWBB.

Table 3.3 Population of New South Wales by areas, census years 1815-51^a

Area	1815	1821	1828 ^b	1833	1836	1841	1846	1851
Sydney ^c	n.a.	n.a.	n.a.	n.a.	21,361	31,617	41,346	49,261
Rest of Cumberland County	n.a.	n.a.	n.a.	n.a.	18,436	26,491	31,037	31,853
Cumberland County	12,372	27,985	25,142	35,844	39,797	58,108	72,383	81,114
Other nineteen counties ^d	346	1,598	10,294	22,740	31,304	46,513	62,658	72,645
Rest of New South Wales	—	—	^e	^e	2,968	9,980	15,813	23,909
Total	12,718	29,583	35,436	58,584	74,069	114,601	150,854	178,668
Others ^f	193	2,052	3,433	992	1,175	2,130	3,351	2,708
Total New South Wales	12,911	31,635	38,869	59,576	75,244	116,731	154,205	181,376

^a Excludes Port Phillip District, Norfolk Island and Moreton Bay, but includes Port Macquarie penal settlement.

^b Census November 1828 listed 14,155 male convicts but return for 1 July 1828 states 16,693 (see comment, *HR4*, I, xvi, pp. 270-1). Similarly, female convict numbers were understated by 142 in the census. As no indication is available of where these convicts lived the total of 2,680 has been included under 'others'.

^c 'Sydney' has been defined here as the parishes of St Philip, St James, St Lawrence, St Andrew, Alexandria, and Willoughby: see discussion in text and chapter 3, note 30.

^d For want of more accurate data 'road gangs' shown under various headings in the censuses from 1828 to 1836 have been included under 'other nineteen counties'.

^e Although there were some people living beyond the limits of location, the number is not known.

^f Includes travellers, colonial marine, military (in 1821, 1846 and 1851), and convicts in 1828 (see note *b* above). See also note *d* to Table 3.1.

Sources: 1815, *HR4*, I, ix, pp. 90-1; 1821, *HR4*, I, x, pp. 575-6 (several inaccurate totals corrected); other years, *NSWBB*.

Table 3.4 Changes in adult population numbers in main divisions of New South Wales, intercensal periods 1833-51

Area	Sex	Population 1833	Changes 1833-36 ^a	Changes 1836-41	Changes 1841-46	Changes 1846-51 ^b	Population 1851
Sydney ^c	M	n.a.	n.a.	2,869	1,226	744	15,675
	F	n.a.	n.a.	3,175	2,913	3,215	15,005
Rest of Cumberland County	M	n.a.	n.a.	2,291	-271	-613	10,549
	F	n.a.	n.a.	2,165	1,298	78	8,118
Cumberland County	M	19,409	569	5,160	955	131	26,224
	F	8,821	1,458	5,340	4,211	3,293	23,123
Other nineteen counties	M	17,848	5,130	3,457	459	-487	26,407
	F	2,349	1,612	4,226	4,525	3,392	16,104
Rest of New South Wales	M	—	2,556 ^d	5,104	2,061	2,354	12,075
	F	—	205 ^d	750	251	2,798	4,004
Total	M	37,257	8,255	13,721	3,475	1,998	64,706
	F	11,170	3,275	10,316	8,987	9,483	43,231
Others ^e	M + F	992	183	955	1,004	-576	2,558
Total New South Wales	M + F	49,419	11,713	24,992	13,466	10,905	110,495

^a In 1833 and 1836 'adults' defined as more than twelve years old; in 1841, 1846 and 1851 defined as fourteen years and over. The change between 1836 and 1841 is thus partly accounted for by the difference in definition.

^b Some of the decreases between 1846 and 1851 are probably accounted for by the fact that the military, totalling 589 males and 175 females, were not allocated geographically in the 1851 census and for the first time appear in 'others': it has been assumed that 75 of these were male children and 75 were female children.

^c Defined in note c to Table 3.3.

^d These changes are exaggerated because almost certainly there were some settlers in the 'rest of' New South Wales in 1833.

^e Includes colonial marine, travellers, etc.

Source: NSWBB.

summarised in Table 3.2. To all intents and purposes New South Wales became divided into two worlds. In the twenty counties land passed into private hands by grant or purchase, the improvement and consolidation of estates continued, and by 1836 only inferior Crown land remained available to newcomers. Beyond the twenty counties, however, there was no security of tenure: improvements were made at the risk of the holder (or so the squatters claimed) and thus most of the dams, wells, fences and buildings were minimal and makeshift. In 1836 the government—realising that settlement was not, and could not be, confined to the twenty counties—imposed an annual licence fee beyond the ‘limits’ which asserted the Crown’s title to the land but also gave some rights of occupancy. Three years later it divided this area into Commissioner’s Districts that provided a framework within which law and order could be maintained and land disputes settled. Then, in 1847, Orders in Council gave comparative security of tenure, and redivided the colony into ‘settled’, ‘intermediate’ and ‘unsettled’ districts in which pastoral leases were available for terms not exceeding one, eight and fourteen years, respectively.¹⁶

The uncertainty and harshness of life outside the twenty counties were reflected in the sparseness and masculinity of the population. As Table 3.3 indicates, only 24,000 people, or 14 per cent of the colony’s inhabitants, lived beyond the twenty counties in 1851 compared with 81,000 (45 per cent) in Cumberland County (1,586 square miles) and 74,000 (41 per cent) in the other nineteen (38,000 square miles): in other words, 86 per cent of the population was concentrated into one-seventh of the area now delimited as New South Wales. Beyond the twenty counties there were three times as many men as women (Table 3.4) and three-quarters of them were unmarried. Conditions were hardly attractive for single girls—only one-fifth of all the females aged fourteen or more claimed to be unmarried when the census collectors called in 1851—or for the families of migrants many of whom came to the colony with habits, feelings and desires implanted in a more urbanised society. Moreover, settlers were reluctant to house and maintain whole families for the sake of the labour of the head of the household; not only would this have added to the cost and problems of carting supplies from Sydney or nearest large town, but the uncertainties of land tenure gave them little incentive to devote capital and effort to providing even primitive amenities for women and children.¹⁷

Urbanisation

The course of urbanisation can be traced broadly from government notices, census data and literary sources.¹⁸ At the beginning of 1815 there was, apart from Sydney itself, a handful of small towns and villages in Cumberland County. Beyond this, until the late 1820s, urban development was rudimentary: Bathurst had been named and marked out by Macquarie in 1815 but there was still little to be seen there a dozen years later,¹⁹ and Newcastle, which was a convict station between 1804 and 1823, subsequently lost several hundred people and contained only 300 to 400 inhabitants early in the 1830s of whom about half were convicts (mainly engaged in mining and handling coal) and their guards. Elsewhere, particularly at fords and

punts, small villages had begun to emerge centred round a store, an inn, a post office and, exceptionally, a flour-mill (sometimes all owned and operated by the same man). Increasing traffic along the main tracks caused settlers to set up 'houses of accommodation' some distance from the head station so that passing strangers could be provided with food and accommodation on a paying basis instead of having to be given more personal hospitality.

Towards the end of the 1820s the government began to face up to a need for the siting, design and regulation of towns and villages,²⁰ and during the next two decades it officially sponsored about seventy-five such settlements in the sense that it chose and proclaimed the sites, drew up the plans and sold the subdivisions.²¹ At the same time some private towns also developed as at West Maitland, Morpeth, Singleton, East Gosford, Wyong, Boyd Town and O'Connell Town. Some were established before a government town was proclaimed in the vicinity while others grew up beside existing official settlements: for example, near Yass (proclaimed in March 1837) one man subdivided some of his holding during 1840 and created O'Connell Town because it was reckoned that there were insufficient blocks within the official boundaries.

There is no need here to trace the fortunes of the individual settlements. Some, like Bungonia, grew up as a staging post but dwindled or died when the line of a main road was changed, and others declined when an important function was located at another settlement—the establishment of a customs house at the official town of Eden partly explains the demise of nearby Boyd Town.²² On occasions the sites were badly chosen: the government town of East Maitland languished behind West Maitland because it was located away from the Hunter River traffic and lacked an adequate water supply, and the village of Larbert was proclaimed in 1843 even though the main road upon which it had started to develop had been realigned.

The settlements came into being as service centres for the surrounding areas, as staging places along tracks, and as posts from which the government could try to keep some semblance of law and order (Figs. 3.1 and 3.2). Along the main routes to Sydney, in particular, towns and villages grew up some 12 to 15 miles apart which was about the distance that could be covered by a bullock dray in a day. Much of the interior land was, however, held in large pastoral blocks and thus it was generally only in the immediate vicinity of established settlements that patches of land were brought into cultivation to supply local needs. In turn, the low density of population and the difficulties of communication meant that only a few of these settlements could increase the size of their hinterlands and support blacksmiths, harness-makers and wheelwrights. Average densities can, of course, be misleading because not all the land was topographically or climatically suitable for settlement: nevertheless, it is worth making the points that *even if all urban dwellers are included* the density of the population in the counties beyond Cumberland County was less than two persons per square mile in 1851, and that the most densely populated squatting district had only one inhabitant for every 2 square miles. Some settlements, such as Goulburn and Bathurst, prospered because they were in more favoured areas and on important transport routes, or because they were at a break

Fig. 3.1: Population recorded in towns and villages in southeastern Australia at the census of 2 March 1841. (Source: *NSWBB*, 1843.)

in transport, like Morpeth located at the head of Hunter River navigation. Some had special functions: Queanbeyan, proclaimed in October 1838, acted as an administrative outpost since it was just within the boundary of Murray County. The use of convict gangs for road making and for public works also facilitated the building of some towns and enhanced their importance (the erection of a stockade at Towrang in 1833, for instance, contributed to the early development of Goulburn 6 miles away).

Only eighteen of the seventy-four towns and villages identified in the 1851 census tables were located outside the twenty counties (Fig. 3.3). The authorities, particularly the British government, were at first reluctant to proclaim towns, and hence further encourage the spread of population beyond the counties. In 1834 the Secretary of State for the Colonies refused to authorise a settlement at Twofold Bay, and the proclamation of Bowning (near Yass) was delayed from 1841 until 1848 when it was found that the site was just inside the Lachlan Squatting District. But the government had to face up to reality, and Gundagai and Albury which lay

Fig. 3.2: Population recorded in towns and villages in southeastern Australia at the census of 2 March 1846. (Source: NSWBB, 1846.)

on the main track to the Port Phillip area were proclaimed in October 1838 and April 1839 respectively even though well outside the boundaries. Similarly, other de facto settlements gained de jure recognition during the 1840s when they became administrative centres—Armidale, Binalong, Cooma and Tumut, for instance, became the headquarters of the commissioners for the squatting districts of New England, Lachlan, Monaro and Murrumbidgee. Even so, outside the counties only Armidale (556), Albury (442) and Gundagai (397) had more than 350 people by 1851, and these and the other fifteen towns contained less than 3,000 inhabitants altogether, or only about 12.5 per cent of the population of this area (Table 3.5).

Within the twenty counties the largest inland centres in 1851 were Bathurst (2,252) with Kelso (339) nearby, Goulburn (1,518), North and South Yass (653) and Queanbeyan (372). In addition, there were several coastal settlements, such as Port Macquarie (519) which had been a convict station not open for free settlers from 1821 to 1830, Wollongong (501), and many other small villages on inlets or at river mouths. However, the main concentrations of urban development were in the

Hunter Valley and in Cumberland County which, leaving aside Sydney and taking the 1851 census figures at face value, together accounted for 16,250 of the 26,000 urban dwellers in the twenty counties.

Hunter Valley settlement began effectively in 1823 when the bulk of the convicts in the district were removed to Port Macquarie and the area was thrown open to free settlers.²³ The main point to be noticed is that the Hunter Valley quickly became the main agricultural area outside Cumberland County; the population had grown to 3,260 by 1829, and 11,350 acres were under cultivation compared with only 10,560 acres elsewhere outside Cumberland County.²⁴ Four main circumstances explain this: there were extensive tracts of rich alluvial soils; the farms were larger and therefore more viable units than those along the Hawkesbury River; the immediate demand for grazing land had been met elsewhere; and produce could be freighted to Sydney by sea much more cheaply and quickly than from the inland districts to the southwest and west of Cumberland County (a point taken up in more detail later). The relatively dense settlement, concentrated on the banks of the Hunter River and its tributaries, led to the growth of towns and villages, a process that was further encouraged by the inauguration of a regular sailing-boat service along the river which was noted by the *Sydney Gazette* on 29 July 1824. Private towns were soon fostered at Wallis's Plains (West Maitland) and on Close's property (Morpeth). The government town of Maitland (renamed East Maitland in 1835) was designed in 1829 and proclaimed in 1833 but made slower progress than its private neighbours, and its administrative functions therefore complemented rather than competed with their industrial and commercial development.²⁵ Morpeth became the port for East and West Maitland when paddle-steamers began to operate between the Hunter River and Sydney in 1831.²⁶ During this period Newcastle made little progress: as a port for ocean-going vessels it was handicapped by shoals in the river and a bar at the mouth, while its potential role in the Hunter Valley was diminished because it was separated from the more productive agricultural areas upstream by low-lying swamps and large reserves of land held by the government and by the Australian Agricultural Company, and because it lacked adequate reserves of timber for use in house construction and shipbuilding.²⁷ The production of coal from the workings near Newcastle increased from 4,000 tons in 1830 to about 35,000 tons in 1840 but did little to offset the town's locational disadvantages which were reflected in the relatively slow growth of its population (Table 3.6). Smaller settlements blossomed at other favoured points: Muswellbrook (proclaimed 1833) developed at a Hunter River crossing as did the private town of Singleton lower down; Clarence Town (proclaimed 1832) on the Williams River and Paterson (proclaimed 1833) on the Paterson River grew up at the upper limits of navigation on two tributaries of the main river; and many of the villages, such as Wollombi (1833), Scone (1837), Aberdeen (1838) and Jerrys Plains (1840), had their origins as overnight resting places on tracks leading through and into the Hunter Valley.

The origins of the more important settlements in Cumberland County were discussed in the previous chapter. A score or so hamlets came into being as service

Fig. 3.3: Population recorded in towns and villages in southeastern Australia at the census of 1 March 1851. See also analysis in Table 3.5. (Source: NSWBB, 1851.)

centres for surrounding agricultural areas but some progressed further than others because they were located on the main roads leading from Sydney to the north, west and southwest, or given judicial, administrative and penal functions, or attracted other activities such as a relatively large industrial establishment. A few had other advantages: Parramatta was at the head of navigation of Port Jackson, Windsor could be reached via the Hawkesbury River by vessels of up to 100 tons, and Liverpool functioned as a small port and shipbuilding centre on the Georges River.

The physical expansion of Parramatta, the second most populous settlement in the colony (Table 3.7), was constrained by large tracts of privately held land on three sides, yet its economy was stimulated by the Female Factory, some educational and other institutions, and a few industrial enterprises. A stage-coach began operating to Sydney in 1821 but, although this service became more reliable after a couple of years, water transport remained important and was further stimulated after 1831 by the introduction of steam ferry services which enabled

Table 3.5 Population in towns and villages in New South Wales at census of 1 March 1851^a
(number of settlements in brackets)

Area	Settlements with population of					Total in settlements	Total population	Per cent in settlements
	Under 100	101-250	251-500	501-1,000	Over 1,000			
Sydney ^b	—	—	—	—	49,261 (1)	49,261	49,261	100.0
Rest of Cumberland County	71 (1)	340 (2)	808 (2)	1,269 (2)	5,563 (2)	8,051	31,853	25.3
Other counties	798 (14)	2,506 (15)	2,247 (7)	3,037 (5)	9,340 (5)	17,928	73,645	24.3
Rest of New South Wales	449 (9)	577 (4)	1,412 (4)	556 (1)	—	2,994	23,909	12.5
Total New South Wales	1,318 (24)	3,423 (21)	4,467 (13)	4,862 (8)	64,164 (8)	78,234	178,668 ^c	43.8

^a At best this should only be viewed as an approximate guide to the size of the 'urbanised' population since practical rather than 'conceptual' considerations determined the nature of the boundaries used.

^b Defined in note c to Table 3.3.

^c Excludes military (764) and colonial marine and travellers (1,944).

Source: *NSWBB*, 1851.

Table 3.6 Population of main Hunter Valley settlements, censuses 1836-51^a

Government (g) and private (p) settlements	1836	1841	1846	1851
East Maitland (g)	{ 1,163 }	1,022	910	1,099
West Maitland (p)		1,746	2,409	3,131
Morpeth (p)		^b	635	734
Newcastle (g)		1,377	1,471	1,340 ^c
Singleton (p)	^b	431	565	630

^a No other settlements had populations of more than 300 in 1851. The boundaries of the places shown probably varied between censuses so that the figures may not be comparable.

^b Morpeth and Singleton originated in the 1820s but were not listed in early censuses.

^c Quoted in the census returns as 1,005 in the 'City' and 335 in 'Suburbs'.

Source: *NSWBB*.

Table 3.7 Population of main Cumberland County settlements outside Sydney, censuses 1833-51^a

Government (g) and private (p) settlements	1833	1836	1841	1846	1851
Campbelltown (g)	n.a.	n.a.	446	541	533
Liverpool (g)	619	597	690	601	392
Parramatta (g)	2,637	3,600	5,389	4,454	4,128
Richmond (g)	762	982	514	746	736
Windsor (g)	998	1,145	1,440	1,679	1,435
Penrith (p)	n.a.	n.a.	n.a.	291	416

^a No other settlements had populations of more than 300 in 1851. 'Boundaries' varied between censuses so that the figures may not be comparable.

Source: *NSWBB*.

Table 3.8 Population of Sydney, censuses 1836-51^a

Status	1836		1841		1846		1851	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Men	10,836	50.7	13,705	43.3	14,931	36.1	15,675	31.8
Women	5,702	26.7	8,877	28.1	11,790	28.5	15,005	30.5
Children ^b	4,823	22.6	9,035	28.6	14,625	35.4	18,581	37.7
Total	21,361	100.0	31,617	100.0	41,346	100.0	49,261	100.0

^a 'Sydney' defined as the parishes of St Philip, St James, St Lawrence, St Andrew, Alexandria, and Willoughby: see discussion in text and chapter 3, note 30. The military personnel and their families enumerated in the City of Sydney have been excluded from these figures. Nonetheless, the importance of this stimulus to the economy of the town should not be overlooked: in 1846, for instance, the barracks and associated quarters contained 788 men, 150 women and 217 children.

^b Children defined as aged twelve years or less in 1836 and as under fourteen years at the censuses of 1841, 1846 and 1851.

Source: *NSWBB*.

Table 3.9 Estimated male and female employment, New South Wales, census 1 March 1851

Area	Estimated males in workforce	Females in workforce			Total workforce ^a	Not at work ^b
		Domestic service ^a	Estimated others	Estimated total		
Cumberland County						
Sydney ^c	14,798	2,822	959	3,781	18,579	30,682
Five towns ^d	2,114	295	476	771	2,885	4,339
Rest of county	7,556	698	588	1,286	8,842	15,787
Other nineteen counties						
Ten main towns ^e	4,036	587	371	958	4,994	7,722
Rest of area	21,168	1,210	1,345	2,555	23,723	37,206
Rest of New South Wales	11,784	611	755	1,366	13,150	10,759
Others ^f	2,373	—	—	—	2,373	335
Total New South Wales	63,829	6,223	4,494	10,717	74,546	106,830

^a As stated in census tabulations.^b Total 'not at work' includes category 'alms people, pensioners, paupers, etc.'.^c Defined in note c to Table 3.3.^d Namely, Campbelltown, Liverpool, Parramatta, Richmond and Windsor.^e Namely, Bathurst (plus Kelso), Goulburn, Port Macquarie, Maitland East and West, Morpeth, Newcastle, Singleton, Wollongong and Yass (no other towns had more than 500 population).^f Colonial marine, travellers and military ('workforce' and 'not at work' components partly estimated).Source: *NSWBB*, 1851.

Table 3.10 Workforce structure, New South Wales, census 1 March 1851
(per cent)

Employment category	Cumberland County		Other nineteen counties			Rest of New South Wales		Proportion of each category in Sydney ^b
	Sydney	Five towns ^a	Rest of county	Ten main towns ^a	Rest of area			
Commerce, trade, and manufacture	36.4	25.0	11.6	31.3	6.1	3.4	16.6	56.5
Agriculture, grazing, and horticulture	1.9	5.8	34.7	5.6	60.1	60.1	36.1	1.4
Other labourers	11.8	12.5	18.0	15.3	12.6	16.1	13.9	21.8
Mechanics and artificers	6.3	17.9	6.9	12.5	6.5	6.3	7.3	22.2
Domestic servants	21.0	14.0	12.0	18.9	9.3	9.8	13.6	39.8
Professional people	7.3	6.3	4.6	6.0	2.0	1.3	4.0	47.1
All others	15.3	18.5	12.2	10.4	3.4	3.0	8.5	46.0
Total labour force ^c	100.0	100.0	100.0	100.0	100.0	100.0	100.0	25.7

^a See notes to Table 3.9.

^b Compared with 27.2 per cent of total population.

^c Excludes 2,373 military, colonial marine and travellers estimated (Table 3.9) to be in workforce but who cannot be allocated geographically.

Source: *NSWBB*, 1851.

people living in this town and the hamlets around the shores of Port Jackson to travel regularly to Sydney.²⁸ This in fact turned out to be a two-edged sword which worked in favour of Sydney: late in the 1830s, for instance, the Bank of Australasia decided not to open a branch in Parramatta 'on the grounds that transport over the short distance to Sydney was so good as to make it unnecessary'.²⁹ But the main cause of Parramatta's decline during the 1840s was that, following the cessation of transportation, the need for the Female Factory (which had 1,200 inmates in July 1842) diminished, and eventually at the end of 1847 it was closed.

Sydney was the administrative, commercial and industrial hub around which the rest of the colony revolved. Defined here on the basis of constant boundaries drawn widely enough to encompass closely related peripheral growth, Sydney maintained an almost constant share—about 28 per cent—of the colony's population at each of the censuses from 1836 to 1851 (Table 3.3).³⁰ But over this fifteen-year period the age and sex structure of the town changed considerably (Table 3.8), since the number of women and children increased at annual average rates of 6.7 and 9.4 per cent respectively, compared with only 2.5 per cent for men. During the 1830s Sydney attracted a considerable proportion of the adult immigrants and locally born women, and during the 1840s absorbed many of the immigrants and their families. About 38 per cent of the population was gainfully occupied in 1851, and it is possible that one-fifth of the workforce were women (Table 3.9),³¹ thus reflecting the greater opportunities here for female labour in domestic service, commerce and manufacturing.

Quantitative evidence about Sydney's role as the main business centre of the colony is not easy to find. Much has to be inferred from the fact that it was by far the largest urban settlement; the focus for internal transport by land and water; the main point of entry for people, goods and investment funds; and the seat of a highly centralised system of government. There is no doubt, however, that Sydney was *the* business centre of the colony: one indication is that 57 per cent of the people occupied in 'commerce, trade and manufacture' in 1851 were enumerated there and this group formed 36 per cent of the town's workforce (Table 3.10).

Some of the produce of the interior, such as wool and tallow, came by dray to Sydney and passed over the wharves for export; a substantial tonnage, of which more details are given later, was also collected by small craft from the harbours and inlets along the coast and brought into Sydney for local use or for loading into ocean-going vessels. As back-loading the drays and coastal vessels carried imported and locally made or processed goods such as provisions, spirits, tobacco, clothing, boots, hardware and implements, and a few printing presses, steam engines and boilers. This trade through Sydney led to the building of wharves, stores and shipping facilities: in 1828 the government alone was operating sixteen bond stores in various parts of the town which, among other things, contained 172,000 gallons of spirits and 134 tons of tobacco.

Associated with this increase in commerce was the growth of banks and financial institutions. Butlin has also traced the moves made by local enterprise during the 1830s and 1840s to set up banks in some inland towns and the response of the

Sydney banks to set up branches.³² Although banks or agencies appeared at Bathurst and West Maitland in 1835, another at Bathurst in 1838, at Goulburn in 1838, at East Maitland in 1839, and at Windsor and Port Macquarie in 1840, only the original Bathurst Bank (which was taken over by the Union Bank in 1840) and the East Maitland branch of the Bank of Australasia survived the reassessments and reconstructions brought about by the slump of the early 1840s. During 1844, for instance, the Commercial Bank of Sydney abolished its branches and agencies at Windsor, West Maitland, Goulburn and Port Macquarie. All the country town banks, apart from the Bathurst Bank between 1835 and 1840, were simply the progeny—short-lived as it turned out—of metropolitan parents. Except temporarily and in some districts, local banking facilities made little impression on the usual form of commercial transaction in the interior. Coins and bank-notes did not remain long in circulation because they were quickly transferred to Sydney. Waugh noted in 1838 that 'every settler has his agent in Sydney, and he pays wages, etc., by an order upon him, which any dealer or publican will cash, and they circulate like bank notes till they come to Sydney and are paid'.³³ Although there was no way of telling good orders from bad, storekeepers were forced to accept them to attract business.³⁴ The effect of this system was to add yet another bond between the settlers and storekeepers of the interior and the commercial world of the colonial capital.

Transport

Among the key influences moulding the economic geography of New South Wales were the cost and difficulty of overland transport. Bach has pointed out that the squatters represented an industry on a new scale geographically but it was precisely because they were so scattered that they could exert little economic or political pressure to get particular lines of communication built.³⁵ Since the first railway—a 14 mile stretch between Sydney and Parramatta—did not come into operation until 1855, all produce and supplies were moved by road and water. In effect, this meant road transport inland and shipping services along the coast because most of the seaboard rivers are short, independent fast-flowing streams that are navigable for very short distances. During this period little use was made of the inland rivers belonging to the Murray-Darling system, which rise in the Tablelands and flow to the southwest.

During the 1820s and 1830s the lines of some main roads were surveyed and a start was made on their construction.³⁶ Although a good deal of convict labour was thus employed their efforts were largely frustrated by washouts and by damage caused by the narrow wheels of heavily laden drays.³⁷ There is little information about construction methods: although there are a few references to the use of 'McAdam's principles', most of the so-called 'roads' were little more than cleared earth tracks.³⁸ Waugh gives a vivid picture of conditions on the road from Goulburn to Sydney in July 1836:

This has been a very wet winter, and as most of the roads are still in a state of nature, almost all intercourse by carriages has been stopped between this [place i.e. Goulburn Plains] and Sydney. There are about 150 drays bogged along the road up to the axles, and the men have run up huts at the road side, and there they remain quite contented till the dry weather comes, which will be in about six weeks.³⁹

The following year Bourke reported that for 400 of the 570 miles between Sydney and Melbourne the route passed through little traversed or known country and that even on horseback the journey took ten days. The same impression is given by the Select Committee on Roads and Bridges which commented in 1847 that

A small portion only of this Colony . . . contains any approximation even to regular and formed lines of road. Such lines, indeed, may be said only to exist a short distance beyond the County of Cumberland. . . .⁴⁰

In these circumstances it is hardly surprising that overland freight costs to and from Sydney were high. The topography around Cumberland County in almost all directions added to the costs and difficulties of building roads and, of course, to the time and effort involved in any particular journey. In 1830, for instance, Mitchell, the Surveyor-General, reported that

The present descent from the Blue Mountains to the Vale of Clywd is so steep, being at the rate of one foot in every four or fifteen degrees of inclination, that heavy drays ascend and descend it with the greatest difficulty. That pull in fact alone counts two days always to teams going between Sydney and Bathurst.⁴¹

Much of the transport task was undertaken by drays hauled by bullocks because these animals were only a quarter the price of horses, could always be sold for their meat if things came to the worst, and consumed about half the quantity of rations.⁴² Indeed, bullock drivers largely relied on roadside herbage for their beasts and for this reason inland transport came to a halt during droughts.

Evidence about freight charges is fragmentary. As roads improved, new routes developed, and competition between public carriers emerged, the rates fell: to move a ton of freight between Bathurst and Sydney cost £22.8.0 in 1824, £10 in 1829 and £6.14.0 in 1832—which meant that the ton-mile rate fell in less than a decade from 39d to 12d.⁴³ It is impossible to generalise, however, because even in 1839 as much as £14 per ton (25d per ton-mile) was being asked for the journey from Sydney to Goulburn.⁴⁴ These high charges severely restricted the distance over which it was worthwhile for a grower to send agricultural produce to Sydney. Even though freight rates were becoming less onerous—the freight on wheat from peripheral parts of Cumberland County to Sydney fell from about 28d per ton-mile in 1829 to 9d in 1841—they remained substantially higher than the charges on river and coastal vessels.

During the mid-1820s about 15/- per ton was being charged for freighting goods along the Hunter River between Morpeth and Newcastle and a further 26/- for shipping them 70 miles down the coast to Sydney, thus making the cost for the

Fig. 3.5: Quantities of timber, shingles, hides and coal shipped coastwise to Sydney in 1846. About 10,000 tons of coal were also shipped from Newcastle to other settlements in Australia and to New Zealand. (Compiled from daily 'coasters inwards' reports, *SMH*, 1846.)

whole journey about 4d per ton-mile.⁴⁵ Charges quoted in the *Sydney Gazette* on 3 January 1832 suggest that the rate between Bathurst and Sydney was 12d per ton-mile but from Newcastle to Sydney by sea it worked out at less than 2d. Exact comparisons are not possible because of inadequate data about usual rates, contract rates, tolls, wharf charges, insurance premiums and so on, but there is ample evidence to suggest that during much of this period freight rates per ton-mile overland were from five to ten times higher than those by sea and delivery was a good deal slower. On a cost basis, therefore, Newcastle was as 'near' Sydney as Parramatta, and in the 1840s Moreton Bay was 'nearer' the capital than Penrith. Darling was not exaggerating in 1828 when he argued that

The Principal Grain District, that of the Banks of the Hawkesbury, is at a distance of at least thirty six Miles from the Sydney Market, and consequently under a disadvantage as to land Carriage of an expense nearly if not equal to that of Freight by Sea from Van Diemen's Land.⁴⁶

There is little quantitative information about the magnitude of the intra-colonial transport task by land and water but there is no doubt at all that Sydney remained the hub around which the whole system revolved: it was the distributing point for all imports and the marshalling centre for virtually all exports. The monopoly was all but complete. It is true that during the 1840s some settlers in the Riverina saved themselves a month of arduous labour by taking livestock and produce to Melbourne (210 miles from Albury by the line of road then used as against the 360 miles from Albury to Sydney) but the quantities involved were probably insignificant.⁴⁷ Early in the 1840s, too, the citizens of Newcastle and later the settlers in the Hunter Valley petitioned with some passion for Newcastle to be made into a free warehousing port—a status eventually granted in London late in 1845 and announced in the colony in June 1846. But for several decades this made comparatively little difference to its pattern of trade even though the journey from Morpeth to Sydney represented one-third of the cost of freighting wool from the Hunter Valley to London.⁴⁸ Only four vessels loaded wool for Europe direct during these early years: the first sailed in 1847 with 396 bales and the three others in 1852 with 1,546 bales between them: it was not until the *Gulf of Carpentaria* left Newcastle on 9 September 1883 that direct shipments of Hunter Valley produce to Europe began in earnest. Thus the immediate, practical effect of Newcastle's change in status was to legalise the small export trade, mainly in coal and livestock, to New Zealand which had been condoned for the previous few years; in the longer-run it enabled Newcastle to develop its coal exports to the Australasian colonies, to the Pacific islands, and, on occasion, even further afield, and to continue and greatly expand shipments to Victoria when it obtained independence.⁴⁹

In the previous chapter it was indicated that from an early date the colonial fleet was bringing considerable tonnages into Sydney. During the twelve months ended 30 September 1818, for instance, some twenty sailing-ships brought in about 1,100 tons of grain, coal, lime, oil, salt and meat, and 58,000 feet of timber.⁵⁰ In 1846 a

much larger fleet, which by then included fifteen paddle-steamers, called at some thirty harbours and inlets scattered from Moreton Bay in the north to Twofold Bay in the south and brought into Port Jackson more than 42,000 tons of wool, grain, coal, shells (for lime), shingles, tallow and hides, and 5,600,000 feet of timber (Figs. 3.4 and 3.5).⁵¹ In addition, some 420 tons of wool came in from Melbourne, Port Albert and Portland.⁵² This analysis helps to throw light on the road transport task. Since the colony's total export of wool in 1846 amounted to about 4,500 tons and since 2,200 tons were brought in by sea, it would appear that over 2,300 tons must have been overlanded to Sydney; similarly 346 tons of tallow came in by coaster which suggests that 550 tons arrived by road.⁵³ All the evidence reinforces the view that Sydney remained the focus of transshipments between intra-colonial and overseas transport. From 1846 through 1850 only about 75 tons of Hunter Valley wool were shipped overseas direct, whereas 6,835 tons were sent, mainly by steamer, along the coast to Sydney; for tallow the relative tonnages during the five years were 20 and 6,100. After Sydney the next busiest port for general cargo was Morpeth through which nine-tenths of the Hunter Valley produce passed. Newcastle itself was important only for the shipment of coal.

The emphasis so far has been on intra-colonial movements of produce to Sydney (largely because return cargoes were usually entered as 'sundries') but this carries the danger of perpetuating the usual view—no doubt derived from contemporary descriptions of hundreds of drays 'passing like snails to Sydney'—that this was the dominant transport task. In one sense this was true since unpressed bales of wool are bulky rather than weighty. But in 1830 the *total* wool exported from New South Wales (including re-exports) amounted to only 400 tons, and this can be compared with an estimate, published in the *Sydney Gazette* on 7 January 1830, that from 400 to 500 tons of Sydney dry goods were being hauled to Bathurst alone each year by public carriers and a good deal more besides was taken inland as back-loading for wool drays. It can be calculated that in 1846 people beyond Cumberland County would have required about 3,950 tons of sugar, tea, salt, tobacco and soap, while the total export of wool from within the colony amounted to 3,740 tons.⁵⁴ Although it is not possible to make similar estimates for more than a few of the main commodities, these suggest that if products like coal, timber and hay are excluded, there was roughly the same order of tonnage flowing from the rest of New South Wales into Cumberland County as moved in the opposite direction. Figures quoted in the *Sydney Morning Herald* on 2 May 1846 to back up a proposal for a railway between Sydney and Goulburn also support this view: disregarding movements of hay and livestock it was reckoned that 3,300 tons of wool, tallow, hides, grain and dairy produce had to be shifted each year from Goulburn to Sydney as against 4,000 tons of general goods in the opposite direction.

Thus, Sydney gained the best of both worlds. It could obtain supplies of foodstuffs like wheat and potatoes and raw materials such as timber and flax relatively cheaply from overseas, from other Australian colonies, and from those parts of New South Wales that were accessible by sea, and it was able to distribute locally made and imported manufactured goods and materials both seawards and

landwards. Moreover, Sydney gained from the processing and handling of the main export commodities: some of the wool was scoured and dumped before loading; hides were tanned into leather; and timber was cut into planks and beams for export. It becomes apparent that while the development of manufacturing in New South Wales was for the most part restricted by the limited demand in local markets, Sydney's potential trade area for a wide range of goods not only included the rest of New South Wales but also the other Australian colonies, New Zealand, and the Pacific islands. Against this background the development and location of manufacturing can now be analysed in greater detail.

4 Manufacturing in New South Wales 1815 to 1850: Its Development and Location

Three main circumstances affected industrial development in New South Wales between 1815 and 1850. First, the government gradually eased out of its role as the leading producer of goods and services and by the 1830s had come to rely almost entirely on colonial producers or overseas suppliers. Second, the growth of population from 12,900 in 1815 to 181,400 in 1851, the change from a mainly convict to a mainly free society, and the vastly increased area over which people were scattered produced substantially greater demands for food and drink, for transport equipment and construction materials, and for implements and supplies to open up and maintain farms and pastoral properties. Third, while most industrial enterprise was concerned with relatively simple activities like milling and tanning, there was also a considerable increase in technical ability, as instanced by the fact that in 1813 a mechanic had to be brought out from England to set up the first steam engine imported into the colony whereas in 1836 local foundries and engineering firms started to build engines from scratch. The way these trends developed and worked out must be seen, of course, against the wider circumstances of the colony; it is convenient, therefore, to consider developments in each of four shorter periods before turning later in the chapter to an overall discussion of the location of manufacturing.

The general contours of industrial development and location from 1815 through 1850 are not hard to establish even though the official returns reveal nothing about employment, value of production, or capital investment in plant and buildings, and give information about the physical output of only a handful of industries for only four years (1847 to 1850). Even the tabulations purporting to show the numbers of mills and 'manufactories' are obviously incomplete but this is hardly surprising since up to 1842 they were simply compiled from notes—some curt, some verbose—sent to Sydney by police magistrates or justices of the peace. The unusually precise return for the Bathurst district in 1830, included here as Fig. 4.1, illustrates this point.

1815 to 1820

At the beginning of this period the government was itself directly involved in making products like bricks, lime, coarse woollen cloth, nails, implements, metal goods and furniture, and in building and repairing ships. The nature and extent of these activities varied according to the availability of skills, the government's building program, the number of people it had to maintain, and the relative costs

A Return of the Number, Names, Situations and Descriptions of all the Manufactories, Mills, and other Machinery or Works in the Districts of Bathurst 24 February 1830

No.	Names of the Proprietors	Situations	Descriptions
1.	Thos. S. Hawkins Esq.	Blackelong	One brick stone windmill for grinding flour; One four horse power steam mill being in progress; and One Tannery
2.	Mr. John Brown	Wadmondah Creek	One Loom for weaving colonial cloth; One six horse power mill for grinding wheat and a Dyeing Machine
3.	Mr. Samuel Torgy	Yarras	One Water Mill for grinding flour, with Dyeing Machine complete in full work; and Machinery for a four horse power is in readiness
4.	James Walker Esq.	Wadmondah	One Water mill turning a pair of small stones 18 in diameter the water wheel being 18 in diameter and 3 feet wide
5.	W. Mackenzie Esq.	Wadmondah	One Loom for weaving colonial cloth
6.	William Jackson Esq.	Wadmondah	One Loom for weaving colonial cloth
7.	Thomas Kelly Esq.	Wadmondah	One Tannery
8.	John Shaw Strange	Wadmondah	One Tannery
9.	William Marlow	Wadmondah	One Tannery
10.	John White	Wadmondah	One Distillery for colonial spirits and One Tannery

*Thos. S. Hawkins Esq.
Sept 1830*

Fig. 4.1: This return of 'manufactories, mills, and other machinery or works' in the Bathurst Police District, dated 24 February 1830, is a better than average example of the information on which the NSWBB tabulations were based. The distillery, mentioned in the last entry, appears to have operated (at least legally by paying duty) only in 1828. Reproduced by permission from original in NSWAO, 4/7267.

of local and imported products. Most of the output was used either for the construction and maintenance of public buildings and works or for the upkeep of military and civil personnel and the convicts and free settlers being supported by the government.

Gradually, despite reversals of policy from time to time, the government came to rely increasingly on private enterprise. In 1816 an arrangement was made to have the cloth woven in the Parramatta Female Factory dyed and dressed commercially,¹ and two years later the government bought for use in Tasmania a 92 ton sailing vessel that had been built on the Hawkesbury River. About this time, too, colonial accounts showed increasing debits covering purchases of goods like bricks, lime, shingles, candles, leather and soap, and for services as diverse as the binding of books and the carriage of freight. Funds also flowed to the private sector through building contracts like those for a church at Liverpool and a new gaol at Parramatta.

In particular the government turned to private enterprise for flour. During 1815

the administration was providing about 3,400 full rations daily which needed about 75 bushels of wheat while in 1821 the 12,100 rations being issued used about 250 bushels.² Demands also arose over and above purely local needs: for example in 1819 troop transports bound for India and England stocked up with over 40 tons of biscuit and flour. The two government mills still operating in 1815 could not possibly cope with these demands: one had a capacity of about 10 bushels a day while the other had been lent to the garrison regiment for its own use. The obvious solution was to call on privately owned mills although this immediately raised questions as to whether the government should purchase the wheat and then contract out the actual milling or whether it should simply buy the flour. Prior to 1820 only one private mill was large enough to supply most of the daily needs; hence it was felt that any arrangement of the latter kind might put this firm in a monopsonistic position that would enable it to force down wheat prices and cause distress among the small farmers.³ In the short-run, therefore, the government decided simply to contract out the milling and dressing of wheat bought by the Commissariat.⁴

These various demands undoubtedly spurred the development of some industrial activities just at a time when businessmen were beginning to look upon manufacturing as a worthwhile prospective outlet for surplus funds. Not only did their investment time-scale lengthen after about 1811 but some merchants saw local manufacturing as a way of replacing the flow of imports that dried up during the commercial depression of 1811-5. Thus Simeon Lord at one time or another manufactured cloth, hats, blankets, woollen stockings, leather, harness-ware, shoes and candles, and interested himself in the possibility of mining iron ore in Tasmania and in experiments to produce dyes, pottery and glassware.⁵ Wentworth's view, however, was that 'unnatural efforts' to make articles like hats and cloth stemmed from the lack of encouragement or even discouragement given to agriculture by the government (which cut its own demands by reducing the period during which new arrivals could draw rations) that had forced small farmers into debt.⁶ From this he argued that local manufacturing had only become necessary in order to provide cheap substitutes for imported essentials like clothing, and had only become possible because of the use of the barter system whereby wool was paid for in cloth and workmen were given meat and grain instead of cash to the full value of their labours.

At least three other factors contributed to the growing interest in manufacturing. The first was the high cost of freight and insurance and the delays and uncertainties associated with importing materials and products from the other side of the world. Second, there was the lack of interest in British mercantile circles about the problems of this remote and puny outpost of empire. Third, for a number of years there was uncertainty about whether the arrangement for merchandise to be brought to the colony aboard convict ships would be allowed to continue.

Two other kinds of investment in manufacturing must be mentioned. One was encouraged by the inducements offered to people with capital and entrepreneurial experience to emigrate to the colony. An outstanding example was John Dickson

who brought £10,000 worth of goods and machinery, including the first steam engine, to Sydney in 1813 with the intention of erecting a sawmill: two years later it was in fact set up as a grain-mill with a daily capacity of 5 tons of flour.⁷ The other type of investment was that made by some farmers and landholders on their own grants. This ranged from a hand-operated loom or grain-mill to more elaborate installations like windmills, tan-pits and forges which made the estates relatively self-sufficient. William Cox on his property at Clarendon, near Windsor, made cloth, clothing, boots and blacksmith's goods, and John Blaxland on his estate at Parramatta turned out 30 yards of cloth weekly from wool which was too coarse to sell for export. Such home-produced wares were mostly used on the spot—Cox and his sons had a hundred convicts to maintain—but from time to time some of the surplus found its way on to the market. But neither then nor later did 'cottage' industry develop in the traditional English sense, perhaps reflecting the scarcity of females in the colony and the desire to make use of them in other ways. The only exception was the manufacture of cheese in primitive farmhouse dairies, sometimes carved into hillsides for coolness, which in the mid-1820s was being sent to Sydney from as far away as Bathurst in the west and Patersons Plains in the Hunter Valley.

There is no quantitative evidence about the growth or importance of manufacturing. Wentworth guessed—apparently relating to 1817—that investment in colonial industry could not be 'far short of £50,000', but there is no indication of what he included in this figure.⁸ No one seems to have ventured another estimate for at least two decades, although literary evidence points to a good deal of new investment, at least in colonial terms, in activities like brewing, flour-milling and the manufacture of woollen cloth and rope. At the beginning of 1815, for instance, the effective milling capacity in the colony was no more than perhaps 50 to 70 bushels of grain per day but by 1821 it had increased tenfold. Not all these enterprises were successful: some operated for only a year or two before going out of business as was the case with a paper-mill which started in 1818 but was idle by 1825.

It would be wrong to place too much emphasis on the relatively few large establishments operating by the end of this period. Although Lord's cloth-mill (1814), Dickson's steam flour-mill (1815) and the water-powered Waterloo Mills (1820) received a great deal of publicity, more typical were the small mills and workshops in which a few score or a few hundred pounds had been invested, such as an animal-powered mill completed at Parramatta in 1820 at a cost, according to the *Sydney Gazette* on 22 April, of £300 with a daily capacity of 14 hundredweight of flour. Newspaper advertisements indicate that the range of products being made was growing although in some cases the quality may have left much to be desired. Bigge's enquiries revealed a good deal, for instance, about the state of the tanning industry. Only one of the seventeen tanneries operating in 1820 was being run by a man born to the trade; all the other proprietors were self-taught and most were operating tan-pits as an ancillary to their shoemaking or harness-making businesses or in association with their grazing activities. Bigge was unimpressed by much of

this local leather—some of which was probably dyed rather than properly tanned—and recommended that tanners should be licensed and that a hide inspector should be employed in each district to try to prevent careless branding and slaughtering.⁹ Experiments were still being made with materials on hand or available from nearby islands; in 1817 samples of line, twine and yarn made in Sydney with flax brought from New Zealand were tested by the Admiralty in England but found to be only two-thirds the strength of those made from Riga and Chile hemp.

The official attitude towards industrial activities at this time was ambivalent but this may have been because of confusion about what was meant by 'manufacturing'. As has been shown, the local administration had to rely on private enterprise for grinding grain, and for part of its supplies of commodities like leather, soap, candles, lime and salt. The British government raised few objections to these kinds of activities and, indeed, showed itself willing to encourage others particularly if they could produce exportable commodities. Thus Dickson's proposal to set up a steam sawmill in New South Wales was supported by Bathurst, Secretary of State for the Colonies, partly because this was useful in itself but also because Dickson undertook to investigate the possibility of smelting and then exporting local iron ore.

More contentious were ventures set up to make items such as cloth, stockings and blankets which could compete with English-made goods. Bigge gave his blessing to private grain-mills and to the production of beer, spirits from grain, good quality leather, and cloth woven on a limited handicraft basis on settlers' estates,¹⁰ but recommended against the growth of factory industry as such:

As I do not conceive that it is consistent with the policy by which this country has always been guided, to encourage in any of her colonies, however distant, the establishment and growth of manufactures; and as the association that is necessarily produced by manufactures, or any difficult mechanical operation conducted in them, is always found to diminish the effect of penal restraint, I think that no encouragement should be given, in the shape of convict skill or labour, to such manufactures as interfere with either object, or that require a number of men to be confined to one spot. The only manufactures hitherto established are those of Mr. Lord, for coarse cloths, stockings, and blankets, and two for hats. From the specimens of those articles that I have brought with me from New South Wales, your Lordship will be enabled to form a judgment of the progress that has already been made in New South Wales, in the manufacture of a principal article of export from the mother country, and of the expediency of discontinuing any encouragement to its further progress.¹¹

In the event the British government does not seem to have taken the implied 'threat' to its exports very seriously. The relevant discussions between Bathurst and Governor Brisbane about Bigge's recommendations showed greater concern about the employment of convicts on useless work (such as making pottery which could not be glazed) and about crowding criminals into urban workshops. Even this

latter problem seems to have been solved by the mid-1820s for the assignment regulations were changed and many convict mechanics were sent to country areas 'away from the temptations of Sydney'.

1821 to 1830

The first part of the 1820s saw boom conditions in the colony as a result of pastoral expansion encouraged by substantial capital transfers in the form of trade surpluses, British government expenditures, and movement of investment funds by individuals and by larger investors including the Australian Agricultural Company which began operations in New South Wales in 1826.¹² Other factors also encouraged entrepreneurial activity in manufacturing such as the continuation of government purchasing; vigorous investment in building, construction and transport activities; and changes in government policy like the legalisation of distilling. An indication of some of the developments taking place in the colony during this period is given in Table 4.1.

Table 4.1 Population and resources, New South Wales, 1821–28

Item	1821 ^a	1828 ^b	Per cent increase
Population (no.) ^c	31,635	38,869	23
Sheep (no.)	119,777	504,775	321
Cattle (no.)	67,949	248,440	266
Land granted (ac.)	381,467	2,766,933	625 ^d
Land cleared (ac.)	58,313	225,812	287
Land cultivated (ac.)	32,271	70,695	119

^a Land and livestock details from *HRA*, I, x, p. 577 (some totals corrected).

^b Derived from *NSWBB*, 1829, p. 200 (amended return for 1828).

^c See notes to Table 3.3.

^d Without the Australian Agricultural Company's grant of 1 million acres the increase would have been 363 per cent.

Towards the end of 1827 there was a downturn in the economy as a result of 'a liquidation crisis leading to a heavy fall in the prices of imported goods, a cut in capital imports, probably associated with the 1825 crisis in England, a fall in wool prices and a severe two-year drought [1827 to 1829]'.¹³ A director of the Bank of New South Wales explained in 1828 that

much of the present distress arose from excessive Imports which had taken place; that the second rate dealers had been tempted by the Comparative cheapness to the Goods to make large purchases; fresh Imports reduced the prices still lower . . .; the Settlers from a failure of their Crops are unable to pay, and the dealers from over speculating are unable to pay the Importers.¹⁴

Imports reached an even higher level in 1829.

The breaking of the drought in 1830 and a substantial increase in export income during the following year revived the colony's fortunes so that by November 1831

the *Sydney Gazette* was able to write about 'all classes of her industrious inhabitants emerging from their difficulties'. Although wool prices did not reach their 1826 level until 1834, total returns were bolstered by a fourfold increase in the quantity sent overseas from 247 to 1,003 tons. Other factors influencing external trade returns (see Table 4.2) were a growth in the entrepôt trade and a reduction in breadstuff imports: whereas the colony spent £143,000 on wheat and flour from 1827 through 1832, it then became a net exporter of these commodities.¹⁵

The evidence about how these boom and then slump conditions affected manufacturing is somewhat conflicting: suggestions that distilling was curbed in 1828 and 1829 because of high grain prices are not borne out by the small quantities of spirits made in 1832 and 1833 when grain prices were low, and suggestions that colonial manufacturers were capturing an increasing share of the local market appear implausible given the falling import prices towards the end of the decade. But, in general, the 1820s saw enlarged capacity in existing industries and a widening range of products being made. The growth in population produced an increased demand for food, drink and building materials; the spread of settlement created a need for more transport equipment on land and at sea; and the diversification of the economy brought into being workshops making goods ranging from farm implements to pottery ware. Concurrently, financial institutions like the Bank of New South Wales, which began operations in 1817, made available some of the capital needed: in May 1826 Robert Cooper had a direct or indirect liability to this bank—with little or no security—of over £12,000, some of which had probably been used to finance a distillery said to have cost between £20,000 and £30,000.¹⁶

By no means all the investment was well conceived: some industries, like distillation, benefited neither the promoters nor the colony. It was noted in Chapter 2 that after a good deal of discussion the distillation of spirits was legalised as from 1 August 1822. Three distilleries were built. Underwood's at Sydney operated only during 1824 and 1825; Cooper's was completed in 1825 but, despite initial government encouragement through the lowering of duties payable, worked much below capacity for only about six months each year; and a distillery near Bathurst appears to have functioned only during 1828.¹⁷ Advocates of colonial distillation (such as Wentworth) had imagined that this additional market for grain would assist agriculture and hence improve the lot of the farmers but from this point of view, too, the distilleries were a failure: from 1824 through 1830 some 25,600 gallons of spirits were made from about 345 tons of grain but 36,900 gallons were produced from 205 tons of sugar most of which had to be imported.¹⁸ The actual amount paid for grain by the distilleries is not known, but on the basis of current prices the expenditure would at most have only been about £640 in 1827, £1,650 in 1828, £540 in 1829 and £920 in 1830.

More successful, and more advantageous to the colony, was the introduction of steam engines, the first of which (1815) was followed by three others, also installed in flour-mills, in 1825, 1826 and 1829.¹⁹ These were wholly imported engines but their setting up (probably by people brought out from England for the purpose),

Table 4.2 External trade, New South Wales, 1826-31^a
(£000)

	1826	1827	1828	1829	1830	1831
Exports						
Timber products	12	13	12	17	5	8
Agricultural products	1	5	4	8	17	19
Pastoral products ^b	49	25	43	74	49	97
Mineral products	—	1	1	1	—	—
Other	9	1	3	7	10	102 ^c
Sub-total	71	45	63	107	81	226
Fisheries products ^d	36	31	27	55	60	96
Total Exports	107	76	90	162	141	322
Imports						
Fisheries products ^d	n.a.	n.a.	1	45	48	125
All other	360	362	569	556	373	365
Total Imports	360+	362+	570	601	421	490

^a Prior to 1831 the trade returns did not distinguish re-exports as such and thus the export totals shown include the value of timber, flax, arrowroot, etc. originally derived from New Zealand and the Pacific islands.

^b In the four years 1828 through 1831 about 173 tons of Tasmanian wool were imported into New South Wales. Some was expressly brought in to be used at the government's cloth-works at Parramatta (which was using 54 tons annually from all sources: see *HRA*, I, xiv, p. 21, assuming 4 lb greasy wool per yard of cloth) but no deduction has been made in this table.

^c This consists of (i) manufactured and miscellaneous goods (the produce of New South Wales, New Zealand and South Sea Islands) valued at £15,000, and (ii) British and foreign manufactures and produce re-exported worth £87,000.

^d Fisheries products were mainly black oil, sperm oil, sealskins and whalebone. Because of the uncertainties surrounding the figures for these items they have been shown separately. The main problem is that so-called imports appear to be a mixture of 'true' imports and of cargoes of colonial vessels returning from whaling and sealing expeditions.

Source: Calculated from *NSWBB*, 1826-31.

use and repair added to the colony's fund of basic engineering skills and prepared the iron and brass foundries for the increasingly complex demands to be placed on them in the 1830s. These same trades also benefited from fitting out and sheathing locally built vessels and repairing and maintaining imported and visiting ships.²⁰ Moreover, even the shipbuilders operating away from Sydney itself had gained enough experience—not to say ambition—to construct substantial vessels: for instance a 264 ton barque was launched into the Hawkesbury River at Pitt Town in 1829, a year in which vessels entering Port Jackson from Europe averaged only 350 tons.

Colonial entrepreneurs of any substance, operating on their own or in partnerships, seldom devoted themselves entirely to their industrial interests. In some instances a mill or factory formed only one part of a many-sided business which in the case of The Waterloo Company included flour-milling, a general store, importing, ship owning, squatting and the issue of notes.²¹ Moreover, businessmen's involvement in projects waxed and waned: The Waterloo Mills was originally operated by Hutchinson, D. Cooper, Williams, and Leverton but a series of changes between 1820 and 1825 brought it into the hands of D. Cooper and Levey.²² Similarly Underwood's distillery project had several partners (including R. Cooper) but these were bought out before the building was finished in 1824.²³ Many entrepreneurs had considerable estates: Dickson was granted 3,000 acres (apart from a smaller area in Sydney on which to erect his steam engine) shortly after his arrival in 1813 and had 17,000 acres by 1828; Hutchinson had half a dozen properties in various parts of the colony by the mid-1820s. Walsh has noted that Terry's Albion Brewery, which began operations in 1828, was supplied with barley from the owner's estates, and there were probably other similar examples of elementary integration backwards.²⁴ Entrepreneurs also spread their risks or utilised resources more fully by venturing into several kinds of manufacturing: sometimes these used related materials as in the case of Wilshire's tannery, soap and candle-works, slaughter-house and salting down works, or used common sources of water or steam power as at Lord's woollen and flour-mills at Botany, and Cooper's distillery and flour-mill near Sydney.²⁵ A significant feature of a disproportionately large number of these ventures is that they were promoted by men who had arrived in the colony as convicts (such as Underwood in 1788, Lord in 1791, Hutchinson in 1799, Terry in 1801, Robert Cooper in 1813, Levey in 1815 and Daniel Cooper in 1816).

The government continued to rely heavily on private enterprise but was able sometimes to take advantage of the increased number of firms and the growing competition between them. Hence, early in 1821 the government encouraged John Dickson and the firm of Hutchinson and Company (The Waterloo Mills) to bid against each other by referring the rate for grinding offered by one firm to the other, a process which whittled down the rate per bushel of wheat from 9d on 26 January to 1d on 17 February.²⁶ Even so the government was never very happy about the expense involved (in 1823 alone the Commissariat spent £2,300 on grinding wheat) but made no move to again undertake this work itself. Brisbane's report in 1824

that the two treadmills (powered by convict labour as a punishment) had done away with the need to use contract millers was stretching the truth because, even before the 'fixed price' system ended late in 1822, the government was arranging for local bakeries to supply bread to various institutions under its control:²⁷ the Sydney gaol contract alone would have used the equivalent of about 6,000 bushels of wheat a year. Such contracts were not always an easy way to make money. Early in 1825 one man agreed to supply bread to the gaol but within a month the price of wheat had risen from 6/6d to 9/6d and more per bushel; although he was given temporary assistance, it was decided that contractors must learn to carry such losses themselves. The government also had to learn from mistakes for it sometimes awarded contracts to people lacking the resources to carry them out and then had to come to their assistance to ensure continuity of supply.

In some instances the government took its time before deciding whether to buy goods locally, to make them itself, or to rely on imported supplies. Complaints about the quality of footwear reaching Tasmania and New South Wales (largely because the thread rotted during the voyage) led to the enlargement of the convict shoemaking shop which by 1827 was turning out over 200 pairs a month. At first the shoes were made up from imported materials but it was soon discovered that colonial leather was cheaper and more durable and that, in any case, local private enterprise shoemakers were prepared to supply the bulk of the government's needs at low contract prices. By 1831, however, Darling had become disillusioned about the standard of workmanship and ordered all the government's requirements from Britain. Despite such experiences, the administration does appear to have gained by engaging in some industrial activities: bricks from its own kilns, for example, cost 12/- per thousand compared with 22/- on the open market, and shingles could be made for half the commercial price.²⁸ Moreover the formation of convict gangs at a limited number of establishments made closer supervision possible and some sort of basic trade training for convict youths practicable. But the colonial administration was under pressure from London to reduce expenditure, and in the late 1820s and early 1830s its industrial establishments were scaled down and eventually closed. Windmills at Sydney, Newcastle and Port Macquarie, and a tannery at Bathurst were leased out, the government dockyard at Sydney was allowed to undertake only 'trifling repairs' after August 1831, and the Lumber Yard (where convict gangs worked up metal and timber) was shut down at the beginning of 1832. To all intents and purposes direct government participation in manufacturing activities then came to an end.

1831 to 1840

The 1830s have been characterised by Butlin as 'a period of extraordinarily rapid economic growth in which immigration and capital import furnished the material for a vast geographic expansion of the wool industry'.²⁹ Whereas there were only 10,300 people (29 per cent of the population) living outside Cumberland County in 1828, there were 56,500 (51 per cent) outside in 1841; whereas there was

Table 4.3 External trade, New South Wales, 1831-40^a
 (£000)

Year	Excluding Fisheries Products				Entrepôt Trade	Fisheries Products ^b	
	Wool exports	Processed and manufactured exports	Other exports	Total exports ^c		Imports	Exports
1831	76	9	54	139	87	125	96
1832	74	19	60	153	82	89	147
1833	104	18	48	170	76	170	147
1834	214	32	72	318	109	139	157
1835	300	17	66	383	115	172	180
1836	369	18	58	445	165	126	134 ^d
1837	320	28	49	397	164	117	183
1838	384	34	41	459	112	117	198
1839	397	18	33	448	247	243	172
1840	498	49	71	618	423 ^e	135	224
Total	2,736	242	552	3,530	1,580	1,433	1,638

^a Excludes Port Phillip District but, unavoidably, includes New Zealand and South Sea Islands produce.^b Fisheries products were mainly black oil, sperm oil, sealskins and whalebone. See note *d* to Table 4.2 about problems relating to these figures.^c Includes only exports of colonial produce: excludes half the value of 'exports' to 'the Fisheries' (estimated prior to 1835) to try to allow for stores simply provided to colonial vessels engaged in whaling and sealing (for no year does this reduction amount to more than £6,000), and excludes the entrepôt trade.^d Later summaries of fisheries products exported in 1836 (e.g. *NSWBB*, 1840) give a figure of £140,220 as being the valuation of the same *quantities* valued at £133,800 in the 1836 return itself.^e The rise in the entrepôt trade in 1840 was mainly associated with the beginning of permanent settlement in New Zealand in January of that year.Source: *NSWBB*, 1831-40.

insignificant urban settlement beyond Cumberland County in 1830, nearly 10,000 people lived in the score or so towns and villages that had grown up there by 1841; and whereas the colony depended entirely on sailing craft for river and sea communication before 1831, a decade later there were nearly a dozen paddle-steamers in the colonial fleet. The external trade figures set out in Table 4.3 also help to indicate (despite their deficiencies) some of the main developments during these years. Aside from the value of whaling and sealing products and re-exports, commodities worth £3,530,000, three-quarters of which was wool, were sent overseas. Retained imports, after deducting the fisheries products, totalled £9,460,000. The scale, if not the detail, of the capital inflow is thus clear especially as these figures take no account of funds transferred privately or officially.

Stimulus was thus given to developments like the construction of wharves and stores, the expansion of shipping and transport services, and the growth of the merchant houses, agencies, shipping offices, retail stores, and other businesses that made up Sydney's commercial world and the financial, administrative and legal institutions related to it. This remains for the most part an unwritten chapter in Australia's economic history although Barnard has sketched the way in which firms became more involved in the purchase, storage, selling and shipping of wool during the 1830s and 1840s.³⁰ Specialisation was still uncommon but some firms were beginning to emphasise a particular aspect, such as sharebroking or wool auctioning, of their multifarious activities. The decade also saw the formation of joint stock companies to engage in banking, insurance, auctioneering, land and sea transport and the manufacture of gas; share-lists at the end of 1840 named twenty-one companies, all but three of which were formed after 1830.³¹ Most commercial and financial activity remained concentrated in Sydney but the needs of country areas were not entirely overlooked: some Sydney firms extended their wool buying activities to Bathurst early in the decade,³² the Commercial Bank of Sydney established an agency at West Maitland in 1835, and residents of Bathurst and nearby settlers set up a local bank which opened for business at the beginning of the same year.

In the absence of any employment, investment or output figures, no clear impression can be obtained of the course of industrial development, but three characteristics can be discerned. One was the establishment of mills and works outside Cumberland County—a process that can be considered more conveniently later in the chapter. The others, now to be discussed in turn; were the increasing use of steam power on land and water with the accompanying growth of engineering and metal-working skills, and the emergence of external markets for some processed commodities.

Steam power, shipbuilding and engineering. In 1831 there is definite evidence of only six steam engines (with an estimated capacity of 112 horse-power) operating in the colony (one of which was used to pump water and raise coal at the Australian Agricultural Company's workings near Newcastle). By the end of 1840 twenty-six engines had been installed in flour-mills and ten in other establishments; these together are estimated to have had a capacity of about 400 horse-power. Paralleling

this was the inauguration and development of coastal paddle-steamer services. The first such vessel, the *Sophia Jane*, arrived (under sail) from Britain in May 1831 just prior to the launching of two locally made hulls. By the end of 1840 a further nine vessels had been built: until the launching of the *Maitland* in 1837 all had used imported engines, and until the *Rapid* was put together from imported iron sections in 1838 all had had wooden hulls. These developments on land and sea marked the beginning of mechanical and marine engineering in Australia. A growing range of associated problems was also tackled: the engine from the *Ceres* wrecked in 1836 was recovered, refurbished and used in the *Victoria*; the two from the *King William* wrecked in 1839 were put into the *Sovereign* which was launched in 1841; and a 350 ton steam dredge was built in 1840 and fitted with imported machinery. In addition, at least five British-built paddle-steamers had seen service in the colony by the end of the decade and these also needed maintenance and repair. Local engineering establishments were thus pushed into new technical feats as in July 1840 when the *Sydney Herald* reported that one had bored a cylinder 43 inches in diameter and another had made a casting weighing 30 hundredweight. A good deal of work was also created by the repairing and refitting of locally registered ships and visiting whalers, merchantmen and naval vessels, the average size of which was growing larger. Thus, the 155 vessels entered inwards in 1831 averaged 219 tons as against 303 tons for the 447 arrivals in 1840; the 4 ships launched in 1831 averaged 24 tons while the 17 built in 1840 averaged 70 tons; and the average tonnage of vessels registered increased from 87 to 129. It was not uncommon in 1840 for a hundred or more ocean-going vessels to be anchored in Port Jackson with twenty or thirty being refitted, a process that was greatly facilitated in 1833 by the erection of an imported slip on the foreshore at Darling Harbour which the owner claimed, in a letter to the *Sydney Morning Herald* (30 November 1846), had accommodated vessels of more than 500 tons.

Up to 1836 all steam engines had been imported, but early that year some small ones were made for coffee and condiment grinders³³ and a few months later a larger one was fabricated for a flour-mill. More than a dozen engines were made during the next five years, including one of 60 horse-power for the *Maitland*, but the *Sydney Herald* on 2 April 1841 considered that production was hampered by a scarcity of competent tradesmen. Demands for metal products also flowed from other sectors of the economy. For instance, stricter regulations about the disposal of stormwater and sewage increased the need for pipes and guttering, and some orders may even have been placed locally for ornamental ironwork (though until the 1850s most of this was imported). Altogether 6,040 tons of raw and semi-fabricated iron and steel were imported during the five years to the end of 1835 and a further 8,350 tons to the end of 1840; comparative figures for copper were 270 and 420 tons, and for lead 630 and 710 tons. At best, however, these are very rough orders of magnitude because some of this metal may have been re-exported, and a certain amount of scrap was probably recycled within the colony itself.

Exports of manufactured and processed goods. This decade saw the growth of external markets for some locally processed or manufactured commodities. Such

exports, valued at £242,000 and making up nearly 7 per cent of all exports of colonial origin from 1831 through 1840, consisted of items like flour and bread (£134,000), butter and cheese (£50,000), soap and candles (£15,000), wooden products excluding sawn timber (£10,000) and beverages (£5,000). Too much should not be made of most of this trade, except insofar as it widened the horizons of local entrepreneurs, although the export of flour and bread had some significance for mill-owners since it represented a throughput of about 500 bushels a week over much of the decade and almost twice this quantity in 1840. It was just as well, in fact, that the millers developed these external markets (to which they sent 6,100 tons of breadstuffs during the decade) because they had to face competition on the home market from the 6,500 tons of flour brought into Sydney over this period from Tasmania, North and South America and elsewhere.

1841 to 1850

Industrial development during this decade probably slackened as a result of an easing in the adult male population growth rate, a downturn in the level of economic activity within the colony, and the lack of any further expansion of external markets for locally made or processed goods. Each of these factors can be considered in turn.

Population. The account of the demographic changes set out in the previous chapter needs only minor supplementation. The particular point to be emphasised here is that the number of adult males in the colony increased between 1841 and 1851 by only 5,700 compared with 24,400 adult females and 40,300 children under the age of fourteen; the potential male labour force thus grew by only 9 per cent whereas the number of 'adult male equivalents'—perhaps a very rough guide to the potential demand for consumer goods—increased by 41 per cent.³⁴ At the same time, Sydney's population increased by 17,650 but only 2,000 were men (Table 3.8), so that the potential male labour force grew by 14 per cent while the number of 'adult male equivalents' rose by 45 per cent. This suggests that industrial development may have been curbed not so much by a reduction in demand but by a shortage of labour, and especially of skilled labour. On 2 April 1841 the *Sydney Herald* indicated that local engineering establishments had orders in hand for seven steam engines 'but from the scarcity of mechanics none of them will be completed this year, although some will be commenced shortly'.

Depression. In 1840 there were signs of a slackening in economic activity. Among the causes suggested by Butlin are the drought that occurred from 1838 through 1840; the decrease in the rate of geographical expansion which reduced the demand for stock for new areas; the opening up of new pastoral stations at increasing distances from the markets which raised stocking, operating and selling expenses; the rises in wage levels; and the cessation of convict transportation in 1840 with the consequent concern about a shortage of labour.³⁵ One view of the events of the decade can be obtained through the external trade figures set out in Table 4.4, although it is particularly unfortunate that the only detailed trade returns available

Table 4.4 External trade, New South Wales, 1841-50^a
(£000)

Year	Excluding Fisheries Products				Entrepôt Trade ^b		Fisheries Products ^c	
	Wool exports	Tallow exports	Processed and manufactured exports	Other exports	Total exports ^d	Retained imports	Imports	Exports ^e
1841 ^f	432	1	n.a.	n.a.	433 +	n.a.	n.a.	128
1842 ^f	444	—	n.a.	n.a.	444 +	n.a.	n.a.	85
1843	467	7	21	44	539	1,019	67	80
1844	471	70	22	63	626	542	48	57
1845	613	90	28	84	815	720	83	100
1846	669	25	32	66	792	1,038	82	80
1847	706	92	35	84	917	1,278	198	86
1848	684	103	27	81	895	914	78	75
1849	664	150	39	66	919	1,086	56	47
1850	788	168	72	102	1,130	1,096	39	37
Total	5,938	706	276 +	590 +	7,510 +	7,693 +	515 +	775

^a Includes Moreton Bay but excludes Port Phillip District, New Zealand and South Sea Island produce: to this extent is it not comparable with Table 4.3.

^b Excludes the value of non-colonial fisheries products (derived from NSWAO, 4/7251, p. 31) as these have been included in column showing fisheries exports.

^c Fisheries products were mainly black oil, sperm oil, sealskins and whalebone. See note *d* to Table 4.2 about problems relating to these figures.

^d Includes only exports of colonial produce: excludes half the value of 'exports' to 'the Fisheries' to try to allow for stores provided to colonial vessels engaged in whaling, and excludes the entrepôt trade.

^e Includes British and foreign fisheries products.

^f Data shown come from summaries available for some items: detailed data are for years ending 30 September 1841 and 1842 and are thus not comparable with calendar year data for remaining years.

Sources: *NSWBB*, 1843-50, supplemented by NSWAO, 4/7251.

for the critical years 1841 and 1842 end on 30 September instead of 31 December like all the others. Retained imports (excluding fisheries products) for the calendar years 1843 through 1850 were valued at £7,693,000 whereas exports of colonial produce amounted to £6,633,000, thus suggesting that there was a considerable decrease in capital inflow compared with the previous decade.

It is difficult to be sure how the depression affected manufacturing. There is certainly evidence of problems. In little more than ten months in 1842 fifty-five manufacturers were among several hundred men declared insolvent, mainly voluntarily under an Act (5 Vic. no. 17 of 1841) which allowed people to retain property if their financial embarrassment appeared likely to be only temporary. Beginning on 17 February 1842, when the first creditors' meeting under this legislation took place, a succession of coach-builders, bakers, wire-workers, sail-makers, blind-makers and engineers submitted themselves to insolvency proceedings which the *Sydney Morning Herald* (3 January 1843) analysed by trades and occupations. Little is known about the majority of these people but some, like Wright (brewer); Korff, Nicholson (shipbuilders); Bourne, Russell (engineers and iron-founders); and Girard, and Howell (millers) were well established in the Sydney industrial world. The deficiencies of manufacturers were generally insignificant, however, compared with those of merchants, agents and settlers. Most of the joint stock companies formed during the previous decade also collapsed: among others the General Steam Navigation Company was disbanded and the paddle-steamers *Sophia Jane*, *Victoria* and *Maitland* were offered for sale at public auction on 14 February 1842. One survivor was the Australian Gas Light Company which was formed in 1837 and, despite the difficulties of the times, raised funds mainly within the colony, bought land, imported equipment, erected a plant, laid mains, and supplied gas to forty-nine consumers for the first time on 24 May 1841.

The failure of some firms affected others (the insolvency of the Russell brothers was precipitated by the failure of two local merchant houses) which, in turn, were also having to sell off imported goods for whatever prices could be obtained. The depressed trading conditions, the high wages and shortage of skilled labour, and the drying up of easy credit placed a damper on experiment and innovation. One broad indicator of the magnitude and duration of these changes is the tonnage of coal apparently used in the colony (production minus exports, disregarding stocks) which rose from 19,000 in 1839 to 27,800 in 1840, fell back to 19,900 in 1845, and then climbed to 33,600 in 1846 and to almost 40,000 in 1850. The reduction in coal usage during the early part of the decade was to some extent masked because of the appearance of several new and significant users, including the gas-works (which took delivery of an average of 1,800 tons of coal a year from 1842 through 1845)³⁶ and the sugar refinery (which started operating in September 1842), and because wood fuel in Sydney had been increasingly scarce and expensive since the early 1830s.

Even so the effects of the depression on manufacturing can be exaggerated or misinterpreted. One of the characteristics of manufacturing even in more 'normal' times was the rapidity with which businesses appeared, collapsed and changed

hands. Added to this is the difficulty of unscrambling the longer-term effects of technical change from the more immediate impact of the depression: some of the less efficient firms were being culled out by the growing use of engines and of machinery like lathes and presses. Many entrepreneurs declared insolvent nonetheless managed to keep their businesses going or to quickly reconstitute them so that in several instances shipbuilders or engineers who had undergone insolvency proceedings were reported soon afterwards to be building more vessels or steam engines. Nor should it be overlooked that most of the more significant mills, foundries and works operated throughout the depression, even if they did change hands, as was the case when the Sydney Flour Company acquired Girard's mill in 1840,³⁷ and Hughes and Hosking took over the mill of Dodds, Blackett and Aird in 1841.

The depression of the 1840s still awaits proper analysis, but some of the problems of unscrambling immediate effects and longer-run changes and of reconciling the meagre statistical evidence can be illustrated by a summary of events in the flour-milling, building and shipbuilding industries.

Flour-milling. Some of the circumstances that precipitated the depression also caused flour-milling firms to run into difficulties: indeed, two of the main business failures before the end of 1840 were the milling firms of Barker and Hallen, and Dodds, Blackett and Aird which had liabilities, respectively, of £90,000 and £45,000.³⁸ The immediate problems arose from the drought, the scarcity of wheat, and imports of flour. The quantity of local and imported wheat available in 1837 and 1838 was so much less than usual (Table 4.5) that it could all have been ground in the four largest Sydney mills working a sixty-hour week. In 1839 the colony again became a net importer of flour and bread and in 1841 only 198 tons were sent overseas compared with the 4,085 tons brought inwards for local consumption. The severe shortage of wheat in the late 1830s, the quantities of cheap wheat and flour imported,³⁹ and the large supply of wheat grown locally in 1840, all helped to cause violent price fluctuations (Fig. 4.2). At times the margin between the price that millers paid for wheat and the price they obtained for flour was less than 20/- per ton even though some costs, such as wages and coal, had advanced considerably during 1839 and 1840. And, to add further confusion to the Sydney milling industry, the Albion Mills of Hughes and Hosking, which was said to be worth £40,000 but insured for only £3,000, was destroyed by fire early in March 1841 thus contributing to the eventual failure of that firm.⁴⁰

Longer-term demand and supply changes were also taking place. Although the quantity of breadstuffs used increased absolutely, consumption per 'adult male equivalent' appears to have declined from 566 lb in 1836 (average of 1835-7) to 396 lb in 1851 (average of 1850-2).⁴¹ The geographical distribution of demand was also changing: in 1836 about 52 per cent of assumed demand (again on an 'adult male equivalent' basis) was within Cumberland County but this fell to about 45 per cent in 1851. Taking these points together, it can be estimated that despite the doubling of the total population in Cumberland County (from 39,800 in 1836 to 81,100 in

Table 4.5 Wheat production and trade, New South Wales, 1836-50^a
(000 bushels)

Year	Local production of wheat ^b	Net imports of wheat ^c	Net imports (+) and exports (-) of flour and bread ^c	Total wheat and equivalent for local consumption	Estimated total wheat available for milling in New South Wales
1836	795	263	+ 72	1,130	1,058
1837	624	112	- 24	712	736
1838	422	79	- 14	487	501
1839	722	170	+ 15	907	892
1840	959	281	+ 24	1,264	1,240
1841	707	227	+ 193	1,127	934
1842	719	139	- 16	842	858
1843	806	366	+ 15	1,187	1,172
1844	1,053	215	- 21	1,247	1,268
1845	879	82	- 43	918	961
1846	968	228	- 12	1,184	1,196
1847	610	216	+ 34	860	826
1848	1,007	116	+ 9	1,132	1,123
1849	1,261	131	+ 7	1,399	1,392
1850	829	50	- 87	792	879
Total	12,361	2,675	+ 152	15,188	15,036

^a Excluding Port Phillip District.

^b Production less 10 per cent for seed and wastage.

^c Re-exports of British and foreign wheat, flour and bread have been taken into account. *NSWBB* statistics for the export of breadstuffs include only colonial produce but, in addition, considerable quantities of British and foreign breadstuffs were re-exported as is shown by the tabulations in *NSWAO*, 4/7251, p. 28. In 1842, for example, 860,000 lb of such bread and flour (equivalent to 19,000 bushels) were exported in addition to colonial produce. Flour converted to wheat equivalent on the basis of 49.8 bushels per long ton.

Sources: *NSWBB*, 1843-50, supplemented by *NSWAO*, 4/7251.

Fig. 4.2: Prices paid for wheat and obtained for 'first quality' flour at Thomas Barker and Company's mills 1839–45. (On the basis of 45 lb of flour per bushel of wheat, 44.4 bushels would have been required for a short ton.) Derived from evidence of Thomas Barker (2 September 1845) to 'Select Committee on Immigration', *NSWV&P(LC)*, 1845, pp. 14–5.

1851), the annual requirements of flour for local consumption there would have increased by 2,300 tons or by about 27 per cent.

There were only four steam flour-mills outside Cumberland County early in 1838 but seven more had been set up by April 1841 which increased steam-milling capacity in the interior from a few hundred to perhaps 2,700 bushels a day compared with about 6,700 bushels a day in Cumberland County. This spread of milling was partly stimulated by the activities of the Sydney firms who took advantage of the lack of grinding capacity in the interior to manipulate the Sydney market for their own ends: the way that one miller benefited from the wheat shortage during the third quarter of 1839 is illustrated in Fig. 4.2. In the main, country milling developed as a response to local needs and insignificant quantities of flour were sent to Sydney. It was thought newsworthy in 1842 when 10 tons of flour reached the capital from Yass and an analysis of the daily 'coasters inwards' reports in the *Sydney Morning Herald* indicates that during 1846 only 3 per cent of the breadstuffs shipped coastwise to Sydney was in the form of flour. Putting together what is known about the external trade in, and coastal movements of, breadstuffs, and making the assumption that negligible quantities of flour moved overland to Sydney, the quantity of wheat available for processing by Cumberland County mills was probably no more than 410,000 bushels in 1836 and 570,000 bushels in 1851. But during this same period the capacity of the mills there approximately doubled. These figures are merely orders of magnitude but serve to

indicate that the events in the flour-milling industry during the depression were, at least in part, manifestations of longer-term and wider-ranging changes.

Building. Unemployment in Sydney in 1843 and 1844 among general labourers and tradesmen like carpenters has been used in the past as evidence that the building industry and associated trades such as brickmaking were particularly hard hit by the depression.⁴² Fluctuations in the level of building activity are confused, however, by changes taking place in the design of dwellings and construction methods used. From 1 January 1838 building in the Town of Sydney (the boundaries of which had been proclaimed on 6 September 1833) was more strictly controlled by 'An Act for regulating Buildings and Party-walls, and for preventing Mischiefs by Fire, in the Town of Sydney', 8 Will. IV no. 6 (8 September 1837); as the title of the Act implies, these regulations aimed to reduce the risk of widespread fires by requiring walls and roofs of buildings to be constructed of permanent materials.⁴³ This legislation, with its amendments in 1838 and 1839, came at a time when the restrictions on land sales, imposed early in the 1830s to facilitate a general sorting out of land titles, were lifted. These circumstances combined to change the face of Sydney almost overnight for, as Freeland has indicated, individual cottages gave way to rows of two-storey terrace houses and the quality of the materials used and the craftsmanship with which they were handled both declined.

The quantity and, in a broad sense, the 'quality' of 'house' building in the various parts of the colony are indicated in Table 4.6. During the five years to March 1846 the housing stock in the City of Sydney⁴⁴ increased by 2,516. It was reported that more than 530 new buildings (though not specifically dwellings) were commenced there in 1842 and nearly 400 during 1843⁴⁵ so that, given the known intercensal increment, any downturn in the level of building activity in the other years must have been fairly small or swift. Moreover, during these five years nearly 800 'houses' were built just outside the City of Sydney and a further 2,270 in the remainder of Cumberland County.⁴⁶ If the census enumerations of 'houses' are taken at face value, it seems that a much more significant slowing down of building activity occurred during the second half of the decade when there was a net addition of only 2,580 brick and stone houses and a net *reduction* of 900 wooden houses in Cumberland County compared with net increments, respectively, of 3,000 and 2,570 houses during the previous five years (Table 4.6). A similar slackening in building activity also occurred in the other nineteen counties though not in the more remote parts of the colony. The building industry was adjusting to changes in regulations, materials and designs during the 1840s and the depression as such was probably only temporarily and coincidentally important.

Shipbuilding. This industry was passing through a dull patch that was only partly occasioned by the recession of the economy as a whole. During the late 1830s and early 1840s coastal shipping was in a turmoil with companies variously competing, co-operating and collapsing. Imported steamships were no strangers in coastal waters but during the three years 1841–3 six vessels were brought out from Britain to join the colonial fleet, leaving local yards with only one or two insignificant orders for harbour ferries. These same circumstances also affected the demand for

Table 4.6 Changes in the housing stock, New South Wales, 1841-51^a
(excluding Port Phillip District and Moreton Bay)

Area	Brick and Stone Houses			Wooden Houses		
	Number 1841	Net increase 1841-46	Net increase 1846-51	Number 1841	Net increase 1841-46	Net change 1846-51 Number 1851
Cumberland County						
Inner four parishes ^b	3,198	1,368	646	5,212	224	-252
Rest of Sydney City ^c	259	456	1,187	1,902	468	-107
Rest of 'Sydney' ^d	106	330	183	619	458	-142
Towns ^e	655	248	62	965	134	-138
Rest of County	612	600	503	1,715	1,285	-263
Other nineteen counties						
Ten main towns ^f	527	703	260	1,490	498	6
Rest of area	546	281	325	1,152	3,590	914
Rest of New South Wales	10	15	112	137	235	997
Total New South Wales	5,913	4,001	3,278	13,192	6,892	1,015
						17,251

^a Includes 'finished' and 'unfinished' houses.

^b Parishes of St Philip, St James, St Lawrence and St Andrew.

^c Sydney City as legally defined minus the four inner parishes.

^d 'Sydney' defined as Sydney City and Alexandria and Willoughby parishes.

^e Campbelltown, Liverpool, Parramatta, Richmond and Windsor.

^f Bathurst (plus Kelso), Goulburn, Port Macquarie, Maitland East and West, Morpeth, Newcastle, Singleton, Wollongong and Yass.

Source: *NSW/BB*, tabulations of censuses dated 2 March 1841, 2 March 1846 and 1 March 1851.

new sailing vessels, but part of this fleet was already in difficulties for another reason. The indiscriminate slaughter of female whales and their calves over several decades made whaling a less profitable activity for colonial craft and this, in turn, had reduced the demand for provisions at remote coastal camps and the availability of cargoes of oil and skins to be brought back to Sydney. Moreover, it was becoming more difficult to find skilled crews since seamen were less ready than in the 1830s to desert from British ships.⁴⁷ Again, the point to emerge is that the shipbuilding industry was affected by several circumstances that had little or nothing to do with the depression as such although the decline in shipbuilding contributed to the downturn in other activities. It was, no doubt, one of several factors leading to a slackening of activity in the metal trades during the mid-1840s; one indication of this is given by the reduction in imports of iron and steel from over 3,000 tons in 1840 to less than 1,000 tons in 1846.

Trade. From 1843 through 1850 locally manufactured and processed goods totalling £276,000 were sent outside the colony. Excluding the £34,000 worth shipped to California in the months following the gold discoveries there in January 1848, this was only £62,000 more than the value of comparable exports from 1833 through 1840. The main items were much the same as before: flour and bread (£77,800), soap and candles (£44,400), leather and leather goods (£35,000) and butter and cheese (£19,200), but a few new items like refined sugar (£36,000) had also joined the list. New Zealand was by far the most important market, taking 39 per cent of the total, followed by other British colonies 29 per cent, the United States 12 per cent (all in 1849 and 1850), and Great Britain 10 per cent (mainly leather).

Two other sorts of external trade added their mites to local industrial activity. Following the exemption of foreign whalers from port charges in February 1845, fifty-five entered Port Jackson during 1846 compared with twelve in 1844 and fifteen in 1845. Between them these vessels, which sometimes stayed at sea for years at a time, sold Sydney traders oil and skins worth £44,000 from 1845 through 1850 to pay for repairs and refitting, and the replenishment of stores.⁴⁸ Much more important was the growing sea-borne trade between Sydney and Melbourne and other ports along the southern coast. Until 1851 this was simply intra-colonial trade and went unrecorded. Approximate figures cannot even be compiled from newspaper reports since the cargoes were usually summarised as 'sundries'. Early in 1845 the *Port Phillip Patriot and Melbourne Advertiser* noted that 'large quantities of merchandise, especially tea and sugar, are annually imported into Melbourne from the Australian capital, the value of which greatly exceeds the contra list of exports to the Middle District'. Since 1,700 to 1,800 bales of wool alone—worth perhaps £35,000 to £40,000—were being shipped each year from the Port Phillip District to Sydney, the trade in the opposite direction may have been considerably greater: no way has been found to check this or to estimate how much consisted simply of transhipments or of locally manufactured and processed goods.

Nor is it possible to say very much about the extent of import substitution although the colony was probably becoming almost self-sufficient in some items

like soap, candles, butter and cheese. Moreover the quantity of refined sugar imported fell from 927 tons in 1840 to 32 tons in 1850 following the establishment of the Sydney refinery.

Consolidation and innovation

The general development of manufacturing can best be discussed by considering first the consolidation of existing activities and then some of the processes and techniques that were introduced during the decade. One general point, however, is that most industrial projects were financed from within the colony by individuals or partnerships, assisted in some cases by the banks: examples, mentioned again later, were a tweed factory and a meat preserving works near Newcastle and an iron-smelting works 60 miles southwest of Sydney at Mittagong. It was uncommon for overseas capital to be directly invested in industrial projects although an important exception was the attempt to set up a sugar refinery in Sydney following the formation of the Australian Sugar Company by W. K. Child and F. Kemble in London in 1839. In this case steam engines and equipment valued at £20,000 were shipped out and installed in a works at Canterbury (about 5 miles from Sydney). But before the works was finished the partners disagreed and the assets were taken over by the Australasian Sugar Company which, according to an indenture dated 31 March 1842, had as its objects

purchasing and refining raw sugar, sale of sugar whether raw or refined, sale of molasses, distillation of such molasses and spirits, manufacture of animal charcoal, ivory black, soda, sal ammoniac, blacking and other business thought fit . . . ;

this document also shows that the capital of £23,000 was divided into 460 shares of £50, all but 16 per cent of which were subscribed locally.⁴⁹ Although the new company managed to get the refinery into production later that year, managerial, technical and financial difficulties made it touch and go whether the venture would succeed.⁵⁰ Occasionally, too, industrial capital came from other Australian colonies: Robert Russell, for instance, moved his engineering works from Hobart to Sydney in 1838 and from this sprang the several metal-working concerns belonging to various members of the family.⁵¹

Consolidation of existing activities. One feature of the 1840s was the way in which industries that had grown up during the previous decade consolidated their gains despite the economic uncertainties. The steps by which this occurred were often too small to be noticed at the time. A simple example was the printing of the *Government Gazette* which grew in size from 1,155 to 1,815 pages a year between 1838 and 1841, appeared twice instead of once a week, and increased its circulation from 500 to 750 copies. Then, from early in 1843, it used type cast in a Sydney foundry. Or, again, the first steam-driven reciprocating saw came into operation late in 1838, and was soon followed by a circular saw in 1842 and planing and moulding machines in 1846.⁵² In this and other industries the use of steam power was going beyond the experimental stage. In 1841 there were forty-one steam

engines (with an estimated capacity of 470 horse-power) in the colony and, although most were installed in flour-mills, they were also being employed in several other industries. Some engineering firms not only made engines and machinery but also designed and supervised the erection of mills and other buildings,⁵³ this being one example of the several ways in which the engineering and metal-working industries gradually extended their activities as and when needs and opportunities arose. Within the colony orders were met for anything from ornamental ironwork for houses to appliances for breweries and from beyond it came contracts ranging from a bell for a Tahitian church to an engine and fan for a South Australian copper-smelting works.

Progress should not, however, be exaggerated. Little of the plant required by the gas company could be supplied by local foundries even though the directors had expected that most of it would be manufactured in the colony. The problem was not so much ignorance or lack of skill but the fact that technology was outstripping the human and physical resources of the colony. Ship repairing facilities, for instance, failed to keep pace with changes in the size and shape of vessels: thus the average tonnage of sailing ships entering Port Jackson from Britain increased from 420 tons in 1840-1 to 530 tons in 1849-50, and the *Seahorse* (440 tons gross) could not be fitted on the patent slip in Sydney to repair damage sustained when she went aground in 1843. Something of the same problem faced The Hunter's River Steam Navigation Company which soon found its dry dock at Newcastle inadequate and began setting up a more modern shipbuilding and repairing yard at Pyrmont near Sydney in 1845. This was ready in time to fit out the *Eagle* (144 tons burthen and 170 feet overall—the largest steamship built in the colony up to that time) launched in 1848 from Chowne's nearby yard.⁵⁴

Introduction of new activities. The 1840s saw the introduction of, or experiments with, several industrial activities new to the colony. The establishment in Sydney of a gas-works in 1841 and a sugar refinery in 1842, although each in itself an important development, simply represented the transplantation of an existing technology from overseas. More innovative was the preservation of meat, because this was an advance into a little-known area of food science, and the smelting of copper and iron, because these were schemes at a new level of entrepreneurial complexity and risk. Each can be discussed in turn.

Towards the end of the eighteenth century experimentation began in Europe into ways of preserving food in bottles and cans, but even fifty years later neither the chemistry nor the industrial technology were well understood. Some laboratory-scale experiments may have been made in Sydney during the 1830s, but there is little doubt that the first commercial cannery in Australia was the one owned by Sizar Elliott which started operations in Sydney in 1846. (Incidentally, this was also one of the first factories in the colony to use gas as a source of heat for an industrial process.) This venture did not last long, Elliott himself explained, because of 'the heavy taxes upon the manufacture in the shape of advertising and cost of tins, added to which a large business firm soon established itself upon the River Hunter, and being able to import its own tins, completely overwhelmed its smaller

competitor'.⁵⁵ This northern works, the Newcastle Preserving Company, commenced operations on 17 July 1848 and during its first full year shipped about 30 tons of tinned meat to New Zealand and down the coast to Sydney.⁵⁶ By 1851 annual production had trebled to 49,000 tins averaging about 5 lb: some were sold locally but most were exported in response to military and naval contracts. The turmoil caused by the gold-rushes then proved too much for the company: the inflated price of fatstock and the shortage of reliable and efficient workmen brought an end to its operations in 1855.⁵⁷ It seems probable that a third meat preserving works operated during the late 1840s but little evidence about it has come to light beyond the fact that it was at Camperdown near Sydney and a comment by Elliott that it was as extensive as the one in Newcastle. The importance of these three ventures lies not in the amount they produced—by the end of 1850 only about 80,000 5 lb tins of preserved meat had been exported—but in the fact that they were set up at all and that one of them made a sufficiently good product to pass the stringent tests being imposed by the Admiralty in Britain as a result of some unfortunate experiences with supplies from other sources.

In 1845 the possibility of smelting copper in the colony excited some interest. During that year people who had brought copper ore from New Zealand for re-export held it in bond while trying to get exemption from the 10 per cent ad valorem duty, which in fact happened under the Metallic Ores Act passed on 8 November. Gipps's certification that this was to meet a 'public or pressing emergency' seems a little far-fetched but suggests that the government was anxious to encourage smelting in New South Wales. In the meantime the *Maitland Mercury* (16 July 1845) had been advocating that ore should be brought to Newcastle for processing as back-loading aboard vessels shipping Hunter Valley coal to the South Australian copper mines which were just coming into production. In South Australia it was considered that the economics of smelter location were neither so simple nor in Newcastle's favour. It was argued there that since charcoal was three times more effective than coal for processing many of the types of ores and since it was available virtually on the spot from the 'almost inexhaustible woods on the neighbouring lines of coast' from Port Adelaide, it would cost 70 per cent more to smelt the ore at Newcastle than at Port Adelaide.⁵⁸

Nonetheless there were at least three proposals to smelt copper in New South Wales. One, which does not seem to have come to anything, was made in June 1846 by the colonial manager of The Scottish Australian Company.⁵⁹ The second, after passing through an experimental phase in 1847, resulted in the erection of the Rosemorrin Smelting Works at Lane Cove (near Sydney) in 1849 which the *Sydney Morning Herald* (21 April 1849) said had a capacity of about 2,500 tons of ore a year but which, judging from the imports of ore and exports of concentrate, probably produced less than one-fifth of this amount. The third was for a smelter on land near Newcastle owned by James Mitchell. Work on this began in 1846 but, possibly because of uncertainties about the fuel supply due to the monopoly of coal rights then enjoyed by the Australian Agricultural Company, the Burwood Smelting Works did not come into operation until 1851; after processing no more than 300

to 400 tons of ore, the works was leased in 1853 to the newly formed Newcastle Coal and Copper Mining Company which suspended its operation during 1854 because of the high price of labour.⁶⁰ It would be easy to dismiss the Rosemorrin and Burwood projects as unimportant, small-scale operations. Their significance lies in the fact that they were among the first metallurgical processing works in Australia and were prepared to take the technical and entrepreneurial risks involved in bringing together mineral resources from widely separated parts of the continent.⁶¹

In contrast, the first attempt to produce iron in the colony, at Mittagong in 1848, used adjacent deposits of iron ore and limestone together with charcoal made on the spot. But the three Sydney businessmen and their local partner probably tried to go too fast too soon, with expensive forging equipment like tilt hammers being ordered before fundamental problems relating to the actual smelting processes had been overcome. The saga of financial, technical and managerial problems has already been told by Hughes:⁶² suffice it to say here that little more than 1 ton of pig iron had been made by the end of 1850, and another fourteen years were to pass before smelting began on a commercial scale.

The role of government

The government, as already mentioned, had given up virtually all direct involvement in industrial activities by the early 1830s. Even the spinning and weaving of coarse cloth by the women confined in the Female Factory at Parramatta ceased soon after Bourke became Governor in 1831. There appear to have been only a few exceptions to the policy of obtaining official requirements from Britain or by contracts placed locally. One was the establishment of a Government Printing Office early in 1841 because the administration was dissatisfied with the service being provided by commercial firms: not surprisingly the printers in the City of Sydney petitioned in June 1844 to try to have the contract system restored, but to no avail.

Legislative and executive decisions were, however, having a noticeably greater impact on industry. Some that affected location, such as the control of noxious trades, will be discussed later: here attention is focused on import and excise duties. Customs duties were charged, almost entirely as a means of raising revenue, on spirits and tobacco and on all goods except those produced or manufactured in the United Kingdom. Apart from alterations to the level of duties, the schedules remained much the same until 1840. On 29 September of that year the general duty on goods other than those from Britain, which had remained unchanged since it was first imposed in 1802, was raised from 5 to 10 per cent ad valorem but a few commodities, like tea, sugar, flour and grain, were still at the old rate. The main exception to this was the special arrangement whereby New South Wales and Tasmania continued to trade goods, after being constitutionally separated in June 1825, without charging duty: in 1842 New South Wales attempted to formalise this situation but the proposed legislation was disallowed in London because it would have perpetuated a particular differential agreement. Thus, on 1 March 1845 New

South Wales started to levy duties on goods arriving from Tasmania which in the same year passed legislation to raise all duties from 5 to 15 per cent.

Three attempts were made during the 1840s to seek exemptions from duties in order to benefit existing or potential industrial ventures. The first was by the Australasian Sugar Company which petitioned to have the raw sugar for its newly established refinery admitted free of duty. The Legislative Council responded by amending a Bill proposed for other purposes by Gipps who subsequently recommended to the imperial authorities that the Bill should be disallowed. Gipps's comments are worth quoting:

The character of the Bill was also further changed by the Council in respect to refined Sugar, and in such a manner as to make it a Bill for the protection of Sugar refined in the Colony . . . I proposed that the duty on *Refined* Sugar should be double that on *Raw* Sugar, a proportion which I believe is higher than it ought to be for mere equivalence; but, by making the duty thrice as much on refined as raw Sugar, the Council converted it into what must undoubtedly be considered a protective duty.⁶³

Aside from the juggling of the excise and customs duties payable on spirits and the long-standing differential of 6d per lb between the imposts on manufactured and unmanufactured tobacco,⁶⁴ this seems to have been one of the first manifestations of the debate about 'protection' that was to absorb so much time and energy during the second half of the nineteenth century.⁶⁵ The two other pleas for exemption were more successful: one sought, as has been discussed already, to have the duties on metallic ores removed, and the other, a similar plea for exempting borax and saltpetre, was accepted in 1849 (13 Vic. no. 11).

Probably no other industry was subject to as many controls and imposts as the distillation of spirits. Suffice it to say that the excise duty on spirits made from grain, which had been 3/- per gallon since 1834, was raised to 5/- in 1839, 6/6d in 1840 and 9/- in 1841, before returning to 3/6d in 1845. The following year there was yet another change in policy when, from 30 October, spirits distilled in the colony could be exported 'to parts beyond the seas' without payment of duty. Whereas no spirits were exported in 1844-6, over 5,500 gallons, or about 6 per cent of local production, were sent overseas in 1847 through 1850.

Location of Manufacturing

The geography of manufacturing during the period from 1815 to 1850 was characterised by two sets of opposing forces. At the macro-scale there began the long (and continuing) tussle between centripetal forces tending towards the concentration of industrial development in the capital city and centrifugal forces leading to a spread of some activities to other parts of the colony. In addition, at the micro-scale, legislative action was forcing some establishments to locate within town boundaries and others to remain, or to shift, outside them.

The dominance of Cumberland County

The dominant role played by Sydney in particular, and Cumberland County more generally, in the economic geography of the colony throughout this period has already been emphasised in the previous chapter. At the census of 1851 urban Sydney contained 27 per cent of the population and 39 per cent of the non-agrarian workforce, while the equivalent figures for Cumberland County as a whole were 45 and 58 per cent. Over the score or so wharves in Port Jackson passed nearly all the colony's imports and exports, and through the counting-houses of the banks, mercantile companies, insurance firms and agencies of various kinds sooner or later flowed most of the colonial business transactions.

Sydney and its environs were the obvious place for many kinds of manufacturing for here were the main colonial markets, the largest sources of labour, and the nodal points of land and sea communications. Here, too, entrepreneurs could find the greatest range of external economies, sources of investment capital, business information and technical skills and knowledge. Moreover, the contrast between the opportunities available in Sydney and those in the rest of the colony was, and seemed to be, very considerable. The *Maitland Mercury* was not far short of the mark when it explained the growth of Sydney, in an editorial on 20 May 1843, as being due to

the influx of immigrants, many of whom found their first asylum in Sydney, and felt little disposed to quit it for what they considered a comfortless subsistence in the bush; the command of bank discounts with which the citizens of Sydney were particularly favoured; the inordinate and reckless importation to which this facility of accommodation led; these and other circumstances, contributing with the natural importance of the city, which is the centre of trade and the seat of government, have given to Sydney an amount of population and an appearance of affluence which is far beyond the general condition of the colony.

Even at the best of times industrial enterprise on any scale was a fairly speculative form of investment in New South Wales and the chances are that, other things being equal, the choice of a location at or near Sydney minimised some of the risks and uncertainties. Although the point needs to be explored in more detail, it seems probable, for instance, that the Sydney business world was more reluctant to lend financial support to industrial enterprises in the interior.

There is very little quantitative evidence on which to judge the extent of Cumberland County's industrial dominance. For only four industries—the manufacture of sugar, soap, cloth and tobacco—are some output data available, and then only for the years 1847 through 1850. During that period all the 7,580 tons of sugar refined in the colony were processed in or near Sydney;⁶⁶ 3,970 out of the 4,480 tons of soap were made in Sydney and Parramatta; and 450,000 out of 711,000 yards of cloth were woven in mills at Sydney, Parramatta and Penrith. (In contrast all but 20 of the 430 tons of tobacco manufactured in the colony came from works in country areas, mainly in the Hunter Valley.)⁶⁷ From 1844 through 1850 the boiling

down works in Cumberland County consumed 15 per cent (142,000) of the sheep and 26 per cent (52,000) of the cattle thus disposed of in the colony, and produced one-fifth (3,250 tons) of the tallow. It does not necessarily follow, however, that the industrial enterprises in Cumberland County were significantly larger than those elsewhere: in 1847 only three of the ten Sydney soap factories produced more than the factory at Maitland, and in 1848 the cloth factory at Stockton (Newcastle) produced a greater yardage than the two Sydney factories combined. The essential feature of manufacturing in and around Sydney was not that absolute size produced economies of scale but that, in relative terms, the number of factories and diversity of activities provided the opportunity for some elementary inter-industry relationships to develop and external economies to be achieved. Processes such as boiling down, fellmongering, wool-washing, slaughtering, tanning, bark-milling, footwear making and soap and candle manufacturing are cases in point.

The government does not seem to have made any conscious attempt to influence the distribution of industrial activities, although if anything its actions probably reinforced the centripetal forces. A simple instance was the procedures by which tenders were called for government contracts using actual samples displayed only in Sydney instead of detailed written specifications, a policy which particularly irritated manufacturers in places like Newcastle. One of the most curious episodes, the erection of distilleries, illustrates the lack of reality that seems to have pervaded much official thinking about the spatial organisation of the colony. The distillation of spirits was permitted under a series of regulations which laid down, *inter alia*, that even the smallest distillery had to be in a compound measuring 200 by 120 feet surrounded by a wall 10 feet high. Bigge justified his approval of these events by pointing out that

It was very desirable in the early establishment of the distilleries in New South Wales to avoid as much as possible the risk of giving a monopoly in the supply of home-made spirits, or an influence in the purchase of grain, by confining the use of it in the distilleries to one, or even an association of individuals; and it was also desirable, that by placing the distilleries in different districts a remedy should be found for the inconvenience, expense, and interruption to their pursuits that was caused by the resort of the settlers to the distant market of Sydney. When the moral effects of the measure came to be considered, it appeared that there was less injury to be apprehended from augmented facility of access to spirits than from confining the sale of them to one place; and that the immoderate use of them was much more likely to be promoted by association in towns than by the domestic consumption of spirits in the country. Upon these principles the regulations issued by Governor Macquarie in the month of February 1821 have proceeded. . . .⁶⁸

Bigge was out of touch with reality. Aside from anything else, the sheer dimensions of the structures prescribed under the regulations (to say nothing of the scarcity of lime in the interior) were enough to discourage any erstwhile investors. His dream of small distilleries scattered around the countryside ignored technical and

economic facts and thus it is hardly surprising that throughout this period only one licensed distillery operated in a country area and produced only a few gallons.⁶⁹ Fanciful notions about the industrial potential of country areas were not, however, the prerogative of visiting commissioners; even such a practical man as Surveyor-General Mitchell envisaged Berrima (about 90 miles southwest of Sydney) becoming the place at which wool and hides from the counties of Argyle and Camden might be made into cloth and leather with any surplus being sent out through the ports of Gerringong and Kiama.⁷⁰

Industrial developments in the nineteen counties

The emergence of industrial activity in the other nineteen counties, forming an arc about 120 miles wide around Cumberland County, took three forms although the distinctions between them are blurred and differed in significance and timing in various parts of the area. First, both in sequence and simplicity, was the appearance of small mills, blacksmiths' shops and tanneries set up by settlers to make their estates more self-supporting. In 1823 a windmill was erected on the 'Blackdown' estate near Bathurst and another was built in 1829 on 'Segenhoe' in the Hunter Valley. By 1832 there were two dozen mills outside Cumberland County, mainly in the Hunter Valley and near Bathurst (Fig. 4.3), as well as farmhouse dairies and a few looms making coarse woollen cloth. Most were small and primitive and barely worthy of notice—the four 'tanneries' listed in the *Blue Book* in the early 1830s were each operated by only one man, and the two 'cloth-mills' at Bathurst produced only 3,000 to 5,000 yards of cloth a year between them.⁷¹

Most of these ventures appear to have been set up for the personal convenience of settlers rather than as commercial propositions. Nonetheless, mill-owners processed grain for other settlers nearby and presumably a certain amount of flour, leather and coarse cloth was bought by travellers or new settlers who had not yet established themselves. In 1828 Darling summed up the situation regarding milling:

Onwards in the Interior . . . the quality of the Soil in many Situations is much Superior to that of . . . most of the Land nearer the Coast, but the expense of Transport renders it unprofitable to raise more Grain than is requisite for the immediate Wants of the Neighbourhood.⁷²

Surplus products were occasionally sent to more distant markets, such as cheese from Bathurst and the Hunter Valley to Sydney. On a more elaborate scale, Berry and Wollstonecraft built a sloop in 1824 and used it to transport surplus timber, tobacco, cheese, butter and leather to Sydney from their nest of industry at Shoalhaven which by the end of 1833 included a salt-works, tannery, cooperage, shipbuilding yard, forge, horse-driven flour-mill and water-driven sawmill.⁷³

By their very nature—scattered, small and transitory—most of these early ventures made only a faint impression on the landscape. But there were some exceptions: the erection of a windmill in 1829 beside an inn at a punt-crossing of the Hunter River encouraged the development of a township at Singleton, and the completion of a successful water-mill at Stroud early in 1834 by the Australian

Fig. 4.3: Distribution of flour-mills in the counties of New South Wales in 1831 and 1839. Note the spread of steam-mills, and the concentration of milling in Cumberland County, in the Hunter Valley and near Bathurst. These maps have been compiled from several sources but principally from NSWAO, 4/7267.

Agricultural Company contributed to the rise of this settlement as its headquarters in place of Carrington (20 miles to the southeast on the coast).

Second, industrial activity emerged in the form of enterprises set up as commercial propositions even though located in relatively isolated places. Several flour-mills originated in this way, among them a water-driven mill built near Clarence Town in 1829. Similarly, a significant tonnage of shipping was launched from yards dispersed along the coast and associated river systems. There is no complete record of the numbers of vessels built, nor could one be expected when the construction of small, wooden sailing-ships required few formal facilities, but the significance of this activity is clear judging from the origins of the sailing vessels in the colonial fleet listed in the *Sydney Morning Herald* on 11 September 1849. Altogether there were 237 vessels (excluding steamships) measuring 15,900 tons, of which 77 (2,440 tons) had been built in Sydney or along the Hawkesbury River; 11 (440 tons) at various places along the south coast; 99 (4,690 tons) in the Hunter Valley and on the north coast; 6 (270 tons) in Tasmania and Victoria; and 44 (8,060 tons) in overseas countries, particularly Great Britain and the United States. By far the most important was the 'Deptford' yard established by Lowe and Marshall in the early 1830s on the Williams River (a tributary of the Hunter River) where

several varieties of hardwoods and softwoods were available in the bush nearby. Here the hulls of steamships like *William the Fourth* (1831), *Ceres* (1835), *Aphrasia* (1841) and *Comet* (1843) were built, to say nothing of a score or more sailing-ships.⁷⁴

Third, from the mid-1830s the development and location of manufacturing and processing establishments were more clearly beginning to influence, and be influenced by, the growth of towns. It is worth recalling, however, that even by 1851 there were only 74,000 people in the settled districts outside Cumberland County, 56,000 of whom were scattered over some 39,000 square miles. The other 18,000 were in the forty-six towns and villages recognised by the census authorities, and three-fifths of these were concentrated in Maitland-Morpeth (5,000), Bathurst-Kelso (2,600), Goulburn (1,500) and Newcastle and its suburbs (1,300). There were two sorts of activities, those serving a town and its region and those producing or processing for a more distant market.

The expense and difficulty of overland transport encouraged and allowed the development of numerous, small businesses serving local markets. Some settlements, especially those located at focal points, attracted ventures that required a greater investment and a wider region from which to gather supplies and in which to sell products—a process that began in the mid-1830s when steam-milling was introduced into the interior (Fig. 4.3). The first such mill outside Cumberland County was erected at West Maitland in 1834, and this was soon followed by others at Wilberforce (1835), Morpeth and Berrima (1837), Goulburn (1838), Wollongong (1839), and Bathurst, Newcastle, West Maitland and Singleton (1840).⁷⁵ By 1850 there were forty-four steam-mills outside Cumberland County (including five beyond the boundaries of the settled districts), most of which had been erected during the early 1840s (Fig. 4.4). Meanwhile, existing windmills and water-mills began to disappear in the face of such competition although some, converted to steam, gained a new lease of life. Yet, even at mid-century there were still twenty-four water-driven mills in operation despite the frequency with which droughty conditions were experienced in the interior and the size of the reservoir needed to enable gristing to be carried on in the dry season.⁷⁶ Settlers who had sown a few acres to wheat for their own needs often erected a temporary mill of the kind illustrated in Fig. 4.5.

Local-serving industries also grew up to supply metal goods, drays, builder's materials (during the 1840s there was a net increase of 960 brick and stone and 500 wooden houses in the ten largest country towns), rope, leather and so on. Gradually the range increased: a brewery was set up in Wollongong in 1838 and a malt-house and brewery at Goulburn at about the same time; an iron foundry commenced at Stockton in 1842; and the *Maitland Mercury*, the first successful newspaper in the interior, started publication in 1843 and still survives. Inter-industry relationships began to develop: the Stockton iron-foundry, for instance, made a 600 gallon boiler for a brewery in 1843, equipment for boiling down and soap-making establishments in 1844, and a 17 horse-power steam engine (the first made outside Sydney) for installation in a West Maitland flour-mill in 1845.⁷⁷

During this period establishments began to appear which relied directly or

Fig. 4.4: Numbers of steam flour-mills in the police districts of New South Wales 1834–46. The first steam-mill beyond these districts (the outer boundary of which corresponds with that of the counties shown in Fig. 4.3) began operations at Armidale in 1847. The source of these data is NSWAO, 4/7267–8; it should be noted that this map shows the number of *mills* not, as in the case of these manuscript returns and the *NSWBB* tabulations derived from them, the number of *engines*.

indirectly on a wider market than a particular town or its hinterland. Thus boiling down, which in its early primitive form can hardly rate as a manufacturing activity,

Fig. 4.5: Many settlers in the peripheral parts of the colony solved their milling problems in ad hoc ways until demand could support a commercial enterprise. This type of mill was in general use in the Murray and Murrumbidgee areas in the 1850s. Redrawn from sketch in W. Gardner, *Northern Districts of New South Wales*, vol. 2, 1854, pagination unclear (Mitchell Library MS A176-2, microfilm copy in National Library G6747-48).

stimulated industrial development of this kind. The processing of livestock in this way came to the fore in 1843 because it helped cushion settlers against some of the worst effects of the depression by placing a minimum value—the export worth of tallow, bones, skins and hides—on sheep and cattle. By the end of 1850 the carcasses of about 1,000,000 sheep and 200,000 cattle had been processed by some sixty works into nearly 17,500 tons of tallow. This activity affected manufacturing in three ways. First, although some boiling down works were makeshift and haphazard affairs, others were more elaborate structures having brick chimneys 30 feet high, large wooden vats, cast iron refining pans and boilers, and a miscellany of pipes and pumps. From 1843 on local foundries, tinsmiths, brickmakers and coopers received a useful amount of business from this source.⁷⁸ Second, boiling down tended to be concentrated geographically; the works in the Maitland, Patricks Plains, Goulburn and Bathurst police districts alone processed two-fifths of the sheep and cattle from 1844 through 1850, and produced 43 per cent (7,550 tons) of the colony's tallow (Fig. 4.6). These works gave direct employment to only a few hands apiece, but the movement of fuel, casks, tallow, hides and skins provided additional demands for transport equipment: consider the effort involved in handling the tallow from the dozen or so works in the Hunter Valley (Fig. 4.7) which sent 800 tons across the wharves at Morpeth in 1844, 1,070 tons in 1847 and 2,530 tons in 1850. Third, although most of the tallow was shipped overseas—from 1844 through 1850 nearly 27,000 tons were sent out of Sydney—some provided the raw

material for soap and candle-works at places like Maitland, Bathurst and Goulburn. It was at these towns, too, that skins and hides were treated in fellmongeries and tanneries: at the last-named place one tannery operated from 1844 to 1926 and another, founded in 1850, was the forerunner of the present day bootmaking firm of Baxter and Company Pty Ltd.

The location of other individual enterprises was influenced by the source of a material or the ownership of land. The 'Deptford' shipbuilding yard made use of

Fig. 4.6: Tonnage of tallow produced from 1844 through 1850 in each of the police and squatting districts of New South Wales. Calculated from *NSWBB*; police districts are identified in Fig. 4.4.

a variety of indigenous timbers; tobacco factories in Hunter Valley settlements like Maitland, Paterson and Gresford processed locally grown tobacco; a pottery at 'Irrawang' near Raymond Terrace was situated on a suitable clay deposit;⁷⁹ and at Newcastle a meat preserving works (1847–55) and at Stockton nearby a tweed factory (1841–51), making about one thousand yards of cloth weekly,⁸⁰ both provided outlets for some of the district's animal products.

Apart from a few aberrations explainable only by special circumstances, the spatial arrangement of the the embryo industrial activity in the nineteen counties was simple and straightforward. The high costs of freight and the great differences between overland and water transport rates were of fundamental importance. The geographical distribution of the boiling down works reflected the balance that had to be achieved between the loss of body weight when animals were moved on foot and the cost of shifting the resulting tallow and other products to Sydney for export. Livestock were driven 20 or 30 miles (and some even further) to the works in the Hunter Valley which, as Fig. 4.7 shows, were nearly all located along the Hunter River itself. Sites were sought close to navigable water whenever possible since it cost only about one-fifth as much to move tallow by boat to Sydney compared with transport overland. Hence nearly two-thirds of the tallow originating from all the squatting districts taken together was produced in a few large works located on the coast, as at Twofold Bay in the south, or a short distance up navigable rivers, as at Grafton and Casino in the north (Figs. 3.4 and 4.6).

Fig. 4.7: In 1844 the dozen boiling and steaming down works in the Hunter Valley consumed 45,000 sheep and 9,900 cattle and produced 836 tons of tallow. The three leading works made 288, 228 and 117 tons. (Source: *MM*, 24 August and 21 December 1844.)

In this way, transport costs encouraged a greater concentration of some activities than might have been expected. Yet there was another side to the coin. It may seem strange that until the 1840s an industry like brewing did not develop on any scale, even in larger inland towns, despite the fact that road freight added between 1/- and 1/6d per gallon per hundred miles and that colonial ale did not 'travel' well (a point explained in Chapter 9). But against this had to be set problems like the small size of local markets (the rural population within 15 miles of any settlement in 1851

averaged only about 1,000 and within 30 miles only about 4,250), the poor quality of much of the local barley, the lack of hops which were therefore mainly imported, and even the unsuitability—so it was believed—of most indigenous timbers for making barrels. Over much of this period, then, ale brewed in Sydney or the heavier malt beers brought from England continued to quench the thirst of settlers in all but a few parts of the colony. One more example serves to illustrate how enterprise in the interior was disadvantaged. In 1839 it cost £14 per ton to take common salt from Sydney to Goulburn, making its price there £20: this freight alone added 7/6d to the cost of preserving the meat and hide of every beast slaughtered.

Legislation and location

Most orders and enactments impinging on manufacturing applied throughout the colony as a whole but in two sorts of cases legislation influenced location. First, in some instances the government nominated the places at which a particular activity would be permitted: thus an Act passed in 1838 (2 Vic. no. 18) prohibited brewing except within the boundaries of specified towns although amending legislation a year later made it possible for other places to be approved by the Governor. This was probably not intended to be unduly restrictive because before long most settlements that might conceivably have supported a brewery had been nominated. Nonetheless, it did produce some curious results: for instance, a brick brewery was built just outside the boundaries of Paterson which had been gazetted as a brewery town in 1840: the citizens petitioned to have the boundaries extended but their request went unheeded and no beer was ever produced.⁸¹

The second type of legislation attempted to limit the sort of industry allowed to operate at random within built-up areas: on 15 March 1830 it was enacted (11 George IV no. 4) that

no slaughter-house or place for slaughtering cattle shall be licensed in any town unless within sixty feet of a creek or river if there be such or if a seaport on the sea-beach within a like distance of high-water mark and if not on the banks of such waters or there should be no such waters as aforesaid within or adjoining any town then not within the boundaries of any such town.

Other industries which produced smoke or smells were to some extent checked by the ready way in which citizens initiated proceedings under various Acts dealing with nuisances. But it was becoming increasingly obvious that more appropriate measures were needed in the City of Sydney where the population density had reached over 10,000 persons per square mile and where in 1848 there were no fewer than seventy-eight places at which animals were being butchered. Accordingly it was enacted in 1849 that no new slaughter-houses would be licensed within, or up to 2 miles beyond, the boundaries of the City.⁸² Existing slaughter-houses were allowed to continue until a public abattoir could be brought into operation but legislation late in 1850 (14 Vic. no. 36) banned all slaughtering in, and within 3 miles of, the City of Sydney except for the purpose of meat preserving. The 1849 legislation also banned from the City other trades like tanning deemed to be

noxious, and gave existing establishments ten years grace to make alternative arrangements. A number of the firms affected were long-established businesses, such as the tannery founded in 1803 belonging to the Wilshire family, but protests and petitions were in vain for on 18 September 1862 a Select Committee reported that it was 'not prepared to recommend any relaxation of the provisions of the 1849 Act'.⁸³ On 1 October 1850 legislation was adopted under which the inhabitants of other towns could apply to have slaughtering and other noxious industries banned but, as the *Maitland Mercury* pointed out on 14 December, 'in the absence of any machinery for local government, we must question if the power thus conferred by the legislature will be used to any great extent, or indeed at all'.

One other spatial influence on industrial activity should be mentioned. The government had little need to control the development of manufacturing or processing beyond the twenty counties because the sparse population and lack of secure tenure were powerful enough restraints in themselves. Moreover, since the growing of crops for sale was illegal (except by the few holders of 'agricultural licences') grain was ground by hand or in small windmills, water-mills or horse-mills set up on the stations. Yet, as if to confound both these generalisations, the first steam-mill beyond the settled districts was built at Armidale late in 1846 even though in 1844 the commissioner for New England had refused to permit the cultivation of crops near this settlement, and the mill-owner had no title to the site since the first town allotments were not sold until Armidale was officially laid out in 1849.⁸⁴

The role of Sydney

What emerges from this discussion is that the Sydney industrial world was little affected by the development of these processing and manufacturing activities elsewhere in the colony. It is possible that some flour-millers, soap-makers and tanners lost part of their country connections, but the metal trades supplying equipment like steam engines had much less cause for complaint. Judging from the published manifests of coastal vessels, few manufactured or processed commodities were sent to Sydney in any quantity: it has been noted already, for example, that in 1846 only 3 per cent (100 tons) of the breadstuffs was being dispatched in the form of flour and, despite the upsurge in milling capacity, this only increased to 15 per cent (730 tons) in 1851.⁸⁵

Only scrappy evidence has come to light about the sources of finance for industrial undertakings beyond Cumberland County. It seems clear that very little overseas or even Sydney capital was directly involved in this way although occasional examples can be found of both sorts of investment. It has been suggested, for instance, that speculative capital from India financed the 'Woodstock' mill built near Kiama in 1838, which was partly powered by the Minnamurra River and partly by steam; this venture was significant, not only because it had a considerable impact on the local economy, but because it may have had the first steam powered reciprocating saw in New South Wales and was *probably* the first

to be equipped with a circular saw (in 1842).⁸⁶ It was rare for Sydney businessmen to become directly involved in particular projects, like the 1848 scheme for smelting iron ore at Mittagong with all the grandiose notions implied by naming the site 'New Sheffield', but it was not unknown for people to move out of Sydney and establish, or re-establish, themselves elsewhere as was the case with the 'Irrawang' pottery set up near Raymond Terrace in the mid-1830s, a brewery set up at Wollongong in 1838, and an engineering works which was moved from Sydney to Newcastle in 1843.

During the 1840s there was a growing feeling of resentment against the 'disproportionate' numbers of population in, and economic dominance of, Sydney.⁸⁷ This was expressed in various ways including proposals for railway building, for 'the residents of Goulburn and Bathurst are naturally anxious to share in the benefits which so obviously flow from the cheap conveyance of passengers and goods to and from Sydney'. Inhabitants in the Hunter River district, possessing the advantage of a sea route to the capital, were more concerned at this stage with having Newcastle in the north (and, for good measure, a port such as Jervis Bay or Twofold Bay in the south) made a free port to 'exercise a very powerful counterbalancing influence to the attractions of the city and neighbourhood of Sydney'. An immediate object was to break Sydney's monopoly of the external commerce of the colony by permitting Newcastle to trade direct with foreign countries.

At the same time other issues were being raised which, although partly stemming from parish pump jealousies, indicate that at least one part of the colony was beginning to differentiate its future path to prosperity. A public meeting at Newcastle in 1843 agreed that a petition should be submitted to the Legislative Council to try to have Newcastle separated from Maitland for electoral purposes and to allow the former town to send in its own representative. It is worth quoting the main argument as reported in the *Maitland Mercury* on 21 September 1843:

Maitland was an agricultural town, dependent for its existence on the farmers and graziers of the Hunter; it was a market town brought into life by the agricultural districts with which it was surrounded. With Newcastle the case was totally dissimilar. Beyond the islands of the Hunter, they could scarcely lay claim to an acre of good land; they were in fact independent of it. What little had been cultivated was because Newcastle was here; the cultivators were dependent on the town, and not the town upon them . . . If, then, the circumstances which gave birth to the towns were so dissimilar, if their interests were so apart, not to say opposed, if their prosperity arose from different causes, if the manufatorial and agricultural interests were so fixedly at variance, both here and at home, who should say that the same member could honestly and fairly represent both towns?

Some of the important influences in the economic geography of New South Wales during the rest of the nineteenth century were already beginning to emerge: railways versus roads; free trade versus protection; farmers versus manufacturers; town versus town; and the rest of the colony versus Sydney.

5 Manufacturing in the Other Colonies 1815 to 1850

New South Wales stood head and shoulders above the other colonies throughout this period in terms of both the amount and the range of manufacturing activity. At the other extreme, Western Australia and the area later defined as Queensland were industrially insignificant and, for present purposes, can all but be ignored. After New South Wales came Tasmania, South Australia and Victoria—probably in that order. Whereas most activities in the latter colony were simply day to day and local-serving by nature, some in Tasmania like flour-milling and shipbuilding, and in South Australia, such as flour-milling and copper-smelting, were themselves providing a stimulus to the economy.

Manufacturing developed in each of the colonies as local circumstances permitted or dictated. An important restraint in each case was the small size of the domestic market (see Table 5.1) although a partial compensation was the great distance—both physically and psychologically—between the main settlements which were therefore thrown very much on their own resources.¹ Even so, the fortunes of the colonies were not entirely independent: the development of flour-milling in Tasmania and South Australia, for instance, cannot be understood without reference to conditions in New South Wales, and the expansion of shipbuilding in Tasmania must be related in part to the spread of settlement in, and growing coastal trade around, the southeastern part of the continent.

Tasmania

Tasmania was still economically backward at the beginning of this period: indeed Melville thought the island from 1804 to 1817 was little more than a prison farm.² Only about one-sixth of Tasmania's population of 5,500 in 1820 had stepped ashore as free immigrants or had been born in the colony. During the next thirty years about 20,000 free immigrants and 57,000 convicts arrived and the population rose to 24,000 in 1830, 57,400 in 1842 and 70,100 in 1851. A combination of circumstances, including changes in economic conditions, year to year fluctuations in the number of arrivals, and alterations to the convict regulations, made it difficult to maintain a long-run balance between labour demand and supply. Furthermore, whereas transportation to New South Wales ceased in 1840 it continued to Tasmania until 1853 at which time convicts still made up one-third of the population.

At the end of 1847, 67,313 people (excluding Aborigines) were enumerated on the island.³ If the military and their families (about whom little information is

Table 5.1 'Adult male equivalent' populations of Australian colonies, 1836-51^a

Census	New South Wales	Tasmania	Western Australia	Victoria	South Australia	Queensland
1836	63,400 (Sept.)	—	—	200 (Sept.)	—	^b
1840	—	—	—	—	10,600 (late)	—
1841	93,200 (Mar.)	47,200 (Sept.)	—	9,800 (Mar.)	—	200 (Mar.)
1844	—	—	—	—	12,200 (Feb.)	—
1846	115,600 (Mar.)	—	—	24,800 (Mar.)	16,000 (Feb.)	2,100 (Mar.)
1847	—	54,400 (Dec.)	—	—	—	—
1848	—	—	3,400 (Oct.)	—	—	—
1851	131,500 (Mar.)	60,000 (Mar.)	—	57,600 (Mar.)	46,080 (Jan.)	7,000 (Mar.)

^a 'Adult male equivalents' calculated as all adult males plus two-thirds the adult females plus half the children.^b Penal settlement only.

Source: Calculated from detailed census returns for each colony on the basis, as far as possible, of the present State boundaries.

Table 5.2 Population of Tasmania, census 31 December 1847^a

Status	Males			Females		
	Hobart and Launceston ^b	Elsewhere	Hobart and Launceston ^b	Elsewhere	Total	Total
Children ^c	4,685	3,626	4,783	3,448	16,542	16,542
Adults						
Free	8,541	8,509	5,959	4,141	27,150	27,150
Ticket of leave	1,740	3,009	628	337	5,714	5,714
Convicts in private assignment	2,363	4,915	887	551	8,716	8,716
Convicts in government employment	905	4,016	1,038	60	6,019	6,019
Convicts on public works		926		—	926	926
Military and families		1,765		481	2,246	2,246
Total		45,000		22,313	67,313	67,313

^a Excludes Aborigines.^b Hobart and Launceston police districts.^c Under fourteen years of age.Source: Calculated from census abstract, *HTG*, 28 March 1848, corrected as discussed in Chapter 5, note 3.

available) are omitted, there were only 32,900 adults who were either free or held a ticket of leave.⁴ Table 5.2 indicates that 32 per cent of the adult population were convicts working for the government or in private assignment, and that there were almost three times as many adult males as adult females. In the absence of data about individual towns, the details for Hobart and Launceston police districts are shown even though these embraced, respectively, 1,294 and 684 square miles: between them these districts had just over half the free adult males and those holding tickets of leave but a disproportionately low share of the convicts in government or private assignment (Fig. 5.1).

The course of land alienation in Tasmania differed from that in the mainland

Fig. 5.1: Status and distribution of population in police districts of Tasmania at the census of 31 December 1847. The correct total of 67,313 (excluding Aborigines) is depicted here: see chapter 5, note 3. (Source: *HTG*, 28 March 1848.)

colonies because it extended inland from the two settlements of Hobart and Launceston rather than from a single nucleus. By the end of 1819 the middle and lower reaches of the Derwent River, the mouth of the Coal River and the head of the Tamar River had been settled.⁵

During the early 1820s extensive land grants were made—678 square miles in 1823 alone—so that by the middle of the decade most of the better tracts, particularly near rivers, in the broad valley between Hobart and Launceston had been taken up. Rapid alienation continued during the remainder of the 1820s but the rate slowed in the 1830s and became slower still in the 1840s. Apart from 550 square miles in the northwest granted to the Van Diemen's Land Company, most of the settlement was confined to the eastern half of the island. By mid-century the belt of alienated land between Hobart and Launceston had widened and there were important offshoots along the Meander River to Deloraine and the South Esk River to St Marys, and some separate areas like that along the east coast beside Great Oyster Bay (see inset to Fig. 5.2).

Table 5.3 Livestock and acreage cultivated in New South Wales and Tasmania, selected years 1820-50
(000)

Item	1820	1828	1844	1850
Cultivated area (acres)				
New South Wales	31	71	133	135
Tasmania	11(?)	34	122	169
Sown to wheat (acres)				
New South Wales	17	31(?)	73	66
Tasmania	9	20	57	65
Sheep				
New South Wales	99	505	3,177	5,566
Tasmania	182	553	1,146	1,822
Cattle				
New South Wales	54	248	827	1,383
Tasmania	29	84	85	83

Sources: 1820, Bigge, *Agriculture and Trade*, *passim*; other years *NSWBB* and *TBB*.

The land policies of the 1820s reflected both the desire of the British government to attract men of means to the island and also the change in emphasis from sheep for mutton (mainly for the limited local market) to sheep for wool which was increasingly in demand in Britain. In contrast to New South Wales cattle numbers remained fairly constant after 1828 (Table 5.3). Cultivated land, forming a very small proportion of the area alienated, amounted to only 5 square miles in 1814, 103 square miles in 1830 and 264 square miles (roughly 1 per cent of the total area of the island) in 1850. At first crops were grown simply to supply local needs more or less at subsistence level, but from 1813 increasing quantities of breadstuffs were

exported to New South Wales and, later, to other external markets. Wheat remained the main crop throughout this period and during five years (1841-3, 1847 and 1849) the area sown to this grain exceeded that in New South Wales.

Unprocessed pastoral, agricultural, forestry and fisheries products made up the bulk of the export trade (Table 5.4). The detailed *Blue Book* returns did not distinguish between colonial produce and re-exports so that there is no way of knowing what value of locally manufactured or processed goods was sent overseas though, apart from flour which is discussed later, it was probably very small. From 1828 through 1850 merchandise imports (£12,654,000) exceeded exports by £2,698,000 although this is an incomplete picture since imports were probably undervalued and exports overvalued, some goods were smuggled into the colony, and considerable funds were transferred in the form of specie. No satisfactory data are available for most of these items but Hartwell has suggested that, if Commissariat expenditure is taken into account, the capital inflow from 1828 through 1850 may have been about £1,900,000.⁸

Whereas virtually all the external trade of New South Wales passed through Sydney, Tasmania's trade was divided between Hobart and Launceston. On the last day of 1814 both these ports were granted the same shipping privileges as Port Jackson, and both were constituted as a free port and free warehousing port by the same Order in Council dated 20 November 1835, the news of which did not reach Hobart until the following June. At first most shipments to and from Great Britain passed through Hobart⁷ which in 1828 handled about four-fifths (by value) of the colony's imports and exports. Later Launceston began to play a more active role because it was conveniently situated to ship livestock, provisions and building materials to the new settlements in Victoria and South Australia and because, as discussed later, it became the main export port for breadstuffs (shipping, for example, four-fifths of the tonnage of wheat and flour from 1839 through 1850). During the eight years 1840 through 1847 Launceston received 37 per cent (by value) of the island's imports and sent out 52 per cent of its exports.⁸

One consequence of this activity in the north was that Hobart, although the seat of government, did not remain as dominant in Tasmania as Sydney did in relation to New South Wales. By mid-century Launceston probably had a population comparable to that of the Maitland-Morpeth complex in the Hunter Valley, but had attracted a wider range of mercantile, insurance and banking facilities.⁹ As early as May 1828 local interests set up the Cornwall Bank at Launceston (the first such institution outside Sydney or Hobart) which was taken over by the Bank of Australasia in 1836; it was followed by other experiments in banking including a branch of the Bank of Van Diemen's Land in July 1832 which became the Tamar Bank at the beginning of 1835 and which, in turn, was absorbed by the Union Bank of Australia in May 1838. This is not to suggest that Launceston ever had a chance of overtaking Hobart which always remained the main commercial and financial focus of the island. But in a situation where the effective size of the market for most goods and services was in any case restricted, the division of economic activities between two comparatively small centres 125 miles apart by road and 320 miles

Table 5.4 Commodity exports from Tasmania, 1831-50
(per cent of total value)

Item	1831-35	1836-40	1841-45	1846-50
Wool	44.0	31.3	41.9	38.9
Livestock	1.0	13.5	2.4	1.9
Other animal products ^a	3.2	0.9	1.3	2.0
Unprocessed agricultural products	12.3	13.9	13.1	16.9
Fisheries products	21.4	15.4	12.4	8.9
Forest products ^b	4.5	1.8	2.3	5.0
Flour	1.2	6.7	8.3	7.0
Sugar, tea, tobacco, and spirits	4.8	3.5	5.0	4.6
Apparel, cloth, haberdashery, etc.	0.8	4.2	4.1	4.2
All other	6.8	8.8	9.2	10.6
Total ^c	100.0	100.0	100.0	100.0

^a Includes hides, skins (not otherwise defined) and salt provisions.

^b Includes mimosa bark and extract, and timber.

^c Actual values were: 1831-5, £978,000; 1836-40, £3,284,000; 1841-5, £2,484,000; and 1846-50, £2,846,000.

Source: Calculated from annual export returns, *TBB*, 1831-50.

apart by sea probably further limited both actual and potential progress. Neither centre was large enough even by 1850 to develop anything like the range of external economies and inter-industry relationships that had grown up in Sydney.

Development and location of manufacturing

Only the simplest kinds of industrial activity were undertaken in Tasmania before 1817 and hardly any effort had been made even to harness wind or water for power to flour or timber-mills. The need for something more than human or animal-power was just becoming apparent: the wheat harvest in 1815-6 could (at least in theory) have been processed by about nine hand-mills in the Derwent area and five at the Tamar. The first application of mechanical power in Tasmania, as in New South Wales, was to gristing flour, but unlike the mainland colony the first mills were privately owned. In 1817 windmills were set up at Pitt Water, Clarence Plains and Launceston, and a water-mill started operations in Hobart at the beginning of 1818.

This emphasis on processing primary produce and supplying day to day consumer goods continued throughout the period. The limited local market, the shortage and high cost of skilled labour, and the richer and more immediate rewards available from sheep farming and commerce all contributed to the slow pace of industrial development. For industries like tanning, soap and candle-making, and brewing there is little point in providing a year by year account even of the numbers of establishments; literary evidence indicates that many, particularly in the rural areas, were small affairs with little continuity of operation or ownership. No data have been found which give an adequate view of the absolute or relative significance of manufacturing, but claims that the island's works ousted imports of some manufactured goods must be viewed sceptically: it was claimed, for instance, that during the 1840s local breweries captured the local market but, in fact, *retained* imports of malted liquors continued to cost the islanders about £20,000 each year with no sign of a reduction.

Apart from a variety of indigenous timbers, some of which were particularly suitable for shipbuilding, Tasmania had few natural resources on which to base industrial development though advantage was taken of one or two particular circumstances. Thus the cooler summers facilitated malting and brewing and enabled Tasmanian beer to find a market in Sydney when operations there were suspended because of the heat. Or again, kangaroo skins were used for the better quality footwear both in Tasmania and New South Wales; indeed, this material was so important in Sydney that in 1846 the tanners and curriers there tried to enlist the aid of the New South Wales Legislative Council to prevent the Tasmanian manufacturers keeping the best skins for their own use and employing cheap convict labour to process them.

The most significant progress was made by the metal-working, shipbuilding and flour-milling industries, and these can be used as exemplars to illustrate other aspects of the colony's industrial development.

Metal-working. Specialist iron and brass foundries and engineering firms emerged

Table 5.5 Shipbuilding in the Australian colonies, 1831-50^a

Colony and item	1831-35	1836-40	1841-45	1846-50
New South Wales ^b				
Number	32	74	129	157
Tonnage	1,504	3,828	6,000	7,740
Victoria ^c				
Number	—	2	11	12
Tonnage	—	21	310	808
Western Australia				
Number	—	1	3	6
Tonnage	—	75	160	245
South Australia				
Number	—	—	16	16
Tonnage	—	—	237	325
Tasmania				
Number	40	44	43	125
Tonnage	1,851	2,798	1,944	14,896

^a These figures have been compiled from many—sometimes conflicting—sources too numerous to mention individually; both the tonnages and numbers of vessels should be regarded as orders of magnitude only. A further complication is that the method of measuring ships was formally changed in Tasmania in 1837 [when 8 Will. IV no. 4 (19 July 1837) adopted 5 and 6 Will. IV c. 56 (9 September 1835) being 'An Act to regulate the Admeasurement of the Tonnage and Burthen of the Merchant Shipping of the United Kingdom']; the other colonies only gradually adopted the new measuring system by mentioning it in Acts related, for instance, to the control of steamship operations.

^b Includes Moreton Bay District.

^c Port Phillip District.

during the 1830s and 1840s and produced a wide range of goods including steam engines, boilers, ploughs and other farm machinery. There was stiff opposition not only from New South Wales manufacturers but also from English firms, at least one of which, Ransomes the agricultural implement-makers of Ipswich, held exhibitions of their equipment, as at Launceston in April 1842. Shipbuilding provided an outlet for metal goods ranging from miscellaneous fittings to machinery: in 1834 a local foundry was reported to have built a replacement steam engine for the *Governor Arthur* which, if true, would have been the first engine made—as distinct from assembled—anywhere in Australia. But this early success could not be followed up because by mid-century only four more wooden-hulled steamships had been built in Tasmania, mostly for use as ferries or tugs on the Derwent River and Tamar Estuary. Nonetheless, the *Hawk*, launched in 1850, was said to have been fitted with the first condensing marine engine made in Tasmania and the first tubular boiler in Australia.¹⁰ But as there were never more than half a dozen steamships regularly operating in Tasmanian waters at any one time, the stimulus given to engineering and repair facilities could not have been very great. Indeed a letter to the *Colonial Times* on 14 April 1840 claimed that a new steamboat for the Derwent River had had its imported engine installed by the engineer who had brought it from England and that local firms were incapable of undertaking more than minor adjustments. Reports of specific achievements, such as the casting of a 2 ton boiler 23 feet in diameter in 1847,¹¹ can be found but there is little solid information about the growth, extent and nature of the metal industries as a whole. All that can be gleaned from the trade statistics, for example, is that by the latter part of the 1840s retained imports of iron, tin and refined copper were running at about 1,000 tons a year.

No ores were smelted on any scale. In 1848 metallic ores were exempted from import duty, a few hundred tons of copper ore were imported from South Australia, the Australian Smelting Company was formed, and a smelting-works was built at Bellerive on the eastern bank of the Derwent River but it probably never came into operation. Nonetheless it is interesting to compare this venture with the one discussed in Chapter 4 which was being planned near Newcastle at about the same time. Both meant bringing South Australian ore to the coal and gaining the benefit of the low freight rates to Britain offered for refined copper which was a useful bottom cargo for wool ships. Although the Hobart smelter was 260 nautical miles nearer Adelaide than Newcastle some of this saving would have been offset by the cost of bringing coal 120 miles around the east coast from Schouten Island; as against this, however, the Newcastle smelter was on much better coal measures but some of this advantage was lost because of the costs involved in shipping via Sydney. The *Colonial Times and Tasmanian Advertiser* compared the advantages of smelting in Hobart or Adelaide in its issue of 5 August 1848: 'If metal is to be sent from Adelaide in its pure state [to England], why then the newly-formed company can beat the people of Adelaide hollow, because the latter have no coal and little wood, whilst we have plenty of both.' It then argued that since it took 4

tons of coal to reduce 1 ton of copper ore it would be cheaper to ship the ore to Tasmania rather than Tasmanian coal to South Australia.

Shipbuilding. Not unnaturally perhaps the inhabitants of this small island, dependent to a large extent on trading, whaling and sealing, developed skills as builders of boats and ships. It is surprising, nevertheless, that towards the end of the 1840s Tasmanian yards were launching more (and generally larger) vessels than all the mainland colonies together (Table 5.5), especially when it is remembered that for many years shipbuilding was officially discouraged and strictly controlled—in 1817, for example, Lieutenant-Governor Sorell deemed it necessary to seek Governor Macquarie's approval before allowing a vessel already on the stocks to be finished. In the mid-1820s shipbuilding began to develop on a permanent basis in and around both Hobart and Launceston and these remained the main centres of the industry. From time to time vessels were built elsewhere—at Pitt Water and Great Swan Port during the 1820s, at the penal settlement at Macquarie Harbour and then at Port Arthur until the early 1840s, and on the Huon River towards the end of this period. From 1830 to 1845 only a modest 450 to 475 tons were constructed each year, but in 1846 and 1847 the total tonnage launched averaged 1,300 tons, and from 1848 through 1850 it averaged 4,100 tons.¹² During these last three years no fewer than fifteen vessels of over 100 tons were launched into the Derwent and Huon and eleven more into the Tamar, but none surpassed the *Tasman* (560 tons) and the *Harpley* (547 tons) built respectively at Hobart and Launceston in 1847. These two vessels were the largest ever built in Tasmania and, up to that time, anywhere in Australia.

Hartwell has pointed out that there were two types of shipbuilder. The capitalist shipwright with a yard on the Tamar or Derwent produced the larger ocean-going vessels representing an outlay of up to about £5,500, while the independent builders with limited resources made smaller coastal craft. As early as 1839 the New Ship Building Company was formed at Hobart, and ten years later the Launceston Ship Building and Shipping Company was set up in the north.¹³ The Tasmanian industry was aided by the availability of local timbers, the growth in the demand for ships and shipping space brought about by the settlement of Victoria and South Australia, the increase in international freight and passenger movements in the late 1840s, the large numbers of wreckings and losses at sea, and various legal amendments that encouraged American whalers to patronise repair facilities in colonial ports. But much of the success must be credited to the skill and entrepreneurial qualities of a handful of men.¹⁴ This shipbuilding and repairing activity also stimulated subsidiary industries like block, sail, and cordage-making, and timber-working: the timbers for the *Tasman*, for example, were pit-sawn into 60 foot lengths, and the squared keel for another vessel measured 2½ x 3 x 124 feet. Little is known about the economics of the industry but, judging from Denison's report to Grey in June 1848 that ships were being built for £8 per ton, the gross output during the five years 1846 to 1850 would have amounted to about £120,000.¹⁵

Flour-milling. The export of wheat began in 1813 and from 1827 to 1838 a few consignments of flour were also sent overseas. No records have been found that

Table 5.6 Wheat production and trade, Tasmania, 1839-50
(000 bushels)

Year	Local production of wheat ^a	Net exports of wheat	Exports of flour ^b	Estimated total wheat available for milling in Tasmania ^c
1839	515	138	90	377
1840	756	89	141	669
1841	793	79	140	714
1842	734	116	171	618
1843	716	252	134	464
1844	727	288	148	439
1845 ^d	879	214	98	664
1846 ^d	977	435	177	542
1847	862	430	183	432
1848	1,118	225	162	895
1849	1,000	305	214	697
1850	873	172	218	707
Total	9,950	2,743	1,876	7,218

^a Production less 10 per cent for seed and wastage.

^b Flour converted to wheat equivalent on the basis of 49.8 bushels per long ton.

^c Allows for small quantities of breadstuffs imported in some years.

^d Partly estimated.

Sources: *TBB*; *Statistics of Van Diemen's Land*, 1839-49; weekly export notices in *HTG*.

show the quantities involved although the total value of flour shipped in the eleven years to the end of 1837 was only £32,000 compared with £203,000 for wheat. During these first two decades the milling industry mainly supplied local needs. From then on flour and wheat exports both increased, partly because of the shortage of wheat in New South Wales during the 1838-9 drought, partly to meet the needs of the new colonies of South Australia, Victoria and New Zealand, and partly to supply more distant markets such as Britain and, late in the 1840s, the United States. For the period 1839 through 1850 reasonably complete data are available (Table 5.6) so that it can be estimated that about 25 per cent of the local crop was exported as wheat, 17 per cent was converted into flour for export, and 48 per cent was consumed on the island, leaving 10 per cent for seed and wastage.

As indicated earlier, the first flour-mills were located at Hobart, Launceston and George Town, and in nearby agricultural areas like Pitt Water, Clarence Plains and New Norfolk. Road transport was expensive but made even more so by toll and ferry charges; for instance, in 1826 the Land Commissioners noted that the charges for the ferry across the Derwent River north of Hobart amounted to about one-eighth of the market value of a load of wheat. Farmers found themselves squeezed between high transport costs and low prices. Melville argued in the mid-1830s that no grower could afford to send wheat 30 miles by road and also meet farm costs out of a return of 5/- per bushel. Moreover, best quality American flour could be landed at Hobart at 21/- per barrel yet it cost 22/6d for the equivalent quantity of locally grown wheat even without the expense of milling and packing.¹⁶ Road transport in Tasmania improved very slowly; by the end of 1835 only 68 miles of road had been surfaced, and during each of the next twelve years a mere 13 miles on average was metalled. Mill-owners were thus attracted to sites beside rivers which provided both a cheaper means of transport and a source of power: only four of the twenty-nine mills operating in 1829 were not water-driven (Fig. 5.2).¹⁷ Many of these establishments, particularly in remote areas, were built for the convenience of the settler concerned, but a few were more elaborate, commercial affairs which, like Terry's at New Norfolk, could grind up to 8 or 10 bushels an hour. The number of mills doubled during the next decade but the general spatial arrangement remained the same and water-mills still predominated. Meanwhile, steam-milling developed slowly with only four such establishments operating by 1839.¹⁸ Beginning in that year the increase in flour exports encouraged the erection of new steam-mills and the conversion to steam power of existing windmills so that in 1849 there were twelve steam-driven establishments within 30 miles of Hobart and six more near Launceston (Fig. 5.2). Even so forty-four water-mills still remained for, as Melville commented, 'the districts which produce the most grain, are those from which water-carriage can be had'.¹⁹

From 1839 through 1850 about 25,000 tons of flour and 64,000 tons of wheat were sent out through Launceston and 13,000 tons of flour and 9,500 tons of wheat through Hobart. It is not known exactly where this export flour was milled or how much was processed by steam or water-power but Fig. 5.3 shows hypothetically in terms of wheat the possible origins and destinations of breadstuffs in Tasmania

Fig. 5.2: (a) Location of known flour-mills in Tasmania in 1829, 1839 and 1849: these maps have been compiled from a variety of sources and thus some mill locations are imprecise. (b) Approximate extent of areas alienated by 1824 (based on Thomas Scott, *Chart of Van Diemen's Land*, 1824) and by 1839 (based on George Frankland, *Map of Van Diemen's Land*, 1839).

Fig. 5.3: Hypothetical movements of breadstuffs (expressed in terms of long tons of wheat) within and from Tasmania in 1847. Contemporary data about coastal movements are poor so that some flows (e.g. from Great Swanport Police District) may not in fact have been entirely overland as depicted here. The actual exports consisted of 397,200 bushels of wheat and 2,573 tons of flour from Launceston and 32,800 bushels and 1,112 tons from Hobart.

in 1847.²⁰ Of the 33,300 tons of wheat produced, about 12,400 tons would, on this basis, have been consumed where they were grown (and are thus omitted from the diagram), 4,400 tons would have moved to Hobart and Port Sorell police districts to make up local deficits, and 14,100 tons would have gone to Launceston and 2,400 tons to Hobart for export. Very little wheat or flour need have been carried more than 50 miles to reach the nearest export port. In other words, neither of these hinterlands was much larger than Cumberland County centred on Sydney, and in both considerable use could be made of river and coastal craft. Moreover, wheat and flour could be shipped to Sydney at very low rates (about 10d per bushel), thus

enabling Tasmanian breadstuffs to be landed in New South Wales at competitive prices.

Government and private enterprise

Soon after founding the settlements in Tasmania the government began to undertake such activities as brickmaking, timber-working, and even printing (using the one and only press on the island), but it kept clear of others like brewing, and initially, cloth-making which had caused nothing but problems in New South Wales. It probably also wanted to keep out of flour-milling and attempted to do so in 1816 by providing a miller at Pitt Water with a pair of grindstones on condition that he processed wheat cheaply for the Commissariat. But in mid-1818 the government was forced to build its own water-powered mill in Hobart to avoid being held to ransom by the only miller operating in or near the town. In the north the government bought a small privately owned windmill at Launceston and shifted it to George Town when it became the headquarters of the settlement in 1819.

From the mid-1820s greater use was made of convict labour in various semi-industrial activities. At Maria Island convict settlement (1825–32) off the east coast of Tasmania gangs were sawing timber, tanning leather, making shoes, weaving cloth and sewing slop clothing. In the late 1820s and early 1830s yarn spun at the Female Factory near Hobart was shipped there to be woven into rough cloth and made into convict suits and blankets. But even though a great deal of effort went into this project, including the erection of a weaving shop, a fulling-mill and a dye-house, only about 5,000 yards of cloth were produced annually.²¹ Before Maria Island was abandoned in 1832, gangs were already cutting timber at the new convict settlement at Port Arthur from which over 2,400,000 feet were shipped between 1830 and 1844 mainly for use on public works in Tasmania. Other activities included footwear making (34,000 pairs between 1832 and 1842 valued at £10,000); coal-mining (63,000 tons raised between 1834 and 1842 valued at £20,000); and ship-building and repairing work between 1834 and 1844 valued at £22,500. It is uncertain what effect operations on this relatively large scale had on the private sector but it must have reduced still further the limited internal market for some goods and services and hence diminished the opportunities available for normal commercial enterprise. It is not known, however, whether the steam vessel *Derwent*, built at Port Arthur in 1839, replaced an order which might have gone to a private yard on the island or in New South Wales or, indeed, whether the vessel would have been built at all. There is some uncertainty, too, about how the government selected the activities in which to employ convicts. The only clear statement found relates to a proposal in 1826 to establish a rope-walk, intended to replace imports of cordage for both public and private use, which was discouraged in London because it might have become a financial burden.

The government influenced directly the development of some industries such as baking and slaughtering in much the same way as in New South Wales though seemingly few legislative measures or administrative regulations affected location; even the controls imposed on slaughtering were directed more at the prevention

of cattle thieving than at the avoidance of nuisance or pollution. In the 1840s, however, industrial activities in general began to be affected by the manipulation of customs duties. The long-standing schedule of duties, maintained after separation from New South Wales by a proclamation dated 4 February 1829 and confirmed by subsequent legislation (4 Will. IV no. 15) early in 1834 imposed a 5 per cent ad valorem duty on all goods apart from spirits (which were subject to special rates) produced anywhere except in the United Kingdom and New South Wales. In 1842 an attempt was made to come to a formal arrangement whereby most goods from New Zealand could be allowed into Tasmania free of duty or, in other words, that the concessions already applying to New South Wales should be extended to this other colony. But under the Constitution Act, 1842 the legislation was reserved and, eventually, disallowed. Then in 1845 the Legislative Council approved a measure that raised duties on all goods—other than those originating in the United Kingdom or New South Wales—from 5 to 15 per cent ad valorem. But next year it had to pass amending legislation that made goods originating in New South Wales subject to the same duties from 1 April 1847 as those from other colonies,²² whereupon the New South Wales Legislative Council petitioned unsuccessfully to have the Tasmanian enactment disallowed. These steps were significant in that they further differentiated one colony from another but, paradoxically, subsequent legislation also emphasised their interdependence. Three years after New South Wales waived duties on imported mineral ores in 1845 (discussed in Chapter 4), Tasmania followed suit. Without doubt one of the main objects of this measure (12 Vic. no. 8) was to encourage a local smelting industry based on copper ore from South Australia but it is doubtful, as explained earlier, whether any plant actually went into operation.

It is usually difficult to measure the impact of legislation upon industrial development but one important exception was the distillation of spirits. As in New South Wales, this activity was permitted in Tasmania from 1 August 1822 and within a couple of years four distilleries had been erected. But no sooner had the infant industry started to find its feet than excise duties on locally made spirits in both New South Wales and Tasmania were increased and customs duties on imported spirits were lowered. These changes, made in Sydney by Governor Brisbane at the beginning of 1825, apparently without consulting Lieutenant-Governor Arthur, made the operation of these relatively small-scale distilleries uneconomic before they had had time to show much return on the capital invested. As a consequence, one Hobart distiller sold his premises to the government which turned them into a Female Factory, and another, ruined, received official aid, and turned to farming while the distillery building was used for the manufacture of tan-bark extract. Production of spirits (at least legally on which duty was paid) declined to about 800 gallons in 1829 and was confined to one distillery at Hobart and another at Launceston. Uncertainty about whether spirits made from sugar were dutiable led to legislation, intended to regulate the industry more firmly, which came into operation on 10 June 1836 (6 Will. IV no. 14) and set the excise duty at 4/- per gallon. A week later the duty was halved on the grounds that the

Attorney-General had previously assured one of the distillers that the new duty would be only 2/-. This affair, along with a fall in the amount of revenue received from imported spirits, led in 1838 to a committee of investigation. It concluded in due course that the two distilleries in Tasmania (by now making about 26,000 gallons a year between them) were resulting in a loss to general revenue of 6/9d per gallon—the difference between the excise on locally made spirits and the duty on imported supplies, that spirits sold to the ‘lower orders’ were being adulterated, and that at most they provided a market for only 12,500 bushels of grain a year. In view of all this the committee recommended that distillation should be prohibited; within a matter of weeks (14 November), and despite considerable opposition, legislation was passed that revoked their licences as from the beginning of 1839. In due course claims for compensation were met by paying £1,238 to two distillers and £793 to two rectifiers.²³ It is hard to believe that the virtual wiping out of, in colonial terms, a capital-intensive industry twice in a dozen or so years would not have gone unnoticed by private enterprise as a whole, and such seemingly authoritarian incidents may well have shaken the confidence of other investors. To be fair, however, the boot was sometimes on the other foot: in 1820, for instance, two investors were refused permission to erect a woollen-mill on an allotment near Hobart because the project was considered beyond their means.

Table 5.7 Agricultural and pastoral progress, South Australia, 1840–50
(000)

Year	Acreage cultivated		Sheep	Cattle
	Wheat	Total		
1840	1	3	167	16
1842	14	19	300	26
1844	19	27	360	25
1846	26	33	700	60
1848	30	49	838	55
1850	42	65	1,000	100

Sources: *SABB*, 1840–50; *Statistics of South Australia*.

Much of Tasmania's industrial progress did depend, nonetheless, on men, especially those arriving as free settlers during the 1820s, who were prepared to invest in manufacturing even if only as part of a many-sided career. For instance, Peter Degraives arrived at Hobart in 1824 and within a few years had sawmills, a flour-mill and a brewery on his grants near Hobart, and in 1841 started a shipyard on the Derwent River; John Walker arrived in 1822 and leased, built or bought several mills in various parts of the island and introduced the first steam engine to the colony in 1830; and Richard Cleburne arrived about 1821 and during the 1840s operated a large soap- and candle-works. Sometimes settlers brought to Tasmania the wisdom and inbred expertise of several generations. One example was John Terry (1771–1844) whose multi-wheeled water-mill at New Norfolk erected in 1820 became something of an industrial showpiece. Terry was a third or fourth

generation member of a family which, by good management and marriage, operated a series of mills in Yorkshire: his father, for example, owned the family mill at Redmire.²⁴ The extent to which free settlers contributed to industry in Tasmania provides a striking contrast with New South Wales where much of the stimulus came from emancipists.

South Australia

The colonisation of South Australia, the first practical application of Wakefield's principles, began during the latter half of 1836. Prior to the formal proclamation on 28 December that year, advance parties had surveyed parts of the coast and selected a possible site for the capital, and 300 colonists had been camping temporarily at Holdfast Bay (now Glenelg). Then, despite disagreements about the site for Adelaide—and even about the name itself—the town was quickly laid out and sections were allotted to settlers or to agents acting for people who had bought preliminary orders in England. Others were later sold at auction. Inadequate surveying arrangements and rigidities in the system of land allocation both tended to delay rural settlement and agricultural development and to concentrate growth around the capital. Towards the end of 1838 there were thought to be about 6,000 souls in the colony of whom perhaps 5,000 were living in or near Adelaide which almost overnight had become, albeit temporarily, the second largest town on mainland Australia.²⁵ Yet this was an unhealthy form of development, for the colony remained entirely dependent on imported provisions and breadstuffs (only 120 acres being sown to wheat in 1839) and had little to offer in return. In 1839 and 1840 retained imports were valued at £340,000 and £287,000 as against exports of local produce (mainly black oil and whalebone) worth £9,200 and £15,650. The problems of the early years of the settlement are detailed elsewhere²⁶ but, in brief, they resulted in financial bankruptcy followed by years of retrenchment, the cessation of assisted immigration from 1841 until 1846 except for a small trickle, and the imposition of complete Crown control in 1842 which relegated South Australia to the status of an ordinary colony.

During 1837 and 1838 surveys were undertaken of the land around and to the south of Adelaide and the first country sections became available for selection in May 1838. Surveys of large blocks bought by capitalists or groups of purchasers then started to open up areas at Port Lincoln in the west, Mount Barker in the east, and beyond the Gawler River in the north. By 1840 agricultural development was beginning in earnest with 2,500 acres under cultivation including 1,060 acres of wheat. Subsequent progress is summarised in Table 5.7 although this disguises a decrease in the wheat area from 23,000 acres in 1843 to 19,100 acres in 1845 due to a fall in prices, a shortage of labour and a rise in wages. In 1843 there was a surplus of breadstuffs for export and by mid-century this had become the chief wheat and flour exporting colony in Australia. Yet the relative importance of breadstuffs soon declined (Table 5.8). One reason for this was the increase in wool exports from 290 tons in 1841 to 1,460 tons in 1850. But much more important was

Table 5.8 External trade, South Australia, 1840-50 (£000)

Year	Exports originating in South Australia						Total colonial exports	Entrepôt trade	Retained imports
	Wool	Breadstuffs	Fisheries products	Mineral ores	Regulus and metals	Other exports			
1840	9	—	7	—	—	—	16	16	287
1841	36	—	4	—	—	1	41	63	225
1842	30 ^a	—	3	—	—	4	37	38	131
1843	46 ^a	10	6	—	—	4	66	15	94
1844	43	20	4	6	—	9	82	13	106
1845	72	26	2	17	2	13	132	17	168
1846	107	27	4	142	—	7	287	26	304
1847	56	40	2	174	—	3	275	75	336
1848	99	37	2	322	—	6	466	38	346
1849	109	32	—	186	34	13	374	29	571
1850	132	39	—	182	183	9	545	26	820
Total	739	231	34	1,029	219	69	2,321	356	3,388

^a The wool clip of 1842 was late and the bulk of it was shipped in the first quarter of 1843; the clip of 1843 was early and was mainly shipped in that year.

Sources: *SABB*, 1840-50; *Statistics of South Australia*; *SAPP*, 1844, vol. 4, no. 174.

Table 5.9 Population of South Australia, 1840-51^a

Area ^b	Children		Adult males		Adult females		Total	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
1840								
Adelaide district	4,470	84.3	4,075	75.0	3,096	82.0	11,641	80.2
Rest of colony	832	15.7	1,356	25.0	681	18.0	2,869	19.8
1844								
Adelaide district	4,782	66.6	3,183	54.4	2,814	67.6	10,779	62.7
Rest of colony	2,398	33.4	2,672	45.6	1,347	32.4	6,417	37.3
1846								
Adelaide district	5,893	63.5	3,810	48.2	3,349	65.1	13,052	58.5
Rest of colony	3,389	36.5	4,092	51.8	1,796	34.9	9,277	41.5
1851								
Adelaide district	12,194	53.3	11,278	48.4	9,341	57.1	32,813	52.5
Rest of colony	10,671	46.7	12,045	51.6	7,023	42.9	29,739	47.5

^a Excludes Kangaroo Island for which inadequate information is available.

^b 'Adelaide district' includes the Municipality, the municipal villages, Port Adelaide and other people living within a radius of about 10 miles (the census districts included are: 1844 and 1846, nos. 8-15; and 1851, nos. 1-9). The terminology 'Adelaide district' is used to imply both an area and population greater than 'urban Adelaide' which cannot readily be defined during this period.

Sources: 1840, *House of Commons Papers*, 1843, vol. 32, pp. 70-101; 'Abstract of Census Returns', *SAGG*, 11 April 1844, 23 April 1846 and 6 February 1851.

the development of the mining industry which resulted in mineral ores, regulus and metals making up 63 per cent of the value of exports from 1846 through 1850 compared with wool 26 per cent and breadstuffs 9 per cent. The tonnage of ore exported reached a peak of 17,000 tons in 1848 but then local smelting—discussed later—reduced the amount of ore and metal handled at the wharves to 10,700 tons in 1849 and 11,400 tons in 1850. The movement of large quantities of minerals from inland mines, especially Burra Burra and Kapunda which were 90 and 50 miles, respectively, north-northeast of Adelaide, gave rise to a considerable internal transport problem that was exacerbated by the difficulty of moving drays, each with a capacity of 2 to 3 tons, along unsurfaced tracks during the wet winter months. In consequence during the mid-1840s the freight rates on other goods increased thus providing another incentive for the dispersion of flour-mills into wheat-growing areas. Pastoralists had less cause for complaint, however, because the availability of copper ore as a bottom cargo allowed shippers to reduce the freight on wool.

The population of the colony increased from 14,600 in 1840 to 63,000 at the beginning of 1851, but the temporary cessation of assisted immigration and the departure of settlers to other colonies meant that the annual average growth rate was only 7 per cent from 1840 to 1846 as against 23 per cent during the following five years.²⁷ At the same time the spread of agricultural and pastoral activity and the opening up of the mines was accompanied by considerable changes in the distribution of population as is indicated in Table 5.9. In particular, Adelaide and its environs became less dominant: between 1840 and 1846 the number of adult males there declined absolutely and from 1846 to 1851 the numbers of women and children declined relatively. By the latter date nearly half the population lived at least 10 miles from the capital and some had dispersed to more distant parts of the colony including 4,400 people clustered at the Burra Burra mineral workings (Fig. 5.4).

Development and location of manufacturing

By the end of this period South Australia had made greater progress industrially than Victoria even though it had fewer inhabitants. For what such comparisons are worth, South Australia had seventeen steam flour-mills in 1850 compared with eleven in Victoria; eighteen breweries compared with fourteen; ten tanneries compared with nine; and six iron and brass foundries compared with five. In addition South Australian manufacturers had had some success at designing and making agricultural machinery and at smelting metals, but there had been few comparable achievements in the neighbouring colony.²⁸ But there was another side to the coin, for progress in some directions was negligible. Shipbuilding was a case in point. The construction during the decade of thirty or so sailing vessels averaging less than 20 tons was more than matched by the output of several shipyards scattered along the rivers of New South Wales; ship repair facilities worthy of the name hardly existed; and the colony's engineers had had little experience even of operating and maintaining steam vessels.

Soon after settlement began, the usual run of local-serving industries—brewing,

some of his neighbours. Little government control was exercised at this or indeed any time during the 1840s except for the licensing of slaughter-houses (1841) which had to be in a 'convenient and desirable situation', and of distilleries (1842) which had to be in Adelaide or such other towns as might be nominated. The rapid growth of population in and near Adelaide during the first years of settlement meant the development of a concentrated market exceeded in size only by Sydney and Hobart. Much of the demand for consumer goods was met by imports but some people quickly took advantage of the opportunities available: by 1841, for example, four breweries had been set up in the Adelaide area to serve no fewer than seventy licensed public houses or about one for every eighty adults.²⁹

The events of the early 1840s led to a weeding out of some existing industrial ventures but the establishment of others in more distant parts of the colony. These events included a financial crisis followed by several years of public and private retrenchment that caused a fall in the value of retained imports from 1842 through 1844 (Table 5.8); the cessation of assisted immigration; unemployment in 1841 and 1842 followed by a labour shortage; the opening up of country areas; and the virtual halting of Adelaide's growth. From about 1845 both Adelaide and country manufacturers shared in the return to prosperity as orders started to come forward for steam engines, rock-drills, gear-wheels, rollers for malt-mills, and even the retorts and fittings for a small gas-making plant. But technical sophistication cannot be acquired overnight, a point no doubt borne in mind by the South Australian Mining Association when in 1848, despite the predictable local outcry, it gave a contract to a Sydney firm for a large steam engine and blower for its Yatala copper-smelting works.³⁰

An impressionistic view of the growth of industry occurring during the second half of the 1840s can be obtained from nine occupational categories common to the 1846 and 1851 censuses that can broadly be described as 'manufacturing'.³¹ The number of such workers more than doubled—from 706 to 1,962—but on both occasions accounted for 8 to 9 per cent of all adult males. It is by no means certain, however, that people were actually using these skills for there is evidence of some unemployment, such as in the Adelaide tailoring trade, shortly before the 1851 census.

Lack of adequate employment or output data for even a single industry makes it impossible to say much about the impact of events during the decade. But some idea of the possible changes in the demand for beer can be obtained from the number of public house licences. Between 1840 and 1843 the number of pubs in Adelaide, Port Adelaide and Albert Town decreased from 70 to 34 but then rose again to 66 in 1847 and to 99 in 1850. The remainder of the colony on these dates had 37, 33, 36 and 176 pubs—the latter figure being a reflection of the very considerable dispersion of population that had taken place. By 1850 eight or nine breweries were functioning in places like Morphett Vale, Noarlunga, Oakbank, Gawler (2) and Kapunda. Most of the country ventures like these early breweries or the blacksmiths' and wheelwrights' shops were and remained insignificant. Few could emulate the example of James Martin who in 1848 started to put together

Table 5.10 Wheat production and trade, South Australia, 1840-50
(000 bushels)

Year	Local production of wheat ^a	Net imports (+) and exports (-) of wheat	Net imports (+) and exports (-) of flour ^b	Estimated total wheat available for milling in South Australia
1840 ^c	22	+ 2	+ 44	24
1841 ^c	78	+ 16	+ 37	94
1842 ^c	189	+ 4	+ 41	193
1843	290	- 11	- 31	279
1844	268	- 90	- 42	178
1845	309	- 90	- 50	219
1846	470	- 59	- 69	411
1847	420	- 113	- 57	307
1848	562	- 89	- 69	473
1849	602	- 75	- 74	527
1850	602	- 95	- 75	507
Total	3,812	- 600	- 345	3,212

^a Production less 10 per cent for seed and wastage: for most years (except 1842 and 1844) the production figures are partly estimated which means that the figures for 'wheat available for milling' are also affected.

^b Flour converted to wheat equivalent on the basis of 49.8 bushels per long ton.

^c External trade in wheat and flour partly estimated 1840 to 1842.

Sources: *SABB*, 1840-50; *Statistics of South Australia*, 1845-50.

Table 5.11 Changes in housing stock, South Australia, 1844-51

Area ^a	Number 1844	Net increase or decrease (—) 1844-46	Net increase or decrease (—) 1846-51	Number 1851
Brick and stone houses				
Adelaide district	1,112	251	2,958	4,321
Rest of colony	234	118	1,199	1,551
Wooden houses				
Adelaide district	572	66	1,542	2,048
Rest of colony	570	196	926	1,692
Other houses and tents				
Adelaide district	599	590	-2	1,187
Rest of colony	304	101	777	1,182
Total South Australia	3,391	1,190	7,400	11,981

^a 'Adelaide district' defined as in note *b* to Table 5.9.

Source: 'Abstract of Census Returns', *SAGG*, 11 April 1844, 23 April 1846 and 6 February 1851.

bullock drays at Gawler for ore carters, turned his hand to making agricultural implements, and then towards the end of the century secured contracts to build rolling stock and locomotives.

Some of these points can be further illustrated by a more detailed discussion of the flour-milling, building and smelting industries.

Flour-milling. Prior to 1841 the colony depended mainly on imported flour—the amount of locally grown and imported wheat would hardly have been enough to keep the two small steam-mills erected in Adelaide by the end of 1840 even in part-time operation. The increased acreage sown to wheat during 1841 then encouraged investment in milling: one company sought a site near Adelaide on the grounds that there was likely to be a deficit in milling capacity of 60,000 bushels in the 1841–2 season so that, unless immediate action were taken, local grain would have had to be shipped to Tasmania for processing.³²

By 1843, however, there were fourteen mills which not only ground all the flour needed in the colony (Table 5.10) but started to send about one-sixth of their output to external markets.³³ But this initial expansion of the milling industry had almost run its course by 1846, with only two more steam-mills being added by 1851 to the fifteen then operating. Water-mills were uncommon although during the first few years millers tried to find sites where water-power could be harnessed if necessary because of the difficulties and delays in getting steam engines repaired.

By mid-century two-thirds of the wheat was being produced on the coastal plain from beyond the Gawler River in the north to Willunga in the south, nearly another one-third in the Mount Barker district east of the Mount Lofty Range, and the remainder in scattered pockets as at Encounter Bay. This extension of wheat farming, the increase in rural population, the poor state of the so-called roads, and the high costs of transport due to labour shortages and the competing demands of the mineral industry, encouraged the spread of flour-mills into country areas beginning in about 1843. Five years later intending immigrants were told not to bother to bring their own querns because commercial mills were ‘disseminated all over the settled parts of the colony’³⁴ at places like Noarlunga, Mount Barker, Encounter Bay, Tanunda and Gawler. South Australia was on the way to becoming the leading wheat-growing and flour-milling colony, an episode taken up in Chapter 13.

Building. During the early 1840s the colony’s financial crisis brought building to a standstill in and around Adelaide. At the end of 1842 one-third of the dwellings in the City were deserted and those of *pisé* construction (mud built up in frames, sun-hardened and whitewashed) were falling into ruin. Some slight renewal of activity occurred between the censuses of 1844 and 1846 (Table 5.11) but an average of only 20 stone, brick and wooden dwellings was built each month. Then the return to prosperity, the renewal of immigration which created both a demand for accommodation and a supply of labour, the sale of real estate to realise capital for investment in mining, and the expenditure of mining profits on buildings all helped to push up the construction rate during the next five years to an average of 115 stone, brick and wooden dwellings and 13 *pisé* dwellings a month. South Australia

thus experienced something of a building boom compared with other colonies, for in Victoria the stock of brick, stone and wooden dwellings increased during this same inter-censal period by an average of only 97 a month and in New South Wales by only 72. Moreover, the number of South Australians describing themselves as bricklayers, carpenters, masons or plasterers increased from 575 in 1846 to 1,600 in 1851 (though there is no certainty that all were working at these trades).

The flow on from this building boom and the increased demand for household goods can only be inferred from such evidence as the increase from 77 in 1846 to 267 in 1851 in the number of brickmakers and from 24 to 145 in the number of cabinet-makers. One of the colony's problems was the scarcity and high cost of building timbers, and this was partly overcome by increasing the imports of sawn timber from Tasmania and New South Wales (which were valued at only £4,300 in 1845 but £70,000 in 1850), and partly by making extensive use of local materials like bluestone. These circumstances help to explain why in 1851 only 31 per cent of the total housing stock (including *pisé* construction) was built of wood as against 52 per cent in Tasmania, 56 per cent in Victoria, and 57 per cent in New South Wales. To some extent, therefore, employment in quarrying was substituted for employment in sawmilling.

Smelting. By the end of 1845 several copper mines had been opened up and about 940 tons of ore had been laboriously carted to Port Adelaide for shipment mainly to the smelters at Swansea in South Wales. It was not long before the mining companies turned their thoughts to the possibility of smelting some of the ore locally so as to reduce freight costs (which made up about one-fifth of operating expenses), to make use of ores having less than 20 per cent metal content which were not wanted at Swansea, and to overcome the shortage of shipping space which meant that some of the ore had to be sent coastwise to Sydney for transshipment aboard wool vessels. At first nothing came of any of these proposals, probably because of a lack of information and expertise about metallurgical techniques. The *Maitland Mercury* took every opportunity from 1845 to 1848 to chide the copper mining colony about the few signs of progress and also its own entrepreneurs for not setting up smelters at Newcastle to take advantage of the lack of coal in South Australia, the removal of New South Wales duties on imported ores late in 1845, and the demand for bottom cargoes for ships sailing in ballast to India from New South Wales with consignments of horses.³⁵ In South Australia consideration was in fact given to sending ore to Newcastle for processing but it was decided instead to press forward with local experiments, on a laboratory scale, using charcoal instead of coal. Eventually several processes were patented.³⁶

By the end of 1847 four schemes to smelt copper had emerged. First, near the Kanmantoo mine (33 miles southeast of Adelaide beyond Mount Barker) the Thomas brothers, who had just arrived after working at a Chilean copper-smelter, began setting up the Bremer Smelting Works towards the end of 1847 and it came into operation in August 1848. This enterprise used charcoal to smelt inferior ore into regulus under arrangements with the South Australian Company, which owned the Kanmantoo mine, and the owners of neighbouring mines.³⁷ Second, during

1848 colonial inventors and mining investors Penny and Owen erected a works at Apoina (25 miles north of Kapunda) using ore from the Burra Burra mine, the first metal from which reached Adelaide early in 1849.³⁸ Third, the proprietors of the Kapunda mine (45 miles northeast of Adelaide) set up a smelter nearby which came into production in December 1849. Fourth, the directors of the South Australian Mining Association called tenders at the end of 1845 for the erection of a smelter near the Burra Burra mine, and reported in October 1846 (apparently with a certain amount of exaggeration) that the works was 'far advanced towards completion' and that 1,460 of the 7,200 tons of ore raised during the first year were on hand at the mine ready for smelting. Meanwhile they had been backing experiments into other forms of charcoal smelting which had led in August 1846 to proposals for a large public company, but the colonists were sceptical, the cash took a long time to raise, and the Adelaide Smelting Company was not actually formed until December 1847. With a nominal capital of £20,000 and paid-up calls from local sources of £6,000, the company started in May 1848 to build a smelter at Yatala, about 7 miles northwest of Adelaide, which came into operation in February 1849. By mid-December 140 tons of copper worth nearly £12,000 had been produced, but the venture was too small and under-capitalised, and soon failed. The location near Port Adelaide was advantageous because of the need to use imported coal and coke to drive the hot blast machinery and, unexpectedly, also as fuel for the smelter because of a recurring shortage of charcoal. But the problem of overland freight costs still remained since, to produce 1 ton of metal, 4 to 5 tons of ore had to be carted more than 90 miles from the Burra mine.³⁹

While these four local enterprises were coming to fruition, the Patent Copper Company (a partnership operating in Wales) sent representatives to South Australia in mid-1848 who quickly reached agreement with the South Australian Mining Association to erect a smelting-works, costing £60–70,000, at Koorunga near the Burra mine.⁴⁰ Construction began in December and went ahead quickly—one furnace was in operation by the end of March 1849, another three by June and two more by October. It soon became evident, however, that the Patent Copper Company had neither the financial resources nor the commercial ability to fulfil its obligations to the Association; accordingly the company's assets in South Australia (valued at £203,000) were taken over by a new concern, the English and Australian Copper Company, floated in Britain.⁴¹ Brown argues (pp. 57–60) that the Association 'made huge profits largely at the expense of the Company' since the latter had to bear the costs of operating a remote smelting-works. The major problem continued to be overland transport. Not only did it cost about £2 per ton to cart imported coal from Adelaide to the smelter but, because the roads were impassable in winter, attempts had to be made to stockpile additional coal during the summer months when farmers were also competing for the services of the carriers. As a result the works sometimes ran out of coal in the winter and the furnaces could only be worked intermittently and therefore uneconomically. A partial solution began to emerge following the discovery in the late 1840s of a good harbour at the mouth of the Wakefield River near the head of Gulf St Vincent. During 1849 a possible

route from Burra Burra to this harbour was surveyed and found to save 50 miles compared with the road distance to Port Adelaide, and from about March 1850 a fleet of barges began to operate between 'Port Wakefield' (it was not officially constituted a port until September) and Port Adelaide. In the first six months 1,156 tons of metal and ore were freighted down the Gulf and 6,000 tons of coal and sundries were back-loaded to the company's wharves.

The development of copper-smelting was reflected in the growth of metal exports from 3 tons during 1848 to 434 tons in 1849 and 2,230 tons in 1850. The metal was worth four times as much as the unrefined ore (on average, £78 as against £19 per ton) but no proper appraisal of the relative economics of these smelting projects is possible because accounting data have not survived. The effect of this activity on other industrial development is also hard to determine in any detail: tenders for fire-bricks, for example, appear to have been met from imported supplies, and much of the plant and machinery was brought from Britain and, to a limited extent, from New South Wales. The Burra mine and the nearby smelter undoubtedly provided a useful market for locally made provisions for by the beginning of 1851 this area supported 600 miners, 1,250 other workers, and 2,550 women and children. Since virtually all supplies had to be carted in—only 90 acres nearby were under crops including hay for fodder—it is possible that some 630 tons of flour alone would have been needed each year, or about 7 per cent of the total milled for internal consumption.⁴²

Little need be said about the smelting of lead and iron. Several attempts to produce pig lead were made between 1846 and 1851 but at £15 per ton it was not nearly as attractive an investment as copper. In May 1849 the prospectus of the Forest Iron Works and Sawing Mills Company, which had land in the Mount Lofty Range at Coxs Creek, was published but apparently only experimental quantities of iron were produced.

These attempts to smelt minerals in South Australia—the only Australian colony which had had any real experience of such operations—illustrate three aspects of industrial geography. First, the financial and technical resources available locally were inadequate and it is unlikely that much would have been achieved in the long-run but for the intervention of the Patent Copper Company and its successor using British capital. Second, the economics of locational decisions in the mineral processing industries was usually finely balanced at the best of times but could alter very quickly; much depended on a company's ability to respond to these changes such as by providing its own infrastructure like the route through Port Wakefield. Third, the need for South Australia to draw coal from the Hunter Valley and the opportunity this gave for back-loading copper ore for smelting in Newcastle marked the beginning of a series of relationships that grew up between widely separated parts of Australia to develop mineral resources on a worthwhile scale.

Victoria

The permanent settlement of Victoria began in 1834 and 1835 when several groups crossed Bass Strait from Tasmania and established themselves at Portland and Port Phillip Bays. Governor Bourke warned these squatters in August 1835 that they were trespassing on Crown land. He realised, however, that this spread of settlement was inevitable and that it would be better to try to minimise potential problems by establishing townships and ports and thereby bring perhaps a semblance of law and order and an opportunity for at least some scholastic and religious instruction in these 'distant parts of the wilderness'.⁴³ Land surveys in the Melbourne area began in October 1836 and the first sale of city sections was held on 1 June 1837. The township of Geelong was proclaimed late in 1838 and the first land sold during the following February. Pastoralists in the meantime were beginning to move overland from New South Wales into northern Victoria (the first stock crossed the Murray River in 1835) but widespread occupation occurred only after Surveyor-General Mitchell had returned to Sydney late in 1836 from a cross-country trek to the Victorian coast. Powell's detailed account of the nature and direction of the squatting occupation of the colony requires no elaboration here.⁴⁴

In November 1836 there were only 224 settlers in the area later designated as Victoria. By March 1841 the population had grown to 11,738 (including 2,339 children under fourteen); five years later it had reached 32,879 (11,217 children), and in March 1851 it totalled 77,345 (27,947 children). At this latter date two-fifths of the population were in the City of Melbourne (23,143) and the town of Geelong (8,291) which in barely a dozen years had become the second and third largest towns on mainland southeastern Australia.⁴⁵ Melbourne quickly established itself as the main commercial and business centre of the colony despite the fact that goods and passengers had to be transhipped from the larger vessels at Williamstown on to Yarra River craft. Port Melbourne was designated a free port and free warehousing port by an Order in Council in 1840, while Melbourne, incorporated as a Town in 1842 and becoming a separate port and district for customs purposes in 1845, gained the status of a 'City' in 1847. Geelong, 40 miles southwest across Port Phillip Bay, was incorporated as a Town in 1849 but its ambitions to wrest supremacy from the capital were frustrated mainly because of a bar across the entrance to the inner harbour. On the coast, Portland (population about 1,000) to the west and Port Albert to the east were developing as subsidiary commercial and shipping centres handling the supplies and produce to and from the nearby pastoral areas (Figs. 3.2 and 3.3).⁴⁶ Other coastal towns and villages were also beginning to feel the spur of ambition—Portland, for instance, soon had rivals in Port Fairy (then called Belfast) and Warrnambool which were declared ports of entry and clearance in 1850 and 1854, respectively.⁴⁷

Melbourne, though always dominant, did not have a monopoly of Victoria's export trade: whereas it received 87 per cent by value of the colony's imports in 1850, export shipments were divided between Melbourne (55 per cent by value),

Table 5.12 Workforce structure, Victoria, census 2 March 1851

Employment category	City of Melbourne ^a		Town of Geelong ^a		Rest of colony		Total colony		Proportion of each category in Melbourne ^b
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	
Commerce, trade and manufacture	2,639	29.6	827	25.4	1,554	6.6	5,020	14.1	52.6
Agriculture, grazing and horticulture	258	2.9	237	7.3	11,146	47.6	11,641	32.8	2.2
Other labourers	1,316	14.8	706	21.7	4,004	17.2	6,026	17.0	21.8
Mechanics and artificers	1,563	17.6	662	20.4	1,190	5.1	3,415	9.6	45.8
Domestic servants	1,518	17.1	478	14.7	2,614	11.2	4,610	13.0	32.9
Professional people	466	5.2	104	3.2	722	3.1	1,292	3.6	36.1
All others	1,136	12.8	239	7.3	2,155	9.2	3,530	9.9	32.2
Total labour force	8,896	100.0	3,253	100.0	23,385	100.0	35,534	100.0	25.0

^a No information is available for individual towns apart from the City of Melbourne and the Town of Geelong.

^b Compared with 29.9 per cent of total population.

Source: 'Census of Victoria for the year 1851', *VIV&P(LC)*, 1851-2, Table V.

Table 5.13 External trade, Victoria, 1837-50
 (£000)

Year	Exports originating in Victoria					Entrepôt Trade	Retained imports
	Wool exports ^b	Tallow exports ^b	Processed and manufactured exports	Other exports	Total colonial exports		
1837	11	—	—	1	12	—	115
1838	22	—	—	6	28	—	72
1839	45	—	—	27	72	5	199
1840	68	1	—	37	106	23	391
1841 ^a	86	1	n.a.	n.a.	87+	n.a.	n.a.
1842 ^a	151	1	n.a.	n.a.	152+	n.a.	n.a.
1843	219	2	2	42	265	13	171
1844	174	14	3	45	236	21	130
1845	397	12	4	39	452	12	236
1846	352	3	6	49	410	15	300
1847	566	16	8	62	652	16	421
1848	557	38	5	58	658	17	356
1849	575	100	10	52	737	18	462
1850	826	133	11	52	1,022	20	725
Total	4,049	321	49+	470+	4,889+	160+	3,578+

^a Data shown come from summaries available for some items: detailed data are for years ending 30 September 1841 and 1842 and are thus not comparable with calendar year data for remaining years.

^b Excludes wool and tallow exports sent coastwise to Tasmania and New South Wales for transshipment there.

Source: *NSWBB*, 1837-50.

Geelong (35 per cent), Portland (9 per cent) and Port Albert and Port Fairy (1 per cent). In this particular year 8,044 tons of wool and tallow passed through Melbourne compared with 3,096 tons through Geelong, 787 through Portland and 77 through Port Albert and Port Fairy. But by themselves these trade figures give an inadequate impression of the role played by outlying ports like Port Albert which prospered because it enabled Gippsland graziers to send livestock to Tasmania in the 1840s to help meet the increasing demand there by the Commissariat for meat.⁴⁸ These port towns also attracted the first formal financial institutions outside Melbourne with experiments—some admittedly short-lived—in branch or agency banking being made at Geelong, Portland and Port Fairy during the 1840s.

Inland, rudimentary urbanisation was only just becoming discernible by mid-century as inns, police stations, post offices, blacksmiths' forges, and wheelwrights' shops began to appear in villages like Bacchus Marsh, Kilmore, Colac, Hamilton, Sale and Benalla. Not uncommonly, river crossings evolved into settlements: in this way Maiden's punt established in the mid-1840s gave birth to Moama on the River Murray and the Ovens River crossing evolved into Wangaratta.⁴⁹ The pioneer nature of settlement outside Melbourne and Geelong in 1851 is indicated by the fact that there were 2.4 adult males to each adult female compared with 1.3 men to each woman in these two towns; moreover, country areas had 73 per cent of the colony's unmarried men but only 42 per cent of the unmarried women. On the other hand, Melbourne and Geelong between them had more than two-thirds of the people described by the census authorities as 'mechanics and artificers' or as being engaged in 'commerce, trade, and manufacture' (Table 5.12).

The summary of Victoria's trade in Table 5.13 indicates the importance of wool and tallow which made up 83 and 7 per cent, respectively, of the value of merchandise exports of local origin from 1843 through 1850. These commodities were even more dominant than such figures suggest because wool and tallow sent coastwise to New South Wales and Tasmania for transshipment were included among *their* exports.⁵⁰ Most of the other merchandise exports consisted of livestock, and animal, whaling and forest products which required little processing. Among the few locally manufactured items appearing in the export returns from 1843 through 1850 were soap (560 tons), candles (50 tons), butter and cheese (220 tons), flour and bread (560 tons) and leather, but the estimated value of these was only £45,000, or a mere 1 per cent of the total.

Development and location of manufacturing

Until the middle of the century Victoria largely depended on manufactured goods brought in from other Australian colonies and from overseas, although flour-mills, tanneries, sawmills, breweries, soap- and candle-works, and so on were gradually coming into existence. At first nearly all were located in Melbourne or elsewhere in Bourke County, but after 1844 they also began to appear in towns like Geelong, Portland and Port Fairy. All that need be said about these early establishments is that steam power was used almost from the outset. Although a water-mill had been

Table 5.14 Wheat production and trade, Victoria, 1838-50
(000 bushels)

Year	Local production of wheat ^a	Net imports (+) and exports (-) of wheat	Net imports of flour ^b	Estimated total wheat for milling in Victoria
1838	—	—	36	—
1839	2	+ 1	39	3
1840	45	+ 1	57	46
1841	43	+ 3	113	46
1842	50	+24	81	74
1843	94	+29	53	123
1844	128	+39	60	167
1845	211	+25	50	236
1846	311	— 2	46	309
1847	315	— 3	40	312
1848	369	+27	38	396
1849	464	+43	34	507
1850	501	+26	29	527
Total	2,533	+213	676	2,746

^a Production less 10 per cent for seed and wastage.

^b Flour converted to wheat equivalent on the basis of 49.8 bushels per long ton.

Source: *NSWBB*, 1838-50.

erected at Dight's Falls on the Yarra River in 1839 and a windmill at Brighton, the third and fourth mills in the colony erected in Melbourne in 1840 and 1841 both used steam to drive saws and grindstones.⁵¹ Prior to 1843 imported flour provided more than half the breadstuffs consumed in the colony and there was hardly enough wheat available locally to warrant much expansion in milling capacity (Table 5.14). But about this time the wheat acreage beyond Bourke and Grant counties was increasing and it was not long before windmills (such as at Port Fairy in 1844) and then steam-mills began to appear in settlements outside Melbourne like Geelong and Portland (1845), Port Fairy (1846), Kilmore (1847), Colac (1849) and Bacchus Marsh (1850) so that by this latter date there were eight in the remainder of the colony compared with five in Melbourne. Nearly all the flour produced was consumed locally and the small quantities exported from 1844 onwards made up less than 1 per cent of the estimated quantity milled.

No serious attempts were made to weave cloth, distil spirits or smelt metals. In fact the colony was still at the stage when much smaller developments appeared significant, with small-town journalists being incurably optimistic. The *Portland Mercury and Port Fairy Register* on 26 June 1844 noted that a local shoemaker had been asked to supply several hundred boots for sheep to prevent footrot: with perhaps the Australian understatement it continued 'should the experiment prove successful, the shoemakers will no doubt obtain constant employment, as the demand for sheeps' boots will be extensive'! Curiously enough for a colony concentrated along a seaboard, even shipbuilding was of small consequence with only two dozen or so sailing-ships being launched, mainly at Melbourne and Geelong (Table 5.5). Although a dock was constructed in 1843, the repair facilities at Williamstown and along the Yarra River were primitive compared with those at Sydney and Newcastle.⁵² This is not to say that enterprise was completely lacking; in 1841 Manton and Company built the *Fairy Queen*, said to be the first Melbourne-Williamstown ferry (using an engine from a flour-mill and a brick chimney) but next year put together an iron paddle-steamer from imported sections. The only other known essay into steamship building in Victoria during this period was the construction by Chessell and Company on the Yarra River of the tug *Diamond* (40 tons net) in 1847. It is clear that the leading engineering and metal-working firms, notably Manton and Company and Langlands & Fulton, had to depend on miscellaneous orders for items like wool-presses, brickmaking machines, boilers and similar kinds of metal goods rather than on a more consistent stimulus from particular activities (like mining and shipbuilding) as in the colonies already discussed. Nonetheless, substantial progress was being made. It was, after all, no mean achievement for Langlands & Fulton, who had started their partnership in 1842 with one foot-powered lathe, to be able four years later to turn out the first steam engines made in the colony. Hardly any sector of the economy provided more than a mild stimulus to industrial activity. Even the boiling down of livestock, which gave some slight encouragement to manufacturing in New South Wales from 1843, did not develop in Victoria until later, with only 3,360 tons of tallow being produced from 1844 through 1847 compared with 10,400 tons during the next three

Table 5.15 Changes in housing stock, Victoria, 1841-51^a

Area	Brick and stone houses				Wooden houses			
	Number 1841	Net increase 1841-46	Net increase 1846-51	Number 1851	Number 1841	Net increase 1841-46	Net increase 1846-51	Number 1851
City of Melbourne	394	982	1,679	3,055	375	583	60	1,018
Town of Geelong	10	137	764	911	60	50	564	674
Rest of Victoria	46	266	586	898	605	1,690	2,141	4,436
Total Victoria	450	1,385	3,029	4,864	1,040	2,323	2,765	6,128

^a Includes 'finished' and 'unfinished' houses; so far as possible, these data are comparable with those in Table 4.6 but the 1851 census returns preclude more detailed analysis.

Sources: *NSWBB*, tabulations of censuses dated 2 March 1841 and 2 March 1846; *VP&P(LC)*, 1851-2, pp. 207-24, for census tabulations of 2 March 1851.

years. Similarly, the building industry did not begin to come into its own until the second half of the 1840s although a surprisingly large number of brick and stone houses were then erected (Table 5.15).

The industrial development of Victoria by mid-century was thus very limited. Although some of the colony's everyday needs were barely being met, there was little incentive for people to invest in manufacturing when many other shorter-term, and apparently more remunerative, opportunities remained open. The most striking feature was not the relative backwardness of Victoria's industrial development but the absence of any sign, even by mid-century, of a possible long-term industrial specialisation.

Queensland

Moreton Bay, developed as a penal settlement in 1825, had its peak convict population of about 950 in 1830 but by mid-1839 only a hundred or so males remained to look after buildings and livestock. Meanwhile pastoralists were pushing northwards through New South Wales and by February 1842, when the prohibition against settlement within 50 miles of the penal station (actually interpreted as 50 miles from Ipswich) was lifted, the squatters had taken up the eastern part of the Darling Downs and the upper Brisbane Valley, and had entered the Burnett Basin. Learning a lesson from the difficulties which had arisen in South Australia, the government sent surveyors to the Moreton Bay area before opening it up for general settlement. Although the first Brisbane land sale did not take place (in Sydney) until July 1842, some free settlers had already set up in business on the understanding that no guarantees about the security of tenure were intended or implied.

At the census of March 1841 the whole district had only 200 inhabitants, in 1846 about 2,500, and in 1851 nearly 8,600 of whom 4,800 were males of working age. At this latter census six towns and villages (Brisbane 2,550, Ipswich 930, Maryborough 300, Warwick 270, Drayton 200 and Gayndah 90) housed half the people while the remainder were scattered over pastoral areas which notionally covered some 58,000 square miles. In detail the population was less evenly balanced: the towns accommodated 67 per cent of the children and a similar proportion of the women but only 38 per cent of the men. The first squatters brought their convict workmen with them, but the cessation of transportation in 1840 and the absorption in the southern districts of most of the free immigrant arrivals created a shortage of manpower to work these ever-expanding northern pastoral areas. Various solutions were attempted or considered, including the importation of Chinese and Indians and the resumption of transportation, but the problem remained unsolved.⁵³

In 1850 the northernmost squatting districts and the reputed County of Stanley simply remained part of the distant—and in their opinion neglected—pastoral areas of New South Wales which had Sydney as their political and economic focus. Until 1850 there was no bank or bank agency anywhere in the Moreton Bay area so that

the 'currency' mainly took the form of orders on Sydney firms, a system which was also used to pay wages.⁵⁴ Moreover, although a customs sub-collector was appointed in June 1846 and Moreton Bay was constituted a free warehousing port in 1849, most of the goods to and from the area passed over the wharves in Sydney: paddle-steamers and sailing craft plied southwards down the coast with cargoes of wool, tallow, skins and a certain amount of timber, and returned with sundries and provisions including breadstuffs (Figs. 3.4 and 3.5). About 1,000 tons of wool and 1,500 tons of tallow were sent out of Moreton Bay during 1850 and at this time there would have been a need there for 1,300 tons of breadstuffs since very little grain was produced locally. Coote (p. 232) considered the value of exports (included in Table 4.4 as part of the general total for New South Wales) to be about £120,000 in 1849 and £150,000 in 1850.

Industrially the Moreton Bay area made little progress during the first two decades of free settlement. Even by 1860 the only 'mills and manufactories' recorded throughout Queensland were four sawmills, two tanneries, two salting and meat preserving establishments, two soap- and candle-works, a steam flour-mill, and a pottery, but most of these ventures were barely ten years old. There are references in the 1840s to blacksmiths' shops, printeries (the *Moreton Bay Courier* became a voice for local opinion in June 1846), cabinet-makers and so forth, but entrepreneurial activity was negligible. One or two people tried to make something of the limited opportunities such as a shipbuilder who shifted his yard from Newcastle to the south bank of the Brisbane River and built a couple of paddle-boats in 1849-50 to ply between Brisbane and Ipswich; more adventurous but less successful was John Campbell who set up a meat curing establishment at Kangaroo Point near Brisbane in June 1843, found it to be unprofitable, and converted it into a boiling down works.⁵⁵

The smallness of the population, the shortage of labour and the economic ties with Sydney all help to account for the lack of industrial development. Nor did much stimulus come from the building industry since only a handful of brick and stone dwellings had been erected by 1851 and the abundance of timber made wooden cottages a cheap and easy alternative. Moreover, although the pastoral industry expanded considerably—sheep numbers increased from 290,000 to 1,297,000, and cattle numbers from 18,000 to 96,000 in the seven years from 1844 through 1850—this provided few opportunities for local manufacturing. Even the amount of coopering required for the eight small boiling down works in operation by 1850 was limited because much of the 1,730 tons of tallow was packed in skins rather than casks. Little land was under cultivation and hardly any at all under wheat except on a domestic scale. One Darling Downs settler told the Committee on the Minimum Upset Price of Land in 1847 that he grew some wheat for his own use but the cost of labour made it cheaper to buy Sydney flour, ship it to Brisbane, and cart it 95 miles overland: he also pointed out that drought had ruined the crops in two years out of six. There was thus little demand for milling facilities and it appears that only one windmill at Brisbane operated from time to time during the 1840s presumably processing imported supplies. The lack of flour or any other

kinds of mills also meant the absence of one of the main stimuli which in the other colonies had led to the growth of engineering and metal-working skills; the first iron casting in Queensland was not made until July 1862.⁵⁶ It was not without reason that it was suggested at the beginning of the chapter that the industrial development of Queensland at this time was so slight that it can virtually be ignored.

Western Australia

This, the second colony on mainland Australia, came into being officially on 18 June 1829 and its capital, Perth on the Swan River, was founded two months later. Progress was slow during the first two decades. The population reached about 1,000 at the end of 1829 but increased by only 1,200 during the 1830s and by a further 2,500 during the 1840s. When the first proper census was taken on 10 October 1848 the total population consisted of 1,722 children under the age of fourteen, 1,945 men and 955 women. Over half the men, excluding military personnel, were land occupiers or agricultural and pastoral workers and this probably gives a fair impression of the orientation of the colony, although some of the so-called agricultural labourers were almost entirely employed on cutting and carting sandalwood for export. Originally it was not intended that Western Australia should become a convict settlement but the shortage of labour and the lack of funds with which to provide free or assisted passages for immigrants led to an Order in Council on 1 May 1849 that made the colony a place to which convicts could be sent. The first batch of seventy-five prisoners reached Fremantle in June 1850.⁵⁷

The small amount of industrial activity that developed was entirely geared to serving the tiny domestic market which by the end of this period did not even match the population of, say, the Maitland-Morpeth complex in the Hunter Valley. Several settlements had grown up including Fremantle (426 inhabitants in 1848) and Guildford (95) near Perth, Bunbury (66) 100 miles south, and Albany (173) 230 miles to the southeast. The capital itself only had 1,148 inhabitants in 1848 and a third of these were under fourteen years old. Moreover a rock bar across the Swan River at Fremantle meant that cargoes had to be lightered ashore and this encouraged the dispersal of maritime activity particularly to Albany, Busselton and Bunbury which from 1842 through 1845 received, respectively, 25,500, 14,500 and 6,100 tons of inter-colonial and overseas shipping compared with 21,400 tons at Fremantle.

Throughout this period, and for some time beyond, the main activities were the pit-sawing of timber for local use and, to some extent during the 1840s, for export; the production of limited quantities of beer, soap, leather and similar necessities at works mainly in Perth and Fremantle; and the building of a few small sailing vessels. The earliest flour-mills were all located at or near Perth—the first in the country being a windmill at Bunbury in 1846. A steam sawmill was imported in October 1829 but was probably never put to work so that steam power was first used at a Perth flour-mill in 1839 when the wheat harvest of the whole colony was little more than 30,000 bushels. Then in April 1844 a steam sawmill and flour-mill was erected at Guildford, 7 miles northeast of Perth (although this may have used the

engine from the Perth Mill). Western Australia had to depend on imported breadstuffs throughout most of the nineteenth century so that flour-milling developed more slowly and remained on a smaller scale than in any of the other colonies.⁵⁸

Several generalisations can be drawn from this account of the first industrial stirrings of the five colonies. By mid-century Tasmania and South Australia probably had, respectively, 3,000 and 2,100 people engaged in what can be loosely described as 'manufacturing' activities, although these employment figures should only be regarded as orders of magnitude estimated from a variety of sources. In contrast, Victoria, with 600 'factory' workers, was still tied to the apron strings of New South Wales and had failed to develop any particular specialisation of its own. Queensland and Western Australia were in a minor league by themselves with, between them, barely 200 people providing a few simple, everyday necessities.

Interest must centre on Tasmania, South Australia and Victoria which by 1850 had similar sized domestic markets in terms of 'adult male equivalents' (Table 5.1). The first two of these colonies, however, had already developed bases like shipbuilding and copper-smelting which not only provided an external trade but also a direct and indirect boost to processing and manufacturing. Clearly, the opening up of resources like timber in the one and copper in the other were of no small significance. At the same time both had placed considerable emphasis on agriculture, whereas in Victoria the more extensive pastoral activities required less support from, and gave little stimulus to, local industry. But another factor was also important. Perhaps partly because of political circumstances and the differences already mentioned, Victoria failed to attract people who had the technical skills to launch industrial projects on any scale or who were prepared to risk capital to support them. This human element cannot easily be discounted. Aside from the shipbuilding and copper-smelting companies, there was a noticeable dearth of entrepreneurs with the spirit and determination of men like Terry and Degraives in Tasmania, with an ability to seize opportunities as they arose.

One other point can be made about developments during this period. Almost paradoxically, as the colonies were formally cutting political ties and ending long-standing arrangements (such as the waiving of customs duties between New South Wales and Tasmania), they were also becoming more dependent industrially in some respects on one another. The expansion of flour-milling in Tasmania, for example, was very largely in response to the demand for breadstuffs in the other colonies, and copper and coal were being exchanged between Newcastle and Adelaide in significant quantities. But these embryonic relationships also contained the seeds of industrial rivalry between the political units, a phenomenon which became increasingly important and which explains much about the later industrial geography of Australia.

PART C

Manufacturing in Victoria 1851 to 1890

Prologue to Part C

In 1851 the 'Port Phillip District' of New South Wales, an area of 87,900 square miles 'bounded on the north and northwest by a straight line from Cape Howe to the nearest source of the River Murray and thence by the course of that river to the eastern boundary of the colony of South Australia', was constituted the colony of Victoria. The newly formed, two-thirds elected, one-third nominated Legislative Council of Victoria held several sessions between November 1851 and March 1856, but was then superseded by an entirely elective bicameral parliament, provided for under the Constitution Act, 1855, which met for the first time in November 1856. Thus in little more than five years the colonists in most respects had become masters of their own destiny.¹

This third part of the book considers the growth of manufacturing in Victoria during the period from the discovery of gold in 1851 to a point immediately prior to the downturn of economic activity into the depression of the 1890s. The discussion is divided between four chapters. The first sketches the spatial setting in which industrial development occurred with particular emphasis on urbanisation and on transport and communications, and thus provides a background for Chapters 7 and 8 that trace the course of events from 1851 to 1865 and from 1866 to 1890—in effect the 'pre-tariff' and 'post-tariff' periods. Finally in Chapter 9 locational aspects are considered in more detail, largely by means of case studies of industries which have been selected because of the light they throw on the way that Melbourne came to dominate the industrial development of the colony as a whole.

6 Victoria 1851 to 1890: The Spatial Setting

In March 1851 Victoria's non-Aboriginal population consisted of 32,000 men, 17,000 women and 28,000 children under the age of fourteen. During the next forty years the number increased by 1,063,000 which was almost equally attributable to natural increase and migration although their relative importance fluctuated considerably: in some years (1861-2, 1872-6, and 1878-9) emigration even exceeded immigration (Table 6.1).

The gold-rushes had gathered momentum by the second half of 1851 and made an impressive impact on the demographic structure of the colony. Partly this resulted from the sheer scale of the influx but mainly it was because many of the newcomers were youths and young men who helped to swell the labour force from 31,400 in 1851 to 236,500 in 1861. Geographically the gold-rushes were also significant. In March 1851 only 17,000 people were enumerated beyond the counties of Bourke, Grant, Normanby and Villiers (which encompassed the coastal nuclei of Melbourne, Geelong, Portland and Port Fairy) and these were scattered over the considerable area that had already been occupied by pastoralists. Although there was still plenty of scope for in-filling and for movement into new areas, it is hard to imagine that this sort of expansion alone would have stimulated much urban development, at least in the short-run, apart from small service and administrative centres like Kilmore, Benalla and Wangaratta that were emerging on the main dray tracks. Almost overnight the gold-rushes changed the picture: in the decade to March 1861 the population outside these four counties increased by nearly 268,000 of whom some 228,000 were at the diggings. The relatively large concentrations at various points on the gold-fields were sometimes ephemeral since people were more concerned with finding instant wealth than providing personal comforts; nonetheless they contained the seeds of urbanisation especially in areas where the development of subterranean working and quartz crushing in the mid-1850s brought a greater investment in fixed assets and equipment.¹ Hence, Yarrowee Creek, officially gazetted as the site for a *village* in mid-1852, became the boundary between the Municipality of Ballarat (proclaimed December 1855) and of East Ballarat (proclaimed May 1857) which in 1861 together contained a population of 22,100 in little more than 11 square miles.

The next two decades saw further significant changes. The total population of the gold-field areas (using the census definition) increased by 42,000 in the ten years to 1871 but this was only because the addition of 65,000 women and children compensated for an absolute *decrease* of 23,000 adult males (Table 6.2). One result was that the number of adult females per 100 adult males in these areas increased

Table 6.1 Growth elements in the population of Victoria, 1851-90
(000)

Period	Natural increase	Net migration	Total increase	Annual average percentage growth
1851-60	67 ^a	395 ^a	462	19.0
1861-65	74	6	80	2.8
1866-70	76	30	106	3.2
1871-75	77	-6	71	1.9
1876-80	70	-6	64	1.6
1881-85	73	28	101	2.3
1886-90	88	86	174	3.6

^a D. R. G. Packer ['Victorian Population Data, 1851-61: A Preliminary Analysis', *Historical Studies of Australia and New Zealand*, 5 (1953), pp. 307-23] gives a very useful summary of uncertainties surrounding the use of census and other sources relating to the 1850s. There are doubts about the accuracy of birth and death registrations, about the records of arrivals and departures by sea and about the numbers moving overland to and from the other colonies. Packer demonstrates that, of the total increase of 461,283 (excluding Aborigines, the number of which was in any case very small) between the censuses of 2 March 1851 and 7 April 1861, 314,016 (68 per cent) can be accounted for by net sea migration and 64,586 (14 per cent) by natural increase, leaving 82,681 (18 per cent) to be accounted for by errors, omissions and overland movements. Here it has been assumed that natural increase was understated by 10 per cent during 1851 through 1854 (after which registration procedures improved) and that the remaining increase during the 1850s must be attributed to net migration. The other main source is Commonwealth Bureau of Census and Statistics, *Demography*, 67 (1949), pp. 154-60, but estimates for Aborigines have here been included.

Table 6.2 Adult population in Victoria, censuses 1851-91^a
(000)

Census	Sex	Melbourne ^b	Gold-fields ^c	Rest of colony	Total Victoria ^d	Gold-miners ^e
1851	M	8.0	—	23.9	31.9	—
	F	6.4	—	11.0	17.4	—
1854	M	37.8	46.3	29.0	124.9	40.0?
	F	23.5	9.2	18.5	51.7	—
1857	M	40.4	120.3	42.0	208.8	87.4
	F	30.6	41.8	18.4	91.4	—
1861	M	43.9	123.2	70.8	241.8	83.1
	F	40.1	42.3	42.6	125.5	—
1871	M	62.7	100.8	88.0	253.5	52.4
	F	63.5	60.8	60.4	185.0	—
1881	M	90.3	79.9	122.9	295.6	35.2
	F	96.7	64.7	93.9	255.9	—
1891	M	166.7	241.5	241.5	411.0	21.2
	F	164.8	193.2	193.2	358.8	—

^a 'Adult' defined as fourteen years and over; 'not stated' ages have been distributed proportionately; Aborigines excluded in 1851 and 1854 because of inadequate data; Chinese included from 1854 on.

^b As nearly as possible the Melbourne and Metropolitan Board of Works area as defined in 1890. Some estimates have had to be made for the censuses in the 1850s.

^c Gold-fields population as published in censuses; these figures were said to include, so far as practicable, only the gold-fields and related townships and encampments. Thus these figures are considerably less than those for the warden's districts.

^d The total for Victoria includes crews and passengers on ships, travellers and other migratory population that cannot be allocated geographically; these numbers were really significant only in 1854 and 1857.

^e Gold-miners also includes those operating mining equipment (sluices, crushers, etc.); the figures shown (which include Chinese) are as given in the censuses. The numbers shown for 1854 and 1857 in particular were probably understated.

Source: Victorian census reports 1851-91.

from 34 to 61. Since the number of men defining themselves as 'miners' fell by 31,000, it is reasonable to deduce that a substantial number—perhaps 8,000—of ex-miners had managed to find other employment on the gold-fields or in nearby towns.

During the 1870s, however, the gold-fields population declined absolutely: in particular, there was an exodus of a further 21,000 adult males, or 3,400 more than the reduction in the number of miners. This suggests, taking the census returns at face value, that alternative employment opportunities on the gold-fields were becoming scarce. The Chinese especially were affected by the general contraction and the changing character of the industry,² and the numbers engaged in mining dwindled still further from 14,160 in 1872 to 8,960 in 1880 of whom all but a handful were engaged in working—or more usually re-working—alluvial deposits.³ Some Chinese had returned home or moved to other parts of Australia, but a few had established themselves as furniture and cabinet-makers in the centre of Melbourne only to become the subject of legislation motivated as much by judgments about skin and creed as by assessments of skill and competence (see Chapter 8).

Several points can be made as a result of the longer-run view of the distribution of the adult population shown in Table 6.2. First, the adult population in Melbourne increased rapidly between 1851 and 1854 and again between 1861 and 1891 (especially in the 1880s).⁴ Second, the increase in the number of women on the gold-fields between 1854 and 1857 and then again during the 1860s contributed to the stability of these areas and added yet another stimulus to town formation. Third, the continued growth of the number of men and the very considerable increase in the number of women (except between 1854 and 1857) in the remainder of the colony indicates that the disruption to the rural economy during the gold-rushes may have been shorter and less severe than sometimes suggested. Indeed the second half of the 1850s saw the acreage of land under the plough expanding in the central districts and an associated development of services such as implement repairing, and processing activities like grain-milling.

Urbanisation

Apart from Melbourne, the only towns with more than 500 population in 1851 were Geelong, Portland and Port Fairy. During the following decade a further forty-six towns reached this size—a threshold adopted not only as a matter of convenience but also because, as Butlin has pointed out, it appears to have been at about this point that townships began to acquire some specialised commercial and industrial functions.

Thirty-three of these places received their initial stimulus from gold although such a distinction is a fine one bearing in mind the spur given to Echuca by the mobs of cattle brought across the Murray River from the Riverina for the gold-field butchers, and to Kilmore and Benalla by the demand for grain and potatoes. Ten of these gold-field towns had more than 2,000 population but only three—Greater

Fig. 6.1: Urban population of Victoria as enumerated at the census of 7 April 1861. Towns with 500 or more population are depicted and those with 2,000 or more are named. Melbourne has been excluded: within the boundaries designated in 1890 as the Melbourne and Metropolitan Board of Works area were approximately 130,800 people. For more detail see Table 6.5.

Ballarat (22,100), Greater Bendigo (13,500) and Greater Castlemaine (13,000)—had reached 10,000 by 1861 (Fig. 6.1).

During the latter part of the 1850s the leading gold-field towns started to take on an air of permanence⁵ and by the early 1860s contained 12 per cent of the colony's stock of brick, stone and wooden dwellings or roughly the same as their share of the colony's population (Table 6.3). Even so nearly one-third of their inhabitants were still living under canvas. The evolution of the main gold-field settlements from mere mining camps to service centres is also indicated by the 1861 occupational data (Table 6.4): mining was still the dominant activity but bankers, shopkeepers, hotel-keepers and manufacturers were beginning to play a not insignificant role. By this time, too, women and girls (mainly employed as domestic servants) made up nearly 12 per cent of the labour force of these towns which was not far short of the proportion in the colony as a whole.

The course of urbanisation from 1861 onwards was by no means constant over time or space (Figs. 6.2 and 6.3). Leaving Melbourne aside, the 1860s saw growth continuing in most of the existing forty-nine towns and the appearance of a further forty. During the 1870s there was little change in the total urban population but

Table 6.3 Distribution of dwellings, Victoria, census 7 April 1861
(per cent)

Area	Brick or stone	Wood or iron lath and plaster	Tents and dwellings having canvas roofs	Slab, bark and mud huts	Not stated	Population
Melbourne ^a	54.5	25.3	0.8	1.7	34.1	24.2
Nine gold-field towns ^b	8.8	12.8	15.1	7.4	13.3	12.1
Rest of gold-fields ^c	4.6	22.7	71.9	58.7	24.8	42.8
Rest of colony	32.1	39.2	12.2	32.2	27.8	20.9
Actual number	18,990	59,346	42,750	9,280	3,966	540,322

^a As nearly as possible the Melbourne and Metropolitan Board of Works area as defined in 1890.

^b Amherst, Ballarat, Beechworth, Bendigo (inc. Eaglehawk), Browns, Castlemaine (inc. Chewton), Creswick, Inglewood and Maryborough. Each of these towns had more than 2,000 population. Maldon (with 3,300 population) has been excluded because comparable data from later censuses are not available.

^c As defined by census authorities.

Source: *Report on Census of Victoria, 7 April 1861*.

Table 6.4 Workforce structures, Victoria, census 7 April 1861
(per cent)

Employment category	Melbourne ^a		Nine gold-field towns ^b		Rest of gold-fields		Rest of colony		Total colony	
	M	F	M	F	M	F	M	F	M	F
Agricultural and pastoral	5.9	1.4 ^c	3.3	1.3 ^c	8.2	15.1 ^c	47.4	38.3 ^c	19.7	19.1 ^c
Gold-mining	1.3	—	50.2	0.4	69.9	2.0	4.8	—	35.6	0.4
Manufacturing ^d	14.7	1.1	7.2	0.5	2.2	0.3	3.7	0.2	5.3	0.5
Building and construction	15.3	—	8.4	—	4.4	0.1	12.2	0.1	9.2	0.1
Commerce	29.3	23.8	16.0	26.8	7.7	27.6	8.8	9.8	12.6	18.8
Transport and accommodation	12.1	3.8	5.5	6.6	3.7	7.1	8.7	3.0	6.9	4.2
Personal servants	3.9	61.8	2.0	54.4	1.0	43.0	2.7	43.2	2.1	50.3
Others (inc. government)	17.5	8.1	7.4	10.0	2.9	4.8	11.7	5.4	8.6	6.6
Total workforce	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Proportion of population in workforce	58.6	19.5	72.6	15.6	79.7	12.0	66.9	20.4	70.4	17.7
Actual population (000)	63.4	61.2	40.6	24.7	114.1	48.8	110.5	77.0	328.7	211.7
										540.3

^a As nearly as possible the Melbourne and Metropolitan Board of Works area as defined in 1890. However, in this tabulation some peripheral areas have had to be omitted: the total population of the Board of Works area in 1861 can be estimated as 67,130 males and 63,660 females.

^b These towns are listed in note *b* to Table 6.3.

^c Some 'farmers' wives' may have also been included.

^d 'Manufacturing' includes the sub-classes 'blacksmiths, whitesmiths, founders, mechanical engineers, etc.'; 'cabinet-makers, furniture dealers, carvers and gilders, turners, etc.'; 'other artisans and mechanics, printers, bookbinders, coopers, etc.'; 'tanners, fellmongers, soap-boilers, wool-sorters, charcoal-burners, etc.'; 'coach and cart-makers, wheelwrights, implement makers, etc.'.

Source: *Report on Census of Victoria*, 7 April 1861.

Table 6.5 Town formation in Victoria, 1851-91^a

Number of inhabitants	1851		1861		1871		1881		1891	
	Number	Population	Number	Population	Number	Population	Number	Population	Number	Population
500- 999	1	980 ^b	20	13,311	42	28,036	49	32,629	63	44,632
1,000-1,999	1	1,000 ^b	14	19,998	27	38,095	26	35,173	34	46,859
2,000-4,999	—	—	11	29,587	14	41,611	14	44,810	17	53,674
5,000-9,999	1	8,800	—	—	3	20,556	3	20,634	3	17,747
10,000 and over	—	—	4	72,205	3	97,551	3	96,758	3	103,491
Total	3	10,780	49	135,101	89	225,849	95	230,004	120	266,403
<i>Per cent of total population</i>		13.9		25.0		30.9		26.7		23.4
Melbourne ^c	1	23,143	1	130,793	1	202,418	1	276,627	1	476,849
<i>Per cent of total population</i>		29.9		24.2		27.7		32.1		41.8

^a Town populations as given in census returns except for Ballarat, Bendigo, Castlemaine and Geelong where adjoining municipalities and suburbs have been used. One difficulty about this analysis is that for any particular place the census population figure was sometimes for an imprecisely defined 'town', sometimes for the municipality, and sometimes for the urbanised part of a municipality. For this table the data available for each place were examined to enable the most consistent definition over the whole period to be chosen.

^b Estimates.

^c Melbourne defined as the Melbourne and Metropolitan Board of Works area except in 1851 where the figure shown is that for the City of Melbourne. Source: Victorian census reports 1851-91.

Fig. 6.2: Intercensal urban population changes (1861–81) in towns of 500 or more inhabitants at start or end of period; towns named are those with variations of 1,500 or more. Melbourne has been excluded. See also Fig. 6.3 and Table 6.5.

there was a marked redistribution especially from the gold-field areas to farming districts like the North East and the Wimmera. Town formation in the peripheral parts of the colony, fostered by the developing railway network, the spread of agricultural activity, and public works of various kinds including irrigation schemes (which led, for example, to the establishment of Mildura), proceeded during the 1880s and balanced the continued decline of some of the older settlements. This decade also saw the rise of a score or more commuter, brickmaking, market gardening and recreational townships in areas to the east and southeast of Melbourne that were being opened up by suburban railway developments.

Fig. 6.3: Intercensal urban population changes (1881-91) in towns of 500 or more inhabitants at start or end of period; towns named are those with variations of 1,500 or more. Melbourne has been excluded. See Table 6.5.

The basic urban statistics set out in Table 6.5 make it clear that after 1871 the main process was one of small town formation and consolidation. Apart from Melbourne there were never more than six towns at any one time with over 5,000 inhabitants, for the gains made by some of the larger places between 1871 and 1891 were partly offset by the losses sustained by others. During these two decades, for example, the population of Greater Bendigo increased from 28,900 to 34,700 and of Greater Geelong from 21,500 to 25,200 but the number of people in Greater

Ballarat, the largest of these provincial centres, declined from 47,200 to 43,600. In contrast, the population within the Melbourne and Metropolitan Board of Works area represented an ever growing share of that in Victoria. Whereas Melbourne absorbed 74,200 people (57 per cent of the colonial total) between 1871 and 1881, the next ten years witnessed an absolute increase of 200,200 inhabitants (72 per cent of the Victorian growth) or more than in the whole of the previous twenty-seven years (192,000 from 1854 to 1871). But this was not achieved without penalty for in the subsequent decade to 1901 Melbourne (similarly defined) added a mere 5,100 to its population or less than 9 per cent of the increase in the colony as a whole.

Transport and Communications

In 1851 there was not a single mile of surfaced road outside Melbourne and Geelong, there was no railway, and there was no river traffic. The next ten years saw significant changes to the transport facilities and, in turn, some marked reductions in freight costs.

The so-called roads in the early 1850s were simply roughly cleared tracks made all but impassable by winter rains. Carters charged according to the state of the weather and of the roads, with the freight rates to inland towns during 1853–5 varying from 3/- to 5/- per ton-mile in the summer to 17/- to 20/- in the winter.⁶ In 1851 and 1852 total government expenditure on roads and bridges was only £46,000 but the following year, after the creation of a Central Road Board, it jumped to £523,000 when work began on a series of trunk roads radiating out from Melbourne and, to a lesser extent, from Geelong. Nearly 200 miles had been made and wholly or partly metalled by late 1855, and a further 336 miles were constructed during the following five years. By the end of 1860 the government had spent £4,800,000 on roads and bridges, or more than on all other public works apart from railways. Then, from 1862, expenditure by local authorities (financed partly by government grants and partly by local rates), which had been increasing in absolute and relative importance during the late 1850s, overshadowed direct government spending.⁷ Perhaps as much as three-fifths of local government revenue during the 1860s and 1870s went on roads though much of this went into maintenance rather than into new work.

Only fragmentary evidence is available about the significance of road transport and the changes that took place to it. In mid-1854 it was estimated that the annual requirement was about 16 hundredweight of flour, tea, sugar, tobacco, spirits, beer, hay, oats and sundries for each person at the diggings: if this figure is applied to the adult population at the gold-fields at about that time, the transport task would have amounted to about 30,500 tons or perhaps 20,000 dray-loads a year. In the opposite direction more than 10,000 tons of wool alone had to be hauled to the coast for export. Over and above this were the activities of the coaching firms that were primarily concerned with passengers and mail: most of the post offices shown in Fig. 6.4 with more than one service a week were on regular coach lines.⁸

The making and sealing of the trunk roads considerably reduced freight costs and

Fig. 6.4: The frequency of mail services in the early 1860s is one measure of the inter-connectivity between the various parts of Victoria. (Source: based on F. Proeschel, *General Agricultural and Gold Fields Map of Victoria*, Melbourne, c. 1861.)

also the differential between summer and winter rates. For the journey between Melbourne and Bendigo (97 miles) as much as £100 per ton was being charged in the winter of 1853 and up to £30 in the summer of 1853–4; three years later the rates had decreased to £18 (winter) and £10 (summer). In 1858 the charge for the whole journey (average of rates for bullock and horse teams) was only £7.10.0 (February) and £8.15.0 (August); it fell to £5 in the winter of 1861 and was reduced to £4.10.0 early the following year. In less than a decade, therefore, the winter freight rate dropped from 20/3d per ton-mile to 1/-, and the summer rate from 8/3d to 10d. The completion of the railway between Melbourne and Bendigo in October 1862 (discussed later) halved the rate again for it then dropped to an average of about 6d per ton-mile summer and winter alike.⁹

Even so old habits died hard. To induce people to send goods direct from Melbourne to Ballarat by rail (instead of part-way by coastal steamer via Geelong) the railway authorities established specially low rates per ton-mile, gave a discount when charges totalled more than £10, and took 60 cubic feet to be the equivalent of 1 ton. Although this aggrieved the citizens of Castlemaine (16 miles nearer Melbourne) who paid an average of about 6d per ton-mile, received no discount,

Fig. 6.5: Sections of railway opened in Victoria during the intercensal period 1861–71 (Melbourne lines are shown in Fig. 6.8).

and were charged at the rate of 50 cubic feet to the ton, the authorities regarded such discrimination as an appropriate way of maximising revenue. It is hardly surprising that road transport changed its role to that of a feeder service to the railheads which gradually extended further into the peripheral parts of the colony. As an example, it was estimated in the *Argus* (16 August 1864) that the wool grown near Deniliquin (in New South Wales) during the 1864–5 season would have had to be shifted to the railhead at Echuca in 297 dray-loads (averaging fourteen 300 lb bales).

The origins and financing of the early railways in Victoria have been detailed elsewhere.¹⁰ Six railway companies were incorporated, three in 1853 (one of which on 12 September 1854 began operating the first steam railway in Australia), two in 1857 and one early in 1859, but it had become clear even by 1854 that the government would have to concern itself with the financing and construction of at least the major lines. In particular it was the failure of the Melbourne, Mount Alexander, and Murray River Company to proceed with its self-appointed task that

Fig. 6.6: Sections of railway opened in Victoria during the intercensal period 1871-81 (Melbourne lines are shown in Fig. 6.8). The Deniliquin to Moama line was built by a private company and purchased by the Victorian government in December 1923.

forced the hand of the government. Simplifying a complex story, the assets of this venture were taken over in 1856 and the Board of Works, established in 1857, was authorised to construct a railway from Melbourne to the Murray River; this line reached Bendigo in October 1862 and Echuca twenty-three months later. In the meantime the Geelong and Melbourne Railway Company, which had also run into financial difficulties, was bought by the government and construction proceeded on a line linking Geelong with Ballarat which was completed in April 1862. By the end of 1864 the government had spent £8,800,000 on railway construction and was operating 256 route-miles (all 5'3" gauge): in addition a further 16 route-miles in Melbourne were being operated by three private companies which amalgamated in June 1865 (and continued as the Melbourne and Hobsons Bay United Railway Company until acquired by the government in July 1878). After 1861 most railway building in Victoria was undertaken by the government.

Intra-colonial parochialism and inter-colonial rivalry both affected the pattern

Fig. 6.7: Sections of railway opened in Victoria during the intercensal period 1881–91 (Melbourne lines are shown in Fig. 6.8).

of railway development, illustrated in Figs. 6.5 to 6.8. Even the main trunk line to Echuca, pushed ahead with more determination than most, deviated through Castlemaine and Kyneton as a result of local lobbying, and much of the detail of the system elsewhere was laid out because of similar pressures. As Bartlett states, 'during the development of the main system, each region not yet connected to it fought for priority; each area within the region fought to be on the route'.¹¹

Inter-colonial rivalry added a further complication. In the 1840s, much to the chagrin of the Sydney commercial world, some of the settlers in the southern districts of New South Wales were orientating themselves to Melbourne largely because the whole of the Riverina area, about 20,000 square miles lying between the Murray and Murrumbidgee Rivers, was nearer this southern port. As early as 1845 it was being said that there are

some at Port Phillip who anticipate, at no distant period, the formation of a railway from Melbourne to the Murray, which would have the effect

of bringing all the produce of the Murrumbidgee to Melbourne, instead of to Sydney, as at present. . . .¹²

The separation of New South Wales and Victoria in 1851 with the Murray River

Fig. 6.8: Sections of railway opened between 1851 and 1891 in the Melbourne and Metropolitan Board of Works area as defined in 1890.

as the boundary had little immediate impact: the small differences in the tariff schedules enacted by both governments in August 1852 would barely have covered the costs of customs posts along the common boundary let alone produced useful revenue. It was not long, however, before the development of trade across and along the Murray River began to create problems that became thoroughly entangled in the inter-colonial negotiations which followed. There is no need to detail these here since the series of moves and counter-moves by New South Wales and Victoria relating to the Murray trade has already been summarised elsewhere. The situation was complicated by growing differences in tariff schedules and rates, in the composition of the flow north (mainly dutiable goods) and the flow south (mainly non-dutiable wool and livestock), and in the short- and long-term interests of the two colonies and the various pressure groups within them. Cutting a long story short, the arrangements painfully arrived at during the 1860s between Victoria and New South Wales for lump sum payments in lieu of border duties came to an end early in 1874 and the Murray River again became both a political and physical obstacle to trade.¹³

The rapid growth of traffic along the Murray River after Cadell's pioneering journey in 1853 opened up a back door that allowed freight to move into and out of Victoria and New South Wales via South Australia. The two southeastern colonies became concerned about the loss of revenue, the differences in the tariff schedules and the philosophies behind them, and the 'unwarranted' gain by South Australia: as a result the three contiguous colonies spent ten years wrangling about fiscal solutions.¹⁴ Victoria realised that it had to take some positive steps to prevent the northern part of the colony becoming economically orientated to South Australia. In the summer of 1856, for example, goods could be freighted from Goolwa near the Murray mouth to Echuca by steamer and thence by dray to Bendigo for a total of £13 per ton which was £5 less than the freight charge to this town from Melbourne. Somewhat later New South Wales woke up to the fact that it also had to actively safeguard its interests in the Riverina area; its refusal to build a bridge across the Murray at Albury and the imposition of high ferry tolls inconvenienced and angered Riverina settlers but did not alter the fact that Melbourne goods were generally cheaper than those from Sydney.¹⁵

The opening of the railway from Melbourne to Echuca in 1864 was Victoria's first answer to South Australia's challenge and this attracted freight, particularly wool, from the Murray itself and from the Murrumbidgee and Edwards Rivers. Victoria also tried to divert wool from Goolwa in South Australia by offering a 10 per cent discount off the rail freight to Melbourne to any steamer owners who during the course of a season brought a certain quantity of wool from the Darling River upstream to Echuca. From 1865 through 1872 (excluding 1867 and 1868 for which comparable data are missing) the value of New South Wales produce passing across the border to Victoria has been estimated as £11,400,000 compared with £1,700,000 worth passing into South Australia. This advantage was pressed home by pushing out another line from Melbourne that reached Wodonga in 1873 and from which branches were built to other Murray ports including Wahgunyah (1879), Yarra-

wonga (1886) and Cobram (1888). The Riverina was further orientated to the south by the 45 mile Deniliquin to Moama railway, a 5'3" gauge private line financed by squatters, that began through-running to Melbourne in November 1876. Meanwhile the New South Wales government lines (4'8½" gauge) were pushing into the area, reaching Wagga Wagga in 1879, Albury in 1881 and Hay in 1882 (Figs. 10.9 and 10.10). Then began a railway freight 'war', which has been examined in some detail by Smith,¹⁶ that lasted until 1905. By an almost continuous series of measures and counter-measures, the two governments tried to secure the trade of the Riverina by offering concessional rates on freight originating from, or consigned to, designated parts of this area. In this way Victoria not only continued to attract a considerable proportion of the produce from southern New South Wales but also helped its businessmen to retain markets north of the border.

Some aspects of this competition, especially in relation to the freight rates charged on manufactured goods, are discussed in later chapters. But it would be wrong to leave the impression here that transport developments and government policies alone were responsible for the orientation of trade and commerce between Melbourne, Sydney and Adelaide. Much of the initial prosperity of the Riverina area came about as a result of the impetus given by the demand for meat during the gold-rushes in Victoria: one indication of this was the extension of the Victorian telegraph line to Deniliquin in New South Wales in May 1859 so that a close watch could be kept on stock prices in the main Victorian markets. There was also considerable investment in the Riverina in the late 1850s and early 1860s by Victorians many of whom had social, political or commercial connections with Melbourne. The direction of trade also depended to some extent on the particular arrangements of pastoral companies, stock and station agents, and carriers: thus one Melbourne-based carrying firm captured a considerable share of the forwarding business passing through Echuca in the latter part of the 1860s and opened up branches in South Australia in the early 1870s to protect its hold on the Darling River trade.¹⁷

An attempt has been made in Fig. 6.9 to illustrate some of the main features of the colony's transport system by a flow diagram of wool movements in the late 1870s. Export produce was carted to a railhead or port and then sent onwards to Melbourne (or, to a lesser extent, Geelong) which was unmistakably the focus for nearly all such movements. The smaller ports along the coast acted for the most part as collecting and distributing points for station and farm produce and supplies being shipped to and from the capital. Much of this intra-colonial transport task was performed by relatively small Melbourne shipping companies and the Australasian Steam Navigation Company based in Sydney. A few local companies (like the short-lived Warrnambool Steam Packet Company Ltd) tried to compete but their fleets were tiny compared with those operating in New South Wales waters (see Chapter 10). The only, relatively minor, exception was the Gipps Land Steam Navigation Company Ltd (registered 25 July 1865) that ran some steamers along the coast but which mainly operated feeder services with shallow draft vessels between Lakes Entrance and Bairnsdale (the main termini for ocean-going ships)

Fig. 6.9: This flow diagram of wool movements through Victoria illustrates some of the main features of the transport system. The flows (in long tons) are averages of the three years 1877-9, the only period for which reasonably comparable data are available for movements by rail and by coastal and overseas vessels. The Murray ports named (using modern spelling) are those in operation during these years. (Sources: VPPP, 1879-81; Vic.SR, 1877-9.)

and river ports like Sale and Bruthen. Even though Portland, Warrnambool, Port Fairy and Port Albert were legally entitled to trade overseas, their direct exports to other colonies and countries were valued at only £2,900,000 from 1866 through 1890, a negligible amount compared with the commodities worth £308,000,000 sent out from Melbourne and £23,000,000 from Geelong.¹⁸

More significant were the ports along the Murray River (named on Fig. 6.9) through which flowed imports and exports amounting to perhaps £71,000,000 and £24,000,000, respectively.¹⁹ Over the wharves at Echuca alone every year during this period passed a greater value of trade than over those at Geelong, and until 1881 a larger tonnage of shipping entered this river port each year compared with Geelong. But the late 1870s marked the apogee of the river trade because, as the

Plate 1: Bairnsdale in eastern Victoria was not connected to the colony's railway system until the late 1880s. Even though such places remained almost wholly dependent on coastal shipping, this seems to have provided little or no stimulus to marine engineering either locally or in Melbourne. (*Australian Sketcher*, 7 June 1879.)

tentacles of the railway system extended, its *raison d'être* diminished and its economic advantages dwindled since the skipper-owners and companies found themselves caught up in the railway freight war. Nevertheless the river trade, if it was unable to maintain its glory, continued to be seen as a threat, or at least a considerable nuisance, to the railways for the next two or three decades. Thus the report of a Board set up in 1904 by Commissioners and General Managers of the Australian Railways noted that

competition east of Echuca rests between Victorian and New South Wales railway departments and goods and wool are either railed or carted into or from New South Wales. But at Echuca, Kerang, and Swan Hill the river competition has to be regarded and at those places the Goods and Wool are principally carted or carried by river into or from New South Wales.²⁰

What emerges from this discussion is that Melbourne was the hub of a large landward and seaward distribution system. From all but a few of the peripheral parts of Victoria and from much of the Riverina area of southern New South Wales, commodities for export flowed towards the capital. Judging from an annual series (published from 1876) showing the value of goods consigned from Melbourne direct for export across the Murray River, metropolitan firms also controlled much of the trade in the opposite direction. This was encouraged both by the system of rebates on goods railed from Melbourne to the Murray ports, and by drawback regulations whereby import duty was repaid when goods and materials were subsequently re-exported. As will be detailed in Chapter 8, these drawback arrangements only applied to a few commodities in the 1850s but were greatly extended after 1870. Melbourne firms were able to import bulk supplies and break them down into small parcels in response to orders from individual stores and stations and these were then forwarded to the border under bond. The chances are, however, that Melbourne benefited directly or indirectly from nearly all this export trade into New South Wales since many of the financial, insurance, and forwarding agencies were branches of, or affiliated to, capital city firms.

In addition, Port Phillip Bay was the centre for an active transshipment business that was not included in the import and export returns since it consisted of movements of goods between ships. Much of this probably escaped the notice of the authorities, but the Statistician (in an annual series published from 1869) valued it at £41,000,000 by the end of 1890. Contrary to the usual view these transshipments were not confined to gold (which accounted for only 18 per cent by value), wool (16 per cent), or the products of South Australia; it was in fact a very diverse trade both in terms of the commodities involved and also their origins and destinations. The important point is that in addition to the *entrepôt* trade, estimated in Table 8.2 as worth £83,000,000 from 1869 through 1890, this transshipment activity was providing yet another stimulus to waterfront firms.

This brief review of some aspects of population, urbanisation and transportation

in Victoria provides a context within which to examine the industrial development of the colony. Above all it illustrates the scale and pace of the changes taking place. During these four decades the population grew by 1,063,000, and it is salutary to bear in mind that it took until 1950 for a similar increment to occur again. The number of towns outside the metropolis with 1,000 or more population increased from two in 1851 to fifty-seven in 1891 when they contained 19.5 per cent of the population (almost exactly the same proportion as the 122 towns in 1971). But the most significant change of all was the growth of Melbourne from a mere 23,000 inhabitants at the beginning of the period to 477,000 at the end, by which time it was not only the most populous urban area but had established itself as the leading commercial and financial centre in Australia.

7 Manufacturing in Victoria 1851 to 1865

Immediately prior to the gold-rushes there were probably no more than about 600 people in Victoria engaged in what could even broadly be described as factory industry, compared with perhaps 3,000 in Tasmania and 2,100 in South Australia. Such a difference cannot be explained by the relative size of the local market; in terms of 'adult male equivalents' these three colonies were not dissimilar since Tasmania had 60,000, Victoria 57,600 and South Australia 46,100. Much, then, must be put down to other factors including the form, timing and nature of political independence; the competing, and perhaps in the short-run, more attractive opportunities available for private and institutional investment funds; the inability to develop export industries of a similar nature or on a comparable scale to copper-smelting in South Australia and shipbuilding in Tasmania; and what can only be described as the apparent failure of Victoria to attract, encourage and nurture more than a handful of people having industrial skills, capital and, perhaps above all, imagination and drive.

The impact of the gold-rushes on the embryo economy is well enough known and requires little elaboration here. One immediate consequence was a massive increase in retained imports, the value of which—as indicated in Table 7.1—jumped from a mere £10.8.0 per head in 1851 to £71.12.0 per head in 1853. Another was the trebling or even quadrupling of the costs of labour—the daily wage of a wheelwright or smith working in Melbourne rose from 6/- late in 1850 to 30/- in 1854. In this latter year, however, the first frenzied excitement, well described by Turner,¹ had started to simmer down and some of the longer-term problems of the colony were beginning to emerge. Although gold production in 1856 was (and remained) a record and employment in mining probably did not reach its peak until 1858, the industry was beginning a long and almost continuous decline (see Fig. 10.1); its organisation and methods of working were changing and the luckless and lazy were looking towards a more settled and less chancy way of life. The government was beginning to face up to the enormous backlog of public works, but although its road and railway construction programs were able to absorb some of the disillusioned miners and newly arrived migrants there were limits to what could be done with available funds even allowing for borrowing and deficit budgeting. Others were employed on commercial and municipal building and works schemes, or seized openings on farms or to a lesser extent on pastoral properties and the facilities that serviced them. Some looked for greener pastures in other colonies including New Zealand with the result that there was a net outflow of migrants by sea in 1861 and 1862 and a much reduced inflow by sea in 1860 and 1863. Even so

Table 7.1 External trade, Victoria, 1851-65^a
(£000)

Year	Exports originating in Victoria ^b					Entrepôt trade	Retained imports
	Wool	Tallow	Gold ^c	Other	Processed and manufactured	Total	
1851	735	123	439		85	1,382	1,015
1852	1,063	60	6,136		79	7,338	3,956
1853	1,652	13	8,645		121	10,431	15,212
1854	1,618	23	8,256		143	10,040	15,923
1855	1,406	29	10,904		n.a.	n.a.	n.a.
1856	1,507	36	11,943		n.a.	n.a.	n.a.
1857	1,336	62	10,988		n.a.	n.a.	n.a.
1858	1,678	44	10,108		407	12,237	13,356
1859	1,754	10	9,122		<div style="display: flex; align-items: center;"> <div style="border-left: 1px solid black; border-right: 1px solid black; padding: 0 5px;"> 27 54 </div> </div>	11,282	13,037
1860	2,023	18	8,625	<div style="display: flex; align-items: center;"> <div style="border-left: 1px solid black; border-right: 1px solid black; padding: 0 5px;"> 369 341 </div> </div>		11,061	13,192
1861	2,089	76	7,870	414	147	10,596	10,300
1862	2,347	66	6,685	467	236	9,801	10,249
1863	2,044	34	6,520	651	348	9,597	10,151
1864	3,250	60	6,203	444	255	10,212	11,288
1865	3,315	15	6,188	254	276	10,048	10,155

^a These data are continued in Table 8.2.

^b From 1851 through 1858 no distinction is made for *individual commodities* between colonial products and re-exports: however other evidence suggests that most of the wool, tallow and gold included in this table for these years originated from within Victoria. For the three years 1855-7 no indication is given even of the total value of exports from within Victoria.

^c The values shown for gold exported are those printed in the detailed trade statistics. It is clear from estimates of the quantity of gold raised that a good deal must have passed undetected from the colony.

Sources: *Vic.SR*; *NSW.SR*.

there was considerable unemployment and under-employment from 1857 on, with periods and pockets of acute distress (necessitating, for instance, the opening of a soup kitchen in the Melbourne suburb of Collingwood in the winter of 1864), and fairly continuous labour unrest.² And, to make matters worse, a succession of floods and droughts from 1861 to 1865 added to the problems of farmers and public works contractors and caused fluctuations in the need for labour and in the prices of some staple foodstuffs.

The Demand for Manufactured Products

The demands for manufactured goods stemming from the private and public sectors within the colony and from external markets can each be considered in turn. The most important stimulus during this period came from the private sector and it is to this, therefore, that attention must first be directed.

Private sector demand

The addition of 210,000 men, 108,000 women and 145,000 children between the censuses of 1851 and 1861 greatly increased the consumption of a wide range of day to day necessities many of which by their nature could only be made locally. While the adult male equivalent population in Bourke County (which included Melbourne) increased fourfold from 29,000 in 1851 to 121,000 in 1861, elsewhere in the colony it multiplied *tenfold* to 291,000. In other words, if the 'adult male equivalent' concept be accepted as a very rough indicator of consumer demand, some two-thirds of the colony's everyday needs were generated in a number of relatively small and dispersed markets, more or less isolated from each other by freight costs. Thus, one effect of the growth and distribution of the population during the 1850s was to promote spontaneous, scattered, small-scale businesses serving immediate needs rather than investment in substantial structures and elaborate plant.

One of the most important stimuli was residential building activity which increased the colony's stock of stone, brick and weatherboard dwellings from nearly 11,000 in 1851 to more than 78,000 in 1861. During the early 1860s an average of perhaps 4,000 brick and 15,000 weatherboard *rooms* was built each year, and for the period 1861 through 1865 Butlin has estimated that new and replacement outlays totalling £4,300,000 were devoted to residential construction, or nearly 28 per cent of all public and private investment (excluding roads).³ Although the details are beyond the scope of this book, it is worth noting that this form of investment was supported by the activities of building societies, the formation of which had been encouraged by legislation (11 Vic. no. 10) enacted in New South Wales in 1847. During the year ending October 1853, for instance, the *Argus* alone mentioned seven such institutions.

Butlin's calculations are, in part, based on the assumption that labour accounted for half the total building costs of new houses. The somewhat sparse contemporary evidence supports this judgment which may, however, give a false impression of

Fig. 7.1: Slightly simplified version of George Slater [publisher], *Map of and Guide to Melbourne and suburbs*, Melbourne, 1857. From an original in the National Library, Canberra.

the way in which the building industry operated. Whereas in England a clear distinction had grown up between the work of joiners (who put together doors and window frames in workshops) and of carpenters employed on the building sites

themselves, this was not yet the case in Victoria. Instead 'a shed [was] generally knocked up on the spot, and the men engaged on the job [went] right through with the fine and rough work of the building'. In this way many of the smaller building jobs were organised since it was a common practice for a group of masons or carpenters to club together for a particular contract and sublet the brickwork and plastering to other trades.⁴ Such an arrangement was convenient and feasible in suburbs like Collingwood, Richmond, Prahran and South Melbourne (Fig. 7.1) where row upon row of terraced houses were thrown up during the 1850s; in these particular districts alone some 8,000 dwellings were enumerated in 1861 only half of which had more than two rooms and only one-sixth of which were constructed of brick or stone. The majority of dwellings being built in Melbourne and elsewhere in the colony were basically timber-framed boxes with weatherboard walls and corrugated iron or shingled roofs. Much of this material was imported—the corrugated iron, hardware and even nails came from Britain and a good deal of the timber (occasionally in the form of prefabricated houses) was shipped from Tasmania. Some British firms, like Samuel Hemming at the Clift House Works near Bristol, specialised in making prefabricated iron buildings for export and sent chapels, churches, theatres, and even long, narrow buildings divided into eight shops below and eight flats above for erection mainly in Melbourne.⁵

These were probably mixed years for the brickmakers (actual production figures do not become available until 1867). During the 1850s stone rather than exposed brickwork was in vogue; thus the Treasury Building, erected between 1858 and 1862, had a basement of bluestone with three upper storeys of freestone quarried 40 miles away at Bacchus Marsh.⁶ But during the 1860s bricks again came into their own for major projects of this kind because of a growing shortage of good, easily worked building stone. Meanwhile, in the latter part of the 1850s brick regained something of its previous importance as a residential construction material in Melbourne and became more widely used elsewhere in the colony when temporary settlements were becoming transformed into towns; in the mining districts alone more than 2,000 brick and stone houses were built during the four years prior to the 1861 census thus raising their share of the permanent dwelling stock in these areas from 5 to 11 per cent. Although there were concentrations of brickmakers in three particular districts of Melbourne—one in East Collingwood, North Melbourne and Hawthorn, another near Toorak, and the third and largest at Brunswick—the industry was much more flexible spatially than this might imply. The yards were generally worked by no more than five or six men apiece with little capital invested in plant or buildings. There were, of course, a few exceptions: the Phoenix Brick Works, for instance, installed a 23 ton American machine in 1856 which, according to the *Argus* (18 December 1856), inaugurated the 'dry' brick-making process in the colony. Most yards operated on a small scale using manual labour: in part this reflected the youthfulness of manufacturing generally, but there was also a technical reason. Whereas brickmakers in Britain had to dig the clay in the autumn, expose it to frosts during the winter, and soak it in shallow pans in the spring, in Victoria the clay was dug, passed through a hand-operated 'pugging' mill,

and moulded into bricks more or less as a continuous operation. The colonial yard could thus operate on a shoe-string and readily respond to market conditions. There were two consequences. One was the almost complete absence of 'jealous restrictions or foolish combinations' in the industry since the hands were frequently equal partners and seldom simply employees. The other was the relative ease with which a gang of brickmakers could contract for a job, open up a clay pit, and make bricks in 'clamps' on the spot, kiln burning being uncommon in the colony at this time.⁷ This institutional and geographical flexibility helps to explain the widespread use of brick for residential and other buildings such as the three-storey, steam-driven flour-mill erected at South Murchison in 1856 (still, incidentally, in a fine state of preservation).

The stimulus to local manufacturing that directly resulted from gold-working activities was at first small. There was an upsurge in demand for equipment ranging from picks and shovels to buckets and spades. But local producers found it difficult to compete with English ironware and German tinware except for the more bulky items, and one Hamburg firm overcame even this problem by sending out semi-finished tinware which could be quickly put together in Melbourne. Much of the work undertaken locally thus consisted at first of making up goods like panning dishes, harness-ware, and drays that were specially suited to local conditions and, more particularly, of adapting and repairing imported equipment.

This latter type of business became increasingly important as machinery appeared on the gold-fields. Initially mining equipment was crude and worked by hand or horse: the first experiments (1853) with steam power as a way of taking some of the drudgery out of jobs like sluicing, cradling and pumping were greeted with threats of violence, but by the end of 1854 there were at least seven engines on the Ballarat field alone.⁸ Subsequently, the use of steam power, particularly to pump water and crush quartz, became common on all the fields though especially on those around Ballarat and Bendigo. By 1859 285 engines were being used on the alluvial fields and a further 296 in quartz mining operations; by 1865 the numbers had increased to 473 and 491 respectively. At first most of these engines were imported, partly because they were cheaper (an imported 16 inch cylinder engine cost from £600 to £850 as against £1,000 for a colonial engine) and partly because they were considered to be more reliable. Nonetheless local iron foundries and engineering works gained a good deal of business because the imported engines almost invariably had to be modified and adjusted. Later, however, some local products proved themselves: in 1865 one Melbourne works alone was turning out three engines a month for mining purposes. Thus, from about 1856 metal-working, boiler-making and engineering works began to appear on the gold-fields and especially at Ballarat, Bendigo and Castlemaine. Some were substantial affairs: in the last-named town, for example, 200 men were employed in Cornish and Bruce's Victorian Railway Foundry (a somewhat misleading name for the range of products actually made) in which £100,000 was said to have been invested in buildings (a former flour-mill), plant and materials.⁹ By August 1864 the *Argus* was able to report that Ballarat had three large foundries (the Victoria, the Phoenix and the

Soho) and four smaller ones which together employed 400 men in repair work and in making pumping, puddling, winding and stamping gear as well as stationary engines. In addition some of the larger mining companies, particularly those crushing quartz, set up their own workshops; thus the Black Hill Company at Ballarat had a foundry to maintain its plant which consisted of a 100 horse-power engine driving a battery of 60 stamps, as well as water-pumps and fans. The growing complexity of gold-mining operations also affected other local industries: the increasing depths of the workings, for instance, created a demand for flat ropes and for improved types of leather glands for pumps thereby pushing some of the existing rope-works and tanneries towards new levels of technical achievement. Occasionally, too, specialist works came into being to handle problems of this kind, such as the factory set up at Ballarat in 1859 to make round and flat chains of iron and wood combined for use in conjunction with deep hoisting gear.

A briefer summary need be given of the stimuli to local manufacturing derived from other sectors of the economy. There was a remarkable sixfold expansion of the area under cultivation from 1854-5 to 1858-9 when it reached nearly 300,000 acres, or more than in any other Australian colony.¹⁰ This, of course, greatly expanded the demand for ploughs and other agricultural implements to say nothing of the products of the blacksmith, the saddler and the wheelwright. In Ballarat alone two large-scale, specialist implement-makers were operating in 1861. The area under wheat increased rather more than proportionately to 78,000 acres during the summer of 1858-9: it is convenient to leave further detail until Chapter 9 but it can simply be noted here that during the four years to the end of 1858 an *additional* fifty-nine steam-mills were built in the colony bringing the total to seventy-four. Although most probably used imported engines, their fitting up and maintenance provided yet another source of business for local engineering and metal-working firms. In addition some of the capital being invested in equipment and improvements on pastoral holdings eventually flowed into the manufacturing sector: many stations bought wool-presses (the design of which was almost a local industry in itself) and others were experimenting with wool-washing installations, some of which—like the steam-driven one at Colbinabbin said in 1864 to have cost £4,000—were not insubstantial structures.

Local manufacturers supplying the shipping trade received a boost from the upsurge in activity, much of which was concentrated at Melbourne. Whereas barely 700 vessels entered Victorian ports in 1851, the number jumped to nearly 2,600 in both 1853 and 1854; during the decade that followed annual entries never fell below 1,700. In 1864 some 400 sailing vessels were registered at this port and 50 steamers (mostly owned outside the colony) were under the supervision of Melbourne's Steam Navigation Board. By the late 1850s facilities were becoming totally inadequate to service ocean-going vessels (the *average* size of arrivals from Britain increased from 530 tons in 1850 to 980 tons in 1858 and to 1,160 tons in 1865) since the two slips and the one floating dock, all privately owned, could accommodate vessels of no more than 800 or 1,000 tons. The government, anxious that Melbourne should not lose business to Sydney, built a slip at Williamstown able

Plate 2: This 30 ton quartz crushing machine, consisting of a cylinder revolving inside a larger one, was among the many items of equipment developed through practical experience on the Victorian gold-fields. Orders for crushers, engines, pumps and so forth provided an important source of business for local foundries. (*Illustrated Melbourne Post*, 19 May 1866.)

to take 2,000 ton vessels and it came into service late in 1858.¹¹ But it was soon obvious that this, too, was inadequate (the Peninsular and Oriental Company, for instance, transferred all its maintenance and repair work—said to be worth about £12,000 a year—to Sydney), and in 1864 money was voted to allow work to start on the Alfred Graving Dock at Williamstown—although it was ten years before this was ready to receive its first vessel.

Most of the sailing craft and steamers required in the colony were imported since they could be obtained more cheaply from yards in Tasmania and New South Wales and, particularly in the case of iron-hulled vessels, from overseas: one reason for this was the restrictive trade practices, discussed later, that were adopted by Melbourne shipwrights. During the whole of this fifteen-year period only 101 sailing-ships (averaging 46 tons) and 24 steamships (69 tons) were launched, but it is probable that the official returns are incomplete since few facilities were needed to build a sailing-ship or paddle-steamer of up to about 100 tons gross. This lack of formality was well exemplified early in 1865 when the first dozen or so Murray River paddle-steamers built in Victoria were put together at convenient spots along the river banks near Echuca. Some were simply assembled from imported iron sections and engines, but others were built up using local red gum timber and Melbourne-made metal frames, engines and components. Yet, even after making an allowance for this sudden burst of shipbuilding on the Murray River in 1865, it is doubtful whether the total value of all craft launched during this fifteen-year period amounted to more than about £110,000.¹²

Public sector demand

Local manufacturing probably gained relatively little from public investment in railways, roads, bridges, water and sewerage services, and other facilities. Apart from contracts for repair work, for bricks and timber, and, occasionally, for items like bridge girders, plate-layer's tools and cast iron lamp-posts, most supplies were brought in from overseas; thus all the seventy-seven locomotives operating on government railways in 1865 had been imported, at a total cost of £287,000.¹³ The only significant encouragement to enterprise came from some contracts for railway carriages and wagons that were placed locally although under somewhat restrictive conditions: by the terms of the first contract awarded in 1856 the work had to be done in sheds built near Spencer Street Station. This enabled railway officials to supervise the use made of the metal, axles, wheels and other components supplied by the government and generally keep an eye on the quality of the workmanship. As against this, however, the contractor was allowed to use government facilities to fulfil additional orders from the private railway companies.¹⁴ Among the arguments used for placing such contracts in the colony was the fact that, after taking into account freight and damage, Melbourne-made rolling stock was really no more expensive than imported supplies and, moreover, it was made of timbers better suited to the hot, dry Victorian summers.

Plate 3: Local manufacturers and importers vied to supply pastoralists with sheep-washing equipment. In 1868, for instance, Sydney ironfounder P. N. Russell and Company was advertising installations similar to this for £600. Washing was undertaken prior to shearing to reduce the dirt and grease content and thus lower the transport costs of wool; in the 1870s the practice declined due mainly to the spread of the railway network. (*Illustrated Australian News*, 1 March 1869.)

Export demand

External demand for goods made or processed in Victoria was slight: from 1851 through 1858 the trade statistics do not indicate whether individual commodities were made locally or were simply re-exports, but in 1859 colonial manufactured and processed goods were worth only £27,000, or 0.2 per cent of the total (Table 7.1). Thereafter the value of such exports increased to between 2 and 3 per cent of the total, with flour, refined sugar, leather, soap and candles, and molasses and treacle being of particular importance. Of the £1,343,000 worth of manufactured and processed goods sent out in the seven years to the end of 1865, 41 per cent went to New Zealand (where the market for items like flour and sugar was considerably enlarged by the gold-rushes of the early 1860s), 22 per cent to Great Britain (mainly leather and leather goods), and 26 per cent to New South Wales. The emphasis, clearly, was on processed rather than fabricated goods, although a noteworthy exception was the export of three railway locomotives to Invercargill in New Zealand; all were built at Ballarat (one in 1861 at the Victoria Foundry and the others at the Soho Works three years later) thus indicating the technical competence that had grown up in this town in less than a decade and presaging the development there of the most important locomotive building business during the nineteenth century anywhere in Australia.¹⁵

Protection and Bonuses

Some lone voices (notably James Harrison in the *Geelong Advertiser*) had been advocating 'protection' as early as 1852, but popular feelings had no particular focus until the formation of the Victorian Association for the Protection of Native Industry in April 1858 followed by the Tariff League of Victoria early in 1859. Although these organisations sought a number of solutions to the depressed state of trade (including a revision of the land laws), their basic concern was with the 'undue competition to which Victorian labor is exposed, owing to the unrestricted imports of all kinds of manufactured articles and produce from Great Britain and Foreign States'.¹⁶ Predictably, most of the coach-builders, tailors, millers, iron-founders and so on who gave evidence before the Select Committee on the Tariff early in 1860 thought that the imposition of duties would help firms already struggling to retain a share of the market and even encourage new industries like tobacco manufacturing. It was said that local manufacturers could not compete with imported goods that were particularly suited to local conditions (e.g. American-made carriages), or much cheaper (e.g. flour, slop clothing and footwear), or of better quality (e.g. leather), or carried as bottom cargo to the colony at nominal rates (e.g. stoneware).¹⁷ Among other difficulties were the high cost of labour (up to 18/- per day for a good iron-founder in Melbourne as against 7/- in England), and the fact that basic raw materials like pig iron cost £5.2.6 per ton in Melbourne compared with £2.14.6 in Glasgow. Conflicts of interest between manufacturers were also beginning to emerge as exemplified by the complaints of Thomas Swallow, the leading biscuit manufacturer in the colony, that the import duty of

6/- per hundredweight on refined and unrefined sugar added £6 per week to his costs, and of the sugar refiners themselves who wanted to see a clear distinction made between raw and processed sugar.

Until the 1860s customs duties continued to be framed almost entirely for income purposes and, indeed, formed one of the main sources of government revenue.¹⁸ Even the adjustments made in 1862 ignored public petitions and manufacturers' motions and concentrated on raising revenue, no doubt because expenditure had exceeded income during each of the previous four years. It is true that some minor—probably incidental—concessions were made to the growing protectionist lobby (like the creation of a differential duty on manufactured and unmanufactured tobacco),¹⁹ but as against that the impost on both raw and refined sugar was left at 6/- per hundredweight. The Select Committee upon Manufactures, taking evidence in December 1864 and January 1865, found that the differential tobacco duties and the simultaneous reduction of excise duties on locally made spirits below that on imported spirits had both led to the investment of capital, the employment of labour and a decrease in the cost to consumers.²⁰ It also concluded that the 'protective duty' on ale and porter which had remained at 6d per gallon since January 1854 had been 'most beneficial' and had stimulated the production of barley.

It would be dangerous to lean too heavily on the conflicting and vague evidence given by the few manufacturers who appeared before these committees or, for that matter, on the findings of these bodies themselves. A case in point is colonial brewing which was affected by several factors other than the level of import duties. Only the better quality English beers were imported because the cheaper ones deteriorated during the voyage and, in any case, publicans generally preferred to stock imported beers and spirits since these were more profitable and helped to cover the costs of the residential accommodation and other facilities required under the licensing laws. As a result, the so-called 'refreshment rooms' that had appeared throughout the colony became an important outlet for colonial beer even though, of course, it was an illegal trade. For seven years the authorities seem to have turned a blind eye to the growth of this practice so encouraging or, more accurately, not discouraging investment in small country breweries. But early in 1860 the police brought this tacit arrangement to an end by invoking the letter of the law; most of the actions were directed against the refreshment room proprietors themselves but one court sounded a warning to brewers by disallowing the recovery of a bad debt on the grounds that the brewery had aided and abetted an illicit trade. Later the same year legislation which sought to permit colonial beer sales in refreshment rooms was defeated in the Legislative Assembly; it was introduced again during the following session and passed through most stages but eventually lapsed. Colonial brewers received some consolation in 1862 when railway refreshment rooms were allowed publican's licences but exempted from the usual, albeit minimal, accommodation requirements. Although unimportant in themselves, these details illustrate the difficulty of unscrambling cause and effect; in this case the problem is exacerbated by the lack of statistics for the brewing industry until

1863 and the glaring anomalies between those that were then produced: the Chief Inspector of Distilleries put production of beer in that year at 13,308,000 gallons from ninety-seven breweries whereas the Registrar-General listed output as 3,544,000 gallons from fifty-one establishments with the warning that this was 'considerably understating the truth'.²¹

Early in 1865 the government proposed a fairly elaborate revision of the tariff but this helped to provoke a dispute between the Legislative Assembly and Legislative Council that was not resolved until the following year. Nonetheless, the new tariff rates were imposed from 20 January to 17 November 1865 (the £151,000 thus collected being later refunded) and again from 22 February to 13 March 1866 before legitimately coming into operation on 12 April 1866. Detailed discussion is deferred until Chapter 8 but it should not be overlooked that to all intents and purposes these events gave local industry ten months experience of the new tariff. Predictably, the *Age* thought it saw evidence of an immediate upsurge in Melbourne's industrial activities (3,000 or more additional employees within six months) especially in the clothing and footwear trades: equally predictably, the *Argus* dismissed such claims as being false or exaggerated and argued that if there had been any increases in employment these had stemmed from entrepreneurial decisions made 'before the tariff was ever dreamed of'.²²

Bonuses

The government tried to influence the development of the colony by offering rewards or premiums to promote 'new manufactures and industries'. Regulations approved in July 1864 endeavoured to foster the production of woollen goods, paper, sheet glass, glassware and good quality leather (as well as a number of raw materials like hops, cotton, silk and flax). The Premium Board charged with the responsibility for disbursing the £5,000 allocated decided to confine the awards to recently established firms that had pioneered a new industry in the colony; at the end of 1864 it recommended grants totalling only £600, of which half went to firms making rope, cigars from colonial leaf, starch and maizena. Another £5,000 was voted in 1865 and was divided among thirty firms. Not surprisingly perhaps, the *Argus* (3 July 1866) thought the whole exercise a waste of public money and it seemed to some that members of the Premium Board had simply feathered the nests of their own constituents.

With two exceptions, the manufacture of woollen cloth and paper, the exercise does seem to have been very largely a waste of time. The Victorian Woollen and Cloth Manufacturing Company Ltd was registered on 12 June 1865 with an authorised capital of £25,000 in 5,000 shares.²³ The Premium Board greatly approved of this proposed mill at Geelong and made an award of £1,500 subject to the condition that 5,000 yards of cloth be produced before 21 December 1866. Yet the company was finding difficulties in raising capital; by 1 June 1866 only 1,728 shares had been taken up and, although 50/- had been called, an average of only 30/7d had been paid. It was obvious by now that the original deadline set by the Premium Board could not be met and the company sought and was given an

extension of time. But a year later the shortage of capital had become even more acute since a call of £5 on all 1,843 shares sold had brought in less than £7,000, thus leaving the company in debt to the tune of £1,240 on its building and machinery account alone: the shareholders had no option when they met on 12 July 1867 but to agree to mortgage most of the assets to a bank. When the first yard of cloth was woven in January 1868 at the new mill, built and fitted out at a cost of £13,870, subscribed capital stood at £9,270 and bank accommodation at £5,990: it is against this background, then, that the real worth of the £1,500 bonus paid later that year can be appreciated.²⁴ The subsequent progress of this and the other woollen companies following closely on its heels is told in Chapter 9. Suffice it to say here that on 3 March 1868 the *Argus*, while acknowledging the first production of machine-made woollen cloth to be 'memorable in the industrial history of Victoria', noted sourly—but with some perception—that 'every attempt to force manufactures, or to foster them by means of bounties, or differential duties, or other government interference, has ended in failure and disappointment if not in ruin and disaster'. It took just twenty-five years for 'ruin and disaster' to catch up with the Victorian Woollen and Cloth Manufacturing Company.

The Premium Board was also prepared to make an award of £1,500 to Thomas Kenny (a partner in the firm that later became Sands & McDougall Pty Ltd, manufacturing stationers) who in 1865 had imported paper-making machinery, said to be worth £8,000, and had begun to instal it in a disused water-driven flour-mill at Dight's Falls on the Yarra River. The Board inspected the project and was impressed both by what it could see and what it could imagine. In particular, it believed that raw material costs would be half those in Britain, commenting that whereas 'English rags are commonly worn to the stump, and are really rags, in the full sense of the word', those collected in Victoria 'are simply half worn out-dresses [sic], which the high wages, and consequent extravagance of the working classes cause to be thrown away, when, in any other country, they would be carefully repaired'.²⁵ A condition attached to the award was that by 21 December 1866 'the machinery must be able to produce ten tons at least of paper, weekly—the quality to be good brown, wrapping, printing, grocer's, or draper's papers'. Soon afterwards Kenny died and the project came to a standstill. Some months later the machinery was bought by Samuel Ramsden and re-erected in a mill on the south bank of the Yarra below Princes Bridge which came into operation in May 1868, too late to claim the bonus.²⁶ The irony of this episode is that, when recommending a bonus for Kenny's project, the Board noted that 'pure water is necessary for making any but coarse paper' but had doubts about the 'adequate purity of the Yarra water' at Dight's Falls. No one seems to have pointed out that it had been illegal for more than a decade, and reaffirmed only the previous year, to allow refuse or noxious substances to flow into this river from any industrial establishment 'above the City of Melbourne': Kenny would have been hard pressed to produce 10 tons of paper a week and keep within the law.

The Course of Industrial Development

Only the barest quantitative picture can be given of the course of factory development during this period. On the basis of a miscellany of information, drawn mainly from literary sources, it seems unlikely, as suggested at the beginning of the chapter, that more than 600 people were employed under formal factory conditions during 1850, and the number probably increased to just under 5,000 during the following decade. The first official employment returns, for the year ending 31 March 1861, put the total at 5,440 hands but these included some people engaged in various public utilities and agricultural pursuits. Then, from 1862 on, calendar year figures become available, and have been used as the basis for a continuous series for the remainder of the century, which suggest that factory employment grew from possibly 5,300 at the end of 1861 to 11,250 at the end of 1865 (Appendix Table A1.4).

Such figures must be regarded only as orders of magnitude. One problem is that the statisticians regarded factory returns as being of secondary importance compared with agricultural data to which much greater care and attention were devoted in terms of collection, analysis and presentation. In general, the methodology and principles underlying industrial censuses remained backward during much of the nineteenth century, although discussion of this can best be deferred until the next chapter. Furthermore, the statisticians were faced with some very real problems about where and how to draw the line between manufacturing and other activities. An indication of this was given earlier when discussing the building and brickmaking industries, and the same sort of blurring occurred between farming and the processing of produce and between manufacturing and retailing. This is well illustrated by a survey of the boot and shoe industry made by the *Argus* on 5 August 1864 when it was noted that several of the leading retail establishments in Melbourne kept 'from five or six to a dozen men at work, producing superior articles, to meet the wants of customers . . . the men sometimes work on the premises, and sometimes at their own homes'. Another system had also evolved whereby

a little master establishes himself, employs and boards four or five men, and pays them 7s.6d. per pair, a rate which enables them to earn from £2 to £2 10s. per week. The employer works for journey-man's wages himself, and, as it is stated, gets no profit by his men, except upon their board. The boots produced in this way—bluchers and lace-ups, technically known as strong work—are taken round to the large wholesale dealers who supply the up-country markets, and are sold to them at 10s.6d. or 11s. per pair.

These quotations point to yet another difficulty involved in assessing the dimensions and course of industrial development, for it is clear that even by the end of the 1850s the use of outworkers had become an established practice in the clothing, footwear and saddlery trades. One tailor told the Select Committee on the Tariff in February 1860 that he had '14 or 15 men' in his workshop and another '20 or 30'

partially employed outside, and there is plenty of corroborating evidence in contemporary descriptions of individual firms such as the slop clothing manufacturer who, noted the *Age* on 3 July 1865, employed 130 hands in his factory and 100 more in their homes.

In these circumstances, it is hardly surprising that any picture of industrial development gained from the 1861 population census occupational tabulations—a hopeless scramble of ‘dealers’ and ‘makers’ and of ‘inside’ and ‘outside’ workers—should differ greatly from that derived as a result of the factory statistics gathered at about the same time. It must be recognised that, in addition to the *factory* workers, there were perhaps as many people again engaged in what might be loosely called ‘manufacturing’ activities which gradually became institutionalised and covered by the industrial censuses. The components of this shadowy fringe cannot be quantified satisfactorily but some adjustments, documented in Appendix 1, have been made to the raw *Statistical Register* figures to try to ensure that people working in *factories* making products like clothes, cabinets and carriages are more adequately represented.

The course of industrial development during this period was thus affected not only by the sorts of demand considerations already discussed but also by a growing formalisation of operations stemming from such factors as the greater use of machinery and equipment (some of which was quite elaborate even if manually operated), the wider application of steam power, and the introduction of new industries that involved more complex physical or chemical processes such as the manufacture of sulphuric acid and the distillation of eucalyptus oil for pharmaceutical purposes.²⁷ Whereas in 1850 there were probably no more than a score of steam engines operating in industrial premises throughout Victoria, by the beginning of 1861 there were about 100 (developing perhaps 1,000 horse-power altogether) installed in Melbourne factories, and a further 175 engines in industrial premises, mainly flour-mills and sawmills, elsewhere in the colony, as well as others on farms, at waterworks and at mines. Steam power was applied to a growing range of existing activities such as brewing (1853), printing (1855), clothing manufacture (c. 1859), bootmaking (1864) and bread-making (1865), and began to influence factory layouts and working practices.²⁸ Paralleling these developments was the introduction of a number of new, capital-intensive ventures including sugar refining (1859), scrap iron rolling (1860), lead sheet and pipe fabricating (1861), bitumenised-paper pipe-making (1861), sulphuric acid (1862) and artificial fertiliser making (1863), and stove and oven manufacturing (1864).²⁹ These, of course, were the exceptions: most industrial establishments were small, unsophisticated affairs that depended entirely on manual labour.

Although nearly all these innovations simply consisted of the local application of overseas techniques, only trial and error could sort out the properties of materials like indigenous timbers that were suitable for specific applications such as the building of railway carriages. It also took time and experimentation to adapt to the natural environment. Printers had to contend with

the changeableness of the climate [which acted] upon the composition rollers so as to frequently melt them from the stocks . . . Another drawback [was] the quickness with which the paper [dried], making it almost impossible to produce . . . 'register'.³⁰

The hot summers were the curse of brewers and it is hardly surprising, therefore, that the first industrial application during the 1850s of Harrison's newly developed ether-compression refrigerator was in a brewery at Bendigo where during the five summer months the average daily maximum temperature exceeds 24 °C.

Other industries suffered less from technical than economic disabilities. The metal trades in particular found themselves in something of a cleft stick since the small size of the market made it uneconomic for firms to import specialised tools and equipment: 'it makes an enormous difference', explained the *Argus*, 'that the colonial masters have to do such an infinite variety of work, while in England one large shop turns out so many castings from the same patterns'. Moreover, many of the tradesmen arriving in the colony were *too* skilled: what was wanted were Jacks of all trades able to work 'well, plainly, and quickly with little emphasis on fine finish'. The point was that colonial metal-working firms had to retain the advantage of speedy execution of jobs as this was the main inducement for work to be placed locally. But there were penalties. This very emphasis on quick delivery meant that capital had to be tied up in imported raw materials (like metal bars and shapes) and components (such as springs and valves) as well as in jigs and templates in anticipation of possible orders. For these sorts of reasons working costs were inflated and, along with high labour and materials costs (coal was four times more expensive in Melbourne than in the English Black Country), offset the 'high protective tariff' imposed, at least in the minds of the free-traders, by the freight, survey, insurance, agency, port and other fees and charges involved in shipping manufactured goods from England.³¹ The structure of the metal-working industry in Melbourne, which towards the end of this period employed perhaps 750 men, reflects these circumstances. The three leading foundries (Langlands, Chambers and Fultons), long-established and with proven ability, had between them nearly 400 employees working on a diverse range of contracts. Then there were a dozen or so smaller foundries which at any one time had to concentrate all their resources on particular contracts ranging from sewing machine parts for Melbourne to lamp-posts for Dunedin in New Zealand. On a much reduced scale the same sort of hierarchy also seems to have been true of the copper-smiths, brass-founders and other trades. As a generalisation, there was little correlation between size and specialisation: it simply seems that the larger firms were able to take on a variety of contracts concurrently whereas the smaller ones could only handle such jobs consecutively. Nonetheless signs of specialisation were beginning to appear, usually because a firm gained something of a name for itself in a particular field such as boiler-making or the fabrication of structural beams and pillars, but occasionally because it was set up with a specific objective in mind. A case in point was Hugh Lennon's agricultural machinery business which he began in 1865 'with one pair

of bellows, one anvil, and a boy helper' and developed into possibly the leading and most innovative plough-making establishment in Australia.³²

Infrastructural developments

The growth of manufacturing was also facilitated by the provision of some basic services. Until 1857 Melbourne relied on rain-water or water carted and pumped from the Yarra River, but late that year the first supplies from the Yan Yean Reservoir Scheme reached the City and entered an embryonic reticulation system. In 1856 the Melbourne Gas Company came into operation charging 25/- per 1,000 cubic feet; however, early in the 1860s competition from the Collingwood Fitz Roy and District Gas and Coke Company, which under its Act of Incorporation (22 August 1860) was not permitted to charge more than 17/6d, brought the effective 'Melbourne' rate down to 14/- in 1864, 11/- in 1868 and 9/- in 1874. In the meantime gas supplies were inaugurated in Ballarat, Bendigo, Castlemaine and Geelong, although in the first three of these centres the high prices charged initially reflected the costs of carting coal inland. This problem was recognised in the Act incorporating the Bendigo Gas Company where it was laid down that the maximum allowable price would be reduced from 60/- to 50/- per 1,000 cubic feet as soon as the railway line from Melbourne had been completed.³³ Even though in this instance the actual tariff was reduced from 45/- in 1860 to 35/- in 1863 and 30/- in 1864, it was still more than twice as much as the 'Melbourne' rate. And, in addition to the improvements to road and railway communications discussed in the previous chapter, an electric telegraph system, which first came into operation between Melbourne and Williamstown in 1854, linked Melbourne with Adelaide (July 1858) and with Sydney (October 1858) and brought it into quicker contact with most of the main towns in the colony (Fig. 6.4).

Formation and Financing of Manufacturing Companies

Much research remains to be done into the financing and organisation of these early manufacturing ventures. Most were owned and operated by individuals, families and partnerships, although it is clear that the banks played a significant role by providing both short-term credit and long-term finance. One illustration, concerning the formation of what was to become one of the most important tanning firms in Victoria, will serve to make this point. In 1864 the long-standing partnership of Isaac Hallenstein, Michaelis Hallenstein and Herbert Buttner added to its various interests by buying a small tannery at Footscray. More capital was needed to make something of this establishment, and accordingly a relation of the Hallensteins was invited to buy into the partnership. This cousin, Moritz Michaelis, sought a loan from a number of institutions, eventually finding a sympathetic ear at the London Chartered Bank, and during 1866 the firm, now styled Michaelis, Hallenstein and Company, began a fourfold expansion of the works. Any of the 480 hides turned out weekly that could not be sold locally were sent to England:

even here the bank came to the firm's assistance by giving advances on export consignments.³⁴

Until the mid-1860s it was rare for manufacturing firms in Victoria to be financed by shares spread relatively widely through the community, and even more uncommon for capital to be subscribed from outside the colony. The first sugar refinery was, however, an exception to both these generalisations. This venture was born of the enthusiasm engendered by the initial success of the Colonial Sugar Refining Company formed in Sydney in 1855 to take over the assets of the Australasian Sugar Company. In 1857 the shareholders called for the formation of an associated sugar refining and distilling business in Melbourne, and by an indenture dated 1 June 1857 the Victoria Sugar Company was set up with a nominal capital of £150,000, half the issue being taken up by shareholders in the Colonial Sugar Refining Company and the remainder by Melbourne businessmen.³⁵ Perhaps because of the protection, albeit imaginary, afforded by the Companies Statute, 1864,³⁶ promoters began to draw on the financial resources of a broader cross-section of the population. Of the seventy or so companies which had been registered by the end of 1865, ten proposed to engage in some sort of manufacturing or processing activity, including the production of aerated bread, bricks, sugar, beer, flour, spirits, woollen cloth, cement and stearine candles. These companies were formed with various motives in mind: some, like the Victoria Sugar Company Ltd, simply changed themselves into limited liability companies without raising their nominal capital. Others were established with the specific intention of purchasing the assets of an existing venture and enlarging the capital. Such was the case with the Warrenheip Distillery Company Ltd which took over the distillery of the same name and increased the capital to £50,000; another was Langlands Foundry Company Ltd, floated a couple of years later with a nominal capital of £25,000 in 1,000 shares of £25 each to purchase the assets of H. W. Langlands who himself subscribed 61 per cent of the initial capital. Finally, some of the companies were registered as the initial step in the promotion of completely new ventures. One of these, the Victorian Woollen and Cloth Manufacturing Company, has already been mentioned and other examples of woollen cloth and meat preserving companies are discussed in the two chapters that follow. These relatively expensive and high risk projects were, however, but one end of a spectrum. At the other were companies floated to set up a local flour-mill or, beginning in the early 1870s, a local cheese factory. The Ararat Flour Mill Company Ltd, for instance, was registered on 3 May 1865 with a nominal capital of £3,500 in 700 shares of £5 each: a couple of years later both the paid-up capital and the value of the assets were about £1,750.³⁷

Employees and Employers

As manufacturing activity developed there was, as in other sectors of the economy, a growing consciousness of the changing relationships between employee and employer. While it is inappropriate to consider these in detail, it is important to

appreciate that they had an influence on the development and, to some extent, the location of secondary industry. During the 1840s a number of trade societies had been formed, such as by the printers, brickmakers, sawyers and bakers, partly as benefit societies and partly as a means for negotiating collectively with employers about wages and conditions. One effect seems to have been to hasten the journeymen's transition from being partly self-employed to being simply employees. As an example of this, Hume cites the society of journeymen tailors formed in Melbourne in 1845 which agreed that its members would not undertake any more work on their own account while the employers promised to hire society members only.³⁸ Such arrangements did not, as might be imagined, necessarily affect the spatial organisation of manufacturing: nearly twenty years later it could be said that it was not 'the general custom [in Melbourne] for the journeymen tailors to work on their masters' premises, but, except in some instances, the work is taken home'.

One reason for this was that many of the budding societies fell into abeyance during the turmoil of the gold-rushes and only became active again in the second half of the 1850s. The emphasis then was on conditions of employment, as indicated by the emergence of the Eight Hour Movement in 1856, but wage rates were never far from view.³⁹ One example of a small but powerful organisation was the Moulders' Association formed in August 1858 which was able to persuade employers to pay 14/- per day of eight hours instead of 18/- for ten hours as previously. On an hourly basis this represented a slight reduction from 1/10d to 1/9d but, since overtime was paid at the rate of time and a quarter for the first two hours, the adjustment meant an increase of just over 2 per cent for a ten-hour day: the *Argus* (17 October 1863) noted that this went a long way towards paying the 2/- per week Association fee that was disbursed to members in the form of sickness and disablement payments.

There is no space here to review the causes and consequences of the industrial disputes which arose during the latter part of this period. Some were attempts to change established trade practices such as when the bakers objected to nightwork and the need to board in their employer's house; others were simply expressions of dissatisfaction about a particular malfeasance, as in the case of the Ballarat Moulders' Club which called its members out on strike when an untrained foreman was appointed. The more important strikes, however, concerned the eight-hour principle itself. One, which received a good deal of publicity, occurred at the Spencer Street railway carriage-building works late in 1859 when the newly appointed contractor tried to revert to a ten-hour day; after three weeks he was persuaded to see the folly of his ways, no doubt in part because the men at his own coach factory also joined in the dispute.⁴⁰ This latter establishment was the scene of more unrest four years later until it was agreed that time off would be granted in lieu of payment for overtime.

The least successful societies appear to have been those in which the tools of trade were cheap and portable. Thus the Tailors' Trade and Benefit Society, formed in the mid-1850s, pushed its claims too far and forced small employers to choose

between going to the wall or going to tailors who were not members. Other manufacturers had less room for manoeuvre. Robert Fulton, who operated the third largest foundry in the colony, told the Select Committee on the Tariff in March 1860 that he could obtain workmen for half the wages he was paying and, when pressed hard enough, explained that he did not do so because 'the men would stick out against it, and our establishment would be closed for several weeks'. It is not hard to see how these sorts of pressures made it more difficult for some manufacturers to compete with imports both because of higher costs and slower deliveries. Perhaps the most clear-cut example was the restrictive practices of the shipwrights which effectively prevented the development of shipbuilding in Melbourne on any scale despite the proven suitability of local timbers like blue gum, red gum and box for all purposes except spars and decking to which Tasmanian Huon pine was better adapted. The 250 or so shipwrights had formed a tightly organised union which demanded 13/- for an eight-hour day (as against 10/- for a ten-hour day in Sydney, Adelaide and Hobart), forbade its members to work alongside other tradesmen such as carpenters and joiners, and drew up job specifications indicating the amount of caulking that could be done by one man in a day. Moreover, shipyards were discouraged, if not actually prevented, from combining repair work with new ship construction since the union insisted that the same gang could not be employed on both types of work. Yards which ignored these rules were black-listed. One consequence was that ship owners turned to the yards at Sydney and Hobart for major repairs and new ship construction, but this reduced still further the amount of work offering in Melbourne and, in turn, made the union enforce its rules—particularly those designed to spread the work amongst its members—with greater vigilance so as to give each man employment for perhaps nine months in the year. And, not satisfied with frustrating local shipyards in all these ways, the shipwrights rubbed more salt into the wound by banding together from time to time to build vessels on a co-operative or joint stock basis—itself an indication of the informality of the construction methods being used.⁴¹

No evidence has been found which shows that the manufacturers tried to cope with any of these problems in a collective way. Their energies, it seems, were largely absorbed in promoting schemes about, preparing exhibits for, and drinking toasts at various displays designed to demonstrate the progress of Victoria and the industriousness of its populace. It was not until 22 February 1865 that the first step was taken towards the formation of a Victorian Manufacturers' Association which sought to assist industry by 'every legitimate means', a move welcomed by the *Argus* on 6 June 1865 as a better alternative to providing it with 'legislative leading-strings' and a 'fiscal go-cart'. But this organisation hardly seems to have been in the vanguard of events. Almost exactly a month before its inauguration a customs schedule had been brought into operation which, despite the constitutional controversy it helped to ferment, marked the de facto beginning of 'protection' in Victoria. And four weeks before the Association on its second anniversary admitted a lack of achievement, a deputation from the metal trades was beginning the long, but ultimately successful, task of persuading the government to place

official contracts locally. Tariff schedules and government contracts were two of the most significant influences on the course of industrial development in Victoria during the remainder of the nineteenth century and thus form major themes in the chapter that follows.

8 Manufacturing in Victoria 1866 to 1890

This period began with the first explicitly protective tariff and ended with a short burst of activity that preceded the downturn into the depression of the 1890s. The years from 1860 to 1890 have been dubbed the 'long boom' but, in reality, the Victorian economy passed through phases of slower and more rapid development: growth appears to have been less pronounced in the years from 1865 to 1870 and from 1875 to 1879 compared with those from 1871 to 1874 and from 1880 to 1883. There was then fairly rapid growth in 1885, a mild recession in 1886, rapid expansion in 1887 and 1888, some slackening in 1889, and a levelling out in 1890 followed by the decline into the depression. Hall has reviewed the main features of the Victorian economy and all that is required here, therefore, is a brief comment on some of the demographic and structural changes.¹ Several aspects of population growth have already been discussed in Chapter 6 but it is worth emphasising again that although the total increased at an annual average rate of 2.5 per cent between the censuses of 1861 and 1891 the number of male adults increased by only 0.5 per cent in the 1860s and 1.6 per cent in the 1870s (Table 8.1). This, in turn, led to weaker demand in some influential sectors of the economy like residential construction, and coincided with the decline of gold-mining and with external events including the gold-rushes to New Zealand in the early 1860s and the employment and investment opportunities provided by the pastoral expansion in New South Wales and Queensland in the 1870s.² In contrast, the number of female adults, boosted also by immigration, increased by 4.0 per cent a year during the 1860s and 3.3 per cent in the 1870s. Moreover, the baby boom of the late 1850s and early 1860s (mainly as a result of the youthful age structure of the immigrants during the gold-rush decade) produced a strong demand for educational facilities in the 1860s, for employment opportunities in the 1870s and for housing in the 1880s. These generalisations are not, however, true of all parts of the colony; there were considerable differences between events on the gold-fields and those in Melbourne and 'rural' Victoria, as Table 8.1 makes clear.

The external trade data also help to give an impression of some of the structural changes taking place (Table 8.2). The diminution of gold-mining, from 1,457,000 fine ounces in 1866 to 579,000 fine ounces in 1889 (see Fig. 10.1), is obvious; equally plain is the role that the pastoral industry continued to play even though there was little increase in cattle and sheep numbers in the 1870s and 1880s. What fails to emerge clearly is that the area of land under cultivation in 1866 (593,000 acres) quadrupled during the next two decades with the result that Victoria became a regular net exporter of flour from 1871 and of wheat itself from 1876.

Table 8.1 Average annual rates of population change by decades and areas in Victoria, censuses 1861-91^a
(per cent)

Intercensal period	Category ^b	Melbourne ^c	Gold-fields ^d	Rest of colony	Total Victoria ^e
1861-71	Children	5.02	5.70	5.42	5.42
	Adult males	3.61	-2.02	1.91	0.47
	Adult females	4.60	3.68	3.48	3.96
1871-81	Children	1.63	-2.31	2.27	0.59
	Adult males	3.72	-2.27	3.34	1.55
	Adult females	4.29	0.62	4.54	3.29
1881-91	Children	4.95	0.18		1.77
	Adult males	6.32			3.35
	Adult females	5.48			3.44

^a Chinese and Aborigines included.

^b Children defined as under fourteen years.

^c As nearly as possible the Melbourne and Metropolitan Board of Works area as defined in 1890.

^d Gold-fields population as published in censuses: these figures were said to include, so far as practicable, only the gold-fields and related townships and encampments.

^e Includes crews and passengers on ships, travellers and other migratory population that cannot be allocated geographically: the numbers involved were not significant.

Source: Victorian census reports 1861-91 (for actual numbers of adults see Table 6.2).

Table 8.2 External trade, Victoria, 1866-90^a
(£000)

Year	Exports originating in Victoria ^b						Entrepôt trade ^d	Retained imports
	Wool	Tallow	Livestock	Gold	Other	Processed and manufactured ^c		
1866	2,971	7	64	5,910	199	282	4,291	11,316
1867	3,651	29	90	5,739	141	322	3,652	8,922
1868	4,255	161	96	6,629	177	380	4,896	9,425
1869	3,235	237	80	5,364	179	445	5,118	9,985
1870	3,120	359	41	4,892	176	514	4,430	9,088
1871	4,287	469	49	5,424	169	754	5,632	8,936
1872	4,261	353	76	5,056	249	764	3,112	10,579
1873	4,809	233	104	5,731	187	813	3,425	13,108
1874	4,997	200	106	4,972	215	863	4,088	12,866
1875	4,694	203	147	4,320	323	885	4,195	12,491
1876	4,852	175	153	3,614	413	949	4,040	11,665
1877	4,373	90	311	4,852	520	1,122	3,889	12,473
1878	4,331	104	382	3,786	696	1,377	4,250	11,912
1879	3,565	151	291	2,210	608	1,245	4,384	10,652
1880	4,234	192	328	3,692	1,211	1,563	4,735	9,822
1881	4,071	247	453	4,680	1,371	1,659	3,771	12,948
1882	4,792	186	594	3,589	1,557	1,853	3,623	15,125
1883	5,213	232	790	3,821	1,292	1,944	3,107	14,637
1884	5,707	257	714	2,010	2,660	1,807	2,895	16,307
1885	4,428	156	699	4,310	1,199	1,660	3,100	14,945
1886	4,306	122	293	1,948	1,083	1,303	2,740	15,791
1887	4,508	86	411	1,255	955	1,288	2,848	16,174
1888	3,755	158	217	3,691	1,304	1,232	3,497	20,475
1889	5,194	149	304	2,280	816	1,034	2,958	21,445
1890	5,122	157	333	2,739	732	1,209	2,974	19,980

^a These data continue the series set out in Table 7.1.

^b Excludes all exports across the border to New South Wales until 31 May 1873; from 1 June 1873 to 31 January 1874 excludes all such exports except those under bond; from 1 February 1874 all exports across the border included.

^c Further details are given in Tables 8.8 and 8.9.

^d This column is the difference between all exports and all colonial exports except for the years 1866 to 1871 inclusive for which an allowance has been made for the estimated value of wool imported across the border from New South Wales. The duty on gold was removed from 1 January 1868 and shipments were embodied in the general trade returns: prior to this gold was transhipped under bond. Thus in 1867 gold imports were recorded as worth £1,671 but in 1868 as £1,305,825.

Aside from short-run incidents, the value of exports of colonial origin and of retained imports changed relatively little during the 1860s and 1870s, the usual picture of long-run growth during these decades being largely explained by the continued development of the entrepôt trade. The decline of this activity after 1880 (coinciding with, and partly explained by, the extension of the New South Wales railway system into the Riverina) was more than offset, however, by the growth in the value of retained imports. The year to year variations in export returns during this latter decade mainly reflect short-run events, like the revival of gold-mining (1880-3) and fluctuations in wool prices, rather than further major structural alterations.

The Demand for Manufactured Products

Despite the brakes imposed by the demographic structure of the population, the decline in gold-mining, and the flow of funds into its northern neighbours, the Victorian economy was nonetheless expanding both absolutely and geographically. It is appropriate to examine the resultant changes taking place in demand for manufactured and processed goods and the extent to which these were met locally. Consideration is given first to the internal demand from the private and public sectors and then to the growth of export sales. Within this framework particular emphasis is laid on government contracts for railway equipment and water-pipes and the overseas trade in canned meat since these illustrate some significant aspects of industrial development during this period.

Private sector demand

It is tempting to speculate that, since the numbers of people, of adult male equivalents, and of employed persons doubled between 1861 and 1891, the demand for a wide range of consumer goods may also have increased twofold. Butlin's index of effective industrial wage rates suggests that after a sharp rise from 1865 to 1870 (with a setback in 1868) the trend levelled off until 1877 (once more with setbacks in 1871 and 1874), rose again until 1881 (apart from 1879), and then slowly declined during the remainder of the decade (with a low point in 1886 and a higher one in 1888).³ Actual earnings were affected by other factors including strikes and lock-outs which, particularly in the 1880s, left several significant groups of workers without any income (except funds disbursed by unions) for two to three months at a time. Since *effective* wage-rates showed a *long-run* upward trend (and Butlin included the available data on house rents in his retail price index), the income available for the purchase of other goods and services probably increased at a slightly faster rate than population. There are indications, however, that considerable changes were taking place in consumer tastes and preferences during these three decades: there was probably a decline in the proportion of personal income spent on the bare necessities of life and a relative increase in the proportion spent on consumer durables and more permanent assets, a shift facilitated in part by the operations of housing finance institutions. Within such broad categories

Table 8.3 Estimates of new capital formation and replacement outlays from the public sector in Victoria, 1861-90^a
(£000)

Period	New or replacement	Railways	Telegraph	Water and sewerage	Bridges and harbours	Defence construction	Public buildings	Other miscellaneous	Total
1861-65	new replacement	3,539 307	64 22	166 93	170 155	90 7	783 121	137 4	4,949 709
1866-70	new replacement	448 445	13 11	911 16	208 150	58 6	1,029 110	107 —	2,774 738
1871-75	new replacement	3,769 681	20 65	908 39	308 283	77 2	1,227 236	103 38	6,412 1,344
1876-80	new replacement	4,426 1,199	8 89	742 55	77 166	99 3	2,051 252	198 17	7,601 1,781
1881-85	new replacement	6,086 2,124	31 132	877 62	338 165	368 17	897 248	600 4	9,197 2,752
1886-90	new replacement	12,610 2,898	77 151	3,714 69	544 149	659 —	1,627 322	385 —	19,616 3,589
Total		38,532	683	7,652	2,713	1,386	8,903	1,593	61,462

^a Excludes local government expenditures except in the case of water and sewerage. The original source should be consulted for an explanation of the derivation of these estimates and related qualifications. Expenditure on roads is excluded from this tabulation.

Source: Butlin, *Australian Domestic Product*, *passim*.

Table 8.4 Estimates of new capital formation and replacement outlays from the private sector in Victoria, 1861-90^a
 (£000)

Period	New or replacement	Residential ^b	Shops and offices	Churches	Industrial	Mining	Agricultural and pastoral ^c	Shipping	Total
1861-65	new replacement	3,936 349	340 46	100 3	467 149	287 230	2,333 1,457	121 —	7,584 2,234
1866-70	new replacement	5,001 429	511 87	141 6	1,454 281	397 511	2,872 1,576	72 —	10,448 2,890
1871-75	new replacement	7,751 611	859 116	157 12	1,531 420	—156 528	3,221 1,610	170 —	13,533 3,297
1876-80	new replacement	6,974 676	523 115	163 15	1,442 636	—152 495	4,375 2,242	62 —	13,387 4,179
1881-85	new replacement	12,168 843	2,815 171	230 19	1,796 851	116 474	472 2,371	37 —	17,634 4,729
1886-90	new replacement	19,743 1,073	9,273 334	206 24	3,226 1,089	146 469	—47 2,557	33 —	32,580 5,546
Total		59,554	15,190	1,076	13,342	3,345	25,039	495	118,041

^a The original source should be consulted for an explanation of the derivation of these estimates and related qualifications.^b Includes hospitals, asylums, hotels, guest houses and other inhabited premises.^c Includes tools, machinery and equipment and physical improvements such as dams, tanks, fences and farm buildings but excludes livestock, the clearing of land and land itself.Source: Butlin, *Australian Domestic Product, passim*.

there were further adjustments of priorities: quite literally there appears to have been an alteration of tastes in favour of newer kinds of processed and manufactured foodstuffs (like canned meat and preserves) that were becoming more widely available, and a decline in some staples like breadstuffs (the annual consumption of which fell from 445 lb per adult male equivalent in 1861 to 285 lb in 1891). Demand was also being affected by changes in manufacturing and distribution methods. The making of standard or branded lines, the use of travelling salesmen, the development of 'display' advertising in newspapers, and the introduction of mail order catalogues all helped to bring producer and consumer closer together. New merchandising techniques sometimes affected the organisation of demand and supply in a particular industry, an example of this being noticed by a factory inspector in 1889:

Clothing.—I am informed upon good authority that the principal reason why the slop-clothing trade has declined so rapidly is, the introduction of the self-measurement system, started by the wholesale houses about three years ago, and which has now gained such a firm hold on the country storekeepers. In the past they were in the habit of buying large stocks of ready-made clothing; but now, confine themselves to ordering a few suits of clothes according to the demand made upon them by their customers. Since the introduction of the above system, the so-called wholesale houses are nothing more than large retail establishments; and those which were formerly in the habit of making large quantities of clothing, and employing a large staff to execute the same, are now reduced to a minimum. Many of the cheaper class of tailors adopt this system of sending travellers around the country with patterns and self-measurement cards; and, instead of keeping stocks, resort to the warehouse, where they obtain what they want.⁴

A particularly powerful demand was created by residential construction activity. Butlin has calculated that from 1866 through 1890 279,000 brick and 509,000 weatherboard *rooms* were built in the colony which, along with maintenance, accounted for slightly more than one-third (£55,000,000) of the new and replacement capital outlays derived from public and private sources (Tables 8.3 and 8.4). Directly this had an impact on brickmaking, sawmilling, joinery and similar industries. But it can reasonably be assumed that the greater geographical stability of the population and the improvements to the average size, quality and design of the dwellings must also have expanded the market for a variety of household wares ranging from armchairs and antimacassars to pots and pans;⁵ in August 1873, for example, the Melbourne Floorcloth Company at Northcote started to sell oilcloth at the rate of some 200 square yards a week. The same sorts of products were also required for the building and maintenance of shops, offices, churches, factories, schools and other premises: over the twenty-five years these absorbed another one-fifth (£37,000,000) of the new and replacement capital outlays from private and public sources. In the two decades to 1890, 1,214 churches and chapels were opened along with 1,094 public and private schools, 994 post offices, 361 banks, 303 libraries and mechanics institutes, and 13 hospitals. Although some (like post office

and bank agencies) shared buildings, others were housed in massively dignified symbols of culture and worthiness, for even the smaller and more puritanical religious sects whose 'teachings frowned on spectacle inside the church . . . had no hesitation in contributing their mite outside'.⁶

Important, too, were the clubs and hotels, not only because of the number (see Chapter 9) but because the more affluent were quick to adopt innovations. The first passenger lift in Australia, using hydraulic power, may have been the one installed in Melbourne's Victoria Club in 1877,⁷ and during the next few years passenger and goods lifts incorporating various operating principles became increasingly common especially in central Melbourne. In part this was a reflection of an age in which creature comforts were becoming more important, but it was also a timely solution to the problem of making better use of inner city properties that, over a decade, had been enhancing in value at an average of 9 per cent a year (and even more quickly from 1881 through 1884).⁸ Buildings could now go much higher than the previous walk-up limit of three or four storeys—one went to ten floors in 1885—and could be greatly increased in bulk. Licensed and temperance hotels vied to be the biggest and best. On 1 August 1888, for instance, the Federal Hotel opened for business with 400 bedrooms and 160 other rooms, stacked seven floors high, served by six Waygood hydraulic lifts. The effects of these changes flowed on to secondary industry. During the late 1880s several existing businesses were converted into public companies—including The Austral Otis Elevator and Engineering Company Ltd, Johns' Hydraulic and General Engineering Company Ltd, and The Australian Waygood Elevator Company Ltd⁹—which made and installed structural ironwork and elevators (as well as other products like pumps and steam engines). The stronger and deeper foundations, with consequential problems of water seepage, needed by these taller, bulkier buildings also created yet another demand for cement all of which was imported at an on-site cost of about £5.7.6 per ton. P. McCann tried to take advantage of this situation in 1888 by buying a limestone quarry at Fyansford (near Geelong) and promoting the Australian Portland Cement Company Ltd, which, with a directorate of six Melbourne and Geelong master builders, came into production in 1890.¹⁰ But this venture had missed the building boom and, without paying a dividend, barely managed to stagger through the rest of the decade: nonetheless it helped to bring down the on-site cost of cement to about £3.2.6 per ton mainly because the Melbourne and Metropolitan Board of Works, the largest single user, was under pressure to place contracts with the local producer even if in the event they could not be fulfilled on time.¹¹

Another source of demand for manufactured products was the operating and capital expenditures of farmers and pastoralists. As Tables 8.3 and 8.4 indicate, new and replacement outlays by the land industries from 1866 through 1890 made up one-fifth of total private investment and one-eighth of all investment. A good deal of this was spent on digging dams and bores or building sheds and fences, often with materials on hand, so that the flow on to the formal manufacturing sector was probably small. Nonetheless the Murray River sawmillers regarded the stations on both sides of the border as the main market for their 'marketable' waste (usually

Plate 4: The Federal Hotel at the corner of Collins and King Streets in central Melbourne was designed to be eight storeys high and have 560 bedrooms. When it opened for business on 1 August 1888 it had been built to a height of seven storeys with six lifts serving the 400 bedrooms. The speculative bubble burst before the full design shown here could be completed. In Collins Street can be seen two tram-sets, each consisting of a grip-car attached to the underground cable and a trailer. (*Illustrated Australian News*, 24 July 1886.)

the slab and heart of red gum left after cutting out sleepers), Melbourne sawmills were supplying imported softwoods to the more affluent properties, and the two Melbourne jute processors were weaving hessian 'pack-sheets' used for lining wooden buildings. By the mid-1870s, too, these latter firms were turning out day to day needs like bran bags, corn sacks and woolpacks, and others, again mainly located in Melbourne and Geelong, were making anything from binding twine to the special types of soap used for washing sheep (a practice increasingly confined, however, to more remote properties).

Of growing importance was the demand for a widening range of specialised equipment. On 21 November 1893 it was suggested to the Board of Inquiry into the Fiscal System that a 300 acre wheat-sheep property in the Wimmera region would need a two-furrow stump-jump plough (£28), a scarifier (£30), a stump extractor (£10), a roller (£8), a sower (£9), a stripper (£60), a reaper and binder (£70), a winnower (£28) and a chaff-cutter (£14), as well as a wagon (£45), horse-works (£40) and harness (£20). The mechanisation of agriculture deserves book-length treatment but, at the risk of over-simplifying a complex story, it is possible to identify four main kinds of development. First there was the adaptation of existing types of implements to local conditions. Hugh Lennon made this point in 1884 when he commented that

the modern implementmaker has kept pace with the quick march of improvements for agricultural purposes. For who is he, if he takes a retrospective glance at the last twenty years, who can remember the old wooden hulk of swing ploughs, with its short Dutchbuilt mould-board; equally clumsy wooden harrows, the old wooden or stone roller, the hand reaping-hook or the hand scythe, in comparison to the immense advantage possessed by the modern mowing machine; the old-fashioned hand-flail, and the hand winnowing machine? To go only twenty years into reminiscence, what a change has taken place! So rapid, indeed, has been the change that we who have taken a part in its advancement, and you . . . who have reaped a corresponding benefit, have scarcely taken notice of it. . . .¹²

Second, the difficulty and expense of clearing mallee scrub-land, ploughing and sowing it to wheat, and handling the subsequent crop led to the development of what were essentially new implements, like the 'mullensing' roller and the stump-jump plough. Much of the developmental work on this type of equipment was done in South Australia in response to the opening up of the scrub-land there in the 1860s and 1870s: when the mallee on the Victorian side of the border began to be developed for arable purposes in the mid-1880s, local manufacturers sought to make these implements under licence.¹³

Third, a good deal of effort was put into trying to invent and further develop machines that could combine several tasks. The Ridley-Bull harvesting machine developed in South Australia in 1843-4 stripped and threshed grain but did not winnow or clean it. In Victoria several people, including George Phillipson, Jr, P. B. Richards, Rupert Smith, C. J. Robinson, James Morrow and Hugh McKay, attempted to improve the Ridley-Bull machine and received encouragement from

the government by the offer of a £100 bonus for the first complete field-harvester. A trial at the Dookie Experimental Farm on 21 December 1883 led to an award of £75 to James Morrow for a machine manufactured by the Melbourne firm of Joseph Nicholson and Company (which about this time became Nicholson & Morrow). Soon afterwards C. J. Robinson, also of Melbourne, developed an improvement whereby the winnowing and the reaping and threshing mechanisms were separated, and the patents to this invention were acquired by Nicholson & Morrow. In the meantime H. V. McKay at Ballarat had built a prototype of his stripper-harvester in 1884 and a handful were produced the following year by the North Melbourne plough-making firm of McCalman, Garde and Company. These niceties of timing are not intended to allocate merit but to emphasise that development was taking place on a wider entrepreneurial and spatial scale than might be imagined from the publicity subsequently given to the role played by a few individuals like Hugh McKay.¹⁴ Nonetheless, these advances, despite their intrinsic importance, had a small impact in the short-run on local manufacturing. For several years McKay's machine was produced only in limited numbers on a contract basis by existing engineering works in Melbourne and Ballarat. The branch manager of Massey, Harris and Company told the Board of Inquiry into the Fiscal System on 4 May 1894 that almost all the 3,000 reapers and binders being used in the colony in 1890 had been imported from ten English, Canadian and American companies. Fourth, other inventions were also bringing primary and secondary industry closer together: a sheep farmer, for instance, could choose from an ever-widening variety of wool-presses, and by the latter part of the 1880s he could buy tools and appliances ranging from a fence-wire strainer made in New Zealand to an early model shearing machine first made commercially in Melbourne in 1885.

Some account was given in Chapter 6 of the spread of settlement and the development of the main transport systems. Apart from the railways, most transport operations were carried on by private firms or individuals and the information now available cannot be pieced together to provide a picture of the purchases of items like ships, coaches, drays and harness-ware. It is known, however, that 115 sailing vessels (averaging 68 tons) and 69 steamships (averaging 66 tons), including about 35 paddle-steamers for the Murray River trade, were launched in Victoria from 1866 to 1890. Moreover, the number of steamships on register increased from about 40 in the late 1860s to 130 in the late 1880s and their average tonnage doubled to 300.

The intra-urban transport systems were also growing although, again, precise quantitative evidence is scarce. In Melbourne in 1871 there were 46 omnibuses (vehicles with accommodation for ten or more passengers) and 1,056 other vehicles licensed to ply for hire: six years later the numbers had increased to 112 and 1,203, respectively. The largest operator was the Melbourne Omnibus Company Ltd which began in 1869 with six horse-drawn vehicles and ten years later had a fleet of over one hundred. During the 1870s it pursued its objective of having the omnibus routes converted into a tramway system and in 1877 went into voluntary liquidation to reconstitute itself as the Melbourne Tramway & Omnibus Company

Table 8.5 Value of manufactured articles made in, imported into, and exported from Victoria, 1880-1 and 1890-1 (£000)

Industry-commodity groups	1880-1			1890-1		
	Articles made	Retained imports	Colonial-made exports	Articles made	Retained imports	Colonial-made exports
Metal goods	1,276	632	97	3,651	1,166	116
Chemicals	743 ^a	102	230 ^a	804 ^a	529	192 ^a
Vehicles and boats ^b	232	4	7	519	39	7
Food (human and animal)	3,304	508	709	4,811	929	543
Beverages (including spirits) ^c	1,021	354	5	1,444	288	19
Textile goods	283	1,746	40	483	2,427	23
Clothing	840	377	184	1,318	643	130
Leather and leather goods	2,198	11	364	2,276	412	216
Paper and printed matter	728	308	42	1,687	612	32
Bricks, glass, cement, etc.	342 ^d	48	2	680 ^d	288	1
Sawn timber and wooden goods	1,365	36	44	3,219	605	31
Tobacco (manufactured)	199	7	—	240	179	—
Miscellaneous and unclassifiable items	632 ^e	482	26	386 ^e	982	26
Total	13,163	4,615	1,750 ^f	21,518	9,099	1,336 ^f

^a Includes tallow.^b Excludes value of ship-repairing.^c Excludes production of and trade in wine.^d Original sources corrected for apparent double-counting of brick production.^e Excludes gas and electricity production.^f Differs from figure in Table 8.2 because of inclusion of tallow and exclusion of wine.Sources: *Vic.S.R., Victorian Year-Book*, 1890-1, vol. 2, pp. 331-47.

Ltd with a nominal capital of £500,000 (later doubled). After considerable parliamentary and public debate and investigation, the company was authorised in October 1883 to operate tramways in the City of Melbourne and eleven adjoining municipalities. A semi-government Tramways Trust was formed charged with the task of building the tracks and the plant necessary to drive and operate the below-ground cable system: the company was to provide, operate and control the vehicles themselves. The first 3 mile stretch was opened for public use in November 1885 and a further 40 miles went into service during the following six years. Towards the latter part of the 1870s the company began making its own horse-drawn vehicles but then in 1885 turned its attention to building all but the first 20 of the 350 tramsets (a forward grip car, or 'dummy', plus a trailer) brought into service by 1891.¹⁵

Most of the other urban utilities (except water and sewerage) were also financed and operated privately: by the end of 1890 thirty-one country towns had gas-works and Melbourne itself was served by eight separate gas companies as well as embryo telephone and electricity systems.

So far almost nothing has been said about the extent to which these demands for manufactured goods were met locally or simply resulted in more orders flowing overseas. A general and very crude impression of the relative importance of local factory production and retained imports of manufactured goods can be obtained for the years ending 31 March 1881 and 31 March 1891 when the statistician prepared some estimates of the approximate value of articles produced (that is, gross output) by each type of manufacturing: these have been summarised by broad industry groups in Table 8.5.¹⁶ Retained imports of manufactured and processed commodities have also been classified in a similar way *insofar as this is possible*.¹⁷ Aside from this qualification, it is not clear what basis was used to value the articles produced locally and how this compared with the valuations of imports and re-exports. Nor can too much be read into differences between the years (both sets of data are, in any case, in current values), although on each occasion total retained imports were lower than usual (see Table 8.2) and manufactured commodities made up a similar proportion—about 46 per cent—of these totals.

Despite such reservations, Table 8.5 bears out the more detailed evidence presented later. There is no doubt, for instance, that most of the road and railway carriages, carts, wagons and small boats required in the colony were made there, or that most of the wool and jute and all the cotton, silk and other textile fabric was imported. Such extremes were also true within categories: virtually all soap and candles were made locally but most fine chemicals had to be bought overseas; the beverage group includes beer (in 1880 local production valued at £781,000 and retained imports at £144,000) and spirits (for which the figures were £45,000 and £203,000); and whereas most bricks were made in the colony all cement and flat glass as well as most glassware except bottles were imported. Unfortunately, very few items listed in the trade returns can be unambiguously matched with the products of particular industries. Thus the tanning and leather-working industries and commodities overlap and have, with the exception of boots and shoes, to be

treated as a group, and the same applies to the metal-working industries apart from agricultural machinery and implements.¹⁸

The retained imports of manufactured goods fell into a number of broad categories. First, a substantial number were basic materials—like pigs or ingots of iron, copper, lead and zinc; iron bars, rods and sheets; and cotton, silk, and jute fabrics and mixtures—which were not generally made in the colony but were required as producers' materials. Second, a related group consisted of commodities that were relatively simple in themselves, like galvanised iron sheets, tin-plate and rails, but could be shipped to the colony more cheaply than the basic raw materials. Third, much of the printing, spinning, weaving, sewing, shoemaking, metal-working and wood-processing machinery was imported largely because the demand was too small to make colonial production worthwhile: the manager of the Phoenix Foundry at Ballarat explained to The Royal Commission on the Tariff on 19 April 1882 that he

could manufacture anything at all you like, but if you put yourself in the way of manufacturing, say lathes, or boring machines, or planing machines, or anything of that kind, it must pay you to do that and nothing else. A number of tool makers at home [United Kingdom] make tools their speciality. It does not pay you to jump from one thing to another. It is best if you can get an outlet for your production to go in for one special line.

Within this category, too, must be included the imports of items like telephone and electrical equipment which emerged as new technologies developed. Local manufacturers were also formally restricted by patents on such products as pumps, gas engines, compressors, rock-drills and food processing machinery and by the activities of the local agents who kept an eye open for infringements; it is not clear how much weight can be put on this point (the government itself, for instance, made no bones about importing what were quite openly called 'pattern' locomotives and railway carriages), but patent use and abuse were constantly under discussion by manufacturers' organisations during the 1880s. Specific evidence on matters of this kind is difficult to document but in April 1894 John Rose of the Titan Engineering Company explained how barbed wire manufacturing began in Victoria in 1889. At that time, he explained to the Board of Inquiry into the Fiscal System, the production of barbed wire 'was a monopoly in the hands of one firm in England and one firm in Germany, and two or three firms in America' but that 'since then the patents have expired'. Then came the following revealing exchange:

Q. You were manufacturing while the patent rights were in existence?

A. Yes.

Q. Did you pay a royalty on those?

A. No. My company thought that the patent rights here were not valid, and I invented and made a machine myself for making barbed wire; and, although the patent holders threatened us several times, they had so little confidence in the validity of their patent that they never tested the matter.

Fourth, the expanding range, sophistication and complexity of the commodities required by producers and sought by consumers outran the capacity, knowledge and ingenuity of local manufacturers who were able to make only a limited range of papers, woollen cloths and leathers, of nails, locks and hinges, or of lubricants, glues and paints. In the 1880s in particular the depth and breadth of demand was forging ahead more quickly than the ability of colonial industry to cope with it. Even while someone was learning how to produce machine-made nails in Melbourne, the introduction of new materials and machines into the building, wood-working and shoemaking industries was changing the specifications and increasing the varieties required. This divergence between supply and demand came about for a variety of basically technical and economic reasons. A case in point (discussed in more detail in Chapter 9) was that the local woollen-mills could supply only a few of the hundreds of types, styles and patterns of cloth required: the problem was that the nine or ten mills were each turning out a similar narrow range of single-colour cloth and thus none were particularly profitable. In turn this meant that the basic concern was to use existing resources and new capital to keep going rather than to venture into making wool and cotton mixtures (which would have meant a heavy outlay on new machinery) or into producing tweeds (which would have meant considerable structural alterations, or even new buildings, to prevent the multi-coloured hairs from the tweed section floating on to and spoiling the plain serges and flannels—this being one of the factors that led to the specialisation of mills in England).

Fifth, there was a considerable range of retained imports that overlapped with the products of local factories and works. In the food group, for instance, refined sugar, confectionery and preserves were being imported even though they were being made in the colony. Sometimes this simply came about because goods of comparable kind could be shipped in more cheaply but usually it was because overseas supplies were of a different type or quality: thus, imported shoes tended to be 'dress' and fashion styles rather than day to day wear, and the beer was mainly heavy, dark malt brews that were sold in hotels at twice the price of the local light, pale ales. These relationships between imports and colonial manufacturing are considered again later when attention is focused on the role of the tariff.

Public sector demand

Much of the total investment on public works (Table 8.3) was disbursed on hiring labour, transporting supplies and buying materials like stone, sand and gravel, but a not insubstantial proportion resulted in contracts and sub-contracts for manufactured items, an increasing volume of which was directed to producers in Victoria. Rows about contracts for railway equipment and water-pipes resulted in unusually full documentation which reveals a good deal about the process of import substitution.

During the 1850s and 1860s, as explained in the previous chapter, local firms received some repair and maintenance contracts but most new machinery and metal goods for official use was purchased overseas. Then, towards the latter part

Plate 5: The Melbourne clothing factory of Sargood, Son and Company was a substantial multi-storeyed building. The various departments using different materials were separated by glass partitions (far right), thus preventing the coloured fibres from tweeds spoiling the white moleskins. (*Illustrated Australian News*, 4 November 1874.)

Table 8.6 Victorian railway locomotive contracts, 1872-90

Date of contract ^a	Number of locomotives	Contract price (£)	Value of additional material supplied by Railway Department (£) ^b
19 January 1872	10	30,700	n.a.
17 January 1873	15	50,610	n.a.
21 May 1875	10	24,890	n.a.
8 September 1876	8	22,812	n.a.
31 August 1877	7	24,010	n.a.
23 May 1878	2	5,200	1,435
1 November 1878	1	2,875	717
24 January 1879	7	22,083	4,772
12 September 1879	8	22,500	3,776
12 August 1879	2	7,300	1,282
8 October 1880	20	59,490	15,312
30 June 1881	10	31,470	5,990
25 November 1881	6	16,640	2,567
8 September 1882	50	148,180	30,747
31 October 1884	25	71,695	14,023
16 October 1885	20	59,910	14,908
20 April 1888	30	99,150	24,675
5 October 1888	25	71,100	12,866
16 November 1888	15	52,110	12,234
16 November 1888	25	76,200	17,700
Total ^c	296	898,925	163,004

^a All these contracts were placed with the Phoenix Foundry Company Ltd (Ballarat) except that dated 12 September 1879 (Robison Bros and Company, South Melbourne) and the larger one dated 16 November 1888 (Robison Bros, Campbell, and Sloss Ltd, South Melbourne).

^b Calculated from data in first source given.

^c Not included are seven locomotives built (1871-9) in the Railway Workshops at Williamstown. Also omitted are contracts for fifty locomotives dated in the first source as '1890' since these were not in fact issued until 17 April 1891.

Sources: 'Locally Manufactured and Imported Locomotives', Return to an Order, *VV & P(LA)*, 1898, 1, C5 (16 August 1898); Annual reports of Board of Land and Works and, subsequently, Victorian Railway Commissioners; L. J. Harrigan, *Victorian Railways to '62*, Melbourne, 1962, pp. 234-5. Technical details about these locomotives can be found in C. C. Singleton and D. Burke, *Railways of Australia*, Sydney, 1963, pp. 150-1.

of the 1860s, unemployment in the metal trades and increasing expenditure on public works stimulated deputations, press comment and questions in the Legislative Assembly about the desirability of more contracts being let to local manufacturers. This culminated in a formal petition on 12 July 1870 from 259 unemployed ironworkers and mechanical engineers who prayed 'that the order sent home by the last mail for railway plant might be cancelled'. The next day the Minister for Railways assured the Legislative Assembly that it was not intended to order any further locomotives from home, that contracts for rails and locomotives already placed overseas could not be cancelled, and that machinery which had been lying idle in the railway workshops for some years would be erected to enable the government itself to build some engines.¹⁹ (By this time seventy-seven locomotives had been imported and about twenty-five more were on order.) One reason for this change of heart was that considerable work had to be done on some of the imported engines before they could be put into operation.

All appeared to augur well for the colonial iron trades until July 1871 when the government made it clear that it had no intention of discouraging firms in other Australian colonies from submitting tenders to supply locomotives: it wanted to 'let Victorian artisans know that they would be subject to competition' but took some of the sting out of this declaration by emphasising that import duties would be levied and that the tenderers would have to bear the costs of freighting engines to Melbourne. Even so the metal trades were concerned lest their expectations should be soured before any real gains had been made. Their eyes turned, in particular, to 'the two leading and long-established Sydney firms' which were thought to be 'in a far better position . . . to carry out undertakings of this kind' especially as coal in Sydney was about one-third the price of that in Melbourne and metal workers there were paid 10d an hour as against 17d locally.²⁰ These worries, though realistic, were shown to be unnecessary when on 19 January 1872 the Phoenix Foundry Company Ltd at Ballarat was awarded a contract to build ten locomotives and, as Table 8.6 indicates, others for a further 253 by the end of 1890. During the same period another forty locomotives were built in Melbourne but, contrary to the fears of private enterprise, only seven of these were put together in the Williamstown railway workshops (between 1871 and 1879). On the whole the government stuck to its promises to place contracts locally since only about fifty engines were brought in from overseas during the 1870s and 1880s: some of these were on order before the government announced its decision in 1870, others were bought as 'pattern' engines to be replicated in the colony, and the remainder were imported in 1883-4 to cope with a shortage that could not be met locally. Moreover the bogey of stiff competition from the other colonies failed to materialise: the first such engines to run on Victorian lines did not make their appearance until 1913 (from Walkers Ltd of Queensland) and, apart from a solitary exception in 1921, New South Wales locomotives did not come into operation in Victoria until 1952.

This new phase of Victorian manufacturing was not without problems. Although the materials needed to build the locomotives were allowed in duty free, the tools and machinery required to fit up the shops were subject to a 20 per cent duty (from

Table 8.7 Victorian railway contracts by category, 1866-90^a
(£000)

Year ^b	Victorian manufacturers ^c			Building and construction ^d	Timber ^e	Ballast ^f	Permanent way building ^g	Imports		Total
	In Melbourne	Elsewhere						Rails and rolling stock	All other	
1866	1	—	—	2	4	—	6	—	—	13
1867	—	—	—	6	11	2	—	—	—	19
1868	—	—	—	1	11	—	2	—	—	14
1869	16	—	—	1	13	—	—	—	—	30
1870	11	1	—	61	12	1	326	—	—	412
1871	10	1	—	13	12	4	325	—	—	365
1872	31	32	—	15	9	2	518	3	1	611
1873	44	53	—	59	11	1	159	—	6	333
1874	31	3	—	110	17	8	312	—	1	482
1875	22	36	—	122	12	4	615	—	—	811
1876	46	36	—	31	10	3	336	—	1	463
1877	72	61	—	99	14	7	99	—	4	356
1878	44	28	—	40	26	9	382	—	6	535
1879	74	55	—	65	12	4	227	6	1	444
1880	26	71	—	43	17	2	46	161	2	368

1881	110	62	51	17	8	383	173	1	805
1882	261	252	107	42	17	609	672	2	1,962
1883	82	23	104	77	19	232	58	1	596
1884	30	78	105	16	15	251	32	5	532
1885	40	82	125	27	27	559	242	1	1,103
1886	155	30	309	22	9	678	6	3	1,212
1887	142	121	206	34	8	1,204	250	13	1,978
1888	250	336	519 ^h	101	20	1,432	332	1	2,991
1889	348	59	354 ⁱ	87	29	872	363	18	2,130
1890	216	79	228	25	14	40	7	20	629
Total	2,062	1,499	2,776	639	213	9,613	2,305	87	19,194

^a All contracts printed in source given which, however, does not include (i) coal and firewood; (ii) consumable items like stationery, tickets, clothing; and (iii) overseas orders for rolling stock and rails until 1880 (and even then is incomplete).

^b Calendar years throughout.

^c Excludes contracts for portable buildings which are included in 'building and construction' column.

^d Includes all building and construction and related maintenance contracts.

^e Mainly sleepers but includes piles, poles and sawn timber.

^f Includes also contracts for bluestone and spalls.

^g Includes only main construction contracts: tunnel and bridge work included in 'building and construction' column.

^h Inflated by contract of £133,000 for station offices at Melbourne.

ⁱ Inflated by contracts of £73,000 for goods shed at Spencer Street and £41,000 for ship canal excavation.

Source: Annual reports of Board of Land and Works and, subsequently, of Victorian Railway Commissioners.

2 August 1871) which was no mean hardship considering that presses, drop hammers, lathes, boring machines and so on were not made in the colony. Undeterred, the Phoenix Foundry delivered its first engine to the Railway Department in March 1873 and completed a further thirty-two by early 1877.²¹ However, a storm was brewing. A report on 26 July 1876 by the engineer-in-chief, Thomas Higinbotham, castigating the design, finish, running qualities and cost of locally made locomotives led to the appointment of a Board of Inquiry that met during February and March 1877. This substantiated the allegations of poor workmanship compared with the 'best English-made engines', considered that the materials used were generally satisfactory except for the hardness and durability of the cylinders and brass fittings, and criticised the designs. The first two points can be summarised as a lack of 'know-how' while the latter probably came about because the first thirty or so engines made by the Phoenix Foundry were 'of more or less local design, no prototypes having been imported for trial, as was almost invariably the case subsequently'²² and because the Railway Department supplied what were said to be 'imperfect' specifications and 'slovenly' drawings, possibly because it had reached the limits of its technical and supervisory competence. Nonetheless, the Inquiry served to give fair warning to local industry that slipshod work would not be tolerated.

This account illustrates the state of technology, the difficulties faced by entrepreneurs, and the dilemma of a government trying to act with responsibility. One of the points made by the Board of Inquiry, which appears to have been overlooked by those who see the tariff as the main stimulus to metal trades in Victoria, was the additional costs of local as against imported locomotives. Even though, as shown in Table 8.6, the government supplied contractors with materials and equipment, such as wheels and axles, worth about 18 per cent of the total cost of the engines (on the grounds that it could obtain these overseas at a lower price than individual firms), the overall expense of putting the Phoenix products on the rails worked out at more than £105 per ton compared with £80 per ton for British-built locomotives, which included £12 for commission, ocean freight, insurance, delivery from the ship and erection.²³ Deliberately, then, the government was also promoting local industry other than through its tariff policies upon which so much attention has been focused.

The locomotive contracts made up only one-quarter of the value of contracts (worth some £3,561,000) placed with Victorian manufacturers by the Railway Department from 1866 through 1890. Table 8.7 should, however, be viewed cautiously because the lists of contracts published each year are incomplete: over the whole twenty-five year period they exclude almost all orders for expendable items, at least some of which (ranging from stationery to soap) were being provided by local firms,²⁴ and only after 1880 were some of the major contracts for imported items included in the annual report of the Railway Department. There are obvious gaps: the listed contracts for steel rails totalled £1,931,000 over the whole of this period whereas net imports were valued at £3,018,000.²⁵ Nor is it claimed that Table 8.7 represents a precise dissection of the published contracts for there are problems

about allocating long-term contracts between years and complex contracts (such as for manufacturing and erecting an iron bridge) between categories.

Items made locally apart from locomotives were carriages, freight and livestock wagons, turntables, crossings, points, signal gantries and, indeed, much of the paraphernalia needed for any railway system except the actual rails and the more technically advanced or patented signalling and safety equipment. The contracts were spread over about 200 firms, although some received only a few orders and for only short periods. Melbourne companies gained business to the tune of £2,061,000 about half of which was accounted for by six concerns.²⁶ Two-fifths of the total value of equipment contracts went to firms elsewhere, mainly to a few large firms in Ballarat, Bendigo, Castlemaine and Geelong.²⁷ Most of the more important contracts were for rolling stock though the total value involved is uncertain because, as in the case of locomotives, the Railway Department itself supplied components like wheels, axles and springs. Indeed in 1877 the poor quality of some of the carriages and wagons led the Department to start buying, seasoning and supplying some of the timber, including teak specially imported from India, and this clouds the issue still further.²⁸

But, even with practical assistance of this kind, local firms were unable to cope with the upsurge in the number and value of contracts placed in the early years of the 1880s. The rapid expansion of the railway system, the inadequacy of produce-storage facilities in newly tapped areas, and the need to replace much of the rolling stock on the Melbourne and Hobsons Bay United Railway Company's lines (taken over in July 1878) were increasing the demand for rolling stock while iron-founders and carriage builders were failing to meet deadlines: the *Age* noted on 3 April 1883 that of the 1,935 carriages, vans and wagons ordered in the colony during the twelve months to 19 October 1882 only 258 had been delivered by the end of March 1883. It had become obvious, even early in 1882, that local firms had over-committed themselves, and in April the government, bombarded by complaints that the railway service was going from bad to worse, could see no other solution but to order eighty carriages from England. Predictably a storm arose which it simply rode out, but as a longer-term measure it started to award contracts running over three years so that firms would be better able to program their work. One more, and what may be regarded as the final, round had yet to come for some parliamentarians thought that the draft of the Railway Management Bill would give the three Commissioners a free hand in awarding contracts. Taking the reports of the debates in August 1883 at face value, this seems to have been an erroneous interpretation since the government quickly amended the relevant clause by adding the words:

Provided that the Commissioners shall not enter into any such contract for the supply either directly or indirectly from places outside Victoria of materials engines or other power or of any other matter or thing without the sanction of the Governor in Council.

The contracts for locomotives, rolling stock and equipment like turntables and

Plate 6: By 1890 the Phoenix Foundry at Ballarat had built 263 locomotives for the Victorian government railways. Components from the cutting and drilling machines (left and centre) were put together on the assembly line (right). The overhead crane, which could travel the 200 foot length of the shop, had a capacity of 60 tons. (*Illustrated Australian News*, 12 August 1873.)

signalling apparatus were the most interesting technically but innumerable other businesses also benefited. Aside from the cash circulated on a day to day basis by permanent way construction gangs, local purchases were also made by firms that contracted to build anything from stations and engine depots to sheds for dairy produce and cottages for crossing-keepers. Much of this railway architecture was grand and substantial in its own right and introduced an air of permanence and solidarity to remote areas: Mark Twain made the point neatly at the turn of the century when he commented that 'Maryborough is a railway station with a town attached'. Apart from the timber required for buildings, the sawmills and timber-cutters had to meet a steady demand (with peaks in 1883 and 1888-9) for piles, posts, beams, and of course for sleepers. About 1,750 sleepers (7,000 cubic feet of timber) were needed per mile of track but, in addition, during the 1870s some 35,000 sleepers—mainly red gum—were bought each year to renovate sections of permanent way that had been built with unsuitable timbers.

Other government expenditures also provided work for local manufacturers. Every issue of the *Government Gazette* listed firms that had been awarded contracts ranging from mending and modifying equipment to making almost anything from nuts and bolts to caissons and girders. During the 1880s in particular a growing volume of contracts flowed from semi-government bodies like the Melbourne Harbor Trust and the Melbourne Tramways Board. In 1885, for instance, this latter body let contracts for rails, cement, engines and other equipment, some of which went to Melbourne firms: one made the 5 ton driving wheels that transmitted the power to each section of the endless cable, another converted old railway lines into thousands of 'yokes' that supported the split rail through which the trams gripped the ceaselessly moving cable underneath, and yet another built most of the boilers and paired horizontal engines that drove the whole system.

Pressure groups were ever ready to make an issue out of contracts placed overseas rather than locally, or with Melbourne rather than country firms, or without what seemed to be any or adequate public notice.²⁹ One instance among many was the discussion in the Legislative Assembly in September 1883 which led to a resolution that 'arrangements should be made that the books used in our State schools should be printed in the colony'. Then, on 2 September 1885, the Legislative Assembly decided in more general terms that contracts for government work should usually be placed in Victoria.

The timing of this resolution probably suited the government quite well because it knew that within a few weeks the first full-scale pipe-making works would be coming into operation thus ending a controversy which had been going on for the best part of twenty years. The water-pipes dispute is a nice illustration of the difficulties that faced both the manufacturers and politicians. It began in January 1867 when a deputation from the iron trades complained that a contract for 7,000 tons of cast iron pipes had been let overseas. The government pointed out that this had been done because no tenders had been received from colonial manufacturers who retorted that they could only be induced to purchase the necessary machinery and materials if assured of further large orders. In effect they wanted the

government to pay a higher price initially so that they could set up plant and then be in a position to bid competitively against overseas firms. Early in the 1870s the government was under considerable pressure to improve water supplies in Melbourne and country towns and it was obvious that a large quantity of pipes would be required for schemes proposed or in hand. The iron trades and protectionists renewed their campaign to have the pipes made locally—even, if the worst came to the worst, in a government foundry.³⁰ Since a direct telegraph link had lately been established between Victoria and England (July 1872), it was argued in Parliament in October and November 1872 that tenders should be called simultaneously in the two countries.

In June 1873 Parliament was told that despite the insertion of some fifty press advertisements no tenders had been received from local manufacturers for 2,800 tons of 3 to 9 inch pipes, while the lowest tender for 400 tons of 36 inch pipes had been £6,500 (from the Fulton Foundry Company Ltd) or £180 more than the quotation submitted by a Melbourne importer. Some negotiating must then have gone on behind the scenes because three months later the Fulton Foundry was awarded a contract for 426 tons of 36 inch pipe at a rate £2. 5. 0 per ton less than their previous quotation.³¹ This, the first such government contract, represented a turning point of policy but hardly of practice since by June 1875 only three further orders for a total of 224 tons of cast iron pipes had been placed with local manufacturers. Some measure of the business that colonial manufacturers could see slipping through their fingers is revealed by a return of 9 June 1875 of government purchases showing that the Yan Yean Water Supply Department, the Railway Department and the Water Supply Branch of the Mines Department together had imported 12,485 tons of pipes since the beginning of 1872. Even so, the water-pipe dispute died down for a while although large quantities of piping were still being imported.

The next main episode occurred in 1878 when 5,000 tons of pipes were being sought: the only tender from a local foundry, the Australian Pipe Company, was accepted even though 17 per cent higher than the lowest bid from an importer. This company, when awarded the contract, refused to proceed with it and the government was thus forced to buy imported pipes to tide it over while advertising for new tenders. In due course the Fulton Foundry was announced as the successful firm with a quotation 8 per cent above those from importers. Apart from demonstrating some desire to support local manufacturers the government had two other motives for this decision. One was that a considerable proportion of imported pipes in previous batches were sub-standard or damaged; the other was that, by making it known that local manufacturers would be favoured, importers would be encouraged to lower their prices (which in fact they did, from £10. 10. 0 to £9 per ton).

This was by no means the end of the matter. By 1882 the increasingly severe water supply and reticulation problems in Melbourne could only be met by laying 500 tons of 24 inch piping, quite apart from smaller sizes, each month. Tenders were called but the prices of local firms were unacceptably high because, explained the Langlands Foundry Company Ltd (which by this time had taken over the assets

of the Fulton Foundry), different equipment was needed to make the 24 inch diameter pipes in 12 foot lengths now sought compared with that installed to meet the previous contract for 9 foot long pipes up to 16 inches in diameter. Not only would this re-equipping be expensive and take time, said Langlands, but it would only be worthwhile if a substantial contract were forthcoming. But time was of the essence to avoid a water shortage in the summer of 1882-3 and thus imported pipes were used.³³

The saga continued in 1884 when tenders were called for over 9,000 tons of pipes in 12 foot lengths and ranging in diameter from 3 to 30 inches. On this occasion Langlands was successful with a tender of £9. 1. 4 per ton ex-works, or 7 per cent above the lowest quotation from an importer. As soon as it heard of the decision in December 1884, Langlands sought and was granted a twenty-one year lease of some Crown land (under section 45 of The Land Act, 1869), sold its freehold property at a handsome profit, and moved its foundry to the new site where a pipe-making plant was built that enabled it to start fulfilling the contract in October 1885.³⁴ The 'hearty toasts' drunk during a ceremony that month, at which members of the government congratulated themselves on having fathered the first pipe-making plant in the colony and the shareholders watched the first results of their £82,000 contract being stacked up ready for delivery, might have been less enthusiastic had it been known that official enquiries were in train into the economics of making and laying wrought iron pipes. This investigation had been initiated by Alfred Deakin on his return to Melbourne in May 1885 after visiting California as president of a Royal Commission on Water Supply. It was found that although the on-site cost of wrought iron piping was £19. 10. 0 per ton as against £10. 0. 3 for cast iron, there were considerable savings to be made because wrought iron piping was only about a quarter the weight of cast iron and could be laid in much longer lengths. The contract with Langlands was altered early in 1886 by cutting out 3,033 tons of 30 inch pipes and substituting 3,639 tons of smaller pipes and by paying the company compensation.

But the government had no sooner bought itself out of this difficulty than it found itself in another. The first two contracts for a total of 2,840 tons of wrought iron pipes were awarded to Mephan Ferguson, the lowest tenderer, without any fuss; then the third contract for 1,650 tons was also awarded to this firm even though its tender price was fractionally above that of a South Melbourne foundry. Immediately there was a fuss, but the government remained unmoved by speeches in the Legislative Assembly, protest meetings in South Melbourne, and representations by deputations, for it backed its departmental advisers who had judged that proven ability as well as the rate per ton had to be given some weight in deciding contracts of this kind. One irony of this episode—which helps to balance a reference to political patronage later in the chapter—was that the Minister for Public Works, who was the Minister responsible for awarding this contract, was one of the elected representatives for South Melbourne.³⁵

Table 8.8 Export of goods manufactured and processed in Victoria, 1866-90^a
(£000)

Description	1866-70	1871-75	1876-80	1881-85	1886-90	Total
Metal goods						
Machinery and engines	87	143	218	446	233	1,127
Agricultural implements and machinery						
Other	21	41	92	146	184	484
	54	66	163	139	102	524
Clothing and textile goods						
Apparel and slops	147	361	834	1,230	612	3,184
Woollen piece goods	1	23	85	50	19	178
Cordage	15	42	77	121	27	282
Other	35	37	80	129	70	351
Chemical products						
Soap and candles	76	30	72	86	65	329
Other	19	24	84	151	129	407
Wooden products						
Furniture	55	51	155	199	104	564
Other	2	6	53	84	55	200
Tobacco (manufactured)	8	—	—	1	—	9
Boats and vehicles	17	28	44	48	33	170

Leather and leather goods						
Leather	441	1,028	1,132	1,666	1,019	5,286
Boots and shoes	21	41	202	195	97	556
Saddlery	12	21	65	93	42	233
Other	5	1	5	18	16	45
Books and stationery	14	19	153	220	172	578
Food (manufactured)						
Preserved meat	263	1,163	576	311	85	2,398
Refined sugar	309	527	692	753	189	2,470
Molasses	54	84	16	46	14	214
Flour	167	110	664	1,325	1,724	3,990
Biscuits	18	57	125	175	125	500
Butter and cheese	21	61	300	582	314	1,278
Confectionery	12	28	73	78	19	210
Other	19	16	107	255	203	600
Beverages	24	23	54	161	265	527
Bricks and building materials	17	14	20	12	6	69
Miscellaneous	10	34	116	203	143	506
Total	1,944	4,079	6,257	8,923	6,066	27,269

^a Also includes articles wholly or partly made up from imported materials.

Source: Vic.SR.

Export demand

During the twenty-five years to 1890 goods worth £27,269,000 claimed to have been processed or manufactured in the colony, including those wholly or partly made up from imported materials, were exported. This was 10.1 per cent of the value of all exports originating in Victoria (excluding entrepôt and transshipment trade): it built up from a mere 3.0 per cent in 1866 and remained at between 12.9 and 15.4 per cent from 1878 through 1887. Although there were considerable year to year fluctuations, most of the leading exports tended to increase until about 1883 (the peak year for all commodities taken together) and then to decline (Figs. 8.1 and 8.2). The main exceptions were preserved meat, the exports of which reached a peak in 1871, and flour, which only became significant in 1876 but then remained so (Table 8.8).

Four main circumstances lay behind the development of this trade. First, as

Fig. 8.1: Recorded value of exports of Victorian manufactured and processed goods 1866-90. (Source: Vic.SR.)

indicated in Chapter 6, Victoria by dint of its railway building and freight policies was able to build up a considerable export market in southern New South Wales. Although the data are inadequate prior to 1874, it can be estimated that goods valued at about £24,000,000 passed northwards across the Murray River from 1866 through 1890. It is not certain how much of this consisted of locally made products but £4,000,000 might be a fair estimate. Melbourne manufacturers actively fostered this market and representatives of footwear, clothing and saddlery firms had built up strong connections in Riverina towns by the late 1870s.

Fig. 8.2: Main recorded destinations of Victorian manufactured and processed goods 1866-90. It is probable that until the mid-1880s some of the goods consigned via Sydney to Queensland were recorded as exports to New South Wales. (Source: Vic.SR.)

Second, although the system of 'drawbacks' (whereby rebates of import duty could be claimed on goods and materials subsequently exported) had been allowed on a few items by legislation introduced between 1854 and 1862,³⁶ a much wider range of goods was covered by the Drawback Act, 1871 (35 Vic. no. 413) and by an increasing flow of subsequent regulations and interpretations. It is convenient

Table 8.9 Destination of exports of goods manufactured and processed in Victoria, 1866-90^a
(£000)

Destination and description	1866-70	1871-75	1876-80	1881-85	1886-90	Total
New South Wales						
Machinery and agricultural implements	25	98	167	370	198	858
Apparel and slops	16	92	475	874	446	1,903
Furniture	7	24	72	139	63	305
Boots, shoes and saddlery	6	21	146	189	101	463
Flour and biscuits	67	62	479	1,043	1,290	2,941
Butter and cheese	—	21	132	465	82	700
All other	131	190	769	1,098	754	2,942
Queensland						
Machinery	—	4	6	6	49	65
Flour	1	1	38	10	247	297
Butter and cheese	—	2	2	1	65	70
All other	8	21	12	14	184	239
South Australia						
Machinery	4	17	23	39	33	116
Apparel and slops	6	12	44	66	29	157
Cordage	4	8	20	35	3	70
Furniture	12	5	34	18	8	77
Boots and shoes	2	4	37	30	5	78
Refined sugar and molasses	15	30	150	95	122	412
Butter and cheese	1	10	93	138	35	277
All other	38	45	175	247	128	633
Tasmania						
Machinery	5	10	22	33	12	82
Apparel and slops	25	62	127	119	70	403
Furniture	3	2	9	25	18	57
Boots and shoes	—	2	28	24	9	63
Biscuits	2	4	7	14	25	52
Confectionery	3	5	16	23	3	50
Refined sugar and molasses	7	11	28	61	30	137
All other	25	57	134	229	186	631

to leave the discussion of the consequences of this system until later: suffice it to say that, by 1890, drawback of £1,680,000 had been paid on goods valued at £13,800,000, of which £1,994,000 (14.4 per cent) consisted of items like apparel and slops made up from or incorporating imported materials on which duty had been paid.

A third factor was that Victorian producers were able to gain markets in nearby colonies where industrial development was less advanced or based on a different set of resources. During the whole of this period one-quarter of Victoria's manufactured and processed exports went to New Zealand (£3,717,000), South Australia (£1,820,000) and Tasmania (£1,475,000): some idea of the commodities involved is given by Table 8.9. By their very nature, however, these were outlets that tended to melt away as local industry developed or to disappear overnight as a result of governmental or entrepreneurial decisions. A case in point was the formation of the New Zealand Sugar Company in 1883 which opened a refinery at Auckland the following year:³⁷ annual exports across the Tasman of Victorian refined sugar, which had averaged more than £125,000 during the previous decade, dwindled to £73,000 in 1884 and then became insignificant. In this way within a couple of years Victoria, though hardly its businessmen, lost 79 per cent of its market for refined sugar and 57 per cent of its New Zealand trade. On the other side of the coin, however, Victorians were able to take advantage of opportunities that arose from time to time—such as for meat processing equipment in New South Wales in the 1870s, for dairy products in South Australia in the early 1880s, for wine in Great Britain after duties there were adjusted in 1886, and for sugar-milling and mining equipment in Queensland in the late 1880s.³⁸

Fourth, there was the development of a significant trade in leather, flour and preserved meat which together accounted for more than two-fifths of the value of exports during this period. A more detailed review of the canned and frozen meat industries will illustrate some of the problems that faced colonial entrepreneurs trying to open up overseas markets for processed primary products.

In the mid-1860s a number of people in Victoria were experimenting with various methods of preserving meat—including immersion in brine, wrapping in melted fat and packing in tins—to try to solve the problem of making 'the surplus of the one [country] feed the exigencies of the other'.³⁹ From one of these trials emerged, early in 1868, the Melbourne Meat Preserving Company Ltd which was not only the first but also by far the most successful of all the Victorian processing companies. During the next five years another fifteen limited liability companies were registered and attempts were made to float at least half a dozen more (Table 8.10). Although the evidence is confusing because of the rapidity with which the assets of one company were taken over by another, only seven or eight works ever came into production and even then most operated intermittently or for only a few months altogether. Actual production figures are not available⁴⁰ but this burst of activity was reflected in the growth in the export of preserved meat from less than 3 tons in 1866 to 1,471 tons in 1869 and to a peak of 6,563 tons in 1871: from then on a decline set in with minor peaks in 1876 (2,683 tons) and in 1880 (2,643 tons).

Table 8.10 Meat preserving companies registered under the Companies Act in Victoria to 1890

Defunct Company pkt no.	Registered name	Date of registration	Initial authorised capital (£)	Initial organisation of shares	Date of resolution to wind up
123	Melbourne Meat Preserving Company Ltd	17/2/68	50,000	10,000 × £5	5/4/86
168	Lake Boga Fish, Game, and Meat Preserving Company Ltd	16/9/69	1,000	2,000 × 10/-	22/4/70
170	Warrnabool Meat Preserving Company Ltd	21/9/69	20,000	4,000 × £5	7/12/71
171	Echuca Meat Preserving Company Ltd	23/9/69	10,000	2,000 × £5	28/11/72
174	Australia Felix Meat Preserving Company Ltd	27/10/69	6,000	1,200 × £5	5/6/71
183	Australian Meat Preserving Company Ltd	8/2/70	10,000	2,000 × £5	19/10/71
187	Victoria Meat Preserving Company Ltd ^a	8/4/70	50,000	10,000 × £5	20/10/71
192	Ballarat Meat Preserving Company Ltd	30/7/70	20,000	4,000 × £5	?
200	Port Phillip Meat Preserving Company Ltd	1/11/70	2,000	1,000 × £5	?
210	Colac Meat Preserving Company Ltd	2/2/71	12,000	2,400 × £5	8/2/72
217	Riverine Meat-Preserving Company (Echuca) Ltd	15/5/71	20,000	4,000 × £5	22/12/74
218	United Meat Curing and Preserving Company Ltd	1/6/71	2,000	2,000 × £1	10/6/72
225	Geelong Meat-preserving Company Ltd	10/11/71	15,000	600 × £25	29/7/74
237	Australia Meat-Preserving Company, Melbourne, Ltd	5/3/72	20,000	40 × £500	22/1/75
244	Western Meat Preserving Company Ltd	3/5/72	10,000	20 × £500	1/3/06
247	Victorian Meat-preserving Company Ltd	3/6/72	20,000	200 × £100	?

^a Dr K. T. H. Farrer (personal communication) has suggested that this company took over the plant and premises of a private venture which came into operation in 1867.

Sources: VAO, Defunct Company Papers; VGG.

By the end of this latter year a total of 36,490 tons of preserved—mainly canned—meat worth over £2,000,000 had been sent out of Victoria—95.1 per cent by weight and 93.5 per cent by value being consigned to Great Britain.

A variety of factors explain this rapid rise and subsequent decline. The scandals during the 1840s associated with the preservation of meat in Britain and Europe for the British Admiralty had made people suspicious of canned foods for a decade or more; this scare was just dying down when there was a severe epidemic (1863–7) of cattle plague in Britain which, along with the mass slaughterings under the Cattle Diseases Prevention Act, 1866, raised the price of fresh meat and stimulated a search for cheap substitutes. Meanwhile in Victoria there was a growing surplus of livestock (especially during drouthy seasons) which was further increased when the railway reached Echuca in 1864 thus facilitating the movement of Riverina stock to the Melbourne saleyards. Gloomy predictions that 'tinned meat will always sell but never pay' started to give way to greater enthusiasm when the *Times* responded to the first trial shipments with the comment that 'this meat is wanted by the ship-load and not in a few tins as curiosities'.

By the end of 1870 no fewer than nine companies had been registered under the Companies Act, 1864; most began investing in plant and machinery prematurely and found themselves running before they had learned to walk (the Australian Meat Preserving Company Ltd, with an authorised capital of £10,000, spent £9,925 on land, plant and buildings within twelve months of registration by which time it had been able to raise only £7,695 from shareholders). Moreover, although the whole science and technology of meat preserving on a commercial scale was still in its infancy, there was no time to undertake proper research, make trial shipments or test the market. Failures were inevitable. One company came to grief because the tins supplied by a contractor were defective and two others discovered that their system of rolling meat and packing it in tallow or melted fat in casks and tin-lined boxes was unacceptable to English butchers although 'used a good deal for charity meals and soup kitchens'.⁴¹

To make matters worse only a few pastoralists showed much enthusiasm for the meat preserving companies whose activities were seen by many as a glorified form of boiling down. But, in any case, no sooner were the companies floated than circumstances changed. A drouthy period came to an end in the latter part of 1870 and wool prices rose sharply in 1872 and 1873. For these reasons, to say nothing of the increased demand brought about by the activities of the preserving companies themselves, the average price paid by the preserving companies for sheep (calculated from their balance sheets) rose from 6/- per head in 1868 to 7/3d in 1870, 8/8d in 1871, 9/- in 1872 and 13/3d in 1873, even though only the poorer stock was being sent off the stations in Victoria and more emaciated mobs were being sent longer distances through western New South Wales to the railhead at Echuca. These changes were of critical importance because prior to 1872 the more efficient works had been able to recover between 80 and 90 per cent of the cost of the sheep by the sale of the tallow, skins and bones—it was in fact the lower proportional yield of these by-products that made beef canning less worthwhile. But during 1872

Plate 7: In 1868 The Melbourne Meat Preserving Company Ltd converted a dilapidated boiling down works beside the Saltwater River at Maribyrnong into a cannery able to process 3,000 sheep and 50 oxen each week. The house behind had been converted into a dormitory for some of the 250 or so employees. (*Illustrated Australian News*, 12 September 1868.)

and 1873 the higher price of sheep and the smaller yield of tallow meant that a much lower proportion of the purchase price could be recouped in this way.

Adding to the difficulties of the Victorian companies was the reduction in the military use of canned meat in Europe following the ending of the Franco-Prussian War in 1871 and the marked fall in the demand for imported meat in Great Britain after 1872. Prices fell (the London invoice price averaged about 6.1d per lb in 1869 and 4.6d in 1872) and consignments took longer to sell, but the directors of several companies disguised the real state of affairs by over-valuing the produce shipped or on hand, thus making the half-yearly balance sheets seem less unpalatable to the shareholders. In mid-1873, for instance, the balance sheet of the Riverine Meat-Preserving Company showed a profit of £39 on the half-year's operations but six months later the directors admitted that this was only because the value of unsold tallow and meat had been overestimated by £2,950. And, by the time the British market recovered in 1875-6, pressed beef in square tins from the meat-packing companies of Chicago had been accepted in Britain as a more palatable food than cans of boiled mutton from Australia (which one woman remembered as containing 'a large lump of coarse-grained lean meat inclined to separate into coarse fibres, a large lump of unpleasant looking fat on one side of it—and an irregular hollow partly filled with watery fluid').⁴² For the few remaining, struggling companies, which used a considerable number of Riverina stock, another blow came in August 1877 when (under 41 Vic. no. 593) an import duty was imposed on sheep of 9d—reduced in October 1878 (under 42 Vic. no. 624) to 6d—per head. By this time, in any case, the writing was on the wall for meat preserving as a large-scale industry in the colony when the S.S. *Paraguay* conveyed frozen meat from Argentina to France in 1877-8.

The Australian colonies quickly saw both the threat implied and the opportunity given by this new development, and the S.S. *Strathleven* was fitted out and sent to London with consignments of frozen meat and butter from the eastern colonies (see Chapter 11). When news reached Melbourne early in February 1880 that this voyage had been successful, the Australian Frozen Meat Export Company Ltd was formed and registered (19 May 1880). It came to an arrangement with the Melbourne Meat Preserving Company to set up refrigerating plant at the Maribyrnong works, fitted up S.S. *Protos*, and dispatched its first consignment to London on 18 November. The good prices received for this shipment turned out to be beginner's luck—London happened to be cut off from its normal supplies by bad weather—because about half the shipments made prior to the transfer of operations to a new works at Newport (less than 3 miles from the wharf at Williamstown) early in 1883 deteriorated during the voyage. The surprising thing is that the failure rate was no greater considering that the Maribyrnong works had been built a dozen years previously as a cannery; that the frozen carcasses had to be conveyed 10 miles or so by rail to the wharf in the cool of the night because at the end of 1882 there were only four refrigerated vans on the entire Victorian railway system; that the meat then had to be manhandled and lightered out to vessels anchored in the Bay; and that, although the actual refrigerating machinery appears to have worked

well on all trips, the best way to convert the holds of the half dozen ships involved and to stow the meat could only be discovered by a process of trial and error. When operations were moved to Newport the subscribed capital totalled £45,000 most of which had been invested (£16,000 in the new works alone), spent (e.g. on fitting out at least two vessels), or lost in profitless voyages. But although the shift to Newport overcame the technical difficulties—the time taken to move carcasses from refrigerated store to ship's hold was reduced from ten hours to one—the company became trapped in others. No sooner had additional capital been raised and a two-year contract signed with the Orient Company to ship 5,000 carcasses a month at 2d per lb, than the cost of good quality sheep began to rise (because of droughty conditions) and the price obtained on the English market started to fall. In the six months to 30 September 1884 only two out of ten shipments made a profit and the company thus lost an average of 2/3d on every carcass delivered; yet, if operations had been suspended before the expiry of the shipping contract, compensation of about £4,500 would have been owed to the Orient Company. One solution seemed to be a reduction in freight costs and, after some none too gentle hints that business might have to be transferred to the rival Peninsular and Oriental Company, the rate was lowered at the beginning of 1885 to 1½d per lb. But the London price continued to fall, the losses continued, and the overdraft grew. When the shipping company refused to take part in a suggested arrangement by which it would cut freight rates still further but share in any profits, the shareholders on 30 November 1885 had no alternative but to agree to a cessation of operations and the realisation of what remained of the assets—as it turned out, 8/4d per £100 share.⁴³

Meanwhile the Melbourne Meat Preserving Company staggered along with its directors at each half-yearly meeting explaining away small profits or small losses and raising hopes for future prospects. But there always seemed to be some obstacle—the high cost and poor quality of sheep, the low prices in London for tallow and meat, a sudden market resistance to the largest pack (6 lb) and competition from frozen meat. Some expansion in local sales of tinned mutton just kept the works ticking over but during 1885 £23,000 worth of debentures became due, maintenance work could no longer be postponed and the company drifted further into debt. On 5 April 1886 the shareholders resolved that the company should be wound up and any assets realised—a process, however, that took longer than anticipated.⁴⁴

To all intents and purposes the cessation of operations by the Melbourne Meat Preserving Company and the Australian Frozen Meat Export Company marked the end of the first attempts in Victoria to ship meat half way round the world although one, possibly two, firms continued to ship small quantities for a few more years. But whereas 36,500 tons of preserved, mainly canned, meat had been exported by the end of 1880, the next ten years saw only 7,300 tons of canned meat and 8,200 tons of frozen mutton pass over the wharves. Apart from illustrating the precarious nature of the export markets, this episode illustrates three other facets of industrial development at this time.

First, the downfall of the score of companies involved really came about not because of the lack of risk capital *per se* but because the amount available was not sufficient to achieve the technological and infrastructural leaps required and still leave enough for day to day operations and to cope with contingencies and market vagaries. The real point is that these firms were among the pioneers—even in world terms—of food preservation on a commercial scale and, at the same time, they also had to become innovators in related fields such as aspects of transport technology and materials handling. From September 1868 until the end of February 1882 the Melbourne Meat Preserving Company alone processed 2,232,000 sheep and 16,000 cattle from which it produced 25,400 tons of preserved meat packed in about 9,500,000 tins, and 15,400 tons of tallow. Although the Chicago meat-packing works operated on a larger scale, they were not in all respects more efficient: thus the Melbourne company adopted the more successful American system of packing in square tins in 1878 but beat the originators at their own game by developing machinery that could fill them twenty-four times more quickly. While the Australian Frozen Meat Export Company had a smaller throughput—it slaughtered only about 220,000 sheep in six years—it became involved in the design, building, operation and maintenance of refrigerated stores, railway vans and ships' holds, along with applied research into the behaviour of everything from micro-organisms to the newfangled electric lighting system under these low temperature conditions.

Second, the scale on which these companies operated, even including the more amateurish ones, and the stimulus given to other parts of the economy, should not be lightly dismissed. It can be estimated that altogether the meat processing and freezing companies had slaughtered about 4,500,000 sheep and 20,000 cattle by the end of 1890 and produced perhaps 58,000 tons of meat and 30,000 tons of tallow. It is difficult to say what this meant in employment or financial terms because some of the critical balance sheets of the companies involved are not now available or, in other cases, must be regarded with scepticism. The most complete details are those for the Melbourne Meat Preserving Company which, at the end of February 1882, claimed to have produced by then £815,000 worth of preserved meat and £519,000 worth of tallow. Apart from the demand placed upon shipping companies and the Railway Department for the movement of livestock, tinsplate and produce, the company also provided direct employment for a variety of other trades. It had a small army of tinsmiths on the premises manufacturing the thousands of containers required, operated a farm to produce vegetables for flavourings, and had established a village complete with shops and a school to house its 250 to 300 employees and their families.⁴⁵ In addition there were some important stimuli given to other industries not because they were particularly valuable but because they pushed firms into attempting types of work in which they had had little previous experience. The construction of cookers, digesters and can-making equipment gave local firms useful experience which they were able to turn to good account when bidding for similar contracts in other colonies. A few years later Melbourne engineering companies increased their expertise still further when they made some half dozen or so sets of meat freezing equipment.

Third, although the spatial aspects of industrial activity are discussed in more detail in Chapter 9, the point can be made here that most of the meat processing took place in and around Melbourne. At various times plants were set up in the vicinity of Ballarat, Warrnambool, Colac, Echuca and Geelong but they appear to have gained no more support from the pastoralists than those in Melbourne, and any advantages to be gained from being able to buy livestock in fresher and fatter condition were offset by the expense of transporting tins to the works and preserved meat and tallow to the wharves at Melbourne.

Tariffs

The clamour for protection spread during the late 1850s but was not immediately reflected in tariff legislation. By the mid-1860s, however, it had become expedient to reduce the import duty on some items like tea and sugar (and the export duty on gold), and the need to make up the loss in revenue provided the excuse or, depending on a point of view, the opportunity to start introducing a broader schedule of duties. The importance of the 1866 legislation (29 Vic. no. 293) was not the level of the imposts *per se*, for it was not particularly high, but the manifest adoption of the principle of protection as a means of fostering local industry. There is little point, and inadequate space, to review the interminable dreary debates, the scores of proselytising pamphlets, and the formidable journalistic joustings stimulated in and beyond the colony by the free trade versus protection controversy.⁴⁶ The discussion here is concerned essentially with the effect of the tariff on the development of secondary industry in the colony. Before proceeding with this analysis, however, it is necessary to make a brief review of the tariff legislation and its relationship with government financial policy and then to make some observations on the 'level' of the tariff.

Revenue and protective tariffs

The ordinary revenue available to the government came from four main sources: (i) railway, water supply, post office and telegraphic earnings; (ii) land sales, rents and fees; (iii) customs and excise duties and wharfage rates; and (iv) various other miscellaneous charges. Excluding the income from the first group, which was largely committed to operating costs and interest payments, and from a spasmodic item 'loans recouped', the relative importance of these other revenue sources is indicated in Fig. 8.3(a).⁴⁷ Clearly, the contributions from land sales, rents and fees were declining and, although this was to some extent offset by a rise in excise duties (including estate duty from 1872-3 and land taxes from 1877-8) and other miscellaneous fees and payments, the main alternative source available for manipulation by the government was customs duties. The contributions to net revenue from several of the commodities named in Fig. 8.3(b)—which had all been subject to duties in the 1850s and early 1860s—decreased relatively during the 1870s as did the total from all of them taken together. Adjustments to the duties on tobacco in 1880-1 and spirits in 1883-4 then temporarily arrested this relative decline but, even

three years later, the proportional contribution had only returned to the 1877–8 level. Meanwhile actual income decreased to £819,000 in 1879–80 (the lowest return from this original group of commodities in any financial year during the 1870s and 1880s) and then rose again to £1,436,000 in 1888–9.

Fig. 8.3: Graph (a) shows the percentage contribution to net colonial government revenue (i.e. total revenue minus earnings from utilities and interest payments and loans recouped) from other main sources in Victoria. Graph (b) indicates the percentage contribution to net revenue disaggregated by commodities. Graph (c) sets out the actual revenue from customs duties. Data are for calendar years 1866 to 1870, for the six months to 30 June 1871, and subsequently for years ending 30 June. (Source: annual 'Treasurer's Statement'.)

The 1866 legislation, which came into effect on 12 April, confirmed that a wider range of 'new' commodities were to be dutiable on the basis of quantity, volume or value. But before many months had passed fresh legislation (31 Vic. no. 306), mostly coming into effect on 6 February 1867, imposed duties on nearly all imports except raw materials with the result that the contribution of these 'new' duties to net revenue increased from 6.2 per cent in 1866 to 18.7 per cent in 1869 while the actual revenue they generated grew from £141,000 to £475,000 (Fig. 8.3).

Then, briefly, the relative and absolute importance of the 'new' duties declined until boosted by further legislation in 1871 (35 Vic. no. 400) which was at once more elaborate and more arbitrary. The two schedules concerned raised the specific duty on some items and lifted the ad valorem duties to 20 per cent on most clothing,

footwear, furniture and metal goods. When introducing these measures to the Legislative Assembly on 1 August, the Treasurer explained that

generally—to describe the principle which guided me in making the division into 10 and 20 per cent. duties—that among the articles included in the 20 per cent. list are all those manufactures which are finished, or in a forward state, for actual use, whereas the 10 per cent. list consists mainly either of progress manufactures—or manufactures upon which a further amount of human labour will have to be employed—or they are items suitable for revenue.

The effect was to increase the contribution of these 'new' duties to consolidated revenue to 23.6 per cent by 1872-3 while raising the actual revenue generated from £390,000 in 1870 to £659,000 in 1873-4.

Then this source of income again declined, relatively after 1872-3 and absolutely after 1873-4, despite some further shufflings of the schedules, so that by 1878-9 these 'new' duties made up only 16.5 per cent of the net revenue and generated only £484,000—the lowest figures in any year during the 1870s and 1880s. This may go a long way to explaining the harsh nature of the changes (43 Vic. no. 646) that came into effect in stages between July and October 1879. In summary, these increased the duty on most items in the 20 per cent category to 25 per cent, reclassified others from 10 to 20 per cent, increased some specific duties and added more items to the dutiable list. These measures helped to raise the contribution to net revenue to 25.1 per cent by 1886-7 and to boost the actual income from these 'new' duties to £758,000 in 1881-2 and to £916,000 in 1886-7.

In the mid-1880s several industries made special pleas to the government and some did not fall on deaf ears: thus, in July 1886 (by 50 Vic. no. 882) the duties on woollen piece goods and woollen apparel were raised and the imposts on galvanised machine-made wire netting and cream separators were removed altogether; and a year later (by 51 Vic. no. 918) the duty on beet sugar was raised but provision was made for cane sugar refined under bond to be charged at a reduced rate. None of these adjustments was designed primarily to generate additional revenue (indeed the changes to the sugar duties brought about a reduction): the simultaneous upsurge in the amount of duty collected (£1,389,000 in 1888-9) resulted almost entirely from an increased volume of imports.

The last set of alterations during this period came into effect towards the end of 1889 (53 Vic. no. 1019). These reduced or eliminated duties on some semi-processed materials and on metal goods not made locally to any great extent but, at the same time, raised still further the duties on other metal products and woollen apparel, on woollen piece goods and on boots and shoes. It is difficult to explain these changes from a financial point of view because income from all customs duties in 1888-9 made up three-fifths of net revenue, or more than ever before. They may have been an honest if misguided attempt to implement, albeit in a watered-down way, some of the findings of the 1881-3 Royal Commission on the Tariff (see later) and to ameliorate some of the problems affecting secondary

industry which had emerged in the meantime. Their main effect, however, was to compound some of the difficulties that came to a head during the 1890s.

So far the analysis has concentrated on the revenue side of the government's finances for two reasons. First, the forthcoming discussion of the tariff system has to be seen in the light of the fact that customs duties provided a significant proportion of the disposable income available to successive Ministries, whatever shades of opinion they held collectively or individually, so that there were very real short-run restraints on their freedom of action. Second, it is becoming conventional to espouse the view that all major tariff increases in Victoria—apart from those of 1889 which are difficult to explain satisfactorily—occurred in a time of budgetary deficit.⁴⁸ This indeed appears to be so, although Patterson's reinforcement of this view has been criticised because of its somewhat isolated treatment of year to year budget surpluses and deficits and its neglect of the broader aspects of public finance.⁴⁹ Nonetheless it seems injudicious to argue from this that Victorian Ministries were more concerned with facing fiscal realities than promoting protectionist causes. It can be demonstrated, as in Fig. 8.3(a), that the proportion of the government's net revenue (that is, excluding income from the railways and other services, and from loans recouped) derived from all customs duties declined from 58.5 per cent in 1872–3 to 46.1 per cent in 1878–9 and then gradually crept back again to 59.3 per cent in 1888–9. Apart from anything else, if tariffs were reducing the flow of some imports, as was so in the case of boots and shoes during the 1870s, duties would have had to have been raised from time to time simply to maintain the same flow of revenue. It is difficult to be sure just how financial considerations did affect decisions about the level of the tariff and, more especially, the detailed structuring of the schedules: as the Board of Inquiry into the Fiscal System commented in 1895 (Second Report, p. xiii),

A large number of the duties are partly fiscal and partly protective. Some duties levied for purely fiscal purposes have fostered home manufacture, and so become protective; whilst others levied for protective purposes have failed in their object and become purely fiscal. The difficulties of classification are enhanced by the fact that the principles that guided the Legislature in making the Tariff are now somewhat obscured.

The same could have been said any time after October 1879.

The level of the tariff

Imports into Victoria were basically of three kinds. First, there were raw materials (coal, pig iron, lead), products (tea, opium, oils), and manufactured items (watches, silk, jute woolpacks) which were not available or not made locally. Second, there were commodities, like wines and spirits, that did not compete significantly with local industries although it is difficult to draw a clear line between this and the third category consisting of imports that clearly did. This imprecision partly arises because the import statistics were not classified in sufficient detail. But it also arises because of the difficulty of distinguishing between the real potential of some

industries and the pipedreams of entrepreneurs who tended to overlook the limitations imposed by the small size of the local market for some products (e.g. machine tools), the technical difficulties involved in making the complete range of some items (e.g. cast and wrought iron pipes), and the restrictions brought about by the scarcity of mineral resources in Victoria. For present purposes, despite such qualifications, any items which *may* have competed with actual or potential local enterprise have been allocated to this third category along with more obvious ones like agricultural machinery, steam engines, woollen piece goods, apparel and slops, blankets and boots and shoes. On this basis, in 1870 about 42 per cent of the value of retained imports (excluding gold, silver, wool and livestock) were in this third category compared with 31 per cent in 1880 and 29 per cent in 1890. In short, taking the period as a whole, only about one-third of the imports intended for local consumption were, by any stretch of the imagination, directly or indirectly (because of their possible substitutability) competitive with local industry.

The items in this third category paid an average duty of 9.1 per cent *ad valorem* in 1870, 16.0 per cent in 1880 and 22.8 per cent in 1890.⁵⁰ This latter figure counters the widely held view that by the end of the 1880s a high level of protection had been granted to local industry. Only a limited number of commodities (some apparel and slops, furniture and upholstery, some machinery and metal products, and brass and tinware) were subject to the highest *ad valorem* rate of 35 per cent, a level that was exceeded (after conversion in current values) by few specific rates applicable in 1890, such as manufactured tobacco (196 per cent), cigars and cigarettes (66 per cent), cast iron pipes (62 per cent) and jams and preserves (51 per cent). By their nature the incidence of specific duties varied with the valuation placed on the commodities concerned but throughout this period most were not particularly high in *ad valorem* terms. Thus, bottled beer (charged 6d per gallon up to 1 August 1871 and 9d thereafter) paid between 11 and 17 per cent; refined cane sugar (3/- per hundredweight) paid between 9 and 13 per cent; and confectionery (at various times charged 1d, 1½d and 2d per lb) paid between 9 and 19 per cent. Moreover, the occasional change from an *ad valorem* to a specific rate did not necessarily mean, as some writers have implied, an increase in duty. In the case of men's shoes, for instance, the 20 per cent duty was changed on 28 August 1874 to a specific rate of 25/- per dozen pairs or the equivalent of only about 15 per cent; what seems like a further increase on 30 July 1879 to 33/- per dozen pairs in fact merely restored the rate to the equivalent of about 20 per cent.

These comments have a special significance because it is clear that in Victoria specific duties were not widely used as a means of imposing rates significantly above the *ad valorem* duties as was often the case elsewhere. In general, the Victorian duties were considerably lower than those in other countries where imposts of up to 100 per cent or more on particular commodities were not uncommon. Some of these high rates had come about because of an appreciation of the distinction between 'nominal' and 'effective' protection as in the case of the woollen and worsted industries in the United States. There, when a duty was imposed on wool, a 'compensating' duty was placed on woollens so that the higher

cost of the raw material would not disadvantage local manufacturers; over and above this came the protective duty proper, which incidentally rose from 35 per cent in 1867 to 40 per cent in 1883, to 50 per cent in 1890, and to 55 per cent in 1897.⁵¹ There is little evidence that assessments of this kind played much part in the structuring of the customs schedules in Victoria. Few of the 548 witnesses who gave evidence in 1881-3 before the Royal Commission on the Tariff (the only public inquiry into the subject during this period) made much effort to quantify, even in an elementary way, their real or imagined problems. And in any case though the Commission tried to distil some sensible conclusions from this mass of imprecise and unsubstantiated evidence, 'the government snubbed the [Royal Commission], did not attempt the herculean and probably suicidal task of systematizing the tariff and eliminating anomalies, and left it alone as much as possible'.⁵²

The tariff and manufacturing

It is doubtful whether the effects of the tariff can ever be satisfactorily unscrambled from the wide variety of financial, technological, commercial and social factors which also helped to mould the course of manufacturing during this period. While it may be possible to detect 'rough coincidences' between the imposition of major tariff increases and upward irregularities in the total number of factory hands this is an over-simplified relationship because it is impossible to disentangle cyclical and structural changes.⁵³ It also suggests that the tariff system was generally beneficial to manufacturing whereas it will be argued here that from 1879 any gains on the roundabouts were probably lost on the swings. Some of the complexities of the issues involved can be illustrated by examining the ways in which the customs schedules affected manufacturing in relation to the procurement of materials, the introduction of new industries and innovations, and the maintenance of export markets. These discussions prepare the ground for the more general assessment of the tariff system which then follows.

The procurement of materials. Most fuels and basic raw materials like iron were admitted free of duty throughout this period, a policy that reflected the colony's poor endowment of these resources. However some unprocessed materials were dutiable and the amount paid did not always reflect the true extent of the additional burden. Only rarely, for instance, did the system make allowances for impurities in the raw material: thus, prior to its gazettal as a bonded warehouse on 23 July 1860, the Victoria Sugar Company was handing the government 6/- to 9/- per ton for the doubtful privilege of importing the sand and clay which made up 5 to 8 per cent of the unrefined sugar. The duty on unmanufactured tobacco, charged on a weight basis, did not distinguish between stemmed and unstemmed leaves and made no allowance for the moisture absorbed during shipment and warehousing before being assessed for duty: even the stems were wasted because snuff was not being made in any quantity in Victoria at this time. The tax on each head of livestock imported from 17 August 1877 was imposed at a time when sheep prices were high while the carcass quality was, for a variety of reasons, poor; the six-monthly reports of the Melbourne Meat Preserving Company Ltd contain

evidence suggesting that the tax, nominally about 6 or 7 per cent ad valorem, amounted in real terms to an impost of some 15 per cent because of the low yields of meat and tallow compared with those of a few years previously. Nor did the schedules take account of wastage during processing: the increase of the duty on undressed hardwood from 9d to 1/- per 100 super feet (a curious levy, in any case, because local supplies of some indigenous timbers, such as red gum, were becoming scarce) raised the effective burden from 12 to about 21 per cent in ad valorem terms since one-quarter by volume was completely 'wasted' in the sawmill and about half could only be sold as 'marketable' waste in the form, for instance, of slabbing. With the possible exception of wool, local manufacturers had few raw material advantages over foreign competitors. Seemingly abundant supplies of a material did not always prove such a boon as might be imagined. Thus, although tallow production greatly increased in the 1870s, largely because of the activities of the meat preserving companies, its price in Melbourne was determined by that ruling on the London market less the cost of freight. As the Tariff Commission was told, the £7 or £8 saved in shipping charges did not represent anything like the advantage gained by higher quality candle manufacturers because they could only use the stearine which made up barely half the weight of the tallow; the other products, oleic acid and glycerine, were not in great demand in the colony and most had to be shipped to England to bring any return at all. The Apollo Stearine Candle Company Ltd was more fortunate than most because during 1877 it started to supply glycerine to the Australian Lithofracteur Company (Krebs Patent) Ltd which had started to make explosives at a site 10 miles west of Melbourne the previous year.

Nor did the Victorian footwear manufacturers, several of whom also operated tanneries, benefit greatly from the availability of cattle hides and the economies of scale brought about by the demand for leather in Great Britain (Table 8.9). Although there may have been some advantage in the case of work boots and heavy shoes for which hides and split-hides were used for both soles and uppers, this was not true of women's and children's footwear and the lighter types of men's shoes which needed calf leather for the soles and uppers. The government, presumably having noted that large quantities of duty free calf and kid leather were being imported each year, imposed a 7½ per cent ad valorem duty on these commodities from 4 September 1879. If this was indeed intended as a protectionist duty it seems to have failed completely for no evidence has been found to suggest that there was any increase in the quality or quantity of the local product, whereas the volume imported for home consumption showed moderate growth from an annual average of 135 tons (valued at £65,200) in 1880-3 (the earliest years for which data are available) to 155 tons (£84,500) in 1855-8. It is, of course, hardly surprising that little resulted from this duty: as the Manufacturing Bootmakers' Association pointed out to the Tariff Commission in 1882,

Old countries, such as England and America, where tanning has advanced to a high stage of perfection, have to depend in a great measure for the supply of the better class of leather, on France and

Germany. Therefore this young community cannot expect to equal those countries, especially as we are deficient in the raw material, viz., calf-skins.

The association could also have pointed to the fact that in Europe animals were specially reared for the tanning trade, with great care being taken to protect their hides or skins during life and after death; in Victoria the animals were at the mercy of the stockman's whip, the station's branding iron, and the slaughterman's knife, all of which literally left their mark—to the misery of both beast and bootmaker. If, on the other hand, this duty was seen as an easy way of generating revenue, it was ill-considered because it did irreparable harm to the local footwear industry (see later) before being rescinded on 1 January 1890.

These are only some of the examples that cast doubt on the assertion that the customs duties were partly structured to promote the colony's basic industrial resources either by encouraging the development of raw materials or by enlarging on a sound footing the range, quantity and quality of semi-processed materials. In reality, no level of duty would have overcome many of the technical, entrepreneurial and financial problems that for a variety of reasons made it impossible for local producers of leather, woollens, paper, glass, chemicals and so on to supply more than a few of the grades, styles and qualities used by other industries whose requirements were, in any event, liable to change. Such a case occurred during the mid-1870s when high-speed newspaper presses, using continuous rolls of paper, were introduced in Melbourne. Ramsden's mill had been the only local source of newsprint since it opened in 1868 but his machinery was 'not equal to the production of the continuous web' so that newspaper proprietors again had to import most of their requirements (especially from North America where wood grinding and later pulping machines driven by water-power were changing the economics and technology of paper-making); Ramsden himself had to fall back on his 'staples of brown paper and rougher sorts' made from the rags and refuse of Melbourne.

One of the great problems, not to say weaknesses, of the customs schedules was the way in which duties imposed to support some industries adversely affected others. The concern here is with inter-relations between manufacturing industries. (It should not be overlooked, however, that other sectors of the economy were also affected in various ways: on 16 September 1874, for instance, the Mining Board of Ballarat petitioned the Legislative Assembly against the tariff on the grounds that each miner had to pay an additional 13/- a year for candles alone.) The carriage-makers felt themselves to be particularly hard hit because nearly everything they needed—spokes, felloes, rims, hubs, springs, axles, bolts, nuts, leather, cloth and paint, to name only a few—had to be imported and was subject to duty. This situation usually arose because the whole of a commodity group was made dutiable when only a limited range of the products could be manufactured locally. The clothing industry was hampered, for instance, by the duty placed on most woollen piece goods even though the local mills could produce only a very limited range of cloths. Another illustration, and one that leaves little room for argument about the

possible effects of substitutability, was the *ad valorem* tariff placed on all types of steam engines irrespective of size or purpose. By the 1880s portable engines of up to about 8 horse-power, such as used for threshing, were being made in Europe and North America on a mass production basis so that, despite the tariff and the cost of freight, it was impossible for local firms to compete. The story with larger, fixed engines was different as these were usually custom-built with fittings to suit the particular mill or crushing plant concerned, thus reducing the economies of scale and giving the advantage to a firm able to make, instal and maintain them. Either the duty on portable engines should have been much higher or it should not have been imposed at all, since the 20 per cent impost on imported engines during the 1870s, raised to 25 per cent during the 1880s, simply inflated the price of, and presumably restricted the market for, farm machinery and thus made it even more difficult for local firms to begin competing against imports. In effect, so far as portable engines were concerned, it was nothing more nor less than a revenue duty, as became explicit in September 1889 when the duty on fixed engines was raised to 35 per cent whereas that on portable ones was left unchanged at 25 per cent, despite a recommendation by the Tariff Commission that it should be lowered.

The lack of discrimination in the customs schedules themselves and the singular lack of comprehensive arguments for particular adjustments made during legislative debates or in surviving archival material leaves the impression that duties were manipulated without very much understanding of the nature of industrial development or any real appreciation of the economic and technical realities and relationships involved.

The way in which the boot and shoe industry was affected by the customs schedules illustrates this point. The second half of the 1870s saw local footwear manufacturers—on the strength of a tariff equivalent to about 15 per cent *ad valorem* on boots and shoes and duty free imports of upper leather—capturing the home market for all but the high quality lines. The volume of all types of imported footwear entered for home consumption declined from 692,000 pairs in 1876 (the first year in which the quantity is unequivocally stated) to 332,000 pairs in 1880 [Fig. 8.4(a)]. Paralleling this was both a recorded increase of 59 boot and shoe factories (to 105) during the five years to 31 March 1881 and of 1,868 employees (to 3,919), and a growth in locally made exports from 58,000 pairs in 1876 to 157,000 pairs in 1880. The significant thing is that these advances had been made before the tariff alterations in September 1879 could have had much effect. One of these changes was, as indicated already, the imposition of a $7\frac{1}{2}$ per cent duty on calf and kid leather; another was the increase—by the equivalent of about 5 per cent *ad valorem*—in the duty on all types of footwear except infants' shoes (which were made duty free).

The duty on calf and kid increased raw material costs more than proportionately because the manufacturers had to pay duty on the whole skin even though they could use only two-thirds of it. (In Europe the scraps from footwear factories were sold to other trades: there was no similar market in Victoria.) In real terms the duty was said to have added from 3d to 7d to the cost of a pair of shoes depending on

Fig. 8.4: Graph (a) indicates the quantity of footwear imported and entered for home consumption in Victoria. Graph (b) sets out the average recorded entry value per pair for main types of footwear. Graph (c) compares the average value per pair of all types of footwear (exports are not available by individual types) imported, re-exported and exported. Alterations to duties on footwear became effective on 18 September 1874, 30 July 1879 and 31 July 1889. (Source: Vic.SR.)

quality. If such evidence can be accepted, and it apparently was by the Tariff Commissioners, even the heightened duties on competitive lines of footwear, ranging from about 11d to 2/9d per pair, represented a much less effective rate of protection than might be supposed. Three important consequences flowed from this situation. First, the increase in duties encouraged some bootmakers to set up as manufacturers on their own account: this was not difficult since the costs of entering this industry were extremely low, with the value of plant and equipment in 1880 averaging only £10 per worker and £380 per factory. Second, it led to a good deal of wasteful competition, as the Tariff Commission learned. For some firms this meant failure because 'they were tempted to go into things beyond them', and for most it meant an increase in overheads since 'as many as ten or twelve travellers [visit] the same small township upon the same day [with] perhaps only two stores in the township'. The truth of the matter really was that the local manufacturers had already captured all they were likely to of the Victorian market and the only prospect of increasing sales lay in lifting exports, especially to southern New South Wales. In fact, however, external sales dwindled during the 1880s: there were a number of reasons for this, the discussion of which will be deferred except to say that much of the blame can be sheeted home to the customs schedules in general and to those of 1879 in particular. Third, the boot and shoe manufacturers, finding themselves squeezed between rising costs and diminishing markets, were hardly in the mood and probably in no position to cope with the strengthening demands

of the operatives which, as discussed later, culminated in a dispute that lasted from 17 November 1884 to 16 February 1885 and added further to their difficulties. This was all the more unfortunate since in Great Britain, the source of most of the imports, the changeover to mechanised factory methods of producing footwear was almost complete and this, together with an easing in ocean freight rates, meant that the landed cost of most lines of imported boots and shoes declined after 1883, as can be seen from Fig. 8.4(c). The mechanisation of Victorian factories was some years behind and, in any case, was being further retarded by the duty on virtually all the machinery they required (except sewing machines) even though newer overseas inventions like heeling and edge-paring machines could not be economically made in the colony.

The result of all these interacting factors was that the local boot and shoe industry lost ground during the 1880s. Imports climbed to a new peak of 708,000 pairs in 1888 while exports the following year fell to 45,000 pairs, the lowest number since 1875. While not all the blame for these events can be attributed directly to the alterations in the customs schedules in September 1879, a good deal of it probably can. By raising costs, by making it impossible to enlarge or even hold external markets, and by forcing manufacturers to resist the demands of the operatives, the 1879 alterations initiated a train of events that meant another propping-up exercise had to be faced by those responsible for framing the adjustments to the customs schedules in 1889. The irony is that kid, calf kid, mock kid and patent calf leather became duty free on 1 January 1890 but by then the damage had been done.

New industries and innovations. A major criticism that can be made about the Victorian customs schedules is that, with some exceptions, they failed to encourage—and sometimes even discouraged—the introduction of new industries and innovations in manufacturing processes. Indeed one of the more curious aspects is the way that increasingly high rates of duty were placed on virtually all types of machinery, apparatus and instruments; yet it must have been only too obvious that because of the small market, the skills available, and patent restrictions, few of the machines and devices pouring out of Europe and North America could ever be made in Victoria except at prohibitive cost. But the only significant items of machinery (though not the engines to run them) exempted from duty for some or all of this period were those used for sewing, carding, spinning, weaving, printing and paper-making. In effect, then, the customs schedules placed a tax on entrepreneurs striving to keep abreast of developments overseas—a policy that was not only short-sighted but also greatly resented as the evidence given to the Royal Commission on the Tariff (from miners and farmers as well as manufacturers) makes clear. This resulted partly from the view that many of the items subject to duty (ranging from biscuit-making machines to drop-hammers and from roller-mills to rock-drills) could not be made locally, and partly from the knowledge that freight, insurance, primage, wharfage and cartage could double or even treble the f.o.b. price of a piece of machinery imported from London or New York. The Tariff Commission was told in 1881, for instance, that the Ballarat Woollen Company Ltd had spent £40,000 on setting up a plant which would have cost

£10,000 in Great Britain, and that one-third of this difference was accounted for by freight charges alone.

It would seem from the long descriptions published in contemporary newspapers that even the leading establishments in industries like ready-made clothing, footwear and metal-working lagged behind their counterparts in Europe and North America. Instances can, of course, be found of firms that tried to keep up with the times: in 1883, for example, a wholesale clothing manufacturer imported a cloth-cutting machine which trebled weekly output,⁵⁴ but these were the exception rather than the rule. By the mid-1880s only one in five of the colony's boot and shoe factories used steam or gas engines to run their machinery which in any case was far from complete judging by contemporary descriptions of similar-sized establishments in the East Midlands. The extent to which this sort of lag can be attributed to the customs schedules is uncertain although it was claimed many times in evidence to the Royal Commission on the Tariff that the duties had indeed forced manufacturers to forgo or postpone the purchase of machine tools and processing equipment. On occasion it seems that major equipment orders may have been placed overseas only after entrepreneurs had sought or been promised an inducement to proceed. Thus the proprietors of a paper-mill under construction at Fyansford near Geelong paid the usual 20 per cent ad valorem duty on machinery worth £6,140. Under 41 Vic. no. 593 assented to on 18 January 1878, 'machinery used in the manufacture of paper' was exempted from duty from the beginning of that month. An application for remission of duties was refused by the Minister of Customs but this decision was overruled by the Cabinet and a refund of £1,228 was placed on the estimates and assented to on 1 November 1878: perhaps it was mere coincidence that the Chief Secretary and Treasurer at this time (Berry) was the member for the electorate concerned.⁵⁵

One of the beliefs about protection in Victoria is that it provided the opportunity for entrepreneurs to introduce new industrial activities of various kinds into the colony. This is, however, largely a myth that probably originated from contemporary journalists who saw every sample submitted and every prototype produced, no matter how untried or how unrealistic, as further proof of the benefits flowing from the tariff. In truth it appears that very few *significant* additions to the colony's industrial capability owed their *origins* (as against, sometimes, their continued existence) to the customs schedules. Some, as will be clear from the previous chapter, were coming into their own before there were any protective tariffs; others (like the weaving of woollens and worsteds and paper-making) were stimulated by bonuses; and others again (such as railway carriage building and iron pipe casting) were the direct outcome of government contracts. And although the tariff did spark off some industries, like the manufacture of glass bottles and some kinds of agricultural implements, it also contributed to the demise of others including, as already detailed, the canning of meat.

It is possible that alterations to the customs schedules may have been one, but merely one, of a number of factors leading to a decision to manufacture locally. A particular case that illustrates some of the difficulties of unscrambling the role

of the tariff is the manufacture of nitroglycerine explosives, generically known as 'dynamite', in Victoria. Early in 1873 the British Dynamite Company Ltd began manufacturing, at Ardeer in Scotland, Alfred Nobel's patented *Dynamite* which enabled him to obtain a foothold in the British home market and also to gain a 'great facility for export to the colonies'. By the mid-1870s nearly one-fifth of the output from this plant was being exported to British Empire countries with the Australian colonies between them taking more than half. Other nitroglycerine-based explosives were also being marketed. One, *Lithofracteur*, made by Krebs Brothers and Company at Cologne, was being exported to Great Britain and also to Australia through a London-Melbourne agency, Jones, Scott and Company, who by an agreement signed on 29 July 1873 were the sole agents in the British possessions in the South Pacific. While a dispute about patent infringements, eventually decided in favour of *Dynamite*, was being fought during the 1870s all the way through the British legal system, Krebs's compound was gaining popularity in Victoria. Meanwhile, governments and shipping and insurance companies, alerted by accidents to the dangers of 'dynamite', devised stricter regulations and demanded steeper rates so that local production in Australia became an increasingly attractive proposition. Then on 18 September 1874, under 38 Vic. no. 489 (27 October 1874), a duty of 4d per lb was placed on 'dynamite' entering Victoria. Soon afterwards, on 29 December, Krebs Brothers and Jones, Scott signed an agreement to manufacture the explosive compound at a site that had already been acquired west of Melbourne, and to float the Australian Lithofracteur Company (Krebs Patent) Ltd in London which was incorporated with a nominal capital of £30,000 on 11 March 1875. Work began without delay on the construction of the factory which came into production in April 1876. By this time £18,325 had been subscribed—£8,425 in the United Kingdom, £5,250 in Victoria and South Australia and £4,650 in Germany. As a nice twist, this firm initiated in Australia unsuccessful litigation for patent infringements against Nobel's Explosives Company Ltd (the successor in 1877 to the British Dynamite Company).⁵⁶ It might be argued that this was hardly a typical example both because it concerned a 'unique' product and because it was largely owned overseas: yet elsewhere the introduction of 'dynamite' manufacturing into Victoria has been cited as the sort of explosion of local industry that could be triggered by the manipulation of customs schedules. This brief account indicates that several other factors were also involved.

The maintenance of external markets. It was shown earlier that during the 1870s there was a considerable increase in the export of a number of items like footwear, apparel and slops, and metal goods that were partly or wholly made up from imported materials. This penetration of external markets was assisted by the inclusion over the years of a few locally made products in the unceasing flow of regulations promulgated under the Drawback Act, 1871 (35 Vic. no. 413). The emphasis in the previous sentence is deliberate for, although the regulations (which came into effect early in 1872) included drawback rates on a wide variety of imported goods subsequently sent outside the colony, there appears to have been a marked reluctance at first to include products made in Victoria from materials

on which duty had been paid. Even this simplifies the situation because necessarily the application of the regulations to locally manufactured goods left a good deal of discretion in the hands of customs personnel. Although the aim was to ensure that people neither lost nor gained from drawbacks, the system was, in fact, loaded against the local manufacturer. Whereas the importer could in most cases get back all the duty paid, the manufacturer could only claim a specified refund on a quantity or value basis after first proving that the articles consisted of or incorporated materials upon which import duty had been paid. Not much imagination is needed to picture the possible wangles and inevitable wrangles involved in trying to prove the origins of the variety of materials that might be included in a suit or a pair of shoes. But the manufacturers of apparel and clothing, confectionery and jam seem to have found it worthwhile to claim refunds even if there were constant complaints about the unfairness of the assessments. In the case of the clothing industry the drawback arrangements were so contrived as to make a farce out of claims that the local woollen-milling industry was being protected. In practice what was happening by the mid-1880s was that the

Sydney merchant sends the cloth, and the Melbourne clothier pays 15 per cent. duty upon it. He is allowed $7\frac{1}{2}$ per cent. drawback upon the value of the manufactured goods when they are returned to Sydney, and the value is allowed to be set down as just double that of the cloth without labour or trimmings. As a matter of fact, the value is usually about double, but should it be less or more the accounts are in every instance carefully adjusted, so that the clothier receives back exactly the amount of duty he originally paid when the cloth arrived to be made up.⁵⁷

The drawback system was, in contrast, of little help to other industries at least notionally brought within the regulations because these were framed with little understanding of, or sympathy for, the kinds of problems they faced. This can be illustrated by again turning to circumstances in the boot and shoe industry. From 3 November 1874 for the remainder of this period, importers were able to claim a *full* refund of the customs duties paid on footwear subsequently re-exported.⁵⁸ Early in 1880 the regulations were amended to include local footwear manufacturers who were then permitted to claim 2½d (men's sizes) or 1½d (all other sizes) when exporting a pair of boots or shoes made from imported calf or kid leather. For several reasons, this was a meaningless gesture. First, the duty on an imported calfskin, which at this time cost about 12/-, was approximately 1/-; from one skin it was possible on average to cut four pairs of soles and uppers for men's size no. 6 or over upon which, eventually, 10d refund could be claimed. This arithmetic speaks for itself. Second, apart from the need to import calf and kid leather (which was the *raison d'être* for allowing the drawbacks), the footwear trade had to import literally dozens of other items (e.g. nails, screws, heel plates, toe tips, buttons and laces) many of which were dutiable even though they were not made locally at all or in the quantities or qualities required. Third, the customs schedules also added to some of the other costs of production. This industry, like many others, was

handicapped by the duties on machinery (such as heeling and edge-paring equipment) but duties also had to be paid on items like lasts. The significance of this can be better appreciated when it is realised that the manufacture of lasts was a skilled trade undertaken even in Great Britain by only a handful of firms. The leading Victorian shoemakers supplied these firms with special patterns so that they could supply lasts suitable for local demand (it was said, for instance, that younger Australians had a broader joint and a higher instep than their English counterparts). Fourth, the small size of the consignments, the scattered distribution of the premises, and the intricate nature of the paper work involved hardly made the fuss and cost of applying for drawback (for which the customs department charged fees and expenses) worthwhile. Indeed the bootmakers claimed that the refunds did not cover the additional outlay, an opinion borne out by the fact that drawback was claimed on only 56,000 out of 1,022,000 pairs (5.5 per cent) of Victorian-made boots and shoes exported from 1880 through 1889 compared with 423,000 pairs (37.1 per cent) of the re-exported ones. In large measure, then, it seems that the boot and shoe trade was justified in describing the drawback arrangements as 'farcical' since they neither adequately compensated local manufacturers for the additional costs stemming directly (much less indirectly) from the customs schedules nor even put them on an equal footing with the import-export agencies. This heavy-handed bureaucratic approach, no doubt intended to minimise fraud, could not have come at a more unfortunate time because the maintenance of export markets—to say nothing of the expansion needed to ensure the continued prosperity of the local footwear industry—was in any case becoming much more difficult. The customs schedules of several of the other colonies were in the process of change, in terms both of philosophy and detail (as will be explained in later chapters); the price of imported footwear was falling because of decreasing manufacturing costs and ocean freight rates; the industries in other colonies were proving themselves to be more sensitive to fads and fashions (this was especially true of the Sydney factories which were also more willing to concentrate their efforts by discarding one line before taking up another); and the freight costs on, and reliability of, the transport systems between the colonies were changing.

Entrepreneurs in various fields tried to make the best of things by opening branches in other colonies. In 1876 the tanning firm of Michaelis, Hallenstein and Company bought into the Sydney firm of Farleigh, Nettheim and Company, and in November the same year the Apollo Stearine Candle Company Ltd set up a Sydney agency, which in January 1878 became based on a subsidiary factory at Pymont that used prepared tallow and distilled stearine sent round the coast from its Footscray works in Melbourne.⁵⁹ Three years later John Danks, perhaps the best-known brass founder in Victoria, opened an agency in Sydney, and William Edgerton (whose business was reconstituted in 1883 as the Victoria Iron Rolling Company Ltd) also established a branch foundry in this rival metropolis. It is difficult to be sure whether these decisions were made, as claimed, in order to minimise some of the difficulties created by the Victorian tariff or as a normal means of penetrating a distant market. In the event it was, for some, simply a case of out

of the frying pan and into the fire. The Apollo Company told its shareholders in September 1883 that the Sydney trade had been almost totally lost because the New South Wales customs department had suddenly imposed a duty on stearine on 1 March, and in the mid-1880s the Sydney foundry of the Victoria Iron Rolling Company was operating at a loss because of the high costs of production.⁶⁰

The view reached here, then, is that the beneficial influence of the Victorian tariff on industrial development has been greatly exaggerated, although it is impossible to ignore the importance of either the general inducement to invest in manufacturing that stemmed from the adoption of 'protection' as a policy or the support given to the economic well-being of the colony as a whole by the public works programs for which customs revenue was an important source of finance.

By the mid-1870s the customs schedules had probably achieved a reasonable balance between the desire to encourage some industries and the need to avoid penalising others. But subsequent changes in the schedules themselves, in the detailed administrative arrangements, and in the parallel drawback regulations, introduced more and more complications and, inevitably, inconsistencies. The distinction between 'revenue' and 'protective' duties became fainter and the principles underlying the tariff system more incomprehensible. In particular, whole classes of goods in an intermediate stage of manufacture became relatively highly taxed even when there was little chance of more than a few of the individual items being made locally in the quantities, qualities or varieties required.⁶¹ While, on occasion, this brought some additional factories into being or propped up those already in existence, the more usual effect was to add further to costs and problems of whole industries as has been illustrated in the case of boot and shoe manufacturing which not infrequently—and yet incredibly—is cited as an example par excellence of the benefits that flowed from the Victorian tariff system.⁶²

Most discussions of the tariff in this colony have tended to ignore other factors such as the increase in population, the rise in real wages, the significance of government contracts especially in the metal trades, and the growth in some exports like leather and preserved meat which in any case would have promoted industrial development given, of course, the general support to the economy provided by the expenditure of government funds derived from customs duties. Nor is enough emphasis usually put on some of the other effects of the tariff system and, in particular, its influence on prices and wages. Although the Second Report of the Board of Inquiry into the Fiscal System was written in 1895 after further adjustments had been made to the customs schedules and before the economy had recovered from the depression, some of its findings need only be changed in degree rather than in sentiment to make them applicable to the situation at the end of the 1880s. Thus, after noting that it had received a good deal of evidence about whether prices had been raised or lowered by protective tariffs, it concluded (p.xi):

It is an established fact that such goods are, as a rule, cheaper to the public than they were before the imposition of such duties, and that recent increases in rate have not, except in isolated cases, been followed by corresponding increases in price to the public. Various causes have, no doubt, combined to bring about this result, but the most potent factor has undoubtedly been the breaking up of rings or monopolies of importers.

But there was another side to the coin as the following exchange with the Board on 31 January 1895 makes clear:

- Q. That the higher the duty the more sweating?
 A. It works in two ways; you have either to give the same article at the same money or an inferior article which you can get a better price for. It has had the effect of bringing a lower class of article into the market.
 Q. So the consumer suffers from that, and the poor man suffers from his wages being lowered?
 A. Yes.

The same comments about the clothing and footwear industries in particular could equally well have been made some ten years earlier. Indeed one of the supreme ironies of this period was the way in which government concern in the mid-1880s led to the introduction of factory legislation that aimed among other things to control abuses like sweating for which, it is argued here, government enactments were at least partly responsible. It has become conventional to blame a general downturn in trade and the aftermath of the thirteen-week strike in 1884-5 for the depression in the boot and shoe industry in 1886 which resulted in unemployment and wage cutting. But the seemingly penny pinching attitude of the employers (see later) which helped to precipitate the labour disputes was mainly a reaction to the cost:price squeeze caused by the alterations to the customs schedules in 1879. Broadbrush judgments about the beneficial effects of the tariffs on the development of manufacturing, on the growth of exports, and even on working conditions are still made and, like so much that has gone before, add to the myths surrounding protection.

Subsidies and Bonuses

Examples have already been given of the way in which the government and its agencies sometimes allocated contracts to local manufacturers even when the tenders submitted were higher than those of importers. In part this was a convenient and politically less embarrassing way of compensating firms for the customs duties they had paid on materials and, more importantly, on machinery and equipment, but in the main it was nothing more nor less than subsidisation. In this sense, then, it could be said that that subsidies played a significant role in encouraging the development of some types of manufacturing and, in particular, the various metal trades. As a specific if somewhat exceptional example, the Phoenix Foundry Company Ltd of Ballarat was probably accorded a 'subsidy'

averaging between £4,000 and £5,000 a year from 1872 to 1890 in connection with its government locomotive contracts alone.⁶³ Not all government contracts produced such favourable results: indeed some resulted in heavy losses which company directors seemed able to excuse—though seldom explain—at the six-monthly meetings of shareholders as being due to anything from ‘over-optimism’ to ‘lack of experience’. On occasion there do appear to have been bureaucratic blunders such as that noted by the *Age* on 17 February 1885 when the Railway Department failed to deliver wheels to the Pickles’ company at Bendigo thus leaving its works chock-a-block with immobile carriages and its shareholders without a dividend.

Very little use seems to have been made of formal subsidies in the sense of regular payments made on a predetermined basis. The only arrangement relevant here was that applying late in the 1880s to dairy companies exporting butter (see Chapter 9). More important were the bonuses offered in the form of lump sum payments to the first person or firm to accomplish stated objectives which ranged from catching whales to cultivating silkworms. Only three—for beet sugar, ammunition and worsted cloth—related specifically to manufacturing activities.

The first, repeated several times in the early 1870s, was £5,000 for the manufacture during one year of 500 tons of beet sugar (the minimum amount to be produced and the maximum amount to be paid falling in proportion in successive advertisements).⁶⁴ There were few claimants and no bonus was paid. This was only one of a number of attempts to encourage agricultural activities of one sort or another: it probably seemed worth trying in view of the success of beet sugar production in Europe but the circumstances there were quite different. Even in the United States, where efforts to produce beet sugar began in 1830, the first commercial plant did not come into operation until 1879.

The second bonus, £2,500 for the establishment of a cartridge factory, was announced in the Legislative Assembly on 20 July 1886. Its origins can be traced back to a recommendation made twenty-one years previously by a Select Committee upon National Defence that ‘it has become the duty of the Government to take prompt steps to establish a powder manufactory in Victoria’ upon which it seems no action was taken. In the mid-1880s the colony’s defences were again under serious debate and in December 1885 the government revealed that negotiations had been taking place with a leading manufacturer in England about the possibility of setting up a factory in Victoria. In the meantime steps were taken to prepare a supply of raw material by planting willow trees beside creeks since the Legislative Assembly had been told that charcoal from weeping willows made the best gunpowder. But there were second thoughts when it was discovered that the manufacture of powder was altogether a more complicated business than had been believed since for military purposes absolute uniformity between batches was essential; it was also likely to be more expensive because several types of powder were required for the various kinds of ammunition in use, and more difficult because the other colonies were unwilling to support such a venture. The

government therefore decided in 1886 to encourage instead the establishment of a factory to make small-arms ammunition using imported powder.⁶⁵

It was almost three years before the subsequent endless rounds of negotiations came to anything. The first difficulty was to choose a company and agree upon terms and conditions, the second was to get the other colonies to agree that this undertaking should serve the needs of them all, and the third was to find an acceptable site. This last problem proved to be by no means the easiest to solve and led to what may have been the first wrangle between governments in Australia about the location of a particular factory.⁶⁶ In response to an enquiry, the New South Wales colonial secretary wrote to the premier of Victoria on 14 May 1888 explaining that he would seek parliamentary approval to share the costs of establishing a 'federal' factory

if . . . the locality could be chosen at the conterminous point of the three colonies of South Australia, Victoria, and New South Wales, or, if this is not practicable, at some eligible place—Albury or Echuca, for example—on the River Murray. . . .⁶⁷

The 'conterminous point' was not only remote but almost completely uninhabited. Every settlement along the Murray promptly found a dozen reasons why it was particularly eligible, and deputations from local authorities and vigilance committees left no stone unturned to make sure that these claims did not go unnoticed. The Victorian government made it clear that the choice of a location would be left to the Colonial Ammunition Company⁶⁸—by now the only serious contender—which responded by agreeing to choose an inland location if it were paid a bonus of £20,000 instead of the £5,000 that had until then been sought. Reasonably enough Victoria wanted New South Wales, which after all had raised this locational issue in the first place, to contribute £10,000 of this but the northern colony refused to match ambition with action. In the event an indenture was signed on 28 May 1889 with the Colonial Ammunition Company under which, in summary, the Victorian government agreed to (i) lease 5 acres beside the Maribyrnong River and adjacent to the Footscray Powder Magazine at a peppercorn rental; (ii) supply gunpowder at reasonable cost; (iii) purchase all ammunition needed from this factory; (iv) pay a bonus of £5,000 after the first half million rounds had been supplied; and (v) refund import duty (up to a maximum of £2,000) paid on machinery. This agreement was ratified by an Act of Parliament, the works was built and started production within twelve months (as prescribed in the Act), the bonus of £5,000 was paid from the 1890-1 defence vote, and slightly more than £2,000 charged in duties was refunded.⁶⁹ This seems to have been the first occasion in Australia in which an agreement between a government and a particular company was incorporated in an Act of Parliament.

The only other bonus, £5,000 for the first 10,000 yards of worsted cloth, was placed on the estimates and agreed to on 28 October 1886 at a time when, as will be shown in chapter 9, the colonial woollen-milling industry was in the doldrums. Seven months elapsed before the conditions were actually published but in the

meantime two firms, E. & W. Gaunt (proprietors of the Alfred Woollen Mills at Williamstown) and the Ballarat Woollen Company Ltd, had imported worsted machinery and begun to set it up. Late in October 1887 a Board appointed by the Governor in Council certified that E. & W. Gaunt had met all the conditions and should claim the bonus, but this satisfied neither the directors of the Ballarat mill nor the elected members of that district who raised the matter in the Legislative Assembly a fortnight later. The government, faced with conflicting facts and opinions, must have rued the day six months earlier when it approved the bonus conditions since these meant that it, ultimately, had to decide how to interpret the words 'good marketable quality' and the appropriate criteria by which to judge whether 'the applicants have permanently established the manufacture of worsted cloth in Victoria'. In mid-December 1887 it managed to defuse what seemed to be growing into an explosive situation by awarding the £5,000 bonus to the proprietors of the Williamstown company and at the same time promising to make an *ex gratia* payment of £4,000 to the Ballarat company when the necessary parliamentary approval could be obtained.⁷⁰ As it turned out, this latter decision proved to be the more worthwhile investment because the Ballarat Woollen Company Ltd was reorganised during 1889 as the Ballarat Woollen and Worsted Company Ltd and a few years later bought the worsted machinery of its former rival.

The Course of Industrial Development

It is now appropriate to take a more quantitative view of the development of secondary industry in Victoria during this period. The discussion must begin by assessing the suitability and reliability of the data available before turning to an analysis of the trends themselves. Although some limited use is made later of investment and output information, most attention must focus on the statistics of employment, partly because these are more complete, partly because some comparisons are possible between data sources, and partly because they are more amenable to processes of revision and amendment which are discussed in detail in Appendix 1. Starting in 1868 the annual factory employment data published in the *Statistical Register* were more fully disaggregated so that they can be reorganised into sixteen reasonably coherent industrial classes after making some further amendments to try to achieve consistency over time. Prior to the 1870s, and to some extent during them, the printed figures tended to include the larger, better-known, and more prominent types of industrial establishment and to omit others whose size, nature and organisation blended them into the general commercial fabric, or which had little entrepreneurial or geographic continuity. Then, during the last three decades of the century, the content and coverage of official statistics were considerably affected by changes in collection methods and by reassessments of the type and size of factories to be embraced.

During the 1860s and early 1870s industrial, agricultural and pastoral statistics were obtained by collectors appointed annually on the basis of tenders submitted, so that there was little incentive to notice new enterprises. Under Part 29 of the

Local Government Act, 1874 the corporation of every borough, shire and road district was charged with the task of collecting and supplying information to the government statistician, but some of the advantages that should have accrued from this increase in the number of enumeration areas were negated because the statistician was no longer in full control of the collectors who were now appointed and paid by over 130 local authorities. Furthermore, the 'directions to persons employed by municipal councils to collect statistics' for the year ending 1 March 1891, when efforts were made to obtain especially good quality statistics which could be lined up with those from the population census of 5 April 1891, still discussed 'manufactories and works' along with schools and quarries under the heading 'minor returns' (see Appendix 1). Over and above irregularities caused by accidental omissions, discontinuities were also introduced into the series by deliberate—usually unannounced or badly explained—changes in definition (such as an alteration to the minimum size of establishment enumerated) and coverage (like the inclusion in some industries of works other than those operated by steam power). Obviously these make it more difficult to detect and evaluate any consequences stemming specifically from factory reorganisation or technological innovation.

Employment statistics from two other official sources may seem potentially useful in helping to calibrate the series prepared for this book. The most obvious, the decennial population censuses, have in fact several drawbacks. The 1871 and 1881 censuses coded people's activities in terms of occupational groupings which, as in the case of the 1861 census discussed in the previous chapter, failed to distinguish between 'makers' and 'dealers' and lumped large numbers of people together under designations like 'general labourers'. The 1891 and later censuses adopted, in effect, an industrial classification though this by no means overcame all the difficulties.⁷¹ One of the most important from the present viewpoint is the continuing uncertainty about how many of the people who described themselves as being engaged in some form of 'manufacturing' activity actually worked in a 'factory' (even if that concept could be defined satisfactorily) as the process of formalisation of productive activities was still taking place. For instance, the introduction of mechanised, continuous brickmaking processes (beginning, effectively, with the opening of the Brunswick works of the Hoffman Patent Brick and Tile Company in September 1870)⁷² led to the disappearance of most of the gangs of itinerant brickmakers cum builders mentioned in the previous chapter; and cheese and, later, butter making gradually moved from farmhouse to factory (a process discussed in Chapter 9). There was also a considerable growth of out-working in the clothing and shoe trades during the 1870s and 1880s but the extent to which these people, mainly women and girls, should be regarded as part of the *factory* workforce (or even fully as part of the total labour force) remains debatable.⁷³ Nonetheless, given the institutional developments taking place on the one hand and the methodological changes being made on the other, it would be expected that over the years the data for *factory* employment recalculated from the *Statistical Register* as the basic source would gradually come closer to the

estimates of *manufacturing* employment derived from the censuses.⁷⁴ Insofar as any such comparisons are even worth attempting, this thesis does seem to be broadly true in the case of male employment although the continuing discrepancy between females employed in manufacturing and in factories must be considered again in a moment.

The other source of employment information is the report of the Chief Inspector of Factories (under The Factories and Shops Act, 1885) available annually from 1886; this material has been reorganised in Appendix 1 into the same categories used for the *Statistical Register* data. The factories registered under this Act were those in cities, towns and boroughs (but not shires) where six or more persons (reduced to four or more persons from 1 January 1894) worked for gain or where steam or other mechanical power was used. Before being registered premises had to be approved by the local Board of Health which could only be done after submitting architectural drawings. The former Chief Inspector of Factories explained the consequences to the Factories Act Inquiry Board on 8 June 1893:

A man employing four people—say, a tailor—is not a factory, but his work increases, and he takes on one extra hand. From that moment he becomes a factory, and to carry out the law he must shut up the place. He must go to an architect, and have plans drawn; he must go to the local council, and get the place passed. The regulations made by the Central Board [of Health] are so stringent and difficult that very few of those men can afford to do such a thing. The consequence is he does not increase his hands. He remains unregistered, and gives out his work.

Two points flow from this. First, it helps to explain the considerable difference between the workforce figures for the clothing industry, in particular, derived from the 1891 census and those in the factory statistics of the Statistician and Chief Inspector. Conventionally this is attributed to (i) the many dressmakers, milliners and tailors working on their own account in small shops and dividing their time between 'making' and 'dealing', and (ii) the large number of outworkers. But neither of these categories quite covers the sort of institutionalised but 'sub-statistical' factory implied by the former Chief Inspector in this comment, and which he illustrated again by citing the case of a shirt-maker who employed only four people in his workroom cutting out material to supply the seventy or eighty folk engaged in making it up at home. Second, the fact that the registration of a factory only came at the end of a series of formal administrative procedures may appear at first sight to support those commentators who regard the Chief Inspector's figures as a more reliable guide to the workforce in urban-based activities like clothing manufacture. It is implied, in part, that most of the 4,000 to 5,000 clothing workers enumerated year after year by the factory inspectors over and above those noticed in the *Statistical Register* can be explained by the time they could spend in their bailiwicks ferreting about the basements and backyards. While there may be some truth in this, it is of doubtful importance since there were only six field inspectors to visit factories, workrooms and retail shops in Melbourne, Geelong, Ballarat and Bendigo, and the implementation of the Act elsewhere was merely

another of the many miscellaneous responsibilities of the police. A further implication is that the statisticians were simply unaware of large numbers of clothing factories (many being within a stone's throw of their office) but this is made even less plausible by the close similarity between the returns for the boot and shoe industry, sections of which operated under much the same conditions.

Three other circumstances seem more significant. First, the inadequacy of the records held by firms (a regular *cri de coeur* by the Chief Inspector) meant that the authorities had to be satisfied with returns giving the situation during 'one week at the close of the year'. The Statistician (until he formally adopted the calendar year in 1895) sought information for the 'past year' about the 'number of workers usually employed, including proprietor or manager', which was subsequently published in the *Statistical Register* as relating to the year ending 1 March (see details in Appendix 1). The situation was in fact more complicated because the 'past year' was specifically defined in a 'note to proprietors' as that ending on 31 December, and because the collectors were not given their instructions until February but promised a bonus for schedules completed and returned before 10 March. It seems certain, then, that there were opportunities for muddle and incentives to haste; the chances are that most of the smaller establishments sent the collector packing with some fairly specific information about the state of employment in February which in some trades, like clothing, was regarded as a 'dull month'. Second, the Statistician deliberately excluded most clothing factories with fewer than ten hands until 1895. This, in effect, was a two-stage process because collectors were instructed to take care 'not to return salesmen or saleswomen' and to send particulars relating only to the establishments which then had ten or more workers. He also excluded 'most' dressmaking, millinery, tailoring and underclothing factories until 1896 and, indeed, later made estimates of the magnitude of these omissions.⁷⁵ These have been included in the amended clothing series shown in Appendix Table A1.5 but, even so, there still remain considerable differences (ranging from 2,600 to 3,400 persons during the late 1880s) between this series and that taken from the Chief Inspector's reports,⁷⁶ and this suggests that a third explanation cannot easily be set aside. On the one hand, the Statistician was attempting to record *factory* activities (however inadequately these may have been defined) and 'to carefully exclude all persons connected with the commercial branch of a business'. The factory inspectorate, on the other hand, was less concerned with function than with working conditions: it is clear from the tenor of the evidence given to the Factories Act Inquiry Board in 1893 that even a dress shop run by two sisters employing four needlewomen to do alterations and repairs would have been regarded as a 'factory' under the Act.

The view taken here, then, is that neither the census results nor the Chief Inspector's returns invalidate the figures published in the *Statistical Register* (after making allowances for known changes in definition and coverage): all they do in fact is to point to the considerable pool of labour—mostly consisting of women and girls, mainly engaged sewing, seaming and selling clothes and millinery, and probably as a group having a fairly low level of productivity—that made a shadowy

'fringe' to more formally defined factory industry. The wholesale reinterpretation of the role of manufacturing during the nineteenth century sought by Thompson, among others, does not seem necessary.⁷⁷

Fig. 8.5: Estimated total employment in Victorian factories 1866–1900 (derived from Appendix Table A1.4). The investment data shown cover only the factories enumerated in the *Vic. SR* minus investment in waterworks, stone quarries, etc.; gas and electricity reticulation; and land.

Factory employment, investment and production

The revised *Statistical Register* employment data displayed in Fig. 8.5 give an initial impression of the course of industrial development during the last three decades of the nineteenth century. There appears to have been a significant upsurge in employment in the late 1860s which continued at a slightly reduced rate after a downturn in 1870 and 1871. Then, from 1874–5, growth slowed perceptibly and hesitated altogether in 1878 and 1879. This was compensated for by a sharp rise in employment from 34,600 to 45,300, in the two years to March 1882 although followed by another period of slower growth that turned before long into a recession from 1885 through 1887. Again there was a brief spurt, with employment rising from 51,100 to 59,400 in the two years to March 1890, which preceded the downturn into the very severe depression of the 1890s. A validation of the general shape of this outline has been obtained from the recorded value of investment in factory machinery, plant and buildings. Despite the differences in coverage noted in the caption, the results set out in Fig. 8.5 are reasonably similar: there was actually a small net disinvestment in 1870–1 and unusually low net investment in 1871–2, 1876–7 and 1879–80, and during the two years ending 1 March 1887.

A summary view of this kind can, however, be misleading. One reason is that the male and female factory workforces underwent different experiences (a point taken up in Chapter 9). Another, illustrated in Fig. 8.6, is that there were contrasts between the fortunes of the main industry classes. It is obvious that (i) metal-

Fig. 8.6: Estimated factory employment in nine industrial classes in Victoria 1868-1900. In 1889-90 the categories shown accounted for 94 per cent of the estimated total. The roman numerals refer to the classes detailed in the source, Appendix Table A1.5.

working, (ii) the manufacture of clothing and footwear, and (iii) the preparation of food, drink and tobacco dominated the industrial scene: taken together these activities occupied well over half the factory workforce throughout the 1870s and 1880s. Whereas the metal-working industries increased their share of the factory workforce from 18.1 per cent in 1869 to 23.8 per cent in 1889-90, the share held by the clothing and footwear industries declined from 24.2 to 20.2 per cent and by the food, drink and tobacco industries from 20.2 to 12.9 per cent. Furthermore, although some of the very short-term incidents seem to have been shared by most industry classes, the longer-run profiles have three fairly distinctive shapes. Apparel, textile and leather industries expanded rapidly in the 1870s but made little progress in the 1880s while the reverse was true of brickmaking and sawmilling. Dissimilar again were the profiles of the metal goods, paper and printing, and food and drink classes, each of which grew at a fairly consistent rate during both decades. Some general reasons for these differences have already emerged during the course of this chapter and more detailed illustrations are given in Chapter 9.

Employment trends tell only part of the story as is clear from the series plotted in Figs. 8.7, 8.8 and 8.9 despite the considerable reservations felt about the quality of the data upon which they are based.⁷⁸ Eight industries were picked out for this further analysis because they were fairly distinct and homogeneous, reasonably representative of various types of manufacturing, and among the least affected by known blatant errors of omission and commission. However, to emphasise again

Fig. 8.7: Average number of hands per factory in ten Victorian industries 1869-70 to 1890-1. The 'discontinuities' shown are discussed in the text. (Source: calculated from *Vic.SR*.)

Fig. 8.8: Average investment (current prices) per factory in machinery, plant and buildings in ten Victorian industries 1869-70 to 1890-1. The 'discontinuities' shown are discussed in the text. (Source: calculated from *Vic.SR*.)

Fig. 8.9: Average investment (current prices) per hand in machinery, plant and buildings in ten Victorian industries 1869-70 to 1890-1. The 'discontinuities' shown are discussed in the text. (Source: calculated from *Vic.SR.*)

the care with which this *Statistical Register* information has to be interpreted, two other industries—furniture and cabinet-making and coach and wagon building—have also been included because both were subject to major discontinuities when coverage was widened to include all works and not merely those where steam power was used.⁷⁹ These graphs speak for themselves. In the case of the brickworks, for instance, the average number of hands altered little during the 1870s (Fig. 8.7) whereas the amount of capital invested in machinery, plant, and buildings obviously did change (Fig. 8.8), and this, in turn, is reflected in the doubling of the capital invested per worker (Fig. 8.9). All three graphs show that the footwear industry, as suggested earlier in the chapter, reached a plateau early in the 1880s and stayed there for the remainder of that decade.

None of these series reveal anything about trends in the productivity of labour employed or capital invested. Given the lack of net or gross value of production data (except for the two years discussed earlier in the chapter), one alternative is to use physical output, although for only four industries is this sufficiently precise over a reasonably long period. In Fig. 8.10 the quantities of bricks, flour, woollen cloth and beer made have been related to the number of establishments, the numbers of workers, and the capital invested in machinery, plant and buildings. In three of these cases there was a distinct long-run tendency for the physical

output per establishment to increase even though the output per worker grew very little, and the output per unit of capital invested stayed fairly constant (woollem-milling and brewing), declined (brickmaking), or increased only slightly (flour-milling). It would be absurd to generalise from these few cases especially as in some respects, like the capital invested per worker (Fig. 8.9), they were hardly typical, but this evidence at least lends support to Butlin's view that productivity was not increasing⁸⁰ and points to the possibility that in some industries factory size and output increased without much gain—perhaps even with a loss—in efficiency.

It is evident from Table 8.11 that in most parts of Victoria the average factory had only one-third the number of workers and one-third the capital invested in machinery, plant and buildings compared with those in Melbourne (although, as a result, the average investment per hand was not greatly dissimilar). These figures, necessarily calculated from raw *Statistical Register* data, probably exaggerate the scale of Melbourne's establishments since no account can be taken of the small labour-intensive clothing factories. Unfortunately, the data for only two industries can be disaggregated spatially in a similar way and it is convenient to defer discussion of both these exceptions—brewing and flour-milling—until Chapter 9: in any case neither is typical of the general run of factory activity.

One other measure which has been used elsewhere to indicate various aspects of industrial development is motive power.⁸¹ Interest here must focus on the use of steam during this period since wind and water were never used to any great extent in Victoria and gas engines were uncommon until the 1880s. It was shown in Chapter 7 how steam engines were gradually utilised during the 1850s by an increasing range of activities, although, excluding mining operations, it is probable that two-thirds or more of the installed horse-power was in flour-mills and sawmills and much of the remainder in a few large enterprises like the sugar refinery. By 1868 when data were published for the first time indicating the motive power used by individual industries, steam engines had been installed in nearly 500 factories. Some 200 flour-mills and sawmills accounted for 60 per cent of the horse-power, but among the remaining users were establishments representing almost every facet of the colony's manufacturing activities. The extent to which mechanical power had become diffused through particular industries varied considerably. At one extreme were the flour-mills which had an average of nearly 4.0 horse-power per worker through the 1870s and 1880s; then followed the chemical works, sawmills and joinery works, and woollen mills with an average of between 0.5 and 1.0 horse-power per employee. At the other extreme were the footwear and clothing industries which even by 1890 could claim a mere 0.04 horse-power per worker. The magnitude of the changes in the power to labour ratios within each industrial category during the 1870s and 1880s was less than might be imagined. There were, of course, exceptions: the introduction of steam-driven electricity dynamos during the 1880s caused a significant increase in the power and light category, and a parallel and hardly less spectacular change occurred in brick and tile making where the adoption of new technology in the 1870s was matched by a fourteen-fold increment in the horse-power available per worker—from 0.04 in

Table 8.11 Average employment and investment in all Victorian factories by area, 1871-2 to 1891-2.^a

Area	Average of ^b	1871-2	1876-7	1881-2	1886-7	1891-2
Melbourne ^c	Hands per est. (no.)	19.8	21.4	27.8	27.2	25.7
	Capital per est. (£)	2,975	3,030	4,118	4,841	5,889
	Capital per hand (£)	150	141	148	178	229
Twelve towns ^d	Hands per est. (no.)	9.7	12.1	13.0	13.2	12.5
	Capital per est. (£)	1,932	1,943	2,005	2,223	2,338
	Capital per hand (£)	200	160	155	168	187
Rest of colony	Hands per est. (no.)	6.1	6.2	8.7	8.0	7.9
	Capital per est. (£)	899	1,116	1,255	1,365	1,619
	Capital per hand (£)	147	181	144	171	205
Victoria	Hands per est. (no.)	12.1	14.5	18.3	18.0	17.5
	Capital per est. (£)	1,911	2,185	2,726	3,156	3,841
	Capital per hand (£)	159	150	149	175	219

^a Years ending 31 March 1872, 31 March 1877, 31 March 1882, 1 March 1887 and 1 March 1892.^b 'Capital' is the value of machinery, plant and buildings but not the value of land. Waterworks excluded throughout.^c Melbourne is the Board of Works area as defined in 1890.^d The twelve towns are Greater Ballarat, Greater Bendigo, Greater Castlemaine, Echuca, Greater Geelong, Hamilton, Maryborough, Sale, St Arnaud, Stawell, Wangaratta and Warrnambool; each of these places had 100 or more factory workers over the whole period (see Chapter 9).Source: Calculated from *Vic.SR*.

1868 to 0.58 twenty years later. However, changes in manufacturing techniques, even if accompanied by an increase in the power required as in the case of the switch from stone to roller flour-milling during the 1880s (see Chapter 9), did not necessarily lead to concomitant changes in the average power available per worker. This was because the greater throughput which such systems facilitated—output per horse-power in flour-mills increased from 42 short tons in 1878 to 58 in 1888—absorbed more labour in other operations that were technically less advanced or less easily mechanised.

Formation and Financing of Manufacturing Companies

The financing of industrial development in Victoria deserves much more detailed treatment than can be contemplated here where the emphasis is largely on examples of the kinds of processes involved. In the previous chapter it was noted that limited liability for trading companies was introduced into the colony by the Companies Statute, 1864 (27 Vic. no. 190), and this formed the main legal and organisational basis on which many of the more important factory operations were initially, or ultimately, financed. Manufacturing was, of course, only one of the outlets for investment funds in an increasingly complicated money market which has been detailed in Hall's study of the Melbourne Stock Exchange, but the relative importance and success of flotations by companies in various fields still awaits adequate research. Tabulations of the numbers of companies registered year by year are quite misleading: some manufacturing companies registered were taken no further; others spent several years trying unsuccessfully to raise even a fraction of their authorised capital and then gave up in despair; and others, again, simply took over existing assets and wholly or partly recycled funds already invested. Nor does the mere number of companies registered give any clue about 'size', measured for instance in terms of authorised capital, although these amounts were sometimes ridiculously low for the objects set out in the articles of association. The range was considerable. At one extreme were the dairy companies like the Newry Cheese Factory Company Ltd registered on 15 June 1874 with an authorised capital of £500 in £1 shares, and which resolved to wind up five months later.⁸² At the other extreme were enterprises like the Apollo Stearine Candle Company Ltd which, when registered on 17 April 1872, had an authorised capital of £30,000 in £1,000 shares: this was increased within a year to £50,000 in forty shares of £1,250 of which twenty-one had been taken up and had met a call of nearly £800 apiece.⁸³

Neither the evolution of something approaching an organised share market in the early 1860s nor the passage of trading company legislation in 1864 gave industrial entrepreneurs access to instant and massive sources of investment funds. As Hall has suggested⁸⁴ most new company formation, other than mining, was still largely independent of the Stock Exchange: during much of this period few manufacturing or processing firms were regularly 'listed' in the financial columns of the daily press or more specialised periodicals and reports of share transactions were few and far between. Aside from the gas companies, which for a number of reasons must be

Brickmaking

Flour-milling

Woollen-milling

Brewing

Fig. 8.10: Actual physical output per factory, per hand and per unit of capital in four Victorian industries 1869-70 to 1890-1. Only the main product has been shown in each case. No account can be taken of changes in the quality and type of product (such as the lowering of the extraction rate brought about by the adoption of roller-milling in the 1880s). (Source: calculated from *Vic.SR.*)

regarded as being rather special and atypical, only the meat preserving and woollen companies seem to have excited much continuing interest in the business world,

although during the 1880s the financial journals kept an eye on the fortunes of some of the leading breweries and foundries and an occasional large firm in other fields.

The industrial ventures registered covered a wide spectrum of activities, but some generalisations are possible. First, there were occasional bursts of company formation in particular fields such as woollen-milling (1865 to 1875), cheese making (1870s), and, most distinctive of all, meat preserving (1868 to 1872). The details of the sixteen companies in this last category, listed in Table 8.10, show that the authorised capital for the purposes of preserving meat reached a peak of £209,000 in October 1871 though paid-up capital was barely half this amount. Second, in some industries (such as brickmaking and brewing) company registrations were spread throughout this period, although the initial authorised capital tended to increase during this time as firms, like the flour-millers, equipped or re-equipped themselves with more elaborate and expensive machinery. Third, a number of companies, especially in the metal-working and chemical fields, appeared several times in the registration records as they were formed, re-formed or amalgamated. The affairs of the Apollo Stearine Candle Company Ltd again illustrate this. It was reconstructed and registered on 23 February 1882 as the Apollo Company Ltd and three years later amalgamated with a former competitor, J. Kitchen and Sons Ltd (which itself had only been registered on 13 January 1883 although manufacturing soap and candles as a private company since 1854). The resulting business commenced operating formally on 1 February 1885 as J. Kitchen and Sons and Apollo Company Ltd with an authorised capital of £250,000 in 50,000 shares; by the end of September 1885 nearly 40,000 of the shares had been taken and, with a £4 call, the paid-up capital stood at about £160,000. Many of the more important company reconstructions made during the 1880s were designed to expand both nominal and subscribed capital and to inject new life into the business. The prospectus of the Apollo Company explained in 1882 that it was being formed to reconstruct the Apollo Stearine Candle Company because sixteen of the forty shares, each of £1,250, belonged to executors of deceased estates.⁸⁵ But a more typical case was the step taken to reorganise and raise the authorised capital of Langlands Foundry Company Ltd (originally registered on 20 May 1867 to purchase the assets of H. W. Langlands) from 1,000 shares each of £25, by registering a new company with the same name on 29 June 1882 that had an authorised capital of £50,000 divided into 20,000 shares of £2.10.0.⁸⁶

More detailed research is also required before much can be said about the sources of industrial finance. There is no doubt, however, that businesses owned by individuals, families and small partnerships continued to play a very significant role throughout this period, even including essays into sugar refining and woollen-milling where the initial investment was by no means insubstantial. But the more usual pattern was for one or two people to get together and set up a forge, a sawpit or a tan-pit, and then by good luck or good management gradually build up the business both by ploughing back profits and remaining personally at the workbench. An impressionistic view is that this process was repeated more often and more successfully in the metal-working and related industries than in others.

One example will suffice. In 1856 Peter Johns emigrated to Melbourne and found employment erecting imported, prefabricated iron buildings. A couple of years later he opened a workshop in central Melbourne to fulfil contracts to design, supply and erect structural and ornamental building components. The business progressed, apparently as the result of good management and the recruitment of skilled staff, and Johns was thus in a position to take advantage of the technical and commercial possibilities that stemmed from the growing use of hydraulic lifts towards the end of the 1870s. He started to make and instal such lifts and, largely to increase capital, registered the Johns' Hydraulic and General Engineering Company Ltd in which—both as managing director and majority shareholder—he maintained a controlling interest. Not long afterwards this firm took over the business of the Australian Waygood Elevator Company Ltd (which had been registered on 31 January 1889) and was formally re-registered in September 1893 as Johns and Waygood Company Ltd.⁸⁷

Not infrequently when private companies were floated into public ones a considerable block of the initial shares was taken up by the previous owners. Thus, H. W. Langlands bought 300 of the 1,000 £25 shares when the Langlands Foundry Company Ltd was established in 1867; R. C. R. Holden and W. H. Shaw between them took 173 of the 543 £10 shares bought during the first six months of the Phoenix Foundry Company Ltd which was floated in 1870 (and registered on 21 November) to buy the assets of this Ballarat partnership and enlarge its financial resources; G. M. Pickles and G. F. Pickles by 1886 owned 6,420 of the 17,787 issued £1 shares in G. F. Pickles and Sons' Carriage Manufacturing Company Ltd which was floated into a public company in 1882; and W. Edgerton contributed £2,377 of the initial call of £7,440 as the holder of 230 of the 720 £50 shares in the Victoria Iron Rolling Company (which he had owned until its conversion in 1883).

Some further tentative generalisations can be suggested about company shareholdings. First, although a considerable proportion of the share capital in each company tended to be held by a handful of people, the remainder was often quite widely spread: in March 1870 the 1,499 £5 shares by then taken up in the Warrnambool Meat Preserving Company Ltd were owned by 152 individuals, and in July 1871 two-thirds of the shares in the Phoenix Foundry Company Ltd were held by 52 people in a broad spectrum of occupations. There were, of course, exceptions. The capital of The Victoria Iron Rolling Company Ltd, although divided into £50 shares, was subscribed by only seven people, a situation which usually occurred only when the units were £250 or more. Second, much of the initial capital of firms operating outside Melbourne was subscribed locally. Eighty-eight per cent of the shares in the Phoenix Foundry Company Ltd and in G. F. Pickles and Sons' Carriage Manufacturing Company Ltd were held, respectively, by residents of Greater Ballarat and Greater Bendigo, and 99 per cent of shareholders in the Barwon Woollen Mill Company Ltd lived in Greater Geelong. Again, exceptions can be found: an extreme case was the Western Meat Preserving Company Ltd, registered in May 1872 to take over the premises and assets of the ailing Colac Meat Preserving Company Ltd, in which only one of the £250 shares was held locally

and the other nineteen in Melbourne and London. Third, it seems to have been rare for companies as such to have invested in others although the Colonial Sugar Refining Company half-owned the Victoria Sugar Company, and the Apollo Stearine Candle Company Ltd of Melbourne partly owned the Sydney Soap Company. The chances are, however, that a more detailed investigation of shareholdings and directorships would reveal considerable inter-relationships between firms at this personal level: a simple illustration is that most of the small proportion of the shares in the Phoenix Foundry Company Ltd subscribed outside Ballarat was taken up by men who were also Melbourne iron merchants.

So far nothing has been said about the importance of the role of the banks and other financial institutions. Even a quick appraisal of the available records of the companies registered leaves no doubt about the extent to which they depended on banks for short-term accommodation and longer-term loan capital. Time and time again the story was the same, especially with enterprises like meat preserving and woollen-milling companies starting from scratch. A company would be registered with a nominal capital that, even if fully paid-up, was often minimal for the objects in mind; on the strength of some initial support construction work would be put in hand and plant ordered; new shareholders would prove harder to find and the calls on existing ones harder to meet; and eventually the assistance of a bank would be sought to bridge what the directors always saw as a frustratingly small gap between failure and fruition. But even if the plant were brought into operation there was usually a shortage of operating capital and, especially in cases where export sales were significant, another approach had to be made to a bank for advances on goods consigned but on which payment would be delayed. It would be tedious to particularise these circumstances although it is worth illustrating the speed at which companies racked up debts: the Warnambool Meat Preserving Company Ltd, within six months of its incorporation in September 1869, owed the National Bank of Australasia £1,305 while paid-up share capital stood at only £5,197; the Australian Meat Preserving Company Ltd started slaughtering in October 1870, eight months after incorporation, on the strength of paid-up share calls totalling nearly £7,700 and an overdraft from the Bank of Victoria close to £6,000; and the Echuca Meat Preserving Company Ltd was wound up late in 1872 on a petition from the Bank of Victoria which was owed about £3,000. When operations commenced early in 1868 at the mill of the Victorian Woollen and Cloth Manufacturing Company Ltd, paid-up shareholders' funds stood at £9,270 but physical assets had been mortgaged to the Bank of New South Wales for £5,990: this was converted the following year into debentures worth £7,000 (7 per cent interest) and increased to £10,000 (6 per cent interest) in 1874. While dividends remained at 10 per cent or more this was a satisfactory arrangement, but the drawbacks became apparent in the 1880s when things started to go wrong (see Chapter 9). The Barwon Woollen Mill Company Ltd, also based in Geelong, was overdrawn at the Bank of New South Wales to the tune of £2,300 a year after it was floated late in 1873; efforts to reduce the overdraft were made in some years but were more than outweighed by bad results in others so that by the end of 1882 it stood at £9,133 as against

paid-up share capital of £19,500. At this point the bank demanded repayment and the company took its problems to the National Bank of Australasia whose loan of £1,080 grew to £6,650 in less than eighteen months. These examples may give the impression that banks were solely involved in the affairs of companies which got into difficulties because of lack of experience, but the translation of a successful business into a registered company was no guarantee of continuing good fortune possibly because plans for expansion were over-ambitious or premature. A case in point was The Victoria Iron Rolling Company Ltd which increased its indebtedness to the Commercial Bank from £1,863 at the end of its first year to £5,645 at the end of the second to help finance additions, such as wire netting machinery, to its Melbourne works and a branch in Sydney where nothing seemed to go right.

Banks appear to have been the most common, but not the only, source of loan capital. For instance, the liquidator's final report on the affairs of the Melbourne Woollen Mill Company Ltd shows that in July 1884 the assets only just covered a building society mortgage of £18,257 and a bank overdraft of £3,196. Or again, on 26 May 1891 the Registrar of Companies was informed that Pickles's business, which was re-registered early the previous year as G. F. Pickles' Melbourne and Suburban Carriage Company Ltd, was being carried on by the Australian Financial and Guarantee Company Ltd. By piecing together the records of borrowing companies and lending institutions it may be possible to make more adequate judgments about these sources of funds and their inter-relationship with, and effect on, industrial development.

Factory Legislation and Working Conditions

It is appropriate to consider here only those aspects of factory legislation that influenced the institutional and spatial organisation of manufacturing. Earlier it was noted that the number of women and girls aged fourteen or more increased rapidly during the 1860s (Table 8.1), yet relatively few employment opportunities were open to females except in domestic service, behind shop counters or at factory workbenches. Although factory work meant long hours, low wages and poor conditions, being 'in service' was regarded as even more unpleasant and restrictive.⁶⁸ Female factory hands thus felt themselves to be in a weak bargaining position because they thought that demands for higher wages or legislative restraints on hours of work would simply encourage employers to replace them with male workers: the *Argus* reported on 20 July 1874 that the tailors' support of a proposed Tailoresses' Protection Society was regarded by some as a devious move to 'get up a feud between these women and their employers' so as to allow the men to regain their former superiority.

There is no shortage of evidence about the conditions under which women and girls worked. On 12 August 1868 the *Argus* reported the results of a survey it had conducted four weeks previously into the wages of factory girls in Melbourne, and this reveals a good deal about various aspects of industrial development at the beginning of this period and, at the same time, points up yet again the difficulties

involved in estimating the size of the formal factory workforce. The report noted that shirt-makers were generally poorly paid:

Those at work in factories, too, are not only the best, but the very small minority. There are hundreds of establishments at Collingwood and Prahran where the work which is given out to be done at home is manufactured at rates that pay but a bare pittance to any but the mistress, who is 'known at the factory', and makes her profit by employing cheap labour, which would be refused elsewhere.

Even at this stage there were, in effect, three systems operating side by side. First, there was the factory proper which concentrated on operations like cutting, machining and pressing with other work being undertaken elsewhere:

Each machine will supply from seven to ten needlewomen; and the fact that machining coats can only be done at certain intervals of its manufacture, has given rise to the rule that the women working by the piece can very nearly come and go as they like, so long as the machines are kept going. The workers all take work home with them. . . .

Apart from the machinists—generally the most skilled and highly paid girls—the factories also accommodated 'apprentices' who were taken on for periods of six months (women) or twelve months (girls under fifteen), paid nothing for half this time and a pittance each week for the remainder, and were then either given the sack or allowed to remain as 'improvers' for a further probationary period during which their wages were increased from time to time as the management saw fit. Second, a good deal of the needlework was done at home:

A single girl will get her younger sisters or her mother, or perhaps a neighbour, glad to make a few shillings by employment in the intervals of her household labour, to help her. . . .

Then, third, was the system by which someone contracted to undertake finishing work but in fact sub-contracted this to people sewing in their own homes or in shabby attic or basement workrooms. It was this form of organisation that led to what later became known as 'sweating'.

These early *Argus* revelations were, however, something of a one-day wonder and nearly another five years elapsed before public attention was again drawn to the wages and working conditions of women and girls. The plight of the sewing girls employed by the drapery and millinery establishments at Ballarat became something of a *cause célèbre* in April-May 1873 when the *Argus* reported that they were being kept at work five hours or more beyond the nominal finishing time of 7 p.m. without any extra pay. Hagan has shown how this affair led to the introduction of a Bill which, after some redrafting, became the first Factory Act in any Australian colony (11 November 1873).⁸⁹ Its main provisions, coming into operation on 1 January 1874, were:

2. The words 'factory' or 'workroom' shall mean any factory or workroom in which not less than ten persons are engaged by an

employer to work for hire or reward in preparing or manufacturing articles for trade or sale.

3. No person or persons shall employ in any factory or workroom any female for more than eight hours in any one day in preparing or manufacturing articles for trade or sale.

5. In order to meet the exigencies of trade the Chief Secretary may from time to time suspend the operation of the third clause of this Act in such factories or workrooms to be specified in writing under his hand as he after due inquiry may deem expedient upon such conditions as he may consider requisite.⁹⁰

The fourth section enabled the central or local Board of Health to make detailed regulations (which in fact were approved on 1 June 1874) about such matters as warmth, ventilation, cleanliness and sanitation.

Employees and employers both reacted in two ways. The sewing girls of Ballarat celebrated, according to the *Argus* of 10 December 1873, with a soirée and concert; however late in 1873 the female operatives of woollen-mills in Ballarat and Geelong sought permission to continue working for sixty hours per week on the grounds that they might lose their jobs, that they were paid by the piece, and that they were unable to take work home as was the case in other trades. Early in January 1874, after receiving reports that these requests were genuinely from the workers themselves, the Chief Secretary used his discretionary powers under the fifth clause to allow them to work sixty hours per week but for no more than ten hours on any one day. But this was unsatisfactory to 108 operatives from four mills who clubbed together to sign a petition opposing this decision because it upset their routine of working ten and three-quarter hours on five days and six and a quarter hours on Saturdays; on 23 February 1874 the Chief Secretary agreed to this rearrangement of the sixty hours.⁹¹ Some employers obeyed the letter if not the spirit of the Act by using almost any 'exigency of trade' as an excuse to seek dispensation under the fifth clause. In at least one case the application to the Chief Secretary was couched more as a threat than a request by making it clear that unless permission were given for the women to work ten hours a day the firm would 'be compelled to engage male weavers only'. A great many more employers simply dodged the issue by accommodating no more than nine people in any one workroom even if this meant dividing their operations between several adjoining premises or sub-contracting further work outside.

It soon became obvious that this first Factory Act was being honoured more in the breach than in the observance, and from time to time the plight of the sewing girls, or 'our white slaves' as the *Australasian* dubbed them in an editorial on 22 July 1876, was further publicised. The motives of the campaigners were mixed: some were genuinely concerned about working conditions; some were afraid that diseases like scarlet fever were being spread in the garments made in the sweating dens; and some considered the upsurge in the number of female factory employees to be an indictment of protection since future 'wives and mothers will have to be taken from the physically feeble, mentally sterile, and domestically untaught and

Plate 8: The publicity given to the plight of the sewing girls of Ballarat in April-May 1873 led some enterprising reporters to re-survey the Melbourne scene. One found that the evils of sweating had abated. Indeed when leaving work at 6 p.m. the girls, far from looking like jaded seamstresses, displayed 'a buoyancy and elasticity about the figure, a gleam of mirth in the eye, and a smile of satisfaction about the mouth'. (*Illustrated Australian News*, 20 May 1873.)

inexperienced girls . . . who scarcely know a frying pan from a soup ladle'. In mid-1879 a group of manufacturers, perhaps more scrupulous and philanthropic than their fellows, drafted a suggested bill for the registration, regulation and supervision of factories and workrooms and handed it to the government.⁹² The Victorian Manufacturers' and Exhibitors' Association was less than enthusiastic but the unions, along with other influential groups and individuals, kept the issue very much alive. Eventually a Select Committee, appointed to examine a proposal in September 1881 to regulate retail shop hours, was transmuted into a Royal Commission that in due course was also empowered to scrutinise the operations of *The Supervision of Workrooms and Factories Act, 1873*.

One quotation only is needed to indicate the general tenor of its findings (p. iv):

Much credit is due to [the] City Inspector under the Melbourne [City] Corporation, for the energy, intelligence, and impartiality he has displayed in the discharge of his . . . duties . . . Owing to his enforcement of the Act many manufacturers have relinquished operations in the city and started business in the suburbs, where the system of inspection is less strict, and where the Act is in consequence frequently evaded. In the suburban municipalities the local inspectors are supposed to have the supervision of factories and workrooms in the district, but as a matter of fact they were found in several instances to be unaware of their duties under the Act, or even of the provisions of the Act itself.

Some manufacturers said that they had never been visited by an inspector, and some inspectors (most of whom seemed to be responsible for policing everything from dogs to nuisances) admitted that they had never seen a copy of the Act or the Board of Health regulations promulgated under it. The inspector responsible for supervising workrooms and factories in the City of Melbourne estimated in his evidence to the Royal Commission on 5 July 1883 that in his area alone half the employees in the clothing trade did not come within the scope of the Act and some of the remainder did not fully benefit from its provisions because of the dispensations given under the fifth clause by the Chief Secretary without even informing, much less consulting, the local factory inspector.

Among the twenty-five proposals recommended by the Commission for inclusion in an amending bill were three in particular that attempted to repair the more fundamental deficiencies of the existing legislation. One was that, irrespective of numbers of employees, all factories and workrooms should be registered and inspected; another was that an eight-hour day should be regarded as of fundamental importance; and the third was that a factory inspectorate should be established so as to avoid both the influence of vested interests and conflicts of duty. An attempt was made on 16 October 1884 to introduce a Bill based partly on the recommendations of the Royal Commission and partly on a similar enactment passed in England six years previously (14 Vic. c. 16), but the schedule of the legislature and the strength of the opposition these proposals engendered among manufacturers together ensured that serious parliamentary debate was delayed for the best part of ten months.⁹³ During that time some of the basic proposals were watered down

prior to their again being put before the Legislative Assembly only to be further diluted during subsequent proceedings there and in the Council.⁹⁴ Thus, The Factories and Shops Act, 1885 that came into force on 1 March 1886, although certainly an improvement on existing legislation, still left much to be desired.

Two of its deficiencies are relevant here because one may have influenced the spatial arrangement of manufacturing at a macro-level and the other affected it in more detail. The Act only applied to factories and workrooms situated in cities, towns and boroughs; although any shire council could seek to have it made applicable to the whole or part of its territory none in fact did so. Since there was a good deal of industrial movement in and around Melbourne during the 1880s, the chance of escaping the provisions of the Act may have acted as one additional inducement for some entrepreneurs to choose shires like Coburg and Preston (see Fig. 9.1) rather than other local government areas. It is difficult to prove satisfactorily that this was indeed a *motivating* factor, but there were certainly complaints from manufacturers covered by the legislation that they were placed at a disadvantage compared with firms which had set up on the other side of a legal boundary.

The Act also affected the organisation and location of manufacturing at a micro-level. A factory or workroom was defined in Section 3 as

any office building or place in which six or more persons are engaged directly or indirectly in working for hire or reward in any handicraft or in preparing or manufacturing articles for trade or sale, and any office building or place in which steam or other mechanical power is used, but shall not include any dwelling office building or place in which the persons engaged in working are shown to the satisfaction of the chief inspector to be all members of the same family nearly related one to the others by blood or marriage and in which steam or other mechanical power is not used. . . .

Whereas less scrupulous employers had escaped the provisions of the 1873 Act by keeping their workforce to less than ten, some now kept the number down to five. It is difficult to unscramble cause and effect. On the one hand, it is possible—even probable—that these attempts to evade the 1885 Act increased the amount of work being done outside factories; on the other hand, no evidence has been found that they were directly responsible for any further deterioration in outworkers' conditions, as seems to be implied in the first annual report of the Chief Inspector of Factories (1887) when he wrote of the 'immense number of workrooms' employing fewer than six people 'who are compelled to work longer hours and with less comfort in every way' than those in registered factories.

The second of these reports also suggests, wrongly, that 'outwork' and 'sweating' were synonymous. In fact sweating generally arose when someone who had tendered low enough to win a contract—such as for button-holing—crowded together a handful of women and girls in a dingy, insanitary basement or backroom, and worked them long hours for a pittance per quantity produced to ensure that the job was done on time and at a profit.⁹⁵ Outwork also embraced a range of other situations such as tailors working at home under 'normal' hours and conditions only

because there was no room at their employers' factories; boot finishers working where they could because proprietors said they took up too much space in a factory and 'annoyed' the other hands since 'they always have gas burning'; young mothers and elderly widows, sometimes helped by parents or children, sewing at home on contracts individually negotiated with factory proprietors; factory girls taking their employers' work home to finish off at night; and men, who perhaps sold newspapers during the day, doing a second job like pressing suits in the evening. Many households had reason to be grateful for an industrial system that was sufficiently flexible to allow women and girls and unemployed or disabled men to earn money at home as and when their domestic or medical circumstances allowed or required. Nor should it be overlooked, when assessing the practice whereby factory girls took work home with them, that one of the complaints of the Ballarat sewing girls in 1873 was that they were *not* allowed to take work home and therefore had to stay late at the workroom and then walk through ill-lit streets in the middle of the night.

It is difficult to form any judgment about how many people were involved in outwork, the frequency with which individuals and households moved into and out of the system, or the extent to which it supplemented the productive capacity of the more formal factories. It appears to have been confined almost entirely to the clothing and footwear trades though, on occasion, other firms like manufacturing stationers used outside labour for certain jobs. No estimate, official or unofficial, seems to have been made about the numbers involved during the 1880s and, in any case, such a figure would have had little meaning because of the complexity of the system. The *Statistical Register* separately distinguished 'homeworkers' for the first time in 1895 but the 726 females and 134 males shown in that year by no means represented the full extent to which people were employed in this capacity.

The incidence of 'sweating' within the outwork system is even more difficult to assess. The usual situation in which sweating occurred shaded off into others. There were accusations, if not evidence, that some factory proprietors would only take on girls willing to do work in the evenings at home at less than log rates, and that women went aboard newly arrived, polyglot immigrant ships to inveigle people of the same nationality into their domestic workrooms. It seems probable, too, that the extent and nature of sweating fluctuated: the Chief Inspector of Factories in 1888 was arguing that 'the demand in almost every class of work is in excess of the supply, and as long as this exists "sweating" would appear to be almost impossible', but a couple of years later he again noted that 'the evil exists to a certain extent.'

Agitation about the existence of sweating in Melbourne, which had also been gathering momentum because of reports about the prevalence of this practice in Britain and New Zealand, came to a head late in May 1890. In part this was probably a genuine reaction against the 'horrors of the clothing trade' revealed in reports about the 'sweaters in Melbourne' which the *Age* featured on 28 and 29 May 1890. But some of the evidence and subsequent fuss was deliberately stirred up by the Tailors' Union as part of a campaign to smear as 'sweaters' all 'outdoor' men (who were excluded from the Union); according to the *Age* of 30 May 1890 the latter

responded by forming the Outdoor Tailors' Union and then joining the anti-sweating chorus. A mass gathering on 9 June appointed a delegation to urge upon Deakin, the Chief Secretary, the need for legislation to suppress sweating, and at a meeting of tailoring trade workmen on 23 June it was decided to send a deputation to persuade the eleven employers known to be sweating labour (the small number is perhaps not without significance) to discontinue the practice. In the meantime, Deakin put all the resources of the Chief Inspector of Factories on to the task of producing a report on the 'sweating system', but because of the short time available and the lack of any special powers to examine witnesses only some three hundred cases involving the use of outworkers were examined. This survey was finished on 21 July and concluded that many people had to work for wretched rates of payment which made it difficult to earn a livelihood even by toiling for very long hours. But something of the many facets of outwork is indicated by the fact that, of the 134 female workers examined, 89 were dependent on outside work and 61 of these were unable to leave their homes for one reason or another, while 45 were not dependent and simply worked for 'pocket money'. Perhaps because it was obvious that the system enabled some people to keep themselves who would otherwise have been supported by the State, the Chief Inspector recommended closer supervision of outwork rather than complete suppression. The government, however, did nothing until 1 June 1893 when it appointed a Factories Act Inquiry Board to investigate continued allegations of sweating and of insanitary conditions in factories. This Board found deficiencies in the way factories were registered, largely because of divided authority between the factory and health inspectors, and also concluded (p.27)

That the practice known as 'sweating', once comparatively limited in extent, has recently from a variety of causes, obtained a stronger foothold among those employed in connexion with the manufacture of apparel. That the evil is apparently becoming more widely spread, and that the collapse of the Tailoresses' Union was one of the factors in bringing about the low prices at present ruling in the clothing trade.

This report led, late in 1893, to a short amending Act (57 Vic. no. 1333) which, from 1 January 1894, reduced the minimum size of a factory from six to four workers and made it compulsory for proprietors to supply information about work done on and off the premises. Three years later this was followed by another and much longer amending Act (60 Vic. no. 1445) which, *inter alia*, (i) provided for boards to be set up to fix prices for certain work (e.g. clothing and furniture making); and (ii) made it compulsory for every outworker who 'wholly or partly prepares or manufactures for trade or sale any articles of clothing or wearing apparel' to register. During the fifteen months to the end of 1897 nearly 2,400 outworkers registered with the Chief Inspector.

One further matter relating to factory legislation must be considered here because of its association with what was probably the only example of an industrial 'quarter' to develop anywhere in Australia during the nineteenth century. This was the Chinese furniture making industry which started to grow up during the 1870s

in a veritable warren of backrooms and backyards in a confined area of about 10 acres of central Melbourne bounded by Little Lonsdale, Exhibition, Little Bourke and Russell Streets. Working long hours for low wages, the Chinese soon captured a considerable proportion of the lower quality furniture trade much to the chagrin of their European competitors. In 1880 there were only a dozen or so such factories employing sixty-six Chinese and twenty European cabinet-makers and polishers (the largest factory, run by Ah Yet, alone employed some thirty Chinese and seventeen Europeans).⁹⁶ But even this situation caused increasing irritation to unionists in general and to members of the Victorian Furniture Manufacturers and Employees Trade Protection Society in particular. About this time two particular issues arose. First, the European cabinet-makers discovered in April 1880 that some of the government contracts for furniture were being sub-let to the Chinese and accordingly sought—and received—an assurance from the Minister of Public Works that the practice would be stopped. Then only a few days later the executive committee of the commissioners responsible for arranging the international exhibition due to be held in Melbourne the following year called tenders for the supply of 6,000 chairs, and attached the condition that they should be made locally but not by Chinese. The government quickly took steps to have the conditions withdrawn, whereupon the Victorian Furniture Manufacturers and Employees Trade Protection Society, seeing the hall-full of chairs that had been snatched from its grasp as the thin end of a wedge, called on other trades to protest against, and if possible boycott, any activities in which Chinese competed with Caucasian. It was perhaps inevitable that the Factories and Shops Bill of 1885 should be seen by some as an opportunity to control the Chinese furniture makers, and thus during its course through the Legislative Assembly a clause was added providing that all such products should be branded 'manufactured by Chinese'. The Legislative Council, however, thought this invidious and, simplifying a more complex story, the clause was amended to read 'all furniture manufactured or sent out of any factory or workroom shall be legibly and permanently stamped' (49 Vic. no. 862, Section 59). Since there was no penalty for ignoring this clause, it was in reality a dead letter.

The first report of the Chief Inspector of Factories for the ten months ending 31 December 1886 contained a strong condemnation of the Chinese furniture factories which were difficult to find, overcrowded and insanitary and run by people who pretended not to understand the Act or argued that it was not applicable because everyone working there was a blood relative. Nonetheless, the inspectorate had managed to trace twenty-three places together employing 320 hands. Four months after the Chief Inspector submitted his report in August 1887, Deakin introduced a Factories and Shops Act Amendment Bill that not only made any office, building or place in which a minimum of *two* Chinese were making *any* goods for sale subject to the provisions of the Principal Act⁹⁷ but also tried on 8 December 1887 to reintroduce legislation whereby the Chinese alone would have to brand their furniture on the grounds that they 'have already, in this city, invaded and almost destroyed the important industry of cabinet-making'. But the Legislative Council,

Plate 9: The concentration of fifty or so Chinese-owned furniture factories in a confined area of inner Melbourne during the 1870s and 1880s was one of the few instances in Australia of the emergence of an ethnic industrial quarter. Other furniture makers bitterly resented this competition, so much so that even in the early 1970s some Melbourne-made products were still being labelled 'European labor only'. (*Australasian Sketcher*, 24 April 1880.)

while it was prepared to see the Act applied to virtually any place where Chinese were working, was not persuaded to change its mind about the marking of furniture which it regarded as an entirely separate issue—as, in truth, it was. The Chinese, finely judging how far they could push bureaucratic patience, were not greatly affected by the legislation and in 1888 the forty factories and their 435 employees were said to be prospering and ‘quite unable to meet the demand made upon them’. But twelve months later it was a different story for they had ‘suffered more from the dullness of trade than any other cabinet makers’; things were no better during 1890 when ‘some of the largest and oldest established places [were] closed through insolvency, some [proprietors] have given up business and gone back to China’. The Factories Act Inquiry Board devoted its second report, dated 19 June 1894, to the furniture industry in general and the Chinese section of it in particular. It found both the European and Chinese industries to be in a very depressed state, and concluded that the Chinese factories, still operating in premises used for eating and sleeping as well as working, needed to be much more strictly controlled and more deliberately excluded from government contracts. As a direct outcome of these views and the evidence presented, the factories legislation in 1896 (60 Vic. no. 1445) was made to apply to all Chinese workshops, in effect bringing even one-man businesses under scrutiny.

Employees and Employers

The 1873 factory legislation was mainly directed towards raising the general physical standard of working conditions and, more specifically, to limiting the working hours of females. The 1885 Act not only elaborated the general health, hygiene and safety regulations but introduced others relating to the employment of juveniles: no one under thirteen years of age could be employed in a workshop or factory; no female and no male under sixteen could, without dispensation, work for more than forty-eight hours a week; no boy under fourteen or girl under sixteen could work before 6 a.m. or after 6 p.m.; and people under eighteen were barred from working in certain dangerous or noxious trades. But this legislation left a wide range of matters, such as the hours of work for men, wage rates, the numbers and training of apprentices, and the use of ‘outside’ workers, as issues to be resolved between employer and employee. Reports of disputes that erupted, and blow by blow accounts of the negotiations to resolve them, filled column after column of the Melbourne dailies, especially during the 1880s. An extensive discussion of these events—important collectively in helping to shape aspects of Victoria’s industrial development—is unnecessary in the light of Serle’s account of them.⁹⁸ Nonetheless, a brief review of three particular disputes will indicate that union activities were not without spatial significance at both the micro- and macro-levels.

Passing mention was made earlier in the chapter of an important dispute in the bootmaking trade in the mid-1880s. Leaving aside many of the finer details, this affair really began early in 1882 when the journeymen bootmakers submitted a new schedule of job rates to the manufacturers. When after a year no reply had been

received, the operatives in January 1883 appointed representatives to negotiate with the employers after making it clear that strike action would, if necessary, be taken. The manufacturers at first agreed to a new schedule but a month later changed their minds, whereupon the Victorian Operative Boot Makers' Union (VOBMU) sought to begin extensive negotiations with the Victorian Boot Manufacturers' Association (VBMA). Each side appointed nine representatives who managed, during the course of thirty-three meetings under an independent chairman, to compile an acceptable log of prices, and to agree that one man in six might be employed at weekly wages (mainly to enable him to teach apprentices) and that one apprentice could be allowed to every five men. Most of the sixty or so leading manufacturers abided by these arrangements but about a dozen refused and, when strike action was taken against them in October 1883, simply took on non-union labour.

By the end of 1883 the boot trade was, therefore, operating under two systems. On the one hand, there were factories being conducted on the basis of the VOBMU-VBMA agreement and, on the other, some factories were being run by the dissenting manufacturers who employed people originally non-unionists but who had formed an association of their own which placed fewer restrictions on men and management (permitting, for instance, both overtime in the factory and outwork). Given the economic pressures on the boot trade in the 1880s, such a live and let live situation could not have lasted: the majority of employers, tied hand and foot by the union, could hardly have stood by and watched a relatively small group of competitors cut its labour costs and thus threaten their markets. Moreover, the 'paid agent' of the VOBMU was W.A. Trenwith—reckoned to be 'one of the most militant and abrasive stirrers' of the era, so that strife was not probable but inevitable. The exact sequence of events in the latter half of 1884 is uncertain. It seems that trouble started to come to a head again in August when one of the manufacturers who had previously accepted the VOBMU-VBMA agreement decided to put all his men on weekly wages graded according to ability. This was unacceptable to the VOBMU and the factory thus turned to non-union labour. Other employers, tired of being pushed around by the VOBMU, also decided to dig their heels in and announced that on and after 17 November they would: (i) resume the system of having work done outside; (ii) not employ hands from another factory unless they could produce a discharge certificate; and (iii) not allow union officials on their premises without permission. Men who refused to work under these conditions were locked out and by late November some 1,400 hands were unemployed. The dispute spread to Ballarat where there was also a lock-out early in December. Negotiations in this town led to a resumption of work there after about six weeks, but the Melbourne organisers of the VOBMU quickly persuaded the men that they had made a serious error of judgment by giving way on the issue of outside work, and again they walked off the job.

It is not necessary to detail the accusations and counter-accusations that flew freely until early February 1885 when more serious negotiations began between representatives of the Trades Hall Council and of 'employers of labour' who, on

10 February, recommended terms for a settlement to the manufacturers and operatives. The part of the agreement relevant here, as reported in the *Argus* next day, stated

That home labour should be provided for as follows:— (a) Until 31st December, 1885, one-sixth of each class the whole number of finishers and putters-up employed by any manufacturer may be employed in work outside the factory; (b) the work to be so given out to be limited to such quantities as shall only enable each man to earn therefrom maximum wages of £3 in each week; (c) each manufacturer to supply to the union through his shop's president the names and addresses of all outside workmen employed from time to time by him, and also when required to produce his books to show the amounts of wages paid to such workmen, or any of them; (d) at December 31, 1885, or at any time thereafter, should the union so desire, outside work shall thenceforth only be done under permits, to be issued by a board . . . it being understood that such permits shall issue where special circumstances in any applicant's case . . . make it evident to the board that he would be placed relatively at a disadvantage in working inside a factory. This arrangement for permits to continue until 31st December, 1886, at which date or at any time thereafter either party may determine it by having given to the other party three months' previous notice in writing.

These events were spatially significant in two ways. First, it was this pressure from organised labour rather than the introduction of machinery alone which accelerated the process of bringing all sections of the footwear industry within the formal factory system. Indeed most of the 'finishing' stages, which made up the bulk of the work being undertaken 'outside' during the 1880s, were done 'on the last' by hand, and the chances are that but for union intervention outside work of this kind would have remained important for much longer. Although some use was still being made of outworkers during the late 1880s and 1890s, most boots and shoes were by then entirely made 'inside' and this, in turn, influenced the long-term change in the relationship between workplace and dwelling. On the one hand, the concentrating effect, caused by the need to shift barrow-loads of boots in various stages of completion quickly and frequently from factory to dwelling and from one house to another, disappeared and the workforce had a greater freedom to choose where to live. On the other, the stringent standards of hygiene imposed by the 1885 Factory Act, the need to make room for more workers, the reorganisation required to accommodate odoriferous finishing processes, and the growing use of steam and gas engines to drive machinery, all necessitated the construction of new, or the remodelling of existing, premises. This precipitated both structural changes in the footwear industry and locational readjustments. Second, these union activities were helping to eliminate the wage differences that existed between various parts of the colony: the impact on the cost structure of some provincial manufacturers was considerable for they were not only brought into line—usually for the first time—with the rates paid by Melbourne employers but all were faced with increased direct and indirect labour costs.

This point is illustrated in the second dispute to be reviewed here. Early in 1889

members of the Ballarat branch of the Ironworkers' Assistants' Union (IAU) asked the management of the Phoenix Foundry to grant them the same wages and conditions as were current in Melbourne foundries for members of the parent union. Instead of 6/- for an eight-hour day and no allowance for overtime they wanted 6/9d per day, fifteen minutes daily overtime at the rate of time and a quarter (because they had to arrive early to prepare the fires for the smiths), and double time on Sundays, Christmas Day, Good Friday and Eight Hours Day. The management dallied and eventually on 22 March the 130 IAU members at the Phoenix Foundry and some other employees walked off the job. Then began an eight-week dispute—the most significant outside Melbourne during the whole of this period—which soon spread to the other foundries in the town and turned into a lock-out. After a fortnight, the Phoenix Foundry, by far the most important of those involved, reopened on 30 April and employed some non-union labour. Despite the 'wild scenes' that resulted, an agreement was worked out during the next few days whereby the Phoenix Foundry undertook to pay IAU members a minimum daily wage of 6/9d and make an allowance for overtime, while the IAU accepted the firm's right to hire and fire as it saw fit and to retain some of its non-union labour. In a matter of months, therefore, about one-fifth of the Phoenix Foundry's workforce gained a 15 per cent wage increase: over a full year this would have added about £1,870 to the firm's wage bill, and the impact of this becomes apparent when it is borne in mind that the foundry's locomotive contracts alone were running at about £110,000 a year, or about £3,175 per engine. A further point is worth noting, if only because the two Melbourne dailies—which seldom agreed about anything—both hinted that there was more to the affair than appeared on the surface. On 13 April 1889 the *Age* reported a view that the 'strikers have been converted into a "cat's paw" to serve metropolitan interests', and three days later the *Argus* noted that

The directors of the Phoenix Foundry have for some time been considering the advisability of removing the establishment to Melbourne so as to save the cost of the conveyance of fuel, etc, and it is said that they have already obtained a site in a suitable place . . . It is stated in some quarters that the pressure put by the Melbourne men upon the Ballarat association was inspired by the hope of crippling the Phoenix Foundry.

It is impossible to say what, if anything, went on behind the scenes in this particular case and whether any notice can be taken of these innuendoes. But there is no doubt at all that Melbourne ironmasters were anxious to see the Phoenix Foundry and any other non-union works brought into line. At one of the first meetings of the Board of Conciliation,⁹⁹ according to the *Age* of 21 February 1888, Henry Dodds, of Robison Bros and Company, was reported to have argued that

Non-union shops had a great advantage over union shops. The successful tenderer for the manufacture of wrought iron pipes for the Yan Yean was an employer of non-union labor. His (the witness's) firm had been beaten in the competition in consequence. The same was the case with the Phoenix Foundry, which was almost continuously successful

in its tenders, because it was not subject to union rules. Such shops could get more work out of their men, and from 15 to 20 per cent. cheaper.

As if to bear witness to this testimony, the Phoenix Foundry during the following nine months was awarded contracts worth £222,000 for seventy railway locomotives, although Dodds himself may have been mollified when his firm was also given a contract to build twenty-five (Table 8.6).

There is other evidence that Melbourne manufacturers, perhaps not unreasonably, tried to ensure when accepting union demands that their country cousins would be subject to the same costs and restraints. The third dispute to be examined here shows clearly that it was the Melbourne employers who were pushing the society concerned to take action in other parts of the colony and, if possible, beyond its borders. On 21 July 1884 the United Millers, Engine Drivers, and Mill Laborers' Society wrote to each mill-owner in Victoria asking him to introduce the eight-hour system, in effect cutting the weekly hours from fifty-six to forty-eight, without reducing wages. On 29 August 1884 the millers resolved

That, while recognising the principles of working eight hours, mill owners find it impossible to carry out a system unless it is adopted unanimously by the whole of the millers in the colony.

There the matter seems to have rested until late in 1885 when, after mustering pledges from its members, the Society threatened to call a strike timed to coincide—not by chance—with the start of the new milling season on 1 February 1886. The handful of members of the Millowners' Association of Melbourne met on 7 January and resolved that

the Melbourne millers are prepared to adopt the eight hours system provided the leading Adelaide millers, and 25 per cent. of the principal country millers of Victoria can be induced to do likewise; or the town millers will consent to a reduction to the system of eight hours for a day's labor provided the men are content to meet them in a fair spirit, and accept a proportionately reduced scale of pay.

This seemingly conciliatory attitude was soon exposed as mere window dressing: when, immediately, the Society agreed to accept a 10 per cent cut in any wages over 40/- per week, the Association said that it was still really seeking a guarantee that, if its members introduced an eight-hour system, the country millers would follow suit. The Society appears to have been persuaded by the force, if not the justice, of this argument and over the next three or four years was able to cajole most owners into operating their establishments on 'union lines'. The process of persuasion had to be done district by district since many country millers said that they would only agree to union demands if nearby competitors did likewise.

Then a new twist arose. Millers operating along the southern side of the Murray River wanted their competitors over the border in New South Wales also saddled with the eight-hour system. Accordingly in November 1889 the Society's itinerant organiser visited Albury and managed to start another hare running: two of the

millers operating there had establishments elsewhere in New South Wales and were therefore keen to see the eight-hour system generally introduced rather than merely in their border mills. Three months later the Victorian Society was asked by some mill employees in Sydney to help launch a similar organisation in New South Wales. There is an ironic touch about this train of events. Some of the Melbourne milling firms, which to protect their own interests had encouraged the unions to be more zealous in the mid-1880s, found themselves seven years later having to introduce the eight-hour system in the Sydney mills they were operating which up to this time had been paying 36/- for a sixty-hour week.

The Millowners' Association of Melbourne appears to have been somewhat unusual, however, in that the activities of most employers' organisations had much less spatial significance, but even so they cannot be dismissed out of hand. There were two sorts. First, there were numerous groups of manufacturers who came together loosely or formally to consider problems facing their industry; the Melbourne mill-owners were only one among sixty or seventy associations of employers that came into being during the 1870s and 1880s, many of which were formed with the object of negotiating with employees and unions. The Clothing Manufacturers' Union, for instance, came into existence on 23 January 1883 just forty days after the Tailoresses' Union had emerged. In most cases the sentiments were the same even if the words differed: the *Age* of 3 February 1885 quoted a 'typical' employer arguing that

If the trades were going to dictate what the manufacturers were to do, it was their duty to band together, not for the purpose of doing an injustice to the *employés*, but for their own interest. A lot of high flown speaking had taken place at the Trades Hall about 'the men won't give in', and so on, but was it expected that the manufacturers would stand still and see this?

Employers' organisations also made representations to government on such matters as contracts and customs duties, usually relating to the trade as a whole but sometimes affecting the members in a particular area. Early in 1878 the Sawmillers' Association took up the case of its Murray River members when it was thought that they would have to pay the newly imposed red gum export duty not only on railway sleepers (an argument that had already been lost) but also on 'marketable waste'. The responsible Minister said he had been unaware that only 25 per cent by volume of the logs could be formed into railway sleepers; that the heart and slab, making up about 47 per cent of the volume was being sold at the rate of one million feet a year to Riverina settlers for slabbing wells and for the erection of woolsheds, sheepwashes, huts and homesteads; or that the remainder was absolute waste. Nor had he appreciated that if the proposed levy curtailed the sales of marketable waste the price of railway sleepers would have to be raised in order to cover the cost of the logs, and some of the flow of Riverina wool through Victoria might be diverted to South Australia because this building slabwood formed an import back-loading for the river steamers.¹⁰⁰

Second, there were various successors to the Victorian Manufacturers' Asso-

ciation which, as indicated in Chapter 7, had become moribund within two or three years of its formation in 1865. Next came the United Manufacturers' Association of Victoria in September 1874 which concerned itself with topics as diverse as exhibitions, water shortages, and patent laws but found its members rather less than united on issues like tariff reform and the inauguration of land taxes. Probably for this reason it was superseded in March 1877 by the Victorian Manufacturers' and Exhibitors' Association, the organisation which in 1879 opposed the changes to the 1874 Factory Act that were proposed by a small group of their confrères. On other issues it showed itself to be more forward-looking: it put forward the suggestion that the government should subsidise the fares of people proposing to travel from Great Britain to visit the Melbourne International Exhibition of 1880, and a couple of months later resolved

That it should be the policy of this country to give every encouragement to the establishment of new industries, by grants of land and otherwise, and that it is the opinion of this association that the Government should take measures to inform the public of the United Kingdom and other countries, at least six months before the opening of the Exhibition of 1880, that grants of land can be had for the establishment of new industries.

During 1881 the Association translated itself into the Victorian Chamber of Manufactures which, by the middle of the decade, was directing a good deal of its energy towards the promotion of free trade between the Australian colonies.¹⁰¹

Curiously enough there was, until mid-1885, no equivalent organisation in New South Wales: the Victorian Chamber expressed regret in its annual report for the year ending 31 March 1885 that

there appears to be no Chamber of Manufactures in the said Colony of New South Wales, through which, by a friendly interchange of views, questions of importance to the manufacturing interests of both Colonies might be opened with reciprocal advantage.¹⁰²

Later that year a New South Wales Chamber was formed and the exchanges of views which followed led to Intercolonial Free-trade Conferences in Adelaide (5 to 7 October 1887), Sydney (6 to 8 June 1888) and Melbourne (14 to 16 November 1888). The Victorian Chamber, which had floated the idea of such discussions in February 1887, also moved the first motion: as finally adopted (and reaffirmed at the subsequent conferences) this resolved

That in the opinion of this Conference it is desirable that free-trade amongst the colonies of Australia should be established on the basis of a Customs Union with a uniform tariff.¹⁰³

It is not surprising that the initiative should have come from Victoria where some industries, like the manufacture of footwear, had been unable to expand or even hold their export markets: the value of locally made and processed goods sent from this colony to the rest of Australasia dropped from £6,530,000 during the first part

of the 1880s to £4,570,000 during the second. As one delegate at the second conference commented:

It was all very well for Victoria who had now fostered her industries, and having secured the position she now holds, to say to her neighbours:—‘Pull down your fences and we will have a fair fight’.¹⁰⁴

The pulling down of the colonial fences and the reconstruction of an Australian one are, however, episodes that must await a later discussion.

This and the previous chapter have illustrated the great diversity of factors that affected secondary industry in Victoria during the forty years to 1890. Above all they have drawn attention to the pervasive role played by government both through formal legislation and through executive action for which it ultimately was responsible. Tariff policies, to which so much—largely uncritical—attention has been given, probably did as much harm as good after 1879 and at no stage helped to create a ‘solid’ industrial base, to develop the colony’s natural resources, or to foster the introduction of new technologies. Among other things, the negative effects of these policies and the positive influence of government contracts have previously received little attention¹⁰⁵ but it is impossible to understand many of the subtleties of the processes of industrial development without taking them into account. Aggregate performance, which for want of better alternatives has to be measured largely in terms of employment and investment, suggests that there was long-run growth during much of this period but, as has been indicated, this obscures the fundamental weaknesses of much that occurred. Similarly, aggregate data tend to disguise the emergence of influences that were beginning to modify the spatial organisation of manufacturing and it is on these that the discussion must now be focused.

9 The Geography of Manufacturing in Victoria 1851 to 1890

This chapter examines the spatial organisation of manufacturing in Victoria during the forty years to 1890 and focuses particular attention on forces affecting the relative importance of factory employment in the metropolitan and non-metropolitan areas. Contemporaneously with the spatial processes taking place in the colony as a whole were others, including the spread of manufacturing occurring within the metropolitan area itself. The relationships between these sets of processes were far from simple. The slowly increasing concentration of the colony's factory workforce in Melbourne (taken to mean throughout this chapter the Metropolitan Board of Works district shown in Fig. 9.1) was one—but only one—of the various stimuli leading in the 1880s to the 73 per cent increase in its population. And, in turn, the growing pressure on space in the inner areas of the metropolis (reflected in rising land prices) was only one of several factors impinging on the locational decisions of manufacturers. Among others were stricter factory legislation and inspection, advances in technology, changes in factory layout brought about by mechanisation and new processes, the stiffening attitude of trade unions to arrangements like outwork, and the residential dispersal of the workforce. At the same time the range of possible locations was being widened by reclamation schemes and other public works, by the spread of utilities like gas and water, and by the inauguration or improvement of transport and communication services including railways, omnibuses, tramways and an embryonic telephone system.

These sorts of influences gathered momentum towards the latter part of the 1870s and greatly reinforced specific centrifugal forces already operating. Some legislative actions had had an immediate impact: the Melbourne Building Act which came into operation on 1 January 1850 had stimulated development in unrestricted areas like Collingwood beyond the City boundaries.¹ Other measures, especially those relating to industrial nuisance, had notionally come into effect during the 1850s but, like the Act of 1855 (18 Vic. no. 36) forbidding the dumping of noxious waste and rubbish into the Yarra River 'above the City of Melbourne' which was reaffirmed in 1865, most were unsatisfactory and difficult to police, or, like the by-law passed by the Melbourne City Council in 1853 aimed at suppressing smoke pollution, were not seriously enforced until the 1880s. Yet these enactments and regulations, through the inquiries, prosecutions and protests they spawned, gave fair warning to industrialists that *laissez-faire* location and unreasonable behaviour could not be continued or condoned much longer. Adding to the complex series of forces affecting factory location in Melbourne were the leases and occupation

Fig. 9.1: Factory employment in the local government districts within the Melbourne and Metropolitan Board of Works area of 132 square miles (defined under 54 Vic. no. 1197, 20 December 1890) during the year ending 1 March 1890. (Source: *Vic. SR*.)

licences offered to new and existing industries under The Land Acts of 1862 and 1869.² By the end of July 1872 about 50 acres along the south bank of the Yarra River west of Princes Bridge had been allocated to sixty industrial enterprises, a similar acreage had been granted to others at Yarraville where Stony Creek joins the main river, and smaller allotments had been made of sites located at various points from the centre of the City through to the periphery of the metropolis. But

consideration of these matters must await separate treatment: here the emphasis is on industrial development elsewhere in Victoria in relation to that taking place in Melbourne as a whole.

Fig. 9.2: Male and female factory workforces in Melbourne and the remainder of Victoria 1868-1900 ('Melbourne' is defined in Fig. 9.1). The data are drawn from Appendix Table A1.6.

The contours of metropolitan and non-metropolitan factory development

The contours of factory employment in Melbourne and in the remainder of the colony are depicted in Fig. 9.2. These were prepared at the same time as the series discussed in the previous chapter and suffer from the same weaknesses as well as from others caused by the need to dissect some estimates spatially.³ Overall, however, they probably give a reasonably good impression of what took place. Male factory employment trends in the metropolitan and non-metropolitan areas

were not dissimilar. In Melbourne this workforce grew at about 6.6 per cent a year from the end of 1868 to the beginning of 1890 (when it was at its nineteenth century peak) despite major interruptions in 1870, between 1877 and 1879, and again during 1886 and 1887. Elsewhere it reached a zenith in 1888-9 after growing at about 5.2 per cent a year, with interruptions roughly coinciding with those experienced in Melbourne even if rather more pronounced. Female factory employment trends were, however, more complicated. The series for Melbourne largely reflects circumstances in the clothing and footwear industries (depicted in Fig. 8.6), notably the slow growth after 1881, the very marked contraction of activity in 1886, and the brief revival of business towards the end of the decade. The number of females employed in factories elsewhere in the colony hardly changed after about 1880 despite the brief but eye-catching peaks (in fact involving only a few people) in 1882 and 1890. The first of these reflected the brief diversion of orders to provincial centres during the trade disputes in the Melbourne clothing industry late in 1882 and early in 1883; the other episode was almost wholly due to a doubling—in 1890 only—of the number of females employed in Greater Ballarat, a curious aberration for which no plausible explanation has been discovered. The statistical evidence for the 1870s and 1880s can thus be quickly summarised. First, during most of this period the male factory workforce outside Melbourne continued to increase but at a slower rate than that within the metropolis; second, the initial expansion of factory employment opportunities for women and girls outside Melbourne fizzled out during the late 1870s and then gradually diminished in importance both absolutely and relatively; and, third, contrary to the usual view Melbourne edged rather than forged ahead, only managing to increase its share of the colony's factory employment by three percentile points in the two decades to 1888-9 (Table 9.1).

A further dissection of non-metropolitan factory employment in Table 9.2 traces events in a cohort of twelve towns chosen, irrespective of population size, because each had a minimum of 100 factory workers for much of this period. Until the mid-1870s these towns gained, relatively, at the expense of the remainder of non-metropolitan Victoria: from then on, however, their position deteriorated, largely because the factory workforce in Greater Ballarat and Greater Geelong failed to keep pace with that in the colony as a whole. Nonetheless, it is clear from Fig. 9.3, that by 1890 these two centres and Greater Bendigo still dominated the non-metropolitan manufacturing scene. This summary may leave the impression that after an initial expansionary phase in the 1850s and early 1860s factory activity in non-metropolitan Victoria reached a fairly simple and perhaps static relationship vis-à-vis that in Melbourne. In reality there was constant interplay resulting from a complex series of centrifugal and centripetal forces which stemmed not only from changes in inputs such as labour and capital but also from factors like entrepreneurial competence and commercial practice. These are examined in the remainder of this chapter through a series of case studies of individual industries selected because of the light they throw on the *processes* of industrial development and location. Taken together they also point up some aspects of Melbourne's

Table 9.1 Proportional distribution of factory employment by sex and area, Victoria, selected years 1868 to 1888-9

Area	1868	1872-3	1876-7	1880-1	1884-5	1888-9
<i>Males</i>						
Melbourne ^a	{ 59.4 }	60.6	63.3	64.8	64.6	65.0
Twelve towns ^b	{ 40.6 }	17.6	20.0	18.1	17.9	15.3
Rest of colony		21.8	16.7	17.1	17.5	19.7
<i>Females</i>						
Melbourne ^a	{ 94.4 }	88.9	84.6	87.2	87.3	86.6
Twelve towns ^b	{ 5.6 }	8.3	13.2	10.5	10.9	11.8
Rest of colony		2.8	2.2	2.3	1.8	1.6
<i>Total</i>						
Melbourne ^a	{ 66.1 }	65.5	67.5	69.7	69.3	68.6
Twelve towns ^b	{ 33.9 }	16.0	18.7	16.4	16.5	14.7
Rest of colony		18.5	13.8	13.9	14.2	16.7

^a As nearly as possible the Melbourne and Metropolitan Board of Works area as defined in 1890.

^b Greater Ballarat, Greater Bendigo, Greater Castlemaine, Echuca, Greater Geelong, Hamilton, Horsham, Maryborough, Sale, St Arnaud, Stawell and Warrnambool.

Source: Derived from a more detailed analysis of the data summarised in Table A1.6.

Table 9.2 Factory employment in twelve Victorian towns showing actual numbers and percentage of colonial total, selected years 1872-3 to 1888-9

Town ^a	1872-3		1876-7		1880-1		1884-5		1888-9	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
<i>Males</i>										
Ballarat	1,023	5.3	1,775	6.7	2,086	6.6	2,574	6.3	2,357	5.0
Bendigo	615	3.2	829	3.2	1,075	3.4	1,479	3.6	1,812	3.9
Castlemaine	244	1.3	373	1.4	292	0.9	381	0.9	409	0.9
Geelong	795	4.1	1,161	4.4	1,153	3.7	1,274	3.1	1,116	2.4
Other eight	706	3.7	1,133	4.3	1,095	3.5	1,644	4.0	1,462	3.1
<i>Total</i>	3,383	17.6	5,271	20.0	5,701	18.1	7,352	17.9	7,156	15.3
<i>Females</i>										
Ballarat	207	5.1	444	7.0	287	3.3	330	3.1	380	4.0
Bendigo	10	0.3	12	0.2	283	3.2	407	3.8	447	4.8
Castlemaine	3	—	38	0.6	23	0.2	37	0.3	60	0.6
Geelong	90	2.3	283	4.4	283	3.2	281	2.6	162	1.8
Other eight	22	0.6	63	1.0	50	0.6	114	1.1	57	0.6
<i>Total</i>	332	8.3	840	13.2	926	10.5	1,169	10.9	1,106	11.8
<i>Total</i>										
Ballarat	1,230	5.3	2,219	6.8	2,373	5.9	2,904	5.6	2,737	4.9
Bendigo	625	2.7	841	2.7	1,358	3.4	1,886	3.7	2,259	4.0
Castlemaine	247	1.1	315	1.4	315	0.8	418	0.8	469	0.8
Geelong	885	3.8	1,444	4.4	1,436	3.6	1,555	3.0	1,278	2.3
Other eight	728	3.1	1,196	3.4	1,145	2.7	1,758	3.4	1,519	2.7
<i>Total</i>	3,715	16.0	6,111	18.7	6,627	16.4	8,521	16.5	8,262	14.7

^a The four towns named are composite groupings of adjacent local government areas; the other eight are identified in note *b* to Table 9.1.

Source: Derived from a more detailed analysis of the data summarised in Table A1.6.

Fig. 9.3: Factory employment in local government areas in Victoria during the year ending 1 March 1890. The twelve towns named are those analysed in Tables 9.1 and 9.2. (Source: Vic.SR.)

'dominance' which are not adequately reflected in the factory statistics themselves, and further illustrate the pervasive influence of government. One such aspect, railway freight policies, can be conveniently considered now as a preliminary to the industry studies themselves.

Railway Freight Rates

It is intended here to give only a greatly simplified account of three main interwoven aspects of railway freight rate policies: the absolute level of charges, the low rates (usually in the form of rebates) devised as a means of competing with New South Wales and South Australia, and the various special rates applied to particular commodities and places.⁴

The situation prior to 1875

The first comprehensive freight rate schedule under The Railways Act of 11 September 1863 came into effect on 9 February 1864. It consisted basically of a mineral class charged at 4d per ton-mile, and four other classes charged at 5d (generally low value, robust goods), 6d, 7d and 9d (valuable and fragile items). These rates applied both to journeys 'up' towards and 'down' from Melbourne.

However, some agricultural commodities (like bagged grain, colonial tobacco leaf and flour) and miscellaneous goods (including beer, bricks, hides, leather in bales, and preserved meat) when dispatched in lots of 2 tons or more were charged 5d on the 'down' journey but only 3d on the 'up'. There were also special rates for a number of commodities that are not of concern here, as well as for sawn timber which will be discussed later. All charges were based on actual rail distance except journeys between Melbourne and Geelong and Ballarat. The 45 miles between the capital and Geelong were reduced by special rates to a 'cost-distance' of 25 miles: for example instead of Class 1 goods paying 18/9d per ton they were charged only 10/5d, a procedure that was later defended because of the need 'to meet the competition of water carriage'. Class 1 and 2 goods consigned direct from Melbourne to Ballarat were also reduced to a 'cost-distance' equivalent of 84 miles or 14 less than the actual mileage, but Class 3 and 4 commodities were charged the usual full rates as were all goods consigned to intermediate destinations like Lethbridge and Buninyong.

These schedules remained basically the same until a major review in 1875. On balance they probably worked in favour of country industry. Castlemaine flour could be landed in the capital at 6/6d per ton less than Melbourne or imported flour could be freighted the 78 miles in the opposite direction; four hogsheads (210 gallons) of beer could be dispatched for the same cost from both places to an intermediate point only 29 miles from the metropolis; and processed products like preserved meat and leather could be dispatched in bulk to Melbourne for export at only three-fifths the 'normal' cost. But, by the same token, these reduced 'up' rates also enabled metropolitan factories to gather in raw materials, such as grain, tobacco leaf, hides and tan-bark, more cheaply.

During the 1870s agitation grew, especially in the main inland centres, for a review of the rates, a particularly loquacious critic being James Martin of Ballarat who attracted large audiences in 1874 and 1875 to a series of lectures on 'The Effects of Low Railway Freights'.⁵ There were three main arguments. First, that the rates were high in comparison to overseas shipping costs: whereas it cost 25/- to 35/- per ton to bring general merchandise from London, Liverpool or Glasgow to Melbourne, the subsequent journey to Ballarat (97 miles) added a further 35/- to 72/6d, to Maryborough (112 miles) 46/8d to 84/2d, and to Echuca (156 miles) 65/- to 117/-. Second, it was claimed that they were also high in comparison to the charges on the railways in other Australian colonies—in South Australia, for instance, the rates for some goods were only one-third as high as those in Victoria. Third, the logic and legitimacy of charging Class 3 and 4 goods at about 4d and 5d per mile, respectively, when consigned to Geelong but 7d and 9d when sent to Ballarat were called into question 'unless it is to stifle the commercial enterprise of inland towns'.

1875 to 1885

In October-November 1875 the structure and classification of the rates were revised. Over 400 commodities were divided into four classes charged at from 4d

to 7d per ton-mile. This was not, as it may seem, a general reduction because many goods were reclassified and thus (like boots and shoes at 6d and agricultural implements at 7d) paid the same as before or, occasionally, even more. A significant change was the discontinuation of all the directional differentials, and the reorganisation of most of the items concerned into an Agricultural Produce Class (such as wheat, flour and sharps) and a Special Class (including coal, copper ore, pig iron, bricks and tan-bark), both of which were charged 1½d per ton-mile for bulk loads. Items in a Miscellaneous Class (containing products like aerated waters, iron bar and rod, preserved meat and leather) were charged 3d. For commodities like flour, bulk beer and pig iron, the lower mileage rate and the elimination of the directional differentials meant that the former 'up' charge was reduced by 2½d and the 'down' charge by 3½d; on others (e.g. preserved meat and leather) the effect was simply to lower the former 'down' rate by 2d.

With only two exceptions these amendments meant that a particular commodity could be sent anywhere on the Victorian system at the same cost per mile. However, the special rates to Geelong and Ballarat were continued and even lowered so that these towns (but not intermediate places) were brought in cost terms to within about 18 and 73 miles, respectively, of Melbourne. This 1875 review was also taken as the opportunity to introduce a rebate system on goods sent the 156 miles to Echuca by rail from Melbourne or Williamstown (and *only* these places) for forwarding to destinations in New South Wales. Concessions had previously been given on Riverina wool sent to Melbourne but this was the first occasion on which special rates were established for general goods moving in the opposite direction and, in this sense, represented the opening salvo in a freight 'war' that continued throughout the rest of the century. Class 1-4 commodities consigned to places between Wakool and Wentworth (266 and 550 miles, respectively, down the Murray River from Echuca) were allowed rebates which reduced the Melbourne to Echuca charge to a standard rate of 48/- (about 3.7d per ton-mile). Thus, for apparel, millinery or other goods included in Class 4, the Echuca wharf was brought in 'cost-distance' terms to within 82 miles of the seaboard. Goods of this kind for places beyond Wentworth paid 30/- (2.3d per ton-mile), as though Echuca were only 51 miles from Melbourne. Storekeepers in Echuca were left wondering why they had to pay twice or thrice as much to bring their wares from Melbourne compared with those down river on the other side of the border.

The 1875 reorganisation affected manufacturers in several ways. First, some country-based industries benefited by the reduction of the charges on basic materials like pig iron and coal: whereas a Ballarat foundry previously paid £8.1.6 for a five ton load it now paid only £3.0.6. Second, although there was no reduction on some country products, such as preserved meat or leather, sent to the seaboard for export, the rate on others like flour and ingot copper was halved. Third, the potential market for some Melbourne-made commodities was extended further inland: metropolitan breweries could now compete on equal freight-cost terms with say, Castlemaine breweries, at a point halfway between the two instead of about one-third the distance from Melbourne as before. Fourth, some Melbourne

manufacturers could obtain their materials more cheaply: the charge, for example, on a truck-load of wheat or tan-bark drawn from 100 miles away was halved to £3.2.6. Fifth, since the low rates on export goods to Echuca applied only to those consigned from Melbourne (and Williamstown), metropolitan manufacturers were given an advantage over country firms located more than the following rail mileages from Echuca:

Class	Goods for places between Wakool and Wentworth	Goods for places beyond Wentworth
1 (e.g. nails)	144	90
2 (e.g. biscuits)	112	72
3 (e.g. boots)	96	60
4 (e.g. clothing)	82	51

In other words, a biscuit maker at Castlemaine (78 miles from Echuca) or a clothing manufacturer at Bendigo (55 miles) had to pay more to rail goods for export across the Echuca wharf to customers west of Wentworth than their competitors in Melbourne.

On balance, rail freights were beginning to favour Melbourne manufacturers. But, at the time, the main complaints were directed at the general level of rates compared with those in the other colonies. As can be seen from Table 9.3, this was not in fact the case over a broad range of commodities, although the critics could judiciously select examples to 'prove' the opposite view. More legitimately, it was also pointed out that in New South Wales and South Australia the rate per ton-mile decreased gradually over distance thus making long hauls relatively cheaper. Farmers made representations that they were being disadvantaged relative to pastoralists, arguing that whereas most of the agricultural produce in South Australia and New South Wales was grown near the coast and most of the pastoral stations were further inland, the distribution of these activities in Victoria was being reversed (a point examined later).

This largely explains the nature of the rate revisions made between 1875 and the next major reorganisation ten years later. Most were concerned with agricultural produce. Following further representations from farming districts, the rate for agricultural produce was altered in October 1878 to 1½d per ton-mile for the first 100 miles and 1d for each mile thereafter. Seven months later the lower rate was allowed only outside an area bounded by Colac, Ballarat, Moolort, Bendigo, Euroa and Traralgon—in effect beyond 100 miles rail-distance from Melbourne. During 1881 the government rejected a recommendation from the Railway Department that a 'tapering' rate principle (regressive rates for longer distances) should be applied to grain traffic, and decided instead to charge agricultural products 1½d per ton-mile for the first 175 miles and ¾d for each additional mile. A formula had at last been found that gave farmers and millers some form of incremental compensation related to distance; the average cost (in pence per ton-mile, allowing for terminal charges) of sending wheat or flour to Melbourne over various distances became:

Table 9.3 Comparative statement of railway freight rates in four colonies, 1879

Commodity	Classification in Victoria	Rates per ton for haul of 100 miles ^a			
		Victoria	New South Wales	Queensland	South Australia
Cement	1	33/6	34/4	25/-	27/-
Nails, wire	1	33/6	42/5	50/-	27/-
Ploughs	1	33/6	58/7	72/6	27/-
Footwear	3	50/-	58/7	72/6	52/-
Sugar	3	50/-	42/5	50/-	27/-
Agricultural implements	4	58/6	58/7	72/6	(specific)
Drapery	4	58/6	58/7	100/-	52/-
Beer (bulk)	Misc.	26/-	58/7	41/8	27/-
Iron bar, rod	Misc.	26/-	42/5	50/-	27/-
Leather	Misc.	26/-	34/4	72/6	27/-
Preserved meat	Misc.	26/-	13/8	30/-	27/-
Pottery	Misc.	26/-	58/7	72/6	52/-
Spades	Misc.	26/-	58/7	72/6	52/-
Coal (bulk)	Special	13/6 ^b	8/4 ^b	6/3	20/10 ^b
Grain	Agric.	13/6	10/- ^b	16/8	22/10

^a Includes terminal charges where relevant.^b Haulage only.

Source: 'Comparative Statement of Tariff Charges Current on the Railways of the Australian Colonies, 1879', Return to Order, *SAPP*, 1880, vol. 4, no. 181 (6 October 1880), pp. 2-3.

Rail distance (miles)	1878	1879	1881
125	1.48	1.48	1.40
150	1.40	1.40	1.40
175	1.37	1.34	1.20
200	1.32	1.29	1.14
225	1.28	1.28	1.09

Finally, on 12 December 1884 an elementary system of tapering rates was applied—for the first time in the colony—to agricultural products travelling more than 150 miles.

Meanwhile a number of concessions had been granted to country-based industries, and these special rates proliferated during the 1880s. In December 1881 new machinery manufactured at country towns and sent to Melbourne, Geelong or Portland *for export* was charged 1d per ton-mile less, representing a reduction of from 15 to 20 per cent depending on the nature of the goods. A month later the rate on truck-loads of sugar consigned from Melbourne or Williamstown to biscuit and confectionery manufacturers in country towns was cut by 20 per cent: such a firm in, say, Maryborough thus had its freight bill reduced from £2.6.6 to £1.17.6 per ton. Even taken together, however, concessions of this kind were less influential spatially than the extension of the system of special rates on export goods consigned from Melbourne or Williamstown to specified parts of the Riverina through an increasing number of border towns. In December 1880 reduced charges came into effect for freight consigned via the Moama-Deniliquin line, and a year later for goods through Wodonga, Wahgunyah and Rutherglen. The practical results of these measures can be shown by comparing the 'cost-distances' from Melbourne, operative in 1883, with actual mileages (in *italics*):

	Echuca	Rutherglen	Wahgunyah	Wodonga
	<i>156</i>	<i>169</i>	<i>174</i>	<i>187</i>
Miscellaneous	120	169	174	187
Class 1	90	169	174	187
Class 2	72	156	156	156
Class 3	60	130	130	130
Class 4	51	111	111	111

1885 to 1890

In July 1885 the Railway Commissioners promulgated another schedule of rates. The most significant change was the application of an embryo tapering principle to *all* classifications. The previous ton-mile charges still applied to Special Class goods (e.g. bulk cement, iron bar and rod, and canned fruit) up to 100 miles and to Miscellaneous Class, Agricultural Produce Class, and Classes 1–4 up to 150 miles. They were then reduced for the next 100 miles (50 in the case of agricultural produce) and by an additional amount for any further distance. Hence, the rates, in pence per ton-mile, became:

	First 100 miles	101-150	151-200	201-250	More than 250
Agricultural produce	1½	1½	½	½	½
Special A	1½	1	1	½	½
Special B	2	1½	1½	1	1
Miscellaneous	3	3	2	2	1
Class 1	4	4	3	3	2
Class 2	5	5	4	4	3
Class 3	6	6	5	5	4
Class 4	7	7	6	6	5

The charge for a Class 4 commodity consigned 300 miles was thus made up of 150 miles at 7d, 100 miles at 6d, and 50 miles at 5d, or a total of £7.18.4. The classifications of most commodities remained much the same although a few (like aerated water, rough castings and large agricultural implements) were charged at a lower rate. In such cases the effect of tapering and reclassification made a significant difference: when consigned 300 miles a ton of aerated water was now charged £1.8.1 instead of £3.15.0, rough castings £2.19.4 instead of £5.0.0, and agricultural machinery £6.13.4 instead of £8.15.0. This new rate structure (which continued with only minor modifications until 1892) tended to give a disproportionate benefit to Melbourne manufacturers since their main competitors were located at places like Ballarat and Bendigo no more than 100 miles away.

The policy of offering rebates on goods consigned to designated parts of southern New South Wales was also maintained. The regulations concerning, and the level of, the rebates changed several times during the second half of the 1880s and this continuing but frequently altering distortion of real space can be illustrated by summarising the freight rate mileages between Melbourne and five of the river ports:

	Echuca (156)			Rutherglen (169), Chiltern (169), Wahgunyah (174), Wodonga (187)		
	1885	1886	1889	1885	1886	1889
Class 1	90	90	156	90	160	150
Class 2	72	72	130	72	128	120
Class 3	60	60	110	60	127	100
Class 4	51	51	93	51	109	86

These figures, based on the maximum concessions allowed, indicate that in 1885 a Melbourne garment manufacturer, for example, could consign slop clothing (Class 4) to any of these border ports for export at the same cost as to a town only 51 miles away. The rebates continued to apply *only* to goods railed 'down' from Melbourne.

Few of the changes after 1885 seem to have been aimed specifically at assisting country manufacturers although they benefited from reductions in some of the minimum quantities that had to be consigned before bulk rates could apply. They also had their fuel costs cut slightly by a reduction in the bulk coal rate from 1½d to 1d per ton-mile: in this way a foundry at Bendigo using 10 tons a week would have saved £2.0.6. But the increasing flow of by-laws and special rates makes it difficult to assess the general impact of transport costs on industrial development.

Thus, new machinery and cast iron pipes manufactured at Bendigo and sent to Toongabbie (12 miles north of Traralgon) could be consigned at a lower rate, and the freight on lager beer brewed in Bendigo and dispatched to Melbourne was reduced from 50/6d to 26/6d per ton. More generally important was a series of by-laws which allowed rebates on specific commodities consigned for export by sea. On 14 August 1885, for instance, a system (of which some details are given later) came into operation whereby drawbacks could be claimed on country flour railed to Melbourne and Geelong for consignment to places outside the colony.

Without origin and destination data it is impossible to draw sensible inferences about the impact of rail freight policies on metropolitan and country manufacturing. A tentative view, given the spatial organisation of the majority of producers and consumers in Victoria, is that the changes tended to work in favour of Melbourne manufacturers. Of particular importance, as has been suggested, was the system of rebates on goods sent through the Murray River border towns to southern New South Wales, although during the second half of the 1880s the advantage gained by Melbourne firms in this way has to be traded off to some extent against the concessions granted to certain country industries exporting through coastal ports. Most of the protests by parliamentarians, by delegations from particular districts, or by spokesmen for individual industries concerned the absolute level of freight charges rather than any suggestion that Melbourne interests were manipulating rates to suit their own ends: indeed, the concessions granted to some country industries during the 1880s indicate that the influences were not as completely one-sided as has sometimes been suggested. But more work needs to be done to establish—perhaps through the detailed analysis of business records—the relative importance of the freight bill for raw materials, products, fuels and even miscellaneous items like ‘returned empties’ paid by various types of firms in various locations. In this way the incidence of transport costs per unit of output might be unscrambled from other considerations like economies of scale and external economies available in the larger centres.

Ubiquitous, Market Orientated Industries

The costs and difficulties of overland transport discussed in Chapter 6 largely explain why the settlements emerging in the pre-railway era lived on a day to day basis very much unto themselves. The resulting industrial activities—if, indeed, they can thus be dignified—were marked by their informality: at one town the baker would grind his own flour while at the next place along the track the baker would buy in the flour and produce bread at the back of his store which also stocked anything from boots to billies. Two characteristics, both pointing up the isolated nature of these small economies, were the number of competing businesses that could be sustained and the rapidity with which a wide range of activities appeared. The two weekly newspapers born in Portland in 1842 were joined by another in 1845: yet early in 1846 there were barely 300 adults and 100 dwellings in Portland

township itself and only a further 1,200 adults and 230 dwellings in the remaining 1,900 square miles of Normanby County.

In 1851 there were three towns outside the metropolis with more than 500 inhabitants but by 1871 there were eighty-nine (Table 6.5) and in these twenty years the non-metropolitan urban population grew from 23,000 to 226,000. Each new settlement developed its coterie of local-serving activities: by 1860 at least forty newspapers, geared to the interests of the populace in a fairly confined area, were being printed and circulated outside Melbourne. Nonetheless, the demand for some apparently ubiquitous items varied seasonally and spatially; thus the considerable emphasis given to sarsaparilla advertisements by cordial makers in quartz-mining districts is explained by the fact that this drink was regarded as an essential 'blood purifier' by men using mercury in gold-extraction processes.⁶ Such firms usually started in a small way and, locked inside a local market, remained insignificant, but a few tried to break through these constraints and make something more of themselves: Peter Church of Beechworth, for instance, simply advertised in the Ovens district that 'in connexion with his present business as Wheelwright and general Blacksmith, he has opened as Coachmaker'.⁷ A different approach was used by Evan Rowlands, who in partnership with Robert Lewis started bottling cordials in a tent at Ballarat in 1854, opened a branch factory in Melbourne in 1873 and another in Sydney in 1883, and set up depots at Creswick and Smythesdale.⁸ Different again was the story of partners Lacey & Hanning who established a smithy at Sale to repair the drays and accoutrements of the bullock teams moving between Port Albert and the Ovens district and to maintain the steamers operating on the nearby coastal lakes: they broke out of this restricted and somewhat chancy market by developing a wind-driven, self-regulating water pump able to raise 600 gallons an hour from a depth of 100 feet which sold widely in the Gippsland area.⁹

The term 'ubiquitous' sometimes accurately describes only a particular phase in the development and organisation of an industry, a point that can be illustrated by an account of brewing in Victoria. Moreover this provides an excellent example of the way that a whole series of seemingly unrelated internal and external influences could impinge on, and eventually modify, the distribution of an activity over space.

Brewing

The number of breweries outside the metropolitan area increased from seven in 1850 to a peak of ninety-nine in 1871 and then dwindled to fifty-five in 1890 (by comparison in these same years Melbourne had seven, twenty-six and thirteen such establishments). The expansionary stage can be explained partly in terms of the spread of settlement and the high cost of road transport and partly in terms of the perishability of the product. Colonial brewing was an unusually haphazard business because different techniques from those in England had to be devised to cope with changes in fermentation processes caused by the higher temperatures, the softer water (in most areas), and poorer barley, and to suit the taste for a light, pale ale with, in the words of a brewer's advertisement, 'beaded bubbles winking at the

brim' instead of the darker, heavier (but alcoholically weaker) malt beers brewed in Britain. Colonial beer was biologically unstable¹⁰ and deteriorated even under favourable conditions, but went 'off' more quickly when carried any distance in the heat of the sun on the back of a dray. A brewery representative, writing of his experiences in the 1860s, noted that beer did not

bear transportation very well, and when the unfortunate publican to whom it is delivered puts it on draught, it either gets sour or takes a second fermentation, and becomes quite turbid . . . The first brewery with which I was connected was at Sandhurst [Bendigo], and I had to cart the beer from 30 to 40 miles, and sell it at my own risk. Not more than a third of it bore the ordeal of transportation without deterioration, and it was a frequent subject of inquiry on the part of my customers why the beer I delivered was so bad, and the beer of the same brewing, which they tasted in the brewery, was so good? The reason was that the beer would not bear transportation.¹¹

Thus, the instability of the product, the lack of cool storage, and the tardiness of road transport were key influences leading to the dispersal of brewing through the settled areas of the colony (Fig. 9.4). Other factors also assisted this process. In some of the smaller settlements hotel-keepers brewed their own beer, a combination of activities facilitated by the laxity of the licensing and brewing regulations and the small investment needed to produce a few gallons at a time. The twenty smallest breweries identifiable from the *Statistical Register* data for 1869 produced an average of 21,500 gallons that year using plant, machinery and buildings worth about £580 apiece: the tiniest, a couple of establishments at Portland, brewed between them only 15,000 gallons from premises valued together at £525. Moreover, it cost a mere £10 annually to register a brewery and, since there was no excise duty on beer (except briefly from 1 November 1880 to 31 August 1882) the owner could concentrate on pleasing his patrons and his pocket rather than any public servant. Brewing was more an art than a science and part of it was to produce a very pale, thin ale with a so-called colonial 'twang'. Opinions about whether the additives used flavoured or fouled the brew varied between connoisseur and coroner: the truth was difficult to establish and probably lay somewhere in the middle, a point that two analysts appointed by the government tried to make in 1875 after examining 1,200 samples of country-brewed ale:

Even after allowing for the saline character of the country waters, the . . . summary shows that about one-fifth of the beer retailed in the country districts is largely contaminated with common salt. This is probably not added in all cases with the object of producing unnatural thirst, but of making the ale more palatable.¹²

In the 1850s beer was being sold in licensed premises (of which there were 1,180 in 1855) and illegally in a great many more refreshment rooms of one sort or another. Although the legislation governing beer, wine and spirit sales was tightened in 1864 and again in 1876 and 1885, this did little to reduce the number of outlets or the per capita consumption of beer which averaged between 16 and

Fig. 9.4: Production of beer and number of breweries in Victoria 1871-2 to 1889-90. (*Source: Vic.SR.*)

18 gallons annually from the mid-1860s. Licensing statistics are poor but it is known that in 1878 there was one hotel for every 247 people (or 80 men) in Melbourne and one for every 174 people (or 61 men) elsewhere in the colony. Calculations made in connection with the Licensing Act, 1885, which introduced a formula permitting one licence for every 250 people of the first 1,000 inhabitants in a district and another licence for each subsequent 500, showed that 480 of the 1,043 hotels in Melbourne would have had to be closed as well as 1,971 of the 3,344 elsewhere in Victoria. The number of licensed premises in some urban districts was staggering: Ballarat West 'proper' (19,685 people) had 134 pubs (one for every 147 inhabitants) or 93 more than allowed under the formula; Sandhurst 'A' (9,920 people) had 118 or 97 more than the statutory number; and Echuca (5,505) and Castlemaine (5,215) each had 54 hotels or 42 too many.¹³ This plethora of pubs became, as will be indicated in a moment, yet another influence on the financial and spatial reorganisation of the brewing industry.

Even before the number of non-metropolitan breweries had reached its peak in 1871, forces were beginning to emerge that led to a doubling of beer production in Melbourne by the late 1880s and an increase in its share of the colony's output from 45 to 62 per cent. Most of these changes became possible because Melbourne brewers were more willing or able to learn, by trial and error or by applying overseas discoveries (notably those of Pasteur), how to adapt to the climatic conditions. One solution adopted in the late 1860s was to bottle beer brewed during the winter for sale in the summer and some specialist bottling firms came into being for this purpose (and possibly, by some judicious labelling, to enable the local product to be priced as though imported from England).¹⁴ Other solutions included the redesign of brewery buildings both to ensure coolness and to achieve gravity flow, to the use of attenuators—coiled copper pipes through which water circulated—in the gyles or fermenting vats, a greater emphasis on cleanliness, and the setting up of laboratories to examine and control the quality of the hops, the malt, and especially the yeast. But, although all these factors were important, none was more significant, as Parsons has pointed out, than the use of cane sugar to starve the yeast of excess nitrogenous food and thus overcome some of the problems of biological instability caused by the warm climate.¹⁵ The Melbourne breweries (or at least the ones for which the detail is available) increased the proportion of sugar in the wort from 32 per cent in the early 1870s to 44 per cent in the mid 1880s, whereas those elsewhere were using only 24 and 34 per cent although hopping more heavily. Of course not all the country brewers were unaware of, or indifferent to, advances in brewing technology, and in the larger provincial centres some tried to keep abreast of the times. It is possible that Cohn Brothers' 'Excelsior Lager Beer Factory' at Bendigo, which began operations late in 1884 or early in 1885 beside their existing ale brewery, may have been the first to make this type of beer in Australia, a distinction usually accorded the Australian Steam Lager Beer Brewery Company built in Collingwood at about the same time.¹⁶ These ventures were significant, apart from the introduction of 'bottom fermentation' brewing techniques, in that lager beer had to be produced under cool conditions (8°—13°C) and then stored for three or four months at a temperature just above freezing point. For the first time in the colony refrigeration was being associated with the brewing process. This was, however, an expensive innovation and not adopted quickly: the Bendigo establishment may have been the only non-metropolitan brewery so equipped during the nineteenth century (and one of only half a dozen or so in the whole colony). In 1887 ice from Cohns's works was being supplied to hotels as far away as Hay in New South Wales (100 miles by rail and 75 more by dray), thus indicating that storage facilities remained primitive and that a good deal of importance must be attached to improvements being made to the stability of the beer itself.

As they developed a product able to travel better, Melbourne brewers could take advantage of the railway fan that was spreading across the face of the colony during the 1870s and 1880s (Figs. 6.5 to 6.7). Between February 1864 and October 1875 bulk consignments of beer (defined as a minimum of 8 hogsheads, or 420 gallons)

were charged 5d per ton-mile in the 'down' direction but only 3d when sent towards Melbourne thus giving an advantage to country brewers. But the removal of this directional differential at this latter date placed all breweries on an equal footing except insofar as the Melbourne firms could take advantage of the rebates offered on consignments to customers in the western areas of southern New South Wales. In general, brewers in Victoria had little cause for complaint about the absolute level of bulk beer rates since they were lower than those elsewhere in Australia as demonstrated by the following comparisons (in pence per ton-mile):

Miles	Victoria	New South Wales	Queensland	South Australia
50	3.24	7.06	5.00	3.48
100	3.12	7.03	5.00	3.24
150	3.08	6.79	5.00	3.16 ¹⁷

A gallon of beer could be railed from Melbourne to Bendigo (or vice versa) for 1.5d, which represented less than 2 per cent of the lowest bar price in a pub giving honest measure. This emphasises that other factors like economies of scale and brand preference cannot be ignored, and these considerations became even more important during the second half of the 1880s when the introduction of tapering rates shaved these margins even finer.

But railway development also set in motion a much more complex and far-reaching train of events. First, some wayside stopping places lost much of their business—even their *raison d'être*—when railway wagons replaced drays. Second, the hotels vied for the patronage of a 'new breed of businessmen', the commercial travellers, who for a fare of 2.0 or 1.3d per mile—depending on whether they enjoyed first or second class comforts—poured forth from Melbourne with an increasing store of gossip about the best beers, barmaids and bedrooms. Third, at railway junctions and termini increasing emphasis was put on accommodation and amenities with standards far in excess of those required under the Licensing Act, 1876. Fourth, although it was illegal for anyone to have a beneficial interest in more than one hotel, the breweries overcame this by lending capital to proprietors who would otherwise have been unable to finance the more fastidious requirements of their residential clientele, to say nothing of the facilities now desired by law (like adequate toilets) or the frills demanded by competition (such as free counter lunches). Thus, during the 1870s chains of 'tied houses' began to emerge mainly, but not only, in Melbourne where by the mid-1880s it was being suggested that half the licensees were under an obligation to one or other of the breweries.¹⁸

These influences had, of course, a considerable impact on the structure and organisation of the industry. Assuming that per capita beer consumption did not vary spatially within Victoria, it can be calculated that in the early 1870s Melbourne breweries were supplying country areas with about 2,250,000 gallons a year or about 25 per cent of the estimated demand. By 1880 they were sending 3,370,000 gallons or 40 per cent of needs thus making up for a decline in the output of the non-metropolitan establishments. The view of metropolitan produce sweeping country industry out of existence may thus have been basically true of the 1870s. But it was the smaller and more isolated breweries that were disappearing, hence

Table 9.4 Average employment, investment and production in Victorian breweries by area, 1872-3 to 1888-9^a

Area	Average of ^b	1872-3	1876-7	1880-1	1884-5	1888-9
Melbourne ^c						
Hands per est. (no.)		13.2	14.0	19.6	31.6	41.4
Capital per est. (£)		5,464	6,424	7,132	12,833	23,840
Capital per hand (£)		414	458	365	407	576
Output per est. (000 galls)		212	294	366	552	880
Output per hand (000 galls)		16	21	19	17	21
Output per £1 invested (galls)		39	46	51	43	37
Twelve towns ^d						
Hands per est. (no.)		8.0	10.4	9.8	10.0	12.3
Capital per est. (£)		3,362	3,762	3,001	3,536	4,388
Capital per hand (£)		419	362	307	352	357
Output per est. (000 galls)		103	130	113	132	187
Output per hand (000 galls)		13	12	12	13	15
Output per £1 invested (galls)		31	34	37	37	43
Rest of colony						
Hands per est. (no.)		4.9	4.9	6.2	6.0	7.6
Capital per est. (£)		1,386	1,672	2,389	1,898	2,709
Capital per hand (£)		280	342	386	315	357
Output per est. (000 galls)		58	58	63	68	96
Output per hand (000 galls)		12	12	10	11	13
Output per £1 invested (galls)		42	35	26	36	36
Victoria						
Hands per est. (no.)		7.8	8.8	10.5	12.9	16.3
Capital per est. (£)		2,935	3,498	3,736	4,815	7,677
Capital per head (£)		377	396	356	373	472
Output per est. (000 galls)		108	140	152	195	291
Output per hand (000 galls)		14	16	14	15	18
Output per £1 invested (galls)		37	40	41	40	38

^a Years ending 31 March 1873, 1877 and 1881; 1 March 1885 and 1889.^b 'Capital' is the value of machinery, plant and buildings but not the value of land.^c The Melbourne and Metropolitan Board of Works area as defined in 1890.^d The twelve towns are named in note *b* to Table 9.1. Where only one brewery was operating in a local government area, averages of summary data have been used.Source: Calculated from *Vic.S.R.*

allowing some of the larger concerns in the main provincial centres to consolidate their positions (such as by establishing their own small chains of tied outlets) and to give the metropolitan firms a run for their money. Although the Melbourne brewers raised their annual country sales by about 1,000,000 gallons during the 1880s, the provincial breweries probably succeeded in raising theirs by nearly 2,500,000 gallons and advancing their share of this market from 60 to 63 per cent.

This proved to be only a temporary respite, however, which partly came about because the real brewery battles during the 1880s were between the metropolitan firms themselves. By a complicated series of take-overs, mergers and closures, the Melbourne breweries tried to outwit each other in the effort to capture an increasing share of a relatively confined market that was growing *each year* by more than 300,000 gallons. The resulting changes in the scale of the Melbourne brewing industry are summarised in Table 9.4. In the process some of these companies rode insecurely on the crest of a wave which broke at the end of the 1880s and left them in no position to cope with other problems including the imposition of an excise duty in 1892.¹⁹ An account of these and later developments, during which this industry became almost completely concentrated in Melbourne, must be deferred. Enough has been said, however, to indicate the complexity of the technical, social and financial forces that impinged on the Victorian brewing industry and led to these phases of dispersion and reconcentration. Although brewing has here been used as an example, mainly because the spatial manifestations were more rapid and the available evidence more precise, it should not be overlooked that, at any moment, the spatial arrangement of a number of activities, like bread baking, printing and cabinet-making, was the result of a temporary balance between concentrating and dispersing forces.

Agricultural and Pastoral Based Industries

The basic facts about agricultural and pastoral development can quickly be summarised. After reaching nearly 300,000 acres early in 1859, the tilled area grew to 940,000 acres in 1872, 1,820,000 acres in 1882, and 2,650,000 acres in 1892. Much of this increase occurred in the Wimmera and Mallee regions in the northwestern portion of the colony (Fig. 9.5): during the 1870s and 1880s 1,250,000 additional acres were brought under the plough in these areas and two-thirds were sown to wheat. The sheep population expanded fairly rapidly until reaching a peak of 11,700,000 in the mid-1870s after which the numbers stagnated (and for a while even declined) before rising again towards the end of the following decade. There was a marked concentration of the flock in the Western and Wimmera regions—in 1881 about two-thirds of the sheep were in this southwestern third of the colony. Beef cattle numbers stagnated in the 1860s and grew only slowly in the 1870s but then started to increase more rapidly. Both these and dairy cattle were mainly concentrated to the west and northwest of Melbourne, in the North Eastern region, and in coastal districts of the Gippsland and Western regions (see Fig. 9.7).

Some consideration was given at the beginning of the previous chapter to the

Fig. 9.5: Tilled acreage by counties (named in Fig. 9.6) in Victoria 1871–2 to 1891–2; shading indicates proportion sown to wheat as reported in *Vic.SR*. The physiographic map indicates that most tilled land was north of the Western Highlands.

demands flowing from primary to secondary industry through expenditure on improvements, on materials, and particularly on equipment. In the latter case emphasis is usually placed on Melbourne firms, founded by men like T. Robinson, John Wilding, Joseph Nicholson, Thomas Henderson, D. Edwards and Hugh Lennon, which even by 1870 were making a name for themselves in both Victoria and New South Wales with their reaping, mowing, threshing and winnowing machines, their chaff-cutters and corn-crushers and their ploughs. All these firms exhibited (and most won awards) at the Intercolonial Exhibition in Sydney during 1870: the 'Official Report' (*The Industrial Progress of New South Wales*) somewhat wryly notes that 'the principal manufacturer [of agricultural implements] in Sydney did not compete, and therefore the display made by Victoria completely threw the older Colony into the shade'. Melbourne never lost this initial supremacy as the main agricultural machinery manufacturing centre of the colony although some competition came from country towns. In districts where mining activity was slowing down a few foundries and general engineering works saw the manufacture of implements as a worthwhile additional, and then alternative, source of income. New firms emerged, too, as individuals or partnerships hived off from existing

establishments and set up on their own, although few were as successful as George Munro of Ballarat who,

while working by day at the Union Foundry, fitted up a small shop of his own, in which he worked at night doing odd jobs for people in the district. This he continued for three years until by industry and economy he had amassed sufficient money to enable him to purchase stock and start improving and manufacturing machinery of various kinds on his own account [c. 1868]. Being an inventor of no mean ability, and a skilled machinist, and going about among the farmers and ascertaining their wants, he invented and made machines to suit their requirements . . . his business increased beyond his expectations, until at the time of his death in 1882 he was employing about 120 hands, and running day and night in busy seasons.²⁰

It was rare for firms to come into being to make a specific item of equipment: when this did happen, as in the case of James Smith who established a works in Ballarat in 1871 to manufacture hay baling presses, it was usually because there was a particular problem to be solved—in this instance the high freight costs incurred in sending hay to Melbourne for export. But for most country town firms implement-making was usually only one part of a many-sided business. At Minyip, a town of 600 people on the fringe of the mallee, Powell's Implement and Coach Works was established in 1878 and employed nine men and a boy making ploughs, strippers, winnowers and harrows as well as coaches, wagons and drays; at Dimboola, 30 miles to the west and about the same size, the Braybrook Implement Works started to undertake machinists', blacksmiths' and wheelwrights' work and in due course became agents for Shearer Brothers' patent steel ploughshares (imported from South Australia), for McCormick's reapers and binders (imported from Chicago), and a range of other commodities like fertilisers and seeds. Then, as now, such country businesses could only survive by spreading their expertise, acumen and assets. During the latter part of the 1880s, however, even the servicing of some agricultural machinery was becoming more difficult. The Board of Inquiry into the Fiscal System was told on 4 May 1894 that this was partly due to the intricacy of some of the mechanisms being developed but partly because of the

custom in this country—and I think there is no other country on the face of the earth where there is such a custom—and that is that when a farmer buys a machine, that machine is warranted to him for all time to come. Every year you are supposed, if you are a machineman, to send your experts round to overhaul that machine, put it in proper shape for him, go at any time that anything is wrong, without charging him a penny for it; and it has come to be such a custom that the buyers think nothing of sending 200 or 300 miles to get us to take up the bolts for them, and it costs the importer a great deal of money.

In this way yet another tie was being created between the man on the land and Melbourne where all the leading importer-assemblers were based.

Processing of animal and agricultural produce was largely confined to flour-milling, tanning and fellmongering, the making of soap and candles, and the

manufacture of cheese and butter. Other establishments turning out products like jam, pickles, maizena, malt, oatmeal and starch were generally small affairs compared with those discussed in the previous chapter which were set up to can meat and to extract sugar from beetroot. The only other capital-intensive ventures were the half dozen distilleries built during the 1860s to try to take advantage of a 4/- differential between the excise on locally made spirits and the customs duty on imported supplies. Flour-milling and the processing of dairy products will serve to illustrate the locational influences that impinged on this type of activity: in both cases the emphasis is on the developmental processes involved which can only be understood by an appreciation of the technological changes that occurred. The manufacture of dairy products is a useful example, too, of the circumstances in which an industry became incorporated into the factory system.

Flour-milling

Early in 1851 there were thirteen steam and eight water-driven flour-mills in the colony as well as a solitary windmill at Port Fairy. Hardly any new mills were built during the following three years, with some of the existing ones being hard put to keep going because the more active and optimistic mill-hands and farm labourers were trying their luck on the diggings²¹ and because only 6 per cent of the breadstuffs was imported in the form of unprocessed wheat. During these years less than a third of the colony's needs was being ground locally, but it was a different story during the second half of the decade. Not only did the quantity of locally grown wheat available for milling increase from 225,000 bushels in 1855 to 1,030,000 bushels in 1856 and to 3,110,000 bushels in 1861, but wheat imports rose both absolutely and relatively. These circumstances (and the spread of settlement and agriculture) stimulated considerable investment in mills, nearly all of which used steam power. Twenty-four were built in 1855 alone, another twenty-one in 1856 and twenty-six more during the next four years. This was a remarkable episode: it meant that by the end of 1860 Melbourne and Geelong between them had fifteen steam-mills, using an average of 17.6 horse-power and employing a total of 110 men, while elsewhere in the colony there were no fewer than seventy-nine such mills with engines averaging 16.1 horse-power and a total workforce of 470 hands. Unfortunately the few business records that have survived do not reveal much about the details of the processes by which this expansion occurred.²²

It is convenient to interpolate at this point some account of the legislative measures that affected the external trade in breadstuffs. Towards the end of the 1850s farmers started to campaign for a duty on imported wheat in the hope that this would dampen the violent price swings which, in their view, were being deliberately manipulated by Melbourne grain merchants and millers. But it was not until 6 February 1867 that wheat imports did in fact become subject to a customs duty equivalent to 4.8d per bushel of 60 lb which was subsequently raised to 5.4d from 17 May 1871 and by stages to 21.0d from 24 October 1889. Meanwhile the customs duty on flour, first imposed on 6 February 1867 at a rate equivalent to 4.8d per 45 lb (approximately the flour content of a bushel of wheat), was raised to 10.8d

Table 9.5 External trade in breadstuffs, Victoria, 1866-90
(000 bushels)

Direction of trade and commodity	1866-70	1871-75	1876-80	1881-85	1886-90
Net imports (+) or exports (-) of non-colonial:					
Flour	+ 843	+ 234	- 31	- 61	- 286
Wheat	+2,373	+1,867	+ 484	+ 49	+ 459
Biscuit and bread	—	+ 2	+ 6	+ 2	+ 2
<i>Sub-total</i>	+3,216	+2,103	+ 459	+ 10	+ 175
Exports of colonial:					
Flour	570	386	2,657	5,838	7,765
Wheat	58	108	3,346	15,561	6,321
Biscuit and bread	25	59	114	128	128
<i>Sub-total</i>	653	553	6,117	21,527	14,214
Net imports (+) or exports (-) of all breadstuffs	+2,563	+1,550	-5,658	-21,537	-14,039

Source: Calculated from annual trade data in *Vic.SR*.

Table 9.6 Wheat apparently available for milling, wheat milled, and flour made, Victoria, 1866-90
(000)

	1866-70	1871-75	1876-80	1881-85	1886-90
Wheat (bushels)					
Grown in Victoria minus seed grain ^a	18,977	19,034	26,052	45,963	48,344
Net imports of wheat ^b	2,373	1,867	484	49	459
Exports of colonial wheat ^b	-58	-108	-3,346	-15,561	-6,321
Quantity apparently available for milling	21,292	20,793	23,190	30,451	42,482
Millers' returns of wheat operated upon ^c	22,073	25,844	22,239	34,231	39,294
Flour (short tons)					
Millers' returns of flour made ^d	479	557	608	752	832

^a Annual crop returns minus wheat used for seed. The amount of wheat that should be deducted as seed grain is uncertain. The government statistician obviously had doubts and second thoughts on this problem: in the *Victorian Year-Book*, 1892, vol. 2, p. 272, the proportion of the local crop assumed to have been used for seed during the four years 1887 to 1890 was 21.0 per cent, but in the *Victorian Year-Book*, 1895-8, p. 828, the proportion of the local crop (for which identical figures are quoted) assumed to have been used for seed during these same four years is 11.7 per cent. In the above table an allowance, declining over the period from 1.25 to 0.75 bushels an acre, has been used to take account of the introduction of more economical sowing methods.

^b Derived from Table 9.5.

^c Derived from *Vic.SR*. Two uncertainties about these figures are the level of stocks carried over from one year to the next and the fact that not all the wheat said to be 'operated upon' was ground—some was sold as stock feed.

^d Derived from *Vic.SR*.

on 9 August 1871, and to 27.0d on 25 September 1889. During the period covered by these alterations, Victoria's external trade in breadstuffs changed out of all recognition. In 1870, for the first time, the colony became a net exporter of breadstuffs, a performance that was repeated in 1873 and 1874 and then regularly from 1877. The composition and magnitude of this trade are shown in Table 9.5. An apparent anomaly, the continuing net export of non-colonial flour, is largely explained by regulations introduced in the 1870s whereby drawback could be claimed on exports of flour derived from imported wheat, and by provisions for milling in bond allowed under Section 9 of The Duties of Customs Act, 1879 (43 Vic. no. 646), that were announced early in 1880. Wheat could then be imported without payment of duty provided that 98 per cent by weight was exported within three months in the form of flour, bran and pollard. This arrangement was intended to assist mills located at places like Echuca, Wahgunyah and Wodonga processing Riverina wheat, but it became something of an issue early in 1886 when a couple of Melbourne millers, noting that New Zealand wheat was 1/- per bushel cheaper, imported sufficient to make 1,500 tons of flour as against the 20 or 30 tons usually handled under this system.²³

The first figures showing the quantities of wheat processed and flour produced

Fig. 9.6: Surpluses and deficits of breadstuffs by counties in Victoria 1871-2 to 1891-2 based on the assumption that in each of the years shown per capita consumption did not vary spatially.

in the colony's flour-mills cover operations during the early 1860s. Even though these returns were probably imprecise and no allowance can be made for opening and closing stocks, they tie up reasonably well with the wheat production information shown in agricultural returns (based on a year ending on 31 March) after allowing for imports into Melbourne and Geelong (Table 9.6). With small variations this was true throughout much of the 1860s, and it is thus possible to generalise that the bulk of the colonial wheat harvest probably moved no more than 20 to 30 miles before being processed.²⁴ Moreover on a county basis wheat production was not greatly out of kilter with local consumption (assuming that per capita usage was the same throughout the colony) although Bourke and Grant counties were becoming increasingly deficient in breadstuffs and the areas north of the Great Divide were producing surpluses over and above local needs.

Fig. 9.7: Production of flour and number of flour-mills in Victoria 1871-2 to 1891-2. (Source: Vic.SR.)

An impression of events during the 1870s and 1880s is given in Figs. 9.6 and 9.7. By 1872 wheat-growing was clearly moving northwards and more than half the tilled area in five of the northern counties was being sown to this crop. A combination of influences, including land legislation; changing farming and pastoral practices in the Western District; the breeding of earlier-maturing wheats; the mechanisation of farming; legislation designed to encourage and finance local

irrigation and water storage schemes; the extension of the railway system; the availability of external markets; and, possibly, the customs duties on wheat and flour, all contributed to the development of a pronounced wheat-growing belt in which merino sheep were also significant. By the early 1870s the spatially simple growing-milling-consuming relationship was becoming blurred (see Fig. 9.8) and virtually disappeared altogether during the next two decades: by 1892 nearly all the southern counties were deficient in breadstuffs and the thirteen northern ones had a combined surplus over local needs approaching 10,000,000 bushels.

All these circumstances had a profound impact on the milling industry. Until 1872 the number of mills in the 'southern area' continued to increase, with thirty-three of the fifty new mills in the previous decade being built there as against only thirteen

Fig. 9.8: Activities of the Wahgunyah Steam Mill from January 1873 to July 1874 showing origins of the 1,290 short tons of wheat bought and 1,100 short tons of flour and pollard sold. (Source: compiled from data in *John Foord Papers*, University of Melbourne Archives Collection.)

Table 9.7 Numbers of flour-mills, horse-power employed and flour made in areas of Victoria, selected years 1871-2 to 1891-2

Area and year	Number of mills	Horse-power employed	Flour produced (tons) ^a
Northern area ^b			
1871-2	24	404	17,849
1881-2	62	1,316	56,456
1891-2	47	1,466	74,196
Southern area ^b			
1871-2	115	1,895	62,714
1881-2	67	995	45,426
1891-2	38	1,578	51,080
Melbourne			
1871-2	15	546	23,246
1881-2	9	294	31,414
1891-2	8	467	69,506

^a Trade tons of 2,000 lb.^b The 'northern' and 'southern' areas are defined in Fig. 9.7.Source: Calculated from *Vic.SR*.

in the emerging northern wheat-growing areas and four in Melbourne itself. Subsequent events are summarised in Tables 9.7 and 9.8.

During the twenty years ending March 1892 two-thirds of the mills in the southern counties ceased operations; although the decrease tended to be concentrated in Talbot and Dalhousie counties, the thinning out was general across this whole area. Those that survived during the 1870s probably did so because of superior entrepreneurial capacity rather than because they were necessarily larger or more advantageously located to process locally grown, railed or imported wheat. The capital invested per mill and per hand declined and average output all showed in fact only a modest increase. This 'weeding out' continued during the 1880s with hardly any new mills being built and on average three of the existing ones suspending operations each year. The survivors tended to be those which had adopted new milling techniques (discussed in a moment) and had been able to raise the necessary capital, or which were sufficiently remote to retain a small local market (like the mills at Byaduk and Harrow in the southeastern corner of the colony which were, respectively, 15 and 30 miles from the nearest railway station). A few also survived at break-of-transport points such as Warrnambool. Significantly, perhaps, mills located on lines running into the northern wheat-growing areas (like that linking Ararat and Portland in 1877) or at what were regarded as significant junctions on the railway system appear to have had no residual advantage.

In the northern area the number of mills increased during the 1870s but then declined during the following decade (Table 9.7). Several influences were involved. All mills were equipped with grindstones and these were placed at a disadvantage

when, beginning in 1884, new premises opened there using rollers. Some existing mills were re-equipped and updated using additional capital obtained by floating the business as a public company, by issuing a new series of shares, or by making additional calls on shareholders. Others, especially in the northern and north-eastern areas, were unable to find resources on the scale required—between £2,000 and £3,000 for a complete set of rollers and ancillary equipment—and eventually succumbed. Occasionally, advantage was taken of a fire, explosion or other mishap to make the conversion from stone-milling to roller-milling (as was the case when the Dimboola mill was rebuilt after a fire in 1883).²⁵

Table 9.8 Indicators of flour-mill activity in areas of Victoria, selected years 1871-2 to 1891-2^a

Average of	1871-2	1881-2	1891-2
Northern area^b			
Hands per mill (no.)	4.5	5.5	7.0
Capital per mill (£)	2,793	2,764	5,523
Capital per hand (£)	626	500	784
Output per mill (tons)	744	911	1,579
Output per hand (tons)	167	165	224
Capital per ton (£)	3.8	3.0	3.5
Southern area^b			
Hands per mill (no.)	4.0	4.9	6.2
Capital per mill (£)	2,378	2,044	3,925
Capital per hand (£)	596	421	629
Output per mill (tons)	545	678	1,344
Output per hand (tons)	137	140	216
Capital per ton (£)	4.4	3.0	2.9
Melbourne			
Hands per mill (no.)	8.3	16.2	21.1
Capital per mill (£)	6,815	10,838	16,813
Capital per hand (£)	186	668	796
Output per mill (tons)	1,550	3,490	8,688
Output per hand (tons)	186	215	411
Capital per ton (£)	4.4	3.1	1.9
Victoria			
Hands per mill (no.)	4.5	5.9	7.9
Capital per mill (£)	2,875	2,941	5,841
Capital per hand (£)	641	499	737
Output per mill (tons)	674	966	2,094
Output per hand (tons)	150	164	264
Capital per ton (£)	4.3	3.0	2.8

^a 'Capital' is the investment (at current prices) in machinery, plant and buildings (but not land). Output figures are expressed in trade tons of 2,000 lb.

^b The 'northern' and 'southern' areas are defined in Fig. 9.7.

Source: Calculated from *Vic.SR*.

Another important influence was the direction and timing of railway development and the freight charges imposed. The detailed effects of these circumstances have yet to be fully documented: not only did the rate structures become

increasingly complicated but many mills, even in the newer wheat-growing areas, were opened several years before the settlements concerned were linked to the railway system. The Dimboola mill, for instance, came into operation in 1876 and the Nhill mill in 1878, six and nine years, respectively, before these places had a rail connection. Hence for a time most of the mills had to send their produce by road to the nearest railhead which, as in the particular instances quoted, might be 50 or 60 miles away. Marginal adjustments in rail freight charges may have been less significant therefore than seasonal or longer-term alterations in local bullock team rates.

Earlier in the chapter it was indicated that the cost of railing wheat and flour in bulk to the seaboard decreased from 3d per ton-mile in 1864 to 1½d in 1875. Then in 1878 it was reduced to 1d after the first 100 miles, and in 1881 to 1½d for the first 175 miles and ¾d for each additional mile. The following tabulation shows the effect of these changes (including the introduction of tapering rates late in 1884) on the cost of sending a ton of flour to Melbourne from mills located various rail distances away:

Miles	1864	1875	1878	1881	1884
100	25/-	12/6	12/6	9/6	9/6
150	37/6	19/-	16/6	14/-	14/-
200	50/-	25/-	21/-	18/-	16/-
250	62/6	31/6	25/-	21/-	17/-
300	75/-	37/6	29/-	24/-	18/-

Then in August 1885 an elementary milling-in-transit concession was instituted whereby drawbacks could be claimed on flour conveyed by rail from country stations and exported at Melbourne and Geelong to places outside the colony 'upon certificate being furnished of a like quantity of Wheat having been carried by rail a distance of not less than 50 miles to the mill at which the Flour was manufactured'.²⁶ These could be claimed on the following basis (pence):

Flour carried (miles)	Wheat carried		
	50 miles	75 miles	100 miles
Under 75	12	12	18
Under 125	18	24	30
Above 125	30	36	42

The effect was to discount the usual freight charges by between 10 and 15 per cent: since this applied only to flour railed from country stations it gave inland mills a modest advantage over their metropolitan competitors.

From 1881 through 1885 45 per cent of the wheat grown in Victoria (net of seed grain) was exported and of this total (21,400,000 bushel-equivalents) 27 per cent was sent out in the form of flour (131,400 short tons). During the following five years, 29 per cent (or 14,100,000 bushel-equivalents) of the available wheat was sold externally, 55 per cent being shipped as flour (174,700 short tons). It is impossible to say, however, how much of the export flour originated in country as against Melbourne mills, although there is no doubt that substantial quantities of inland flour were finding their way on to external markets. Indeed the *Argus*

campaigns during the 1880s for the introduction of improved milling techniques, attributing the poor name which Victorian flour had earned itself on the Sydney market to the inferior quality of much of the country produce that, it claimed, made up the bulk of exports.

From about 1884 the Melbourne mills probably started to increase their share of this external trade as they were among the first in Australia to invest in roller plant. This system of milling began to be developed and applied commercially during the 1830s in Switzerland and Hungary, and eventually spread to Britain and the United States in the 1870s.²⁷ Machinery of this kind was probably used in South Australia in 1879, and then later that year fluted and plain rollers were displayed at the Sydney International Exhibition by Ganz and Company (Hungary) and porcelain rollers by F. Wegmann (Italy);²⁸ similar demonstrations were made at the Melbourne International Exhibition two years later. Millstones, whether set low and operated at high speeds or set 'half-high' and run more slowly, ground up all the wheat grain so that the resulting flour contained particles of the germ, bran and scutellum, as well as the powdered endosperm. In contrast during the roller-milling process, the endosperm was first separated from the other constituents of the grain and then gradually reduced in size. There were thus three main stages: 'breaking', in which the grain was fed through corrugated rollers that scraped the endosperm from the bran; 'purifying', in which reciprocating sieves and blowers graded the 'middlings'; and 'reducing', in which the middlings were passed through a series of smooth rollers that gradually produced smaller and smaller fragments without damaging the starch granules themselves. The flour obtained at each of the break and reduction rolls could be mixed in various proportions to obtain several types or grades of flour. Not only was the resulting product whiter and finer but it was also 'stronger' and able to absorb more moisture. This meant, in turn, that bakers could make 750 instead of 680 4 lb loaves to the ton and were therefore prepared to pay premium prices. The millers gained, too, because they were able to double their daily throughput without substantially increasing their wage or fuel costs.

The first roller system in Victoria was that installed in David Gibson's mill in Carlton in 1882 at a cost 'upwards of £4,000'. Other Melbourne millers were more cautious; Thomas Brunton told the Tariff Commission in May 1883 that 'from a sanitary point of view I think [this patent flour] is a mistake'. But the sceptics were soon impressed by the fact that Gibson's flour commanded a premium of 20/- to 25/- per ton, and Brunton himself became the second Melbourne miller to purchase rollers and these were put into operation in September 1884.²⁹ By March 1885 seventy sets of rollers had been installed—usually in addition to the existing stones—half of these being in Melbourne. Country mills, although not slow to introduce rollers, could seldom realise their full potential: only a few establishments, at places like Bendigo, Charlton, Chiltern, Echuca, Wangaratta and Wycheproof, had more than one, or at the most two, sets by the end of the decade compared with an average of fourteen sets in Melbourne. The very considerable increase in scale which took place in the metropolitan mills during the 1880s is indicated in Table 9.8; smaller increases also occurred elsewhere, but it was only

the Melbourne mills that displayed a significant improvement in the tonnage produced per unit of capital invested.

The Melbourne mills went even further ahead of their leading country competitors during the second half of the 1880s. They also benefited from their location at the hub of a railway fan since this enabled them to take advantage of the differences in harvesting schedules and seasonal conditions, the varieties of wheat being produced, and the fluctuations in local prices. They were in a better position, too, to assess and gain advantage from changes in overseas markets and the availability of shipping space. But Parsons goes too far when he says that the Melbourne millers 'controlled' the Victorian industry 'from at least the early 1880s'.³⁰ The whole tenor of the trade dispute between the mill-owners and mill-workers during the latter half of the 1880s (discussed in Chapter 8) suggests that even by then the Melbourne firms had very little influence over the affairs of millers operating elsewhere in the colony. Moreover, it is questionable whether the establishment of a head office in Melbourne in 1881 by James Fry and Company Ltd, which was operating six or seven country mills and a dozen or so country wheat purchasing agencies, can be used—as Parsons does—as evidence of the extent and nature of the control being exercised by Melbourne *millers*. This was merely an unusual case of a Ballarat-based firm which had grown sufficiently large to enable it to set up its own metropolitan agency to compete against established Melbourne millers and grain merchants at a time when wheat and flour exports were expanding very considerably.³¹ It is not known how much of the colony's wheat crop was simply handled by independent grain merchants or by metropolitan and country millers some of whom also acted as produce agents. Nonetheless a partial measure of the extent to which Melbourne millers could have 'controlled' the industry is the fact that in the year ending 31 March 1882 they processed only 23 per cent of the wheat 'operated upon' in the colony. This increased to 37 per cent during the next ten years and it was only at this stage that Melbourne millers began to take control of, and eventually dominate, the industry.

The processing of dairy products

The movements of cheese and butter making from farm to factory provide useful illustrations of the processes of 'industrialisation'. These events and their time-tabling were, however, quite different. The formalisation of cheese making occurred in two distinct bursts in the 1870s and 1880s each in a separate and fairly confined part of the colony, the 'trigger' in both cases being the apparent success of a pioneer factory. The number of establishments was never very large but was sufficient to have a 'demonstration' effect in the southern coastal area of New South Wales where cheese factories were also erected in the 1870s. In contrast the formalisation of butter making did not begin until the late 1880s. This tardiness can largely be explained, prior to the beginning of that decade, in terms of inadequate technology but the lack of initiative then must be put down to entrepreneurial apathy: ironically, it was the apparent success of the factory system on the South Coast of New South Wales that eventually acted as the spur to the Victorians.

Cheese making. In 1869 G. G. Pierce set up the first cheese factory in Victoria at Allansford near Warrnambool. He used methods and machinery developed in North America to make a mild 'cheddar-type' cheese, and adopted the American practice of establishing a 'tied' dairy herd to provide a basic supply of milk and of purchasing additional requirements from farmers at a fixed price.³² The success of this venture aroused interest, much of it created by Pierce himself, in other parts of the colony and especially in Gippsland. At about the same time the customs duty on dairy products, first imposed in April 1866, was doubled to 2d per lb in August 1871 thus enhancing the possibility that locally made cheese could compete with imports on the domestic market since the new impost was equivalent to about 30 per cent in ad valorem terms. During the early 1870s several companies were floated (Pierce being the leading light in a number of them). In particular, a company was promoted at almost every settlement within a dozen miles of Stratford in the Gippsland District: those at Maffra, Newry, Briagolong, Clydebank, Sale and Stratford itself were floated as limited liability companies and others as co-operatives or as proprietary concerns with a nominal capital ranging from £500 to £1,000 usually in £5 or £10 shares.³³ Not all the proposals came to anything, but by the middle of the decade Gippsland cheese had established a name for itself on the Melbourne market.³⁴ During the early 1870s some small consignments were sent outside the colony but it was not until 1875 that exports started to become significant, reaching £36,600 three years later and a peak value of £46,300 in 1882, with the main markets being New South Wales and Queensland in one direction and South and Western Australia in the other. Export potential was limited, however, by the fact that the bulk of the cheese was mild and unmatured and thus lost its flavour fairly quickly.

During the 1880s cheese making was also taken up in the Loddon Valley following the success of the Newbridge Cheese Factory Company Ltd which was formed in 1881, acquired a disused brewery building, and almost immediately started to pay regular dividends to its six owners.³⁵ Aside from some private firms, several companies and co-operatives were floated to set up factories at a string of places extending from Eddington in the south through Bridgewater, Appin, Macorna and Kerang, to Murrabit in the north. By this time, however, export markets were becoming more restricted and competitive as other colonial dairy industries started to come into their own, sometimes aided by tariffs. The value of cheese exports thus dwindled from the 1882 peak to a mere £6,000 in 1890, half of which went to Queensland and the remainder to New South Wales and Western Australia. In 1891-2, when the first production figures were published, the thirteen cheese factories still operating (four near Stratford and eight in the Loddon Valley) turned out 365 tons.³⁶ But, even after two decades, cheese making was still very much the preserve of farmers who in this year made 1,112 tons. Farm cheese declined in importance after 1894 but, even so, continued to account for nearly half the colony's output for the rest of the decade.

Butter making. The production of butter was an essential activity on every dairy farm because it used up surplus milk especially during the spring flush that reached

its peak during ten weeks in September through to November. It was also important to the farmers who built up herds for town milk supply because no country train services operated on Sundays and thus one-seventh of the milk was left on their hands. The methods were simple enough: the milk was poured into racks of pams and allowed to separate into the fat (which had a specific gravity of about 0.93) and the liquid or serum (with a specific gravity of 1.04). To process the milk from 100 cows required up to 6,000 square feet and took from thirty-six to seventy-two hours.³⁷ By about 1860 the colony was over-supplied with butter and attempts were made to develop an export trade. For several years New Zealand took most of the surplus but this market collapsed in 1869 leaving no obvious alternative: when a group of farmers sent a consignment to London in 1871, the whole lot was sold as cart grease. From 1875 to 1888 Victorians had to rest content with sales to other Australian colonies: during this period 61 per cent (valued in all at £705,000) went to New South Wales and Queensland and 23 per cent to South and Western Australia. In the early 1880s it seemed that a trade might be opened up with Britain using refrigerated steamships. Some consignments brought high prices (in 1881 as much as 16½d per lb), but the quality was variable and the methods of packaging and presentation were unsatisfactory.

There was, in effect, an impasse. On the one hand, panning was too slow, wasteful and space-demanding to be translated into a factory system but, on the other, there was no hope of breaking into the British market unless quality control could be exercised all the way from the dairy herd in Victoria to the auction floor in London where butter made to set standards and properly graded and packed could then hope to compete against European supplies. A compromise solution tried by one or two export agencies in 1880–1, whereby depots were set up in dairying areas so that farm butter could be purchased, cleaned, sorted and packed for shipment, was unsuccessful because it was like trying to make a silk purse out of a sow's ear.

Meanwhile in Sweden and Denmark a technical solution was being developed in the form of a cream separator—basically a centrifuge—which allowed better separation of the fat and liquid portions of the milk especially during winter months when there was less difference between their specific gravities, facilitated quicker processing, eliminated the need to expose milk for long periods in hot weather, and made fresh skim milk available for feeding livestock. Moreover, it made a factory system possible by reducing the space required for processing a given quantity of milk from 5,000 to 25 square feet.

Danish and Swedish separators were exhibited in Britain in 1879 and a de Laval machine, which eventually became the best known, was exhibited in Sydney in 1881 although the display was so amateurish that the Danish product was at first preferred.³⁸ The first commercial installation in Australia appears to have been the two separators used by the Melbourne Milk Supply Company Ltd at Romsey, 30 miles north of Melbourne. This company, finding its fresh milk business limited by the lack of Sunday train services outside the metropolitan area, established a dairy factory in 1881 to make condensed milk, cheese and butter, depending on their

Table 9.9 Dairy produce and factory bonuses paid in Victoria, 1889-90 to 1894-5^a
(£)

Season ^b	On butter exported	On cheese exported	On factories	Total ^c
1889-90	2,622	—	1,700	4,322
1890-91	13,269	—	7,301	20,570
1891-92	52,197	—	2,975	55,172
1892-93	35,512	—	16,910	52,422
1893-94	—	1,285	1,502	2,787
1894-95	—	216	—	216
Total ^c	103,600	1,501	30,388	135,489

^a The conditions for these bonuses were published in *VGG*, 2 May 1890, p. 1627. The export bonus could be claimed on produce exported after 21 October 1889. The minimum factory bonus could be claimed by a factory that in any twelve-month period between 30 June 1889 and 30 June 1895 produced butter or cream 'of good quality' from an average of not less than 500 gallons of milk per week: the regulations set out conditions under which additional amounts could be claimed.

^b Year ending 30 June.

^c Some totals do not tally because of rounding.

Source: 'Royal Commission on the Butter Industry, Final Report ... [1 June 1905]', *VPPP*, 1905, vol. 2, no. 10, p. 14.

relative profitability. In fact the separators were used simply to prepare fresh cream for the Melbourne market, and it is doubtful whether at any stage the company turned its hand to butter making. The initiative then passed to New South Wales where, beginning at Mittagong in 1883, nine butter factories were in operation by 1888 as well as eighty-two separators at creameries or in farm dairies.

In Victoria, however, the first separator used for butter making appears to have been that installed in 1885 or 1886 on a dairy farm near Bendigo. The Royal Commission on Vegetable Products was impressed in June 1886 by accounts of the speed and efficiency of these machines (one capable of processing 60 gallons per hour cost about £45) and the potential export market for factory-made butter. Then in April 1888 it visited Sydney and Kiama and learned of the activities of the South Coast and West Camden Co-operative Company (which was shipping butter overseas on commission for farmers and eight dairy factories) and the New South Wales Fresh Food and Ice Company Ltd (which was supplying Sydney with fresh dairy produce and exporting surplus butter). Within a week the commissioners had signed their *Fifth Progress Report*, recommending inter alia that the government should assist the Victorian industry, noting that it was

annually sustaining an enormous loss by failing to adopt the modern system of carrying on the business which has superseded the old methods in the leading dairying portions of Europe and America. It has been shown that the centrifugal cream separator effects an important saving of cream, and produces it in a better condition for making first-class butter than the old system of setting the milk, while the co-operative factories reduce the cost of production, and by turning out the whole of the butter of a district in one quantity, even and excellent in quality, command, as a rule, a higher price than private dairies.

Not long afterwards, as part of a wider scheme to assist primary industry, the government offered bonuses for the establishment of dairy factories and on export produce that met certain standards, used refrigerated chambers at Newport to store produce prior to shipment, chartered refrigerated space aboard ships, stepped up the construction of refrigerated railway wagons (the first of which had been built in the Williamstown workshops in 1881), erected shelter sheds for dairy products alongside railways, built travelling model dairies and appointed expert staff, offered inducements for people to come forward with improvements (like a cheap way of cooling dairies), and imitated the very successful working dairy set up at the Sydney Intercolonial Exhibition in 1888 with a similar exhibit of its own at the Melbourne Centennial Exhibition in 1889. The cost of all these activities cannot be determined from the published public accounts, but £135,500 alone was paid as bonuses to dairy factories and on exported produce during the six years ending 30 June 1895 (Table 9.9). These grants to factories depended on the quantity of milk, cream or butter treated; altogether 125 creameries each received an average of £157 and 42 butter factories £256, thus making up about one-sixth the usual cost of buildings, plant and machinery. The bonus on butter handled and marketed under the supervision of the Department of Agriculture ranged from 1d per lb for

consignments that brought 7d to 9d on the London market to 3d per lb on those selling for 1/- or more.

The results were dramatic. From May 1888 there was a flurry of butter factory company formation: most missed the 1888-9 season but the Cobden and District Cheese and Butter Factory Company Ltd started operations on 15 October 1888 thus becoming the first butter factory in the colony. Eight others came into production during 1889, 11 in 1890, 35 in 1891 and 150 more by the end of the century. The first available production figures, for the year ending 1 March 1892, show that the factories churned out over 2,600 tons, or 35 per cent, of the colony's butter. About four-fifths of this found its way to the Newport refrigerated store where it was graded, dispatched and marketed in London under the supervision of the Department of Agriculture. During the 1889-90 season 370 tons were handled in this way, then 759 tons in 1890-1 and 2,140 tons in 1891-2. But the scheme had its problems. The two shipping companies would not accept consignments of less than 50 tons on the grounds that plenty of frozen meat was offering in Sydney to fill holds of this size; the government made available any spare space to independent exporters who were thus able to take advantage of the cheaper government contract rate of 1d per lb. Produce merchants not granted this facility because there was no space naturally resented the scheme as being an 'interference with private enterprise'. More importantly, these arrangements did little to reduce the number of consignors. As the London agent pointed out in a report on a shipment that arrived there in January 1890, the 669 boxes and 126 kegs shipped from Sydney under two marks (the South Coast and West Camden Co-operative Company and the New South Wales Fresh Food and Ice Company Ltd) 'being of the same character and condition as those of the previous shipments, were readily dealt in without inspection', whereas the 1,877 kegs and casks dispatched from Melbourne by forty-three different persons could not be sold 'without personal inspection by the intending buyer'.³⁹

Nonetheless, this problem was beginning to solve itself because of the activities of a few Melbourne produce merchants and the growth of two firms formed in 1889, The Fresh Food and Frozen Storage Company Ltd and the The Melbourne Chilled Butter and Produce Company Ltd, each of which established a factory in central Melbourne supported by a cohort of creameries in the main dairying areas. The former company is the illustration par excellence of the scale and speed of the changes taking place. Even though its Bourke Street cool store and butter factory were not finished when the business formally started on 24 September 1889 (and thus it could only send 30 tons of butter overseas during the 1889-90 season), it was acclaimed in 1893 as the largest butter factory in the world with a daily output of 6 to 8 tons made from supplies gathered in from thirty-six creameries. Not far behind was the Chilled Butter Company which by 1892 was making from 4 to 6 tons of butter a day at its works in Flinders Street West to which an average of 10 tons of cream was sent daily from thirty-two creameries scattered across Victoria from East Gippsland to the Wimmera (Fig. 9.9). During 1891-2 and 1892-3 these two inner Melbourne works turned out 42 per cent of the factory butter in Victoria.

Fig. 9.9: Location of the eighty-four creameries associated with the three main Melbourne butter making firms in March 1892. The railways opened by this date are also shown. (Source: *ATR*, 7 March 1892, pp. 85–6.)

Each made an average of 567 tons during 1891–2 compared with an average of only 28 tons in country factories, and the discrepancy was even greater—1,219 as against 41 tons—in 1892–3. These two organisations were joined by The Victorian Creamery and Butter Company Ltd, based in Melbourne and organised along similar lines, which came into production in 1892.⁴⁰

This meteoric rise of the Victorian industry did not pass unnoticed in New South Wales. The explanations there ranged from the plausible possibility that Victoria's earlier spring flush gave it an edge on the London market to the view that its protectionist politicians had again duped a gullible public into paying through the nose for a dubious benefit. Invective aside, the Victorian success led to structural and locational changes in the New South Wales industry and, with an imitative compliment that was hardly welcomed in some quarters, to the announcement in 1896 that the government of that colony proposed to rent cool storage facilities at

Darling Harbour and to appoint an expert butter maker and grader to supervise the export trade.⁴¹

Much more was involved in the formalisation of butter and cheese making in Victoria than a simple shift of processing from farm to factory. Consider the related problems of the financing and profitability of the factory companies and the seasonal fluctuations in the milk supply. The ideal arrangement was thought to be for all the shareholders to be milk suppliers who would therefore have a direct interest in maintaining the factory in profitable operation all the year round. In practice this ideal was seldom achieved because producers were reluctant to take up the whole of the issued share capital: in the case of the Newbridge Cheese Factory Company Ltd formed in 1881 all the capital in the end had to be subscribed by five local businessmen and the cheese maker. More common was the solution adopted by the Macorna and District Butter and Cheese Factory Company Ltd in 1888 which eventually admitted non-suppliers as shareholders in order to raise £746 to build its 840 square foot wooden building and another £608 to pay for plant and equipment. Most companies thus found themselves trying to please two groups of shareholders with conflicting interests: the non-suppliers wanted milk prices kept low so as to maximise returns on capital invested but the suppliers wanted high milk prices and were prepared to go without dividends. Various compromises were devised, such as limiting non-suppliers' dividends to maximum of 10 per cent or, more commonly, guaranteeing them a dividend of 6 per cent with an option to sell their holding to suppliers. At the same time the milk producing shareholders also had their differences since they were paid on the basis of quantity not quality and it was easy to suspect—but difficult to prove—that a neighbour was watering down his contribution. The solution came with the Babcock tester, and the first factory in Australia to pay for milk on the basis of butterfat content was the Koroit and Tower Hill Butter and Cheese Factory Company Ltd in November 1892.⁴²

These considerations did not make it any easier for companies to achieve a regular supply of milk during winter as well as summer. This seasonal variation in milk production—in winter cows were dried off to one milking a day—forced dairy factories, particularly in drier areas like the Loddon Valley, to close down during the autumn and winter which was just the time, of course, when prices were higher and temperatures lower. Companies tried arrangements varying from legal agreements to pricing systems in an attempt to induce farmers to pay more attention to green fodder crops and ensilage. When most shareholders were suppliers it was possible to write an obligation into the articles of association setting out the minimum quantity of milk to be sent in throughout the year. Companies with mixed shareholdings relied on a price mechanism: some contracted with individual farmers to buy all their milk at a higher fixed price, say 6d per gallon, on condition that the winter supply was not less than one-quarter of the summer gallonage which was normally worth only 4d or less. Others adopted or modified the system common in New South Wales whereby a higher price was paid to a producer during the summer months for the same gallonage supplied during the winter. Enough has been said to indicate that, while the cream separator was undoubtedly the main

'trigger' that set these changes in motion, the development of the factory system of butter making depended on some basic alterations in farmers' attitudes and practices.

This was yet another activity in which Melbourne played a significant role even though it contained only two of the fifty-five dairy factories, none of the sixty-five creameries, and only 12 per cent of the workforce recorded in the industry in 1891-2.⁴³ The two Melbourne works turned out over two-fifths of the colony's factory butter and, together with their creameries, did so on a scale which ensured considerably greater productivity per unit of labour employed and of capital invested in buildings, plant and machinery. Local transport costs alone favoured a country location because most factories drew the bulk of their supplies from a radius of no more than 4 to 6 miles and the resulting butter weighed only about one twenty-sixth as much as the original milk. But considerations of this kind were more than balanced by other advantages that accrued to the Melbourne manufacturers:

while butter made 150 miles up country very often deteriorates badly on the journey to town, the cream improves, and one cool chamber will do for the produce of a large number of creameries. There is thus a saving of expense, the best market is at hand, and the cream can be delivered in perfect condition.⁴⁴

Other factors also made it worthwhile for the Melbourne companies to rail two tons or more of cream an average of about 125 miles to make a ton of butter. The scattering of creameries, almost literally from one end of the colony to the other, meant that there was less chance of production being brought to a standstill because of localised hazards and unseasonal fluctuations. Moreover, whereas most country butter factories had to use metropolitan agents (mainly because these had branches or associates to handle the London end of the business), the Melbourne companies could take care of this themselves. They were also in a favoured position to keep in touch with, and even influence, developments in the industry⁴⁵ by both fair and less respectable means. A Royal Commission in 1904-5 found that fraud, collusion and graft, involving several of the leading Melbourne butter makers, merchants and shippers, had been rampant since the early 1890s. Among other things it discovered that over 70 per cent of the export butter bonus had been paid to only ten companies most of which were based in Melbourne. Some of these were related financially or had entered into secret agreements, and the bonus had been used to hide accounting discrepancies that resulted. This, in turn, enabled them to disguise the true returns due on the produce of the country factories for whom they were acting as agents thus leaving these small, local companies—apparently struggling to keep their heads above water—easy prey for a cheap takeover or financial manipulation. The 1904-5 Royal Commission found that by the turn of the century about half the dairy factories in Victoria had in these and other ways been brought under the control of a handful of Melbourne operators. Moreover, secret payments to butter factory managers and company secretaries ensured that orders for dairy equip-

ment—even for butter boxes—were directed to agents or suppliers which were associated with the main operators.

This account of butter making in Victoria illustrates again the importance of focusing attention on the processes of industrial development rather than simply accepting the spatial result at face value: there can surely be few better examples than this to demonstrate the superficiality of apparent correlations between primary and processing activities. It also points up the way that metropolitan businessmen could take advantage of their country cousins and hence gain benefits that are barely reflected in the factory statistics themselves. Nor was this a unique example, as will become clear from other studies to be discussed later.

Forest and Mineral Resource Based Industries

Victoria was not richly endowed with natural resources—a point already stressed in a previous chapter. The emphasis always placed on gold (of which 53,554,000 fine ounces, or 76.8 per cent of the Australian total, had been produced by the end of 1890) tends to obscure the fact that no other mineral was produced in significant quantities during this period. Apart from some attempts to smelt tin, copper and iron ore (discussed later) no primary metallurgical industry came into being, which is perhaps hardly surprising given the apparent lack of any official encouragement or interest. Paradoxically, Victoria's hardwood forests—one of the few major natural resources that it did possess—were decimated for want of official discouragement. The long-run result in both cases was to advantage Melbourne.

Forest sawmilling

Victorians had a curiously ambivalent attitude towards the wholesale destruction of the hardwood forests with expressions of public concern being matched only by official apathy: time and time again until the 1890s the government of the day tiptoed towards legislative action only to retreat at the first sign of trouble. This attitude of mind was bred during the early decades of settlement. The licensed occupant of a run, the purchaser of land from the Crown, or the holder of a miner's right or a carrier's licence could cut without restriction any quantities or qualities of timber wanted for building, fencing and mining, or for use as industrial or domestic fuel. The only Crown land to which this did not apply consisted of a few reserves and that 'within ten miles from Melbourne, seven miles from Geelong, or within the boundaries of any proclaimed township or municipal district, or within one mile from the shores of Port Phillip'. No charge was imposed unless timber-cutting was 'the basis of a regular business' in which case a fee of 25/- per quarter was payable. The invitation to anarchy was accepted enthusiastically especially near gold-mining areas where, the Inspector of Forests reported in 1871, 'the forests . . . suffered severely from the wanton devastation and reckless manner in which timber for mining purposes [was] obtained'. The quantities consumed on the gold-fields were staggering: during 1870 alone, for instance, 767,000 tons of firewood, about 23,500 tons of sawn timber, and countless 'pieces' for props, caps

and slabs were used. Nor was that exceptional for in 1872 they used 941,000 tons of firewood and about 19,300 tons of sawn timber.⁴⁶ Generalising from the operations of a number of companies, about 1 ton of firewood was consumed for every 3 tons of quartz raised and crushed: thus at the Port Phillip Company's works at Clunes 25 tons of firewood were burnt each day during 1858 in the calcining kilns and steam engines, and an army of seventy-five cutters, splitters and carters was employed to maintain a 2,500 ton stockpile.⁴⁷ Furthermore, 'immense numbers of standing trees' were killed when the bark was stripped to make frail, temporary huts for woodcutters, and the lack of any forest management meant that the ground was covered with debris and dead wood which increased the risk and destructiveness of fires.

Mounting concern led to a Board of Inquiry which according to the *Argus* of 21 February 1868 recommended that conservation measures should be undertaken in the forests near gold-fields, that coniferous trees should be 'extensively introduced' into the state forests, and that the 180 square miles of forest proclaimed under the Land Act, 1862 and the Amending Land Act, 1865 should be permanently reserved and properly managed. But, before the year was out and as if to snub the Board, the existing 25/- licence fee was reduced to 10/- thus giving virtually anyone permission 'to cut timber on the Crown lands of the colony where and how he pleases'. Then on 1 February 1870 regulations were proclaimed under the Land Act, 1869 which enabled sawmillers to obtain the 'exclusive right' to cut timber in a designated area of state forest; these were rescinded on 26 September 1870 and fresh regulations substituted that provided for sites for mills on Crown land and the payment by sawmillers of a royalty on the quantity of timber cut. From the outset these proved to be a farce. The sawmillers refused to keep adequate records and the Crown Land Bailiffs, who already had more than enough to do, could hardly be expected to dash hither and thither through their bailiwicks—some of which covered hundreds of square miles—policing the day to day activities of itinerant mill-owners. These regulations were rescinded on 11 December 1871, revised on 3 January 1872, and replaced on 26 May 1873 with others that to all intents and purposes reintroduced the previous indiscriminate licensing system. A firewood or splitter's licence costing, respectively, 10/- and 20/- per quarter, was regarded as 'a legal instrument giving authority to any person to cut any quality of timber he pleases, and, virtually, from any Crown lands he pleases'. A sawmiller had to pay only £12 to £15 to erect a mill and 'on paying ten pounds a year for a log carriage [timber jinker], and five pounds a year for each man employed in felling timber', he could 'fell the pick of the trees in the forests in his neighbourhood'. Moreover, many trees were hacked down simply to prevent a rival from obtaining them or to block his access to some coveted patch of forest timber. For these rights sawmillers paid a total of only £2,073 into consolidated revenue during the year ending 30 June 1874.⁴⁸

The wholesale destruction of red gum and other forests, and the waste caused when splitters tried to thwart mill-owners and the latter tried to frustrate each other, again led to proposals that each sawmiller should be allocated an exclusive area.

The next legislative step, the Forest Act, 1876, made provision for the 'care, management, and control of State forests' by the creation of local boards: although regulations under the Act were approved on 15 May 1877 none were in fact appointed. Then in 1879 another Forest Bill was read a first time in the Legislative Assembly but not proceeded with and the same fate befell an amended version in October 1881. A more detailed Bill was prepared in May 1887 but was not even laid before Parliament. Thus during the 1870s and 1880s the only controls directly impinging on sawmillers were regulations promulgated under sections of various Land Acts. Most of these were well-meaning but trivial and impossible to police, like the one authorised on 16 July 1877 which made it an offence to remove standing or fallen timber from within 99 feet of any of the main rivers in the colony.

Of particular importance in view of later developments was the interest shown towards the end of the 1860s in the use of river red gum timber (*Eucalyptus camaldulensis*) for railway sleepers and wharf piles. The main stands—identified in Fig. 9.10—lay astride the Murray River, one east of Echuca between Barmah and Yielima (about 30 square miles) and the other west of Echuca from Gunbower to Murrabit (about 106 square miles). The first mill was built in 1863 at the junction of the Murray and Goulburn Rivers by the Bendigo-Echuca railway contractors, but the main development occurred between 1868 and 1873 when seven or eight sawmills were established in and around Echuca with subsidiary mills working in the bush. Altogether at this latter date about a dozen mills were processing red gum drawn from Victorian forests: it was said that 1,500 men were employed turning out about 10,000,000 super feet of sawn timber a year, most of which was used in southeastern Australia but some of which was exported to India.⁴⁹

In July 1878 the Secretary for Agriculture submitted a disquieting report suggesting that the 'length of time that our red gum forests will last, at the present rate of consumption, is variously estimated at from four to six years'. One Echuca miller claimed to be putting through 1,000 logs each week: the Secretary pointed out that at this rate this miller himself would exhaust the Gunbower forest in little more than two years, but noted that since a log averaged about 1,000 super feet this miller's claim was 'probably somewhat exaggerated'.⁵⁰ Nonetheless the gist of the message was plain enough: if the red gum reserves continued to be depleted at the same rate, Victoria would quickly run out of supplies even for its own needs. Some measures had already been taken to regulate cutting, such as by closing parts of these forests altogether and allocating particular areas of up to 1,000 acres to each sawmiller, but more positive action was needed. The government thus imposed a swingeing export duty on red gum of 10/- per 100 super feet as from 1 February 1878. Sleeper sizes varied between export markets but this represented a levy of approximately 3/9d on a sleeper costing 4/6d. Hardly surprisingly, Victorian millers lost most of their external markets overnight; the South Australian railways, for instance, immediately cancelled a contract with an Echuca firm for a million sleepers. The red gum millers protested to the Minister for Lands pointing out that only about a quarter of the volume of a log could be used for sleepers, another quarter was 'absolute waste', and nearly half—the so-called 'marketable

Plate 10: During the 1870s and 1880s in particular Echuca on the Murray River was a hive of industrial activity with sawmills cutting red gum and informal shipyards building paddle steamers and barges. The height of the wharf (middle distance) illustrates the change in water level between winter floods and summer drought. (Phillips Collection, National Library of Australia.)

waste'—was suitable only for sale to settlers and miners as slabbing for buildings, wells and shafts. They explained that one of the reasons why the Murray River boat owners were prepared to bring wool upstream to Echuca from the Murrumbidgee and Darling systems was because the strong demand by Riverina settlers for this slabbing timber made it a worthwhile back-loading. The government quickly had further thoughts: it first exempted exports of timber cut from logs floated across the Murray from New South Wales and then slabwood. Finally, from 1 August 1878, it suspended all red gum duty until 31 August 1879 but obliged mill-owners to enter into bonds to pay duty if the legislation were reimposed. The long period of uncertainty that followed—the duty was again suspended for one year, then for another year, and finally repealed by an Act assented to on 2 August 1881—brought the industry to a standstill. Whereas in 1877 fourteen mills had been hard pressed to cope with the demand for sleepers worth 14/- per 100 super feet, only three mills remained and the local orders for sleepers (the value of which had slumped to 9/- per 100 super feet) were insufficient to keep even them going for more than two or three days a week.⁵¹ When the duty was repealed once and for all in mid-1881 the sawmillers found that their best markets had been lost. South Australia had placed long-term contracts for jarrah from Western Australia and New South Wales had opened up its own red gum forests under a carefully supervised system which required royalty payments on timber felled but which allocated clearly separated blocks to each mill in a way that fostered larger-scale and more economical operations (see Chapter 12).

This account emphasises that the decline of the forest sawmilling industry in Victoria during the closing years of the century was part of a story stretching back over several decades and had much less to do than some commentators have suggested with the bursting of the Melbourne building boom in the late 1880s and the depression in the years that followed. The virtual extinction of the red gum industry at the end of the 1870s has been emphasised because it was one of the more dramatic and best documented episodes, but it should not be overlooked that the remainder of the industry seemed determined to destroy itself. The ruthless exploitation of the timber in more accessible areas, the destruction of immature trees, and the tardiness of replanting programs forced sawmillers to move into more rugged country where capital and operating costs were higher, or to pioneer new districts where they also had to provide the basic infrastructure. In the meantime builders, even in country towns, were using increasing quantities of the more easily worked imported timbers, such as battens and deals of Norwegian pine, Oregon pine and Canadian spruce; tongued and grooved boards of American white or clear pine; and New Zealand kauri for interior construction. Changes in railway freight rates also encouraged this process. Early in 1864 the 'down' rate on truck-loads of hardwood timber was equivalent to 7.5d per mile per 100 cubic feet (i.e. 1,200 super feet) compared with an 'up' rate of 4.0d. These charges were raised later that year to 9.3d and 4.7d, respectively, and then in 1875 reduced to 4.0d irrespective of direction, and this remained the charge for the remainder of the period. Meanwhile

the rate on softwood was reduced from 10.0d to 8.0d in 1875 and again to 3.3d in 1885.

Melbourne furniture makers too were making use of a wide variety of timbers from overseas and from other Australian colonies, like cedar and beanwood from Queensland. Country factories producing jams, preserves, pickles, tobacco and preserved milk found it cheaper to buy bundles of wood from Melbourne mills cut ready to nail together into containers. Even the thousands of butter boxes needed for the export trade from the late 1880s were made of white pine planks brought in from New Zealand because Victorian timbers contaminated the contents.

The problems of the indigenous timber sawmillers led in 1886 to a plea for more tariff protection on the basis of increased production costs caused by the need to build tramways in rugged terrain, the expenses involved in opening up previously unsettled districts, the higher level of licence fees compared with other countries, and the growing restrictions on the choice of mill sites, all of which made it more difficult to compete with imports. The first two of these problems were, of course, of their own making, and the others were gross exaggerations. It is true that parts of some forests were being closed to allow regeneration and that mills were being prevented from cutting over each other's areas but, as the Conservator of Forests (a position created in 1888) noted in his report for the year ending 30 June 1890, a sawmiller could

take up 1,000 acres—rent £10 monthly—put on 100 or more men, and cut off all the timber in a couple of months, at a cost of only £20. The saw-miller may also take out another area in another forest, and proceed in the same manner.

Moreover, since the level and nature of the licence fees payable in the 1880s were changed only in detail by regulations promulgated under The Lands Act, 1890, the findings of a survey carried out in August 1899 are relevant. This revealed that licence fees bore no relationship to the quantity of timber cut since the amount paid for all purposes by fourteen firms ranged from 7d to 2/11d per 1,000 super feet of timber actually processed, and this was very much less than the charge borne by sawmillers in most of the other colonies.⁵²

From 1890, when appropriate figures were first published (see Fig. 9.10) to the nadir of the industry in 1897, the number of forest sawmills decreased from 179 to 96 and the amount of timber produced from 105,000,000 to 28,000,000 super feet. Only a small part of this decline can be explained by any material alteration to the free and easy licensing system that had operated during the previous two decades. This change, affecting only red gum timber, was prompted when an Echuca sawmiller was found to have cut 1,600 red gum logs in 1892 for a total payment of £31 in licence fees whereas in similar circumstances the New South Wales government would have gained a royalty of £700. Regulations were quickly devised and promulgated on 28 November 1892, giving sawmillers the exclusive right to fell red gum over an area not exceeding 1,000 acres on payment of 10/- per 100 acres per month but, in addition, imposing a royalty of 10/- per 1,000 super feet on first

Fig. 9.10: Number and location of sawmills cutting indigenous timber in Victoria during the year ending 1 March 1892. Data are by shires: those producing more than 2,000,000 super feet are named. (Source: *Vic.SR*, 1891, p. 61.)

class and of 7/6d on second class timber.⁵³ Five months later this dual classification was discontinued and the rate lowered to 5/-. Even though this was considerably less than the 10/- to 12/6d rates applicable in New South Wales, it represented the first real attempt to charge Victorian millers on an equitable basis and, at the same time, provide funds for forest conservation.

It is not easy to quantify the spatial consequences of these developments. There is reason to believe that employment in forest sawmills was considerably understated in the *Statistical Register* during the 1870s and 1880s when this activity was lumped in with moulding, framing, turning, joinery and similar works. Judging from its reports, the Department of Agriculture, which was responsible for forests until the 1890s, had precious little idea about how many or where sawmills were operating (for not all bothered to take out licences), and it seems unlikely that the statisticians would have been better informed. Moreover employment in the industry was greatly affected by seasonal conditions. One of the main factors determining the level of activity in the red gum mills was the state of the Murray River along which the logs were towed from the river forests chained to outrigger barges. Elsewhere sawmills operated on a reverse regime because winter rains

made tracks impassable. Literary and documentary evidence leaves little doubt that the native timber sawmilling industry reached its zenith during the late 1870s when it may have been the main source of income for between 3,500 and 4,000 men. By 1890 the number of employees had fallen to 2,600 and by 1897 to 1,100. Some of this decrease resulted from the large quantities of sawn timber arriving from overseas and from other Australian colonies. In turn, this partly came about because of the limited range of building timbers available naturally in commercial quantities, but it also reflected the long-standing greed of the sawmillers, the apathetic attitude of the government, and the failure to heed the recommendations of the 1868 Board of Inquiry. Whatever the reasons, the result was to reduce the importance of country sawmills based on indigenous timbers and enhance the significance of those, mainly located in Melbourne, that were handling and processing imported supplies.

Iron-smelting

During the nineteenth century several attempts were made, as mentioned already, to smelt tin, copper and iron ore in Victoria but with limited success. The remoteness of the deposits and the high costs of overland transport meant that most of these smelters were set up at the mineral source. But, as if to contradict this generalisation, the first relatively large-scale processing of tin was carried out in Melbourne in 1859 by the Victoria Tin Smelting Company using black sand from the Ovens River area.⁵⁴ By 1864, if not before, at least one tin smelter was operating in the Ovens district, and during the next decade three or four more were set up at Eldorado and Reids Creek (between Beechworth and Wangaratta).⁵⁵ These smelters, which at no stage processed more than a small proportion of the ore being produced (mainly for export), benefited in the early 1870s from the increased demand for solder which the meat preserving works were using at the rate of nearly 4 lb per 100 containers. But this proved to be a short-lived boom and only modest quantities of tin were produced during the remainder of this period. Copper-smelting, mainly based on deposits near the Thompson River in Gippsland, remained insignificant. Much more interesting and potentially important was the attempt to smelt iron ore from a deposit at Mount Doran 3 miles southeast of Lal Lal, itself located 13 miles up the railway from Ballarat to Geelong. The circumstances are worth reporting in some detail because they illustrate the consequences for industrial development of government indifference and entrepreneurial incapacity.

Considerable interest was aroused by a report to Parliament in 1871 suggesting that the colony had 'an immense quantity of good iron ore, which under favourable circumstances would prove remunerative to the smelter'. In North America, it noted, a ton of blooms required about 46 hundredweight of charcoal, and that

the charcoal used in [Canadian] furnaces costs about eight cents a bushel [16 to 18 lb], while here suitable charcoal may be obtained at about one-half that price. This difference should compensate for any excess in the price of labor.

First off the mark was a private concern, the Victoria Iron Company, which in 1873 raised 20 tons of ore from a mineral lease near Maldon and forwarded it to Melbourne for experimental smelting. Work was started on a furnace but the contractor walked off the job and it was never completed. The company could hardly have been enthused by the attitude of the government which, when asked on 5 November 1873 whether it would offer a bonus for the first 500 tons of iron made in the colony, replied that the high price of iron should alone be sufficient inducement although 'no doubt any company which developed an iron mine would have a fair claim upon the Legislature for some consideration'.⁵⁶

Meanwhile the iron deposits in the Ballarat area had been attracting attention and led to further analysis and laboratory-scale smelting over the next twelve to fifteen months. Then on 11 February 1874 application was made to register the Lal-lal Iron Company Ltd, under the Mining Companies Act, 1871, with a nominal capital of £48,000 divided into £100 shares.⁵⁷ But nominal capital is one thing and paid-up funds another. During its first year the Lal-lal Company made eight 5/- calls so that at best it could have garnered no more than £960 from its shareholders. Yet on the strength of this the company went ahead in 1874 and erected a smelting furnace, contracted with gangs to prepare charcoal, and opened up the ore deposit. Eventually on 21 October 1875 the smelter, with a capacity of 30 tons of pig iron a week, was fired for the first time. By the end of the year it had turned out 110 tons from 220 tons of ore using flux railed 45 miles from limestone quarries near Geelong and landed at the works for £1 per ton.

This seems to have been regarded as an experimental phase, for mining and smelting operations were discontinued during 1876 and 1877 while the company was being reconstructed and new equipment installed. The new venture, registered in May 1876 as the Lal Lal Iron Company No Liability, had a nominal capital of £9,600 in £4 shares. There were, initially, twenty-seven shareholders, mainly from Ballarat and district; 70 per cent of the equity was held by only six people one of whom, the manager of the enterprise, alone held 30 per cent. The reasons for this reconstruction are not clear since new capital was called up very slowly—3/6d per share (or £420 altogether) in 1876, 6/- (£720) in 1877, 2/- (£240) in 1878 and 3/6d (£420) in 1879. Whatever work was done to the plant made little difference to its capacity or efficiency: when smelting was resumed in 1878 only 140 tons were produced representing an extraction rate of 46.5 per cent, in 1879 only 52 tons (43.3 per cent), and in 1880 only 45 tons (46.6 per cent). More positive steps were needed; hence, during the latter part of 1880 two further calls of 10/- each were made and tenders sought for the erection of a furnace having a capacity of 50 tons a week. But the full potential of this new investment was not realised, even though 560 tons (51.3 per cent) of pig iron were produced in 1881, 300 tons (50.0 per cent) in 1882, and 600 tons (50.0 per cent) in 1883, because the smelter was fired only intermittently. Consequently, the workforce fluctuated from 15 to 150 and this was hardly conducive to the development of the requisite skills.

On 30 July 1883 an extraordinary meeting of the Lal Lal Iron Company No Liability decided to wind up its affairs and dispose of its chattels to a newly

registered firm, the Lal Lal Iron Company Ltd. This new company continued the previous arrangement whereby all the pig iron produced was sent to a Ballarat foundry. Its first balance sheet, for the year ending 31 July 1884, noted that the smelting works had turned out 395 tons of iron, that the operating expenses of £4,771 had exceeded the value of output by £1,098, and that this was compensated for to some extent by a profit of £376 on the year's work at the Ballarat foundry. But, overall, the company, which had a paid-up capital of £13,125 and a bank overdraft of £3,640, ended the year with a loss of £1,627. A year later the directors reported that the smelting works had not operated at all 'in consequence of certain law proceedings', that the demand for foundry work had been dull and had largely consisted of making stamp heads for quartz crushing machines, and that the company had suffered a further loss of £1,071. By now the writing was well and truly on the wall: at the annual meeting for the year ending 31 July 1886 the shareholders were told that the Lal Lal mineral lease and plant had been put up for sale and that the loss for the year amounted to £3,189. The only reason for keeping the company going, the directors suggested, was to try to make the most of the remaining stock of iron rather than simply to sell it possibly at a loss. The death knell was sounded on 8 July 1889 when the shareholders of this, the third company to be involved in the Lal Lal iron project, decided that its affairs should be wound up voluntarily.⁵⁸

It is difficult to be sure precisely why this venture failed. During its first few years the lack of entrepreneurial and technical ability led to an excessively cautious approach for a type of undertaking where some flair and boldness are usually needed to achieve worthwhile results. This point is illustrated by the way the second company made fourteen separate calls from June 1876 to May 1879 to raise a total of 15/- per £4 share, not one being at the maximum rate of 2/6d per month that was permitted under the articles of association. Then, early in the 1880s, lack of co-ordination or managerial inability resulted in the newly enlarged smelter being shut down for weeks at a time because of shortages of water, charcoal and limestone. No hint has been found that there was anything wrong with the quality of the pig iron produced: indeed plans to set up a pipe-making plant were abandoned not because of doubts about the suitability of the iron but because 'the uncalled capital [was] not sufficient to carry out the necessary work'. Whatever the reasons, the failure of this venture meant that Victoria again became completely dependent on imported supplies of basic metals. It also put paid to any notion that country foundries might be able to save themselves the cost of freighting all their metal requirements from the seaboard, a journey that added about 25/- per ton to the price of pig iron in Ballarat and Bendigo. This became even more of a burden towards the end of the 1880s when unions were demanding wages and conditions comparable with those being won in Melbourne and when tenders for contracts were becoming more competitive.

Other Industries

Other industrial activities that developed outside Melbourne do not fit neatly into any of the three categories considered so far. Several emerged as part of, or were greatly influenced by, the process of post-gold structural readjustment. Thus, metal-working firms that originally grew up on the strength of the demand for gold-working machinery turned to alternative products and markets. To some extent, too, interest in activities like woollen-milling was fostered by local businessmen in the anticipation that they would create new investment and job opportunities and hence prevent the collapse of urban economies that had previously depended almost solely on gold.

Metal-working

Even before the end of the 1850s the more percipient observers on the gold-fields were drawing attention to the need for a wider economic base. The *Castlemaine Advertiser* in 1859 welcomed the diversity of equipment being installed in a large, new foundry because

the necessity has long been recognised for the development of other resources than the gold the great staple product of the colony, but which cannot be supposed to last for ever, how abundant soever it may appear to be in certain regions.⁵⁹

Establishments like this, prepared to make anything 'into the construction of which wood and iron enters' were thought to be

invaluable as means of rendering us independent of foreign aid, of fixing the population of the district, and rendering our mineral wealth reproductive.

The gold-field foundries began to feel the winds of change during the 1860s. Technical, financial and legal circumstances led to considerable year to year fluctuations in expenditure on machinery in keeping with the short-run speculative cycles which became a characteristic of the quartz mining industry. Moreover, although new kinds of underground working equipment—like compressed air rock-drills, safety cages, and underground haulage and forced ventilation systems—were introduced during the 1860s and 1870s, by no means all the mines were as well equipped as the leading examples usually quoted. Foundries at places like Ballarat, Bendigo and Castlemaine tried to cope with these changing circumstances in various ways. Some smaller firms endeavoured to specialise in a particular field such as the manufacture of boilers, rock-drills or stamp heads; consequential modest economies of scale and reductions in overheads enabled some of them to take advantage of the extending railway network and tender competitively for contracts in other districts.

Others took the opposite course and diversified their business such as by opening a branch in an area with a different economic base. J. W. Horwood, owner of the Albion Foundry Company in Castlemaine did this in 1876 by buying the Echuca

premises of a partnership which had simply been buying and finishing off his rough castings. By installing more equipment, Horwood put himself in a strong position to satisfy a substantial part of the growing demand for miscellaneous metal components being created by the Murray River steamer and barge building boom. From 1865 through 1890 at least 7,000 gross tons were launched in the vicinity of Echuca, three-fifths of this being constructed in four hectic years from 1875 to 1878.⁶⁰ Horwood's business also benefited from the fact that Echuca was the maintenance base for the 'top end' fleet (as distinct from the 'bottom enders' using Goolwa in South Australia) which, according to the *Australasian* of 4 March 1876, consisted of twenty-four steamers and thirty-three barges measuring 5,500 gross tons. Another example of this kind was the firm now known as Walkers Ltd of Maryborough in Queensland. In 1863 two Ballarat men, Walker and Braddock, formed a partnership with another pair from Melbourne and erected the Union Foundry to make heavy machinery. Four years later Walker visited Queensland to try to win orders for sugar-milling equipment and for mining machinery on the newly discovered Gympie gold-fields: prospects seemed so encouraging that the firm decided to open a branch foundry at Maryborough, 135 miles north of Brisbane, which cast its first metal early in 1868. It proved so successful that in 1873 the partners decided to sell half their interest in the Ballarat business (which then became Walker, Hickman and Company) to finance new equipment for the Maryborough works. Finally, in 1879 the remaining half share in the Union Foundry was sold, the firm moved to Queensland, and in 1884 the business was floated publicly as John Walker and Company Ltd with a nominal capital of £75,000.⁶¹ By this time there were about 160 sugar-mills in Queensland and Walkers was kept fully occupied dealing with new and replacement orders for unloading, carrying, crushing, macerating, clarifying, subsiding, evaporating, fuggalling and drying machines.

Other foundries and metal cum wood-working firms competed for a share of the increasing volume of government business being placed locally in circumstances already discussed in the previous chapter. The Railway Department from 1866 to 1890 placed contracts totalling £3,560,000 for locomotives, rolling stock and other equipment, of which £1,500,000 worth went to firms outside the metropolitan area (Table 8.7). The impact on employment can be roughly calculated on the basis that the gross value of output per worker in the industries concerned during 1880-1 was about £230. As a broad order of magnitude, then, perhaps 350 people would on average have been sustained in non-metropolitan foundries and rolling stock works from 1872 to 1890 by railway contracts alone. At certain busy times, especially 1881-2 and 1887-9, the number thus employed probably rose to 650 or 700.

About two-thirds of the non-metropolitan equipment contracts went to firms in Greater Ballarat, and the lion's share of this business was won by the Phoenix Foundry Company Ltd which by the 1880s was easily the largest industrial enterprise outside Melbourne and one of the more significant in the colony as a whole. It is also an outstanding example of the way that a firm adjusted the basis of its operations without changing location. This enterprise originated in 1855 when

a partnership trading as Richard Carter and Company set up a small foundry in Ballarat to make mining machinery. During 1869 or 1870 the two remaining partners decided to float the business as a public company, duly registered on 21 November 1870, in order to finance new equipment and put the firm in a stronger position to win government contracts. The nominal capital was set at £10,000 in £10 shares with one of the original partners, W. H. Shaw, being appointed manager. In the middle of 1871, with paid-up capital standing at a mere £1,501 and unpaid calls at £943, work started on the first railway locomotive contract, worth £2,244, for a single engine ordered by the Rockingham Jarrah Timber Company, a Ballarat-financed enterprise operating in Western Australia. Early the next year, as explained in the previous chapter, it started to construct locomotives for the government railways and continued to turn out about 8 a year during the remainder of the decade, gradually building up its workforce from 50 in 1870 to a peak of 430 in 1883. Until this time the firm's order book had remained open for items of gold-mining machinery, castings, steam engines and even for 2 or 3 small locomotives needed by railway contractors. But then it discarded these other lines and for the next two decades concentrated almost exclusively on government locomotive contracts (Table 8.6). Before ceasing operations the Phoenix Foundry had supplied 353 locomotives to the Victorian Railway Department, the last being delivered in 1904, and perhaps another 8 in response to private orders. Since only 2 of these 361 locomotives were built as a result of orders from outside Victoria, conventional statements such as 'despite the foundry's distance from the sea its railway engines were sent as far afield as New Zealand' are totally misleading. The Phoenix Foundry was successful partly because of the way it anticipated events and prepared itself financially and technically in 1870 thus gaining an initial advantage, and partly because of the managerial ability of men like Shaw who made several visits overseas to buy equipment. There seems little doubt, too, that until 1889 the lower wages being paid in Ballarat compared with Melbourne enabled this firm to offset some of the costs of railng materials—such as 150 tons of coal a week—from the seaboard.⁶²

It was some years before other non-metropolitan metal-working firms obtained much business from the Railway Department. One of the first was Walker, Hickman and Company of Ballarat which received a contract for sheep wagons in 1875; the Vulcan Foundry (Humble & Nicholson) at Geelong began its long series of contracts for weighing machines, pumps, boilers and turntables in 1876; and Thompson and Company of Castlemaine was barely two years old when it started to supply a range of items like points, crossings, springs and tools in 1877. Melbourne manufacturers managed to win the bulk of the contracts for rolling stock. Only the Phoenix Foundry (from 1875), G.F. Pickles and Sons Ltd of Bendigo (from 1882), and P. Ellis of the Bendigo Rolling Stock Works (from 1888) obtained substantial orders for railway carriages. Relatively small numbers of wagons were built in Ballarat by Quayle & Williams, and G. Munro; in Bendigo by Pickles, Ellis, and Harkness and Company; and occasionally, as in 1888-9 when

the usual contractors were too busy, in other country towns like Shepparton, Tarnagulla and Warrnambool.

These railway rolling stock and equipment contracts made up only part of the business flowing from official sources to the metal cum wood-working establishments. The Railway Department itself spent £2,776,000 on building and construction including stations, bridges and other structures that required pillars and girders as well as items like guttering, down-pipes, gratings and man-hole covers. The Vulcan Foundry of Geelong, for instance, supplied £4,000 worth of ironwork for the town's railway station, £5,000 worth for the Cressy bridge 40 miles to the west, and £1,000 worth for the Echuca wharf. Some of the requirements of other government departments and semi-official bodies were also made outside the metropolis, ranging from letter boxes for Melbourne streets (cast in Geelong) to bells for country post offices (made in Castlemaine).

What emerges from this analysis, which embraces all reported railway contracts and a sample of the 'contracts awarded' notices in the *Government Gazette*, is that the bulk of the extra-metropolitan orders went to firms in Greater Ballarat, Greater Bendigo, Greater Geelong and Greater Castlemaine—probably in that order of importance. It can be estimated that for much of the period from 1875 through 1890 between 10 and 12 per cent of the combined workforces of these four centres was directly sustained by government contracts, and the multiplier effects of this flow of funds within these local economies meant that an even greater proportion of the workforce was dependent on it.

Woollen-milling

By the mid-1860s local communities were also becoming conscious that positive steps were necessary to provide alternative employment opportunities in the face of changing circumstances. Apart from the structural adjustments confronting the gold-field towns there was also increasing concern about the lack of openings for young girls and women with dependent children. In Geelong, too, businessmen were keenly aware that they were losing trade, one cause being the differential rail charges adopted in 1864 aimed at persuading people to forward freight direct from Melbourne to Ballarat instead of part-way by coastal vessel. It seemed to some that the establishment of woollen-mills would be an ideal solution because it was thought that these would absorb relatively large numbers of unskilled hands and would also provide a market for colonial wool. To what extent the companies were launched as a result of genuine concern for the continuing viability of local economies cannot now be easily assessed, but to inaugurate schemes that appeared both philanthropic and potentially profitable must have seemed all the more rewarding to the promoters concerned. Certainly, few denied, and several proclaimed, the altruistic nature of their endeavours.

The circumstances can only be fully appreciated by an account of the development of the industry as a whole: not only was there an important 'demonstration' element involved but the fortunes or, more usually, misfortunes of the individual establishments affected the prosperity of them all. In Chapter 7 it was shown how

Table 9.10 Woollen-mill companies registered under the Companies Act in Victoria to 1890

Defunct Company pkt no.	Registered name	Date of registration	Date weaving commenced	Initial authorised capital	Initial organisation of shares	Date of resolution to wind up
48	Victorian Woollen and Cloth Manufacturing Company Ltd	12/6/65	Jan. 1868	£25,000	5,000 × £5	23/12/91 ^a
100	Australasian Woollen Mill Company Ltd	14/11/66	never	£12,000	2,400 × £5	— ^b
223	Ballarat Woollen Mill Company Ltd	26/9/71	mid-1873	£40,000	40,000 × £1	31/7/89 ^c
232	Melbourne Woollen Mill Company Ltd	28/12/71	Oct. 1872	£30,000	6,000 × £5	1/2/84 ^d
307	Barwon Woollen Mill Company Ltd	11/12/73	late 1874	£20,000	200 × £100	closed August 1886 ^e
316	Warrnambool Woollen Mill Company Ltd	23/2/74	Sept. 1876	£25,000	1,250 × £20	burnt 30/3/82
(368) ^f	Castlemaine Woollen Mill Company Ltd	27/9/75	July 1876	£20,000	4,000 × £5	still operating
477	Doveton Woollen Mill Company Ltd	31/7/79 ^g	Aug. 1879	?	?	^h
2340	Ballarat Woollen and Worsted Company Ltd ⁱ	4/9/89	Sept. 1889	?	?	still operating 1900

^a Assets bought by G. Hirst and Company 1897 and operated as Excelsior No. 2 mill.

^b Bank foreclosed in 1869-70; Melbourne Woollen Mill Company Ltd formed to purchase building and crates of machinery in store.

^c Shareholders agreed to winding up to permit reconstruction as Ballarat Woollen and Worsted Company Ltd.

^d Assets bought for £21,532 by the chairman's son (Alexander Munro) and operated until 1889 as a private concern.

^e Assets bought privately but mill remained idle until sold to G. Hirst and Company in 1890 and re-opened as 'Excelsior Woollen Mill'.

^f Companies Office file 368/23097 very incomplete for early years.

^g Believed to have been operated for about one year previously as private concern styled Wilson and Company.

^h Bought in 1922 and reconstituted as Myer Woollen Mill Company Ltd (a subsidiary of Myer Emporium Ltd).

ⁱ Took over assets of Ballarat Woollen Mill Company Ltd. Liquidated in December 1929 with shareholders allotted 57,600 £1 shares in new company of the same name.

Sources: VAO, Defunct Company Papers; VGG; newspaper and literary evidence.

Table 9.11 Private woollen-mill companies operating in Victoria to 1890

Name of mill	Location	Date weaving commenced	Comments
Albion	Geelong	1870	Promoted by Alexander Gray; became Albion Woollen Mill Company 1891. Still operating 1900.
Union	Geelong	1874	Promoted by W. H. Collins; trading later as Collins Bros. Still operating 1900.
Alfred	Williamstown	1879	Promoted by E. and W. Gaunt. Still operating 1900.
Yarraville	Footscray	1884	Formerly Melbourne Woollen Mill Company Ltd's premises. Ceased operations in 1889.
Excelsior No. 1	Geelong	1891	Formerly Barwon Woollen Mill Company Ltd's premises taken over by G. Hirst and Company. Still operating 1900.

Sources: Newspaper and literary evidence. For account of G. Hirst and Company, see I. Southall, *The Weaver from Meltham*, Melbourne, 1950.

the Victorian Woollen and Cloth Manufacturing Company Ltd struggled through its formative years in Geelong and eventually started to produce cloth early in 1868. By 1890 eight more public companies had come into being, the details of which are set out in Table 9.10 so far as they can be authenticated. The Victorian, Barwon (Geelong), Doveton (Ballarat), Warrnambool and Castlemaine companies had no connection with any of the others but, as will be explained in a moment, the Melbourne took over the assets of the Australasian, and the Ballarat Woollen and Worsted Company was simply a reorganisation of the Ballarat Woollen Company. Thus, only seven public companies were ever in production at any one time and then only briefly from August 1879 (when the newly registered Doveton took over a small privately owned firm) until March 1882 (when the Warrnambool mill was destroyed by fire). In addition, three private woollen-mills—the Albion and the Union at Geelong and the Alfred at Williamstown—had come into operation during the 1870s (Table 9.11) so that for this brief span of thirty-two months there were actually ten mills at work (four at Geelong, two at Ballarat, and one each at Footscray, Williamstown, Castlemaine and Warrnambool). But by then the industry had overreached itself and was already passing from one crisis to another.

No serious thought appears to have been given to the possibility of making woollen cloth in the colony prior to the government's announcement in July 1864 that £5,000 would be set aside for the 'promotion of New Manufactures and Industries', the regulations for which noted that 'precedence of claim' would be given to the manufacture of, inter alia, 'blankets, rugs, flannels, cloth, or other woollen fabrics of general use'. This bonus seems to have directly affected only the Victorian Company at Geelong. The motives that led to the floating of the second company, the Australasian, in 1866 are obscure, though the *Age* commented on 5 February 1872 that it had been promoted 'by a few enthusiastic free trading soft-goods firm, with a view of showing that protection was not necessary for the encouragement of colonial industries', and the prospectus certainly listed several businessmen associated with prominent firms of this kind. If there was any truth in the *Age*'s assertion—and the Chairman does seem to have tried to keep people with protectionist leanings off the Board—it is even more difficult to understand why the company's affairs were allowed to get into a thorough muddle within a few months of its registration. The freetraders neither demonstrated the courage of their own convictions nor displayed much entrepreneurial and financial acumen. Although 1,150 shares were taken up during the first six months, none were bought during the remainder of the year; and although by then £4 per share had been called an average of only £2.17.0 had been paid. At the end of the first year shareholders were told that on-going building costs had absorbed the equivalent of £4 per share and that the remaining £1 would have to be called to 'lay the floor'. They were also informed that machinery had yet to be ordered from England, that the staff had disobeyed instructions and had had some equipment made in a local foundry, that the directors wanted to sack the manager, and that the Board members had voted themselves fees at a meeting lacking a quorum. This sort of lax, if not actually dishonest, management continued to dog the company's affairs, with one share-

holders' meeting after another being adjourned to allow tempers to cool and truth to be collated. By the beginning of 1870 the company had still only raised £5,000 on the 1,063 shares still effective (some of the original ones having lapsed) and had borrowed £3,000 from the Victorian Permanent Building Society and over £4,000 from the Commercial Bank to cover outlays on buildings (£4,500), machinery (£5,500) and other items (£2,000). Then came a stalemate because the company could not afford to erect the newly arrived machinery but existing shareholders ignored appeals for further funds and new investors did not materialise. Eventually the Commercial Bank, now owed £7,000, foreclosed and became the owner of the empty building and the 300 tons of crated machinery. During 1870 and 1871 several moves were made to launch a company to take over these assets, but it was not until November 1871 that steps were taken to float the Melbourne Woollen Mill Company Ltd which was registered late the following month, acquired the bank's white elephant for £7,000, and put the first loom to work on 25 October 1872.⁶³

In the meantime circumstances had been changing. A 10 per cent ad valorem tariff had been put on woollen blankets from 12 April 1866, and a 7½ per cent tariff on woollen piece goods imposed on 17 May 1871 had been raised to 10 per cent on 2 August 1871. During 1868—before the Victorian Company had paid any dividends—proposals were being canvassed for mills in several towns in the colony, like Malmsbury (near Kyneton) and Echuca, but nothing came of any of these schemes until the Ballarat Company was formed in 1871. By then, however, investors were becoming more receptive, not so much because of the tariff but because of the publicity given to the 10 per cent dividends paid by the Victorian Company in 1869 and 1870 and the apparent success of the privately operated Albion Mill which started to put tweed on the market in May 1870.

Even at this early stage the long-term problems of the industry were beginning to emerge although it is doubtful whether they were recognised as such at the time.⁶⁴ The first auction of locally made cloth, from the Victorian Company, took place on 22 May 1868 and the price for this and subsequent batches was about 5/- per yard. But, as the *Argus* somewhat gleefully noted on 13 January 1869, the 'first lots put on the market realised fictitious prices in consequence of the novelty of the manufacture' and the average (and approximately the median) price obtained for the 237,000 yards of the Victorian's cloth sold during the thirty months ending 30 November 1871 was only 4/1d. This was particularly unfortunate as the price of greasy wool in Geelong had risen from about 7½d per lb in 1869 to 11d in mid-1871 thus raising manufacturing costs by about 7d per yard. Two consequences followed. One was that the company was unable to pay any dividends during 1871 so that its paid-up capital increased by less than £300. The other was that it was forced to raise prices late that year to an average of 5/- a yard which made its products less competitive with imports and enabled the anti-protectionists to canvass this as the sort of 'greedy opportunism' to be expected as a result of the tariff increases announced a few months previously.

In reality the Victorian Company was running into the cost:price problems soon to be shared by most of the other mills coming into operation during the 1870s. They

found that it was one thing to produce the cloth but quite another to place it on the market and into the hands of the end users, most of whom obtained their supplies, often on credit, from established importers and wholesalers. These latter firms quickly discovered that locally made all-wool cloths were less profitable lines than imported 'union' and 'angola' goods.⁶⁵ These, being wool and cotton mixtures based on reclaimed rags ('shoddy') picked up—in the words of one embittered Geelong mill-owner—'from evil-smelling dung-heaps', were cheaper and thus more acceptable to the Victorian slop clothing trade.

There seems little doubt that much of the grey tweed produced by the local mills during the 1870s was, technically, of good quality. In 1872, for instance, the Albion Mill was able to sell small quantities of broadcloth to London tailors, and English manufacturers were not slow to send out cloth using the same patterns and packaging that had been adopted in the colony. There were, of course, teething troubles: as late as 1873 the Victorian Company discovered that some of its machinery had been designed for cotton rather than wool and it took the opportunity to replace it with £5,000 worth of double-width power looms. The fundamental dilemma facing the Victorian mills was that their few lines of grey tweeds and woollen blankets suited only a small section of the market but it was difficult to move into either cheaper or more expensive ranges. On the one hand, they were reluctant to make 'unions' because, in the absence of a local source, all the cotton warp thread would have had to have been imported. On the other, they were unable to weave, say, blue suiting or scarlet uniform cloths because the multi-coloured threads from their other looms spoilt the appearance, and they were in no position to finance the separate buildings thus required or to venture into the quite distinct task of weaving worsteds. Each new firm that appeared only made the situation worse for they were set up as fully integrated units undertaking all the processes from wool-scouring through carding, spinning, dyeing and weaving. Apart from the Castlemaine Company, discussed in a moment, none seemed prepared to distinguish themselves fundamentally from the others.

The Victorian mills were thus forced to make ends meet by trying to expand the market for their limited range of all-wool tweeds. None could spare the financial resources to set up their own marketing organisations or their own clothing factories (a device adopted by the Queensland Woollen Milling Company which commenced operations at Ipswich in 1875 and by mills in other countries like New Zealand); consequently they remained at the mercy of the wholesalers who saw no virtue in pushing local cloth in preference to imported supplies especially as they were able to obtain 'end of season' lines at cut prices from English manufacturers. Moreover, the wholesalers quickly circumvented moves by the mills to sell direct to clothing firms or drapers by threatening these small businesses that they would cut off both credit and supplies of other textiles that could not be made in the colony. The importers also managed to secure most of the government contracts because these were usually advertised as mixed lots of blue, scarlet, grey and white goods of various qualities which the mills could not supply without themselves buying in some of the lines.

Plate 11: The Geelong mill of the Victorian Woollen and Cloth Manufacturing Company, which began operating in January 1868, made the first cloth in Victoria. About half the fifty employees were women who were paid about 24/- per week. The need to provide motive power through a series of overhead shafts, gears and belts was a major constraint both on the design of factory buildings and the internal layout of machinery. (*Illustrated Melbourne Post*, 16 June 1868.)

By the end of 1874 the industry was beginning to gear itself more closely to local needs by producing a greater range of qualities and weights of all-wool tweeds and by varying patterns between seasons. To a limited extent the individual mills also began to specialise in particular lines (such as the Melbourne Company on buckskin cloth) depending on the skill of the workforce, the type of machinery installed, and the enterprise of the management. These sorts of changes in turn made the colonial products more acceptable to the making-up trade which was benefiting from the doubling in August 1871 of the *ad valorem* duty on apparel and slops to 20 per cent. Outwardly, the industry as a whole seemed to be progressing fairly satisfactorily from 1875 to 1878 with the Victorian Company, for instance, regularly paying dividends of 4 per cent every six months. But this apparent prosperity was illusory and thus all the more unfortunate since by 1878 it had encouraged investment in three more mills, at Warrnambool, Castlemaine and Ballarat. Whereas in 1875 six mills had been trying to dispose of 645,000 yards, three years later there were nine mills putting 1,070,000 yards on the market. Then in 1879 the Williamstown mill added its quota to the colony's output which in that year reached 1,105,000 yards. This very considerable increase in production, mostly of similar and substitutable types of material, inevitably led to fiercer competition between the local mills which were forced to sell off stock at discounted prices or on credit. Prices had been falling for several years—partly as a deliberate attempt by the mills to capture some of the market for cheaper and lower quality lines, but by 1879 the companies had to choose between selling at cost or accumulating stocks. For instance, the average price per yard obtained by the Ballarat Company, which had been about 4/1d during 1876-8, fell to 3/4d in 1879 and 3/0½d in 1880.

This soon exposed the financial weakness of some of the public woollen-mill companies which had disguised the real state of their affairs by not devaluing, in keeping with market trends, their growing stocks of finished and partly processed cloth (by now equivalent in most cases to between four and six months output). Borrowed money was used to finance new plant in an endeavour to cut labour costs but bottlenecks in other sections of the mills meant that the faster, automatic looms could only be used inefficiently. Several companies increased their nominal capital but, by some judicious juggling, used the cash from additional share issues to finance items like wear and tear of machinery and 10 per cent dividends to shareholders in years when the claimed profit was very small and the real result was probably a loss. Little attempt seems to have been made to reduce these liabilities, possibly because during 1875-7 loans could be negotiated with interest rates as low as 6 or 7 per cent. The crunch came in 1879 and 1880 when some of the companies had to seek further accommodation at a time when interest rates were rising.

The Melbourne Company was the first to be caught by such policies for by 1880 it had racked up debts of £18,000—more than its paid-up capital—to the Victorian Permanent Building Society and was using notional profits from current operations in 1878 and 1879 to pay 10 per cent dividends and to buy additional equipment. When yardage sales started to decline in 1880 it became difficult to meet interest payments much less repay capital. Early in 1883 the directors proposed an

amendment to the articles of association so that they could issue the balance of unallotted capital, amounting to £11,140, in the form of preference shares: the shareholders agreed but sought to have these funds used to reduce the company's liabilities. In the event the directors decided to suspend production and sell off accumulated stock worth £13,000, but by then things had gone too far and a few months later the company was put in the hands of liquidators. The Barwom Company also ran into similar difficulties and in 1886 it, too, had to cease operations.

The other firms in the industry, with the exception of the Warrnambool Company whose mill was destroyed by fire, managed to keep going by adopting various strategies. The Castlemaine mill concentrated on 'white goods' and started to make 'union' flannels for which it imported the cotton warps; the Ballarat Company began selling direct to the trade and to country stores; and the Victorian Company concentrated on lower quality all-wool tweeds. By now all were conscious of the need to avoid excessive long-term liabilities. The Doveton Company did this by paying no dividends to its handful of shareholders for the best part of twenty years and ploughing back profits. The Victorian Company, on the other hand, usually paid annual dividends of 6 to 8 per cent until mid-1884 and issued new series of shares from time to time which eventually brought its paid-up capital to a maximum of £64,000 in 1886.

All these measures were, however, little more than palliatives: none overcame the fundamental problem of an excess of local production in a limited domestic market. The mills may have been aided marginally by a 5 per cent increase in the ad valorem duty on woollen piece goods, clothing and wearing apparel and of 10 per cent on woollen blankets which came into effect in July 1879, but at least one company told the Royal Commission on the Tariff in December 1881 that it strongly opposed such increases as they simply encouraged greater production and intensified competition. The closure of the Melbourne mill in 1883, an increase in average prices of cloth from a record low of 2/6d in that year to 3/7d in 1885, and a simultaneous reduction in greasy wool prices, made little difference since a growing proportion of the million yards and more being turned out each year was piling up in warehouses.

For several years the directors of the Victorian Company, among others, had been warning shareholders that the situation was steadily becoming more serious, and eventually at the end of 1884 they took the unusual step of recommending no dividend because of the unsatisfactory results achieved during the previous six months due to the glutted state of the market. Next year most mills made losses. The Victorian Company tried to keep faith with its shareholders by paying one dividend of 3 per cent but this was only done by discontinuing their long-standing (and so far unbroken) practice of making an annual provision of £2,000 to £3,000 for 'wear and tear'. To add to the industry's problems, the government was proceeding with The Factories and Shops Act, 1885 which limited the hours of work of any female or any male under sixteen to forty-eight per week. It will be recalled from Chapter 8 that the Chief Secretary had used his discretionary powers under

The Supervision of Workrooms and Factories Statute, 1873 to allow female woollen-mill operatives to work more than the statutory number of hours as a result of petitions from the employees themselves. This time the woollen-mill companies petitioned the Chief Secretary for a dispensation, in view of the difficulties facing the industry, that would allow their operatives to work longer hours. On the very day, 1 March 1886, that the new Act was due to come into force, the Chief Secretary agreed to allow mill employees aged sixteen or older to work fifty-six hours, but no more than ten hours a day, and allowed people under sixteen to work more than forty-eight hours a week if he or she consented.⁶⁶ At three-monthly intervals, as required under the Act, the request was renewed and granted.

Early in 1886, with an election pending, agitation mounted in Geelong for a review of the tariff on woollen piece goods. On 19 February a meeting of operatives, presumably with the active or tacit approval of the owners, formed the 'Woollen Factories Protection Union' with the intention of influencing parliamentary candidates to 'support a sufficient increase of the duty on woollen piece goods on the American system at so much per pound' on top of the existing 15 per cent duty. Suffice it to say that all three candidates returned from this constituency had pledged that they would indeed seek a reform of the tariff. On 31 May a delegation of mill-owners waited on the Chief Secretary to press for a duty of 1/6d per lb on woollen piece goods to deter the cheapest types of tweed being imported at 10d per yard from English and German factories where, it was claimed, wage and fuel costs were much lower.⁶⁷ The clothing industry protested equally vehemently against such a proposal on the grounds that it would mean 'an increase on a boy's tweed suit from 18s. to 25s.' which would destroy the export trade. Preserved among the Chief Secretary's correspondence is a departmental memorandum which details the arithmetic.⁶⁸ The calculations, based on a 'medium priced common tweed' suit made up from 6 yards of imported cloth weighing 64 ounces and invoiced at 6/4d, showed that the ex-factory cost would be 24/6d on the basis of a customs duty of 1/6d per lb as against 18/10d with the existing 15 per cent ad valorem impost. After allowing for the wholesaler's mark-up and assuming that all import duty could be claimed as drawback, the suit would be sold to the trade in Sydney at 22/8d if the new duty were to be imposed compared with the existing price of 21/6d 'thus making it harder to compete with English goods'. On the Melbourne market, assuming a wholesale mark-up of 20 per cent and a retail mark-up of 33 per cent on top of that again, the comparative prices would be 39/3d and 30/1d. This anonymous adviser stopped short of making a recommendation but left no doubt as to where his sympathies lay:

The real reason why the Mills are not fully employed is because they do not meet the public demand which is mostly for dark coatings even among the poorer classes, and all the duty in the world will not affect the demand when *Fashion* leads the way. If the public were content to use only tweeds then the mills would do very well, for they are turning out most excellent goods, both for quality and patterns . . . if you increase the duty on woollens, you must also increase the duty on

clothing in a proportionate degree or else the English cloth manufacturers could beat us.

The government tried to compromise by proposing a 5 per cent increase in the ad valorem duty on woollen piece goods thus making it 20 per cent, and a simultaneous increase in the duty from 25 to 30 per cent on articles of wearing apparel made up from fabrics like vestings, trouserings, coatings and shirtings that contained wool (a form of words that embraced 'union' cloths) and from broad-cloths, naps, flannels and other woollen materials. After an acrimonious debate in the Legislative Assembly in August the Government had its way, unmoved by resolutions passed at a public meeting in Ballarat or a 'monster deputation' of woollen mill operatives that waited on the Chief Secretary a few hours before the vote was taken. It is not hard to understand the intensity of feeling that had been generated. During the first few months of 1886 about 100 mill employees had been dismissed and the other 700 could see their own jobs in jeopardy. As if to demonstrate their plight, the Barwon mill closed in July after having paid only five small half-yearly dividends throughout the twelve years it had been operating. Again using the medium-priced common tweed suit as the illustration, the 1/6d per lb duty sought would have been equivalent to an ad valorem impost of about 85 per cent. The increment of 5 per cent actually granted meant an increase of only 4d on the ex-factory price, of 1d on the wholesale export price (after allowing for drawback), and of 7d in the Melbourne retail price. Moreover, because of the complexities (and curiosities) of the arithmetic involved, this latter increase—amounting to less than 2 per cent—was about the same as the advance in the retail price of an imported suit caused by the additional 5 per cent duty on made-up clothing. Relatively, then, no one gained by the 1886 customs revisions but the final consumer had to pay more.

The difficulties facing the woollen-mill companies remained unchanged. The gap left by the failure of the Barwon Company was soon filled by the others and by the re-opening of the old Melbourne Company's premises at Footscray as a private concern. Output again increased each year from 899,000 yards in 1887 to a record 1,197,000 yards in 1891, competition remained intense, and average prices never rose much above 3/1d per yard. The first firm to give up was the one running the Footscray mill in 1888, and then the Victorian Company closed its mill in 1891 in circumstances that can be fully documented from its half-yearly balance sheets. Until 1885 the Victorian Company had seldom allowed its borrowings to exceed £13,000, but by the middle of 1886 liabilities in the form of overdrafts, promissory notes and debentures had reached £30,000. The profit from current manufacturing operations, substantially reduced because the mill had to be worked intermittently and because of low selling prices, failed to cover even the interest on debentures. The directors tried to keep things going by issuing preferential shares (and they themselves bought most of the few taken up), selling stock at as much as 15 per cent below cost, writing down the value of plant and machinery, and trying to reduce external liabilities. They also toyed with the idea of entering the race for

the £5,000 bonus for the first 10,000 yards of worsted cloth (see Chapter 8) but wiser counsels prevailed. Then in 1887 the Victorian Company, along with others, agitated for a further revision of the tariff, but the Chief Secretary told a deputation in August that the government could not deal with customs duties 'in a sectional way' since it had to 'carefully observe the relation of one industry with another'. Next year the mill-owners unsuccessfully tried another tack, arguing for a reduction in the compulsory school-leaving age from fifteen to thirteen or the adoption of the system in England whereby children between these ages were allowed to spend alternate days in a factory. At long last the government acted to raise the tariff on woollen piece goods, first to 25 per cent from 31 July to 19 September 1889 and thereafter to 30 per cent, and on apparel made up from woollen fabrics to 35 per cent. But this solved none of the problems. In any case it came too late to save the Victorian Company which during the second half of that year recorded a net profit of only £50 with liabilities to financial institutions standing at £34,600. The final crippling blows came in 1890 when manufacturing costs were raised because of the application of the eight-hour system and the rise in fuel prices caused by the maritime strike. It was obvious by 1891 that the enterprise was making no headway and the decision was made to close the mill and liquidate the company. The shareholders had to wait nearly a decade before realising their assets, for an attempt to float the 'Geelong Woollen Mill Company' to take them over failed, and the premises could not be sold until 1897 (when they became Hirst's Excelsior No. 2 Mill). Eventually on 6 April 1900 the liquidator reported that the stock had been sold for £30,935 and the mill for £15,000 which more than covered outstanding liabilities of £22,264.

This account of the struggles of the woollen-mills illustrates several aspects of industrial development during this period. The Victorian was the fifth public company in this field to fail (the others being the Australasian, Warrnambool, Melbourne and Barwon ventures) leaving only the Ballarat (reconstituted), Castlemaine and Doveton, none of which had provided more than limited returns to shareholders. The balance had swung in favour of private companies: the Albion, Union and Alfred mills had all been operating for a decade or more and were joined by the Excelsior No. 1 Mill (established in the Barwon's old premises) in 1890. These firms did not have to expose their affairs to public scrutiny and much less is known about their operations; it is thus difficult to be sure why they were relatively more successful though a few tentative explanations can be advanced. First, all were owned or managed by men who had had some previous experience of the technical side of the business which was thus given proper emphasis. In contrast, several of the public companies had rushed into things prematurely, saddling themselves with liabilities over which they had little control, buying unsuitable machinery, and even, as in the case of the Australasian Company, erecting a building before ordering any equipment at all. Second, in almost all the public companies there was constant friction between the directors and the senior staff: possibly the private companies had similar problems but none could have surpassed the record of the Melbourne Company where no fewer than ten

'manufacturing superintendents' were either dismissed or resigned in less than ten years. Naturally enough this did not escape the attention of parliamentarians: opposed to 'protection' who noted that it was 'a curious thing that mills in private hands pay, whereas mills belonging to the companies do not pay'.⁶⁹ Third, the private companies may have been more innovative for the Alfred Mill was the first to instal worsted machinery, and less concerned about criticism since the Union Mill used cotton warps in the 1870s and the Alfred Mill incorporated 'shoddy' in their cloths during the 1880s. Finally, there is some evidence that the private firms may have been tougher employers: in 1890 an attempt was made to reduce mill-workers' wages in Ballarat when it was discovered that they were above those being paid at the Alfred Mill at Williamstown where piecework rates depended on the speeds, and hence capacities, of the looms.

During this period the mills in Geelong, Ballarat, Castlemaine and Warrnambool accounted for about four-fifths of the cloth produced and of the operatives employed, the total number of which from 1878 on fluctuated between 775 and 850 except in 1883 and 1886 (Fig. 9.11). the reasons for the choice of these locations are not altogether clear. One, mentioned already, was the growing concern about the limited employment opportunities: whatever the real weight that can be placed on this motive, it is certainly true that by 1880 these provincial mills were directly employing about 6 per cent of the estimated factory hands outside Melbourne (Appendix Table A1.6), besides providing contract work for carriers, firewood cutters and foundries. Two other factors were significant. In most company prospectuses considerable stress was laid on the advantages that would accrue to the graziers in a district if the locally produced wool were bought and processed on the spot thus eliminating many of the freight, insurance, storage and handling costs involved in shipping wool overseas. It seems that the woollen-mill companies did in fact buy much of their requirements (about 6,000 bales annually in the early 1880s, or nearly 12 per cent of the colony's output) direct from pastoralists rather than through the increasingly formal wool auction system.⁷⁰ If the local market had been able or willing to absorb good quality all-wool fabrics, the advantages might have been significant, but, as one mill manager pointed out,

the manufacturers at home are in a better position than we are. They do not content themselves with buying one class of wool, they have the pick from all countries—they can buy cheap wools and blend them and bring out their woollens cheaper than ours.

The other factor was the availability of investment funds. In all cases where lists of shareholders are extant only a small proportion of the paid-up capital came from outside the immediate neighbourhood, although as often as not this was insufficient for the purpose and additional funds had to be sought from financial institutions. Even the Barwon Company at Geelong, which was able to call up—almost entirely from local residents—£9,750 in the first year after registration and a further £9,350 in the second year, had to turn to the Bank of New South Wales for £3,900 to cover the £20,700 investment in land, plant and buildings and initial operating expenses.

Fig. 9.11: Employment and investment in, and output of, Victorian woollen-mills 1868-92 (derived from annual *Vic. SR* returns), and level of ad valorem duties imposed on woollen piece goods and on apparel and slops made up from cloth containing wool.

More detailed investigation is needed before much can be said about the original sources of these local funds but in the case of the Warrnambool Company use was made of finance originally invested in a totally different type of enterprise. On 17 June 1875 a special meeting of the mill company, which was finding it difficult to raise sufficient capital to start its enterprise, jumped at an offer by the shareholders of the defunct Warrnambool Meat Preserving Company to sell their premises for £5,000 in paid-up shares. Since this offer was made some time after the mill company had gone to the trouble of buying a disused flour-mill in which to base its operations, it is doubtful whether there was originally any formal connection between the two ventures, but it was this arrangement that enabled the mill company to start manufacturing tweed cloth in September 1876.

Curiously enough, little emphasis seems to have been placed on 'traditional' factors like climate and water supply as instanced by the fact that the water at Warrnambool was relatively hard which made wool-scouring more expensive. The Melbourne mills had to pay for their water which was drawn from the town reticulation system and they ran into increasing problems relating to effluent disposal. In contrast the abundance and softness of river water at Geelong was undoubtedly one of the main considerations that attracted mills to an area that had already been picked out by other water-orientated activities like tanning and wool-washing. Indeed it is possible that the pre-existence of such establishments may also have seemed attractive as a source of raw materials (and of products like leather belting) in addition to what was available from their own wool-scouring plants. Significantly, the newly appointed manager of the proposed Commonwealth-owned woollen-mill recommended Geelong as the best location after the extensive tour of possible sites throughout Australia in 1912.⁷¹ This town was the only one in which the nucleus of a skilled labour force began to develop, although no evidence has been found of any specialist firms undertaking ancillary activities like dyeing or textile printing. The public companies all seem to have deluded themselves about the nature of the workforce required: the prospectus of the Australasian Woollen Mill Company blandly suggested, for example, that

the scale upon which it is proposed to erect the first mill would involve the employment of about 250 persons—men, women, and children—about two-thirds being women and children, whose employment would be chiefly attending self-acting machines at which skilled labour is not required.

In the event several of the companies had to recruit part of their workforce from textile areas in England, thus leaving themselves open to more snide remarks from the anti-protectionists.

There is no better illustration of the dilemma that confronted successive ministries in trying to balance, or at least appear to balance, the interests of one industry against another and the requirements of the internal economy against the exigencies of external trade. The whole episode supports and again illustrates the argument of Chapter 8 that the alterations to the customs schedules in 1879 were

ill-conceived. By that time the Victorian mills had captured much of the domestic market for the type of cloth they were able to produce on the basis of locally available resources: subsequent juggling with the customs schedules owed more to political influence than to any real attempt to solve the problems of either the woollen-milling or the clothing industries. It was also one of the few clear-cut cases in which the conflict was essentially between a secondary industry mainly located outside Melbourne and one mainly concentrated within it. Most of the makers-up and drapers were in one way or another beholden to Melbourne commercial interests which not only had the necessary political influence but could manipulate the internal and external trade in softgoods to suit their own ends. The country mills were unable even to supply the needs of the towns in which they were located: the member for Ballarat East reminded the Legislative Assembly on 19 September 1889 that these firms had

to send their goods to the large wholesale houses in Melbourne, which supplied the retail establishments in the country. If the mills were found giving small parcels to individuals or brand establishments, the wholesale houses would turn round and refuse to take any of their goods.

At most of the government inquiries held during this period a contrast was drawn between the hapless state of the local woollen industry and the apparent success of the mills in New Zealand. The chairman of one company thought it was because in that country

the companies principally go to the public direct, and New Zealand is so situated that there are a number of large places all about equal; here we are handicapped by having only one centre. . . . The point . . . is this . . . that in those centres they have large distributors, wholesale men, and they radiate from those centres over practically their own district. They are cut off from each other to a great extent.

While there was no doubt a good deal of truth in this rationalisation, the problems of the Victorian industry really stemmed from the over-production of a very limited range of textiles. The board appointed to inquire into the fiscal system of Victoria noted in 1894 that

the representative of a large drapery establishment showed us samples of his stock of flannels—394 in all. Of these thirteen only could be made in the colony, while the 381 kinds of plain and fancy, which could not be locally made, were taxed to protect the thirteen descriptions produced at our own mills. The same to a greater or lesser extent is, no doubt, the case in regard to all other woollens in the piece.

Therein lay the dilemma of the woollen-mill companies, the clothing manufacturers, and the government.

The Spatial Influences Reviewed

These detailed examples demonstrate the complexity of the factors underlying the employment profiles summarised in Fig. 9.2. The theme common to most of the

case studies is the way that a series of technical, economic and political circumstances gave, or were contrived to give, an advantage to Melbourne. The presence of a resource, like timber or iron ore, or the development of farming and grazing proved to be uncertain foundations for the development of industries in country areas, while relatively 'footloose' activities like iron-founding and woollen-milling were able to advance only so far before being nipped in the bud.

One aspect of all this, which has been implied but not yet adequately emphasised, was the absence of much overt entrepreneurial connection between industrial firms located in Melbourne and the remainder of the colony. There are a few examples of elementary integration backwards such as Michaelis, Hallenstein and Company which established a plantation during the 1870s to try to overcome a shortage of wattle bark for tanning, Swallow & Ariell which produced dried fruit at Shepparton for its Melbourne biscuit factory, the Apollo Stearine Candle Company Ltd which operated a small boiling down works at Wodonga, and the Melbourne butter factories which set up creameries in the dairying areas. But there appear to have been few instances in which firms operated branch factories, although an early example was the Fulton Foundry Company which opened a subsidiary works at Bendigo during the 1850s to do on the spot repairs and to fulfil orders for quartz crushing machinery: in this case the parent factory in Melbourne undertook the more complicated work because it made better sense to pay freight on finished products rather than on raw materials (the dross from which was wasted) and on coal for furnaces.⁷² Slightly more common was the process in which country firms first established branches in Melbourne and then translated these eventually into their main factories. The case of E. Rowlands, a cordial maker of Ballarat who infiltrated the metropolitan market in this way in 1873, has already been cited. Another instance was G. F. Pickles and Sons' Carriage Manufacturing Company Ltd which after 1882 divided its activities between the original works at Bendigo where most of the railway rolling stock contracts were fulfilled and a large factory in Melbourne (which, in turn, had an outer city branch) where most of the horse-drawn carriages were built; in 1887 the Bendigo business was sold and all its operations were transferred to the metropolis. Occasionally, too, firms originally founded in country towns, like the Bendigo engineering and boiler-making firm of Buchanan & Nodrum, moved to locations in or near Melbourne.

The stress already laid on the significance of local capital in country manufacturing makes further examples unnecessary. Although private investment from Melbourne sources seems to have been unimportant, short- and long-term institutional capital was almost always required. Thus an important investigation yet to be undertaken is the spatial consequences of bank policies including the extent to which branch managers had discretion to support local ventures in the form of overdrafts and loans. If the direct involvement of the Melbourne commercial world was minimal, its influence was significant nonetheless because of the hold it had or managed to obtain over the internal and external trade in raw materials and finished products, as evidenced by circumstances in the dairying and woollen-milling industries. The sway which Melbourne political and commercial interests

had over railway freight policies is uncertain but, as indicated earlier in the chapter, the distortions to real space that had resulted by the 1880s tended to work in favour of metropolitan firms.

The favouritism, real and imagined, being shown towards Melbourne, which had been a simmering source of discontent in country areas, started to come to a head in 1884 when, under the sixty-seventh schedule of The Railway Construction Act (48 Vic. no. 821), £225,000 was set aside for a new locomotive, carriage and wagon workshop to be located at Newport (near Williamstown) whereas only £50,000 was to be spent on workshops in country areas. To add fuel to the fire, construction of the Newport works began immediately whereas even a year later nothing had been done elsewhere, perhaps, as one member of the Legislative Council suggested on 26 November 1885, because 'the commissioners had great difficulty in deciding as to where the country workshops should be established, in consequence of the jealousy which existed among country members'. Towards the end of 1885 (beginning in Bendigo in October) 'decentralisation leagues' were formed in thirty or more places: the Legislative Council was told that there was, in fact,

a strong feeling in all large centres of population in the country districts, and it was growing stronger day by day, in favour of decentralization, and this feeling was manifested by the formation of decentralization leagues supported by men of all shades of political opinion. It was matters like the expenditure of vast sums of money on gigantic workshops at Newport which had caused the decentralization agitation.

There was, it seems, some genuine misunderstanding about the purpose of the Newport workshops, and the Railway Commissioners went to some pains to explain that they were to be used for the maintenance, not the construction, of rolling stock and that the site had been selected 'simply because the natural advantages of its position were most convenient, and the land required for the purpose could be better obtained there than in any other place in the district'.⁷³ But promises to begin work on maintenance depots at Ballarat, Bendigo, Maryborough, Benalla, Seymour, Geelong, Stawell, Ararat and Sale (the places, in order of importance, at which locomotives were 'stabled') did little to appease country electors. To add to their concern, the 'Electoral Districts Amendment Bill' was seen as a device to increase metropolitan representation in the Legislative Assembly from twenty-three to thirty but country representation from sixty to only sixty-one. Both practically and politically 'the system of centralization' was thought to be 'drawing the life-blood out of country districts . . . and aggrandizing Melbourne and its suburbs at the expense of all the rest of the colony'.

In December 1885 delegates from the decentralisation organisations and their supporters met at Ballarat and formed the 'Victorian Decentralisation League'.⁷⁴ It is worth noting in full the mixed bag of objectives that emerged from this conference, reported in the *Australasian* on 19 December:

1. To further the interests of all the country districts in pressing their just claims wherever and whenever they may arise.
2. To counteract the continued disproportionate aggregation of popu-

lation in Melbourne, by extending the principle of local self-government in all its various ramifications, and to have all of the departments of the colony so arranged that all the principal centres shall have the same facilities for securing the services of the law courts and the other branches of the administration as are possessed at present only by the metropolis.

3. That the railway workshops shall be for repairs only, and shall be so distributed as to give justice to all parts of the colony, and that a determined opposition be offered to the further extension of the railway workshops at Newport.
4. The encouragement of legitimate schemes for the development of the natural resources of the colony, an increase in the prospecting vote, and a liberal expenditure of public money to formulate a natural scheme of irrigation, and to secure a permanent and sufficient supply of water for mining and domestic purposes.
5. To secure the affiliation of Schools of Mines and kindred institutions with the Melbourne University.
6. To obtain due recognition of the claims of country centres of population to participate on equal terms with the metropolis, and to obtain special facilities for country manufacturers to compete for Government supplies manufactured in the colony; also to secure for country districts equal facilities as are and may be accorded to the metropolitan district.
7. Greater attention to the conservation of timber and the planting of new forests.
8. To use every effort to secure the representation of the country constituencies by residents thoroughly identified with country interests, and pledged to support the principles of this league.

It was one thing to concoct a series of brave resolutions but another to achieve practical results and, as the *Argus* said on 8 June 1888, 'the decentralisation party made no great figure in Victorian politics'. Nonetheless, even if to some it seemed 'futile', the 'town v. country strife' continued. In 1888, for instance, the provincial press was fulminating against the proposal for a railway to serve Melbourne's northern suburbs. There was perhaps a grain of truth in the metropolitan view that 'if a city of thirty or forty thousand people had sprung up in the country, and required a two miles link to connect it with the main line, the connection would be made without demur'. Another sign of the antagonism was the controversy, which still continues, as to whether electoral boundaries should be determined on a strictly numerical basis or whether some compensatory allowance should be made for the low density and scattered nature of the population in country areas. Clearly, 'decentralisation', an issue that in various forms was to dominate much of the thinking about Victoria's industrial and economic development during the twentieth century, had already emerged. The nub of the problem then, as now, was succinctly stated by the *Argus* on 8 June 1888: 'as the city grows so must its weight in the councils of the nation'.⁷⁵

PART D

Manufacturing in New South Wales 1851 to 1890

Prologue to Part D

The Australian Colonies Government Act, 1850, which provided for the separation of Victoria from New South Wales, increased the power of the Legislative Council of New South Wales in some respects and also liberalised the franchise on which the two-thirds representative membership could be elected. But on 8 April 1851 the Council protested that the Act did not place the management of all the colony's territorial and general revenue entirely in the hands of the local legislature. Following an election of the Council on the widened franchise, the newly constituted body confirmed the sentiments of its predecessor, and offered to 'assume and provide for the whole cost of our internal government' if empowered to manage all revenues. The gold-rushes by this time were having such an impact on the wealth and prosperity of the Australian colonies that the British government was persuaded that a new legislature, consisting of an Elective House and a nominated Legislative Council, should be established in each colony. In New South Wales a draft constitution was prepared and adopted by the Council on 21 December 1853 and, after some excisions by the Imperial Parliament, it was included as a schedule to the New South Wales Constitution Statute (18 and 19 Vic. c. 54) assented to on 16 July 1855. The first Parliament under Responsible Government was opened on 22 May 1856. With one main exception—the separation of the 'Northern Districts' into the colony of Queensland—these constitutional arrangements survived for the remainder of this period. As against that, however, no fewer than twenty-six ministries occupied the Treasury benches between 6 June 1856 and 22 October 1891 so that policies directly or indirectly affecting manufacturers were subject to frequent amendments of detail and to occasional major changes of principle.

Under 5 and 6 Vic. c. 76 (30 July 1842) 'An Act for the Government of *New South Wales* and *Van Diemen's Land*', provision was made for the separation from New South Wales of any part of the colony lying north of latitude 26° S, later amended to 30° S by 13 and 14 Vic. c. 59 (5 August 1850). Petitions for separation were made by northern residents as early as 1851 but it was not until 6 June 1859 that letters patent were issued erecting the Moreton Bay district into the distinct colony of Queensland, the resulting formalities being completed on 10 December 1859. The industrial development of the Moreton Bay district and Queensland will be considered later. This present group of chapters is concerned only with the area of 309,433 square miles now enclosed within the boundaries of New South Wales, and the statistical material for the period prior to 1860 has, so far as possible, been adjusted accordingly.

Over the years a good deal of effort has been spent on trying to detect differences

arising from the espousal of the philosophy of protection in Victoria and of free trade in New South Wales. Yet comparisons of this kind are meaningless because the industrial development of the two colonies was also influenced by other circumstances, such as attitudes about the allocation of government contracts to local or overseas producers, the availability and sources of finance, the mineral, climatic and other 'natural' resources that were or could be exploited, and the effects of the scale and scope of town formation. In turn, these and other factors (like the structure of railway freight charges) led to differences in the spatial organisation of manufacturing in the two colonies and to variations in the nature and rate of changes triggered, for instance, by technological innovation.

The three chapters that follow have been arranged in much the same way as those relating to Victoria to help facilitate what, at the present stage of the analysis, must remain largely implicit comparisons of this kind. Chapter 10 provides an account of town formation and the expansion of transport facilities in New South Wales, and forms the setting for the more detailed discussion of the development and structure of factory industry in Chapter 11 and its spatial organisation in Chapter 12.

10 New South Wales 1851 to 1890: The Spatial Setting

Early in 1851 there were 181,000 people in New South Wales. The next four decades saw the addition of a further 951,000, about three-fifths of whom resulted from natural increase and the remainder from net migration—a particularly important element at the beginning of this period and then again towards the end (Table 10.1).¹ The gold-rushes had less impact in New South Wales than in Victoria. The initial rushes beginning in the middle of 1851 to pan for alluvial gold in the tributary streams of the Macquarie River north and northwest of Bathurst were over almost before they had begun, and only 2,800 miners remained there in 1856. Little imprint was left on urban development: a few existing villages, like Orange, benefited from the upsurge in trade but only Sofala (and later Cudgegong) developed into more permanent mining settlements. Meanwhile in the north, fields at Peel River, Bingara and Uralla in the New England area were attracting small groups of miners, as were others in the south like those near Braidwood. A second upsurge in gold production (Fig. 10.1) during the early 1860s is largely explained by developments near Adelong (which grew from 186 inhabitants in 1861 to 864 in 1871), Forbes (124 to 710) and Young (0 to 792). But this revival was followed by another decline that continued during the remainder of the period except for a burst of activity in the early 1870s mainly as a result of developments at Hill End and Grenfell.

Three important points follow from this brief outline. First, by the end of 1870 no fewer than seventy-four gold-fields had been officially proclaimed,² although most of these had been worked with pick and shovel in a 'rough and imperfect mode' by small groups of miners who were always ready to move on to seemingly more productive or attractive areas elsewhere. Compared with Victoria there was much less investment in the plant and equipment needed to exploit buried alluvial leads and auriferous quartz reefs; deep mining, as at Grenfell, Tambaroora and Adelong during the 1860s, was the exception rather than the rule. Second, there were fewer gold-miners in New South Wales than in Victoria and the numbers tended to fluctuate considerably between seasons (depending on the availability of water and, in southern areas, on the severity of the winter) and also between years. Third, it is relevant to both these points that two-thirds of the 20,000 miners in 1861 were Chinese and they still made up approximately half the mining workforce, by then reduced to 16,000, ten years later.

The changes in the distribution of adult population shown in Table 10.2 can therefore only partially be explained in terms of gold-mining activity within the colony. Between 1851 and 1861 gold-miners made up a mere 37 per cent of the

Table 10.1 Growth elements in the population of New South Wales, 1851-90^a
(000)

Period	Natural increase	Net migration	Total increase	Annual average percentage growth
1851-60	65 ^b	93 ^b	158	6.2
1861-65	48	12	60	3.2
1866-70	56	33	89	4.0
1871-75	66	30	96	3.6
1876-80	74	73	147	4.5
1881-85	93	110	203	5.0
1886-90	117	53	170	3.4

^a Chinese and Aborigines included.^b Approximate figures only.Sources: Commonwealth Bureau of Census and Statistics, *Demography*, 67(1949), pp. 154-60 (estimates for Aborigines added); *Vic.SR*.

Table 10.2 Changes in adult population numbers in main divisions of New South Wales, intercensal periods 1851-91

Area	Sex	Population 1851	Changes 1851-56	Changes 1856-61	Changes 1861-71	Changes 1871-91 ^a	Population 1891
Sydney ^b	M	19,597	7,400	2,422	11,053	87,841	128,313
	F	18,146	8,256	5,378	13,025	79,362	124,167
Rest of Cumberland County	M	6,627	1,959	696	18	13,413	22,713
	F	4,977	1,941	1,184	-596	10,245	17,751
Cumberland County	M	26,224	9,359	3,118	11,071	101,254	151,026
	F	23,123	10,197	6,562	12,429	89,607	141,918
Other nineteen counties	M	26,407	12,398	19,296	12,042	36,710	106,853
	F	16,104	10,038	11,113	13,778	36,403	87,436
Rest of New South Wales	M	12,075	2,499	19,948	17,495	89,673	141,690
	F	4,004	1,739	6,795	14,296	60,347	87,181
Total	M	64,706	24,256	42,362	40,608	227,637	399,569
	F	43,231	21,974	24,470	40,503	186,357	316,535
Others ^c	M + F	2,558 ^d	975	-1,824	557	3,285	5,551
Total New South Wales	M + F	110,495	47,205	65,008	81,668	417,279	721,655

^a The detailed 1881 census data were destroyed by fire so that much of the geographical information is not available. Estimates indicate that between 1871 and 1881 the adult population of Sydney increased by 33,512 males and 28,315 females, and between 1881 and 1891 by 54,329 males and 51,047 females. On this basis the adult population in the remainder of the colony increased by 60,750 males and 42,713 females (1871-81) and 82,062 males and 64,551 females (1881-91).

^b Sydney defined on constant boundaries as the Metropolitan Police District plus Ryde and Hunters Hill municipalities (see discussion in text). This is a slightly larger area than is used in Table 3.4.

^c Includes colonial marine, travellers, etc.

^d The 'military' (589 males and 175 females) were not defined by age: as in Table 3.4 it is assumed that 150 were children.

Source: New South Wales census reports 1851-91. Excludes estimated population of Queensland 1851 and 1856.

Fig. 10.1: Recorded gold production (fine ounces) in Victoria, New South Wales and Queensland, 1851-91. (Source: Z. Kalix, L. M. Fraser, and R. I. Rawson, *Australian Mineral Industry*, p. 176.)

additional workforce in the original 'settled districts' (excluding Cumberland County) and about the same proportion in the area beyond. More important, except locally for relatively short periods, was the growth of farming and grazing activities, partly to meet increased local needs but mainly in response to the demand for meat (especially beef) stemming from the gold-fields south of the border.

Urbanisation

Most of the urban development during this decade took place within the Settled Districts. Some places, like Mudgee, Sofala, Orange, Bathurst and Braidwood, grew up largely in response to nearby gold-mining activities; others developed on the coal measures near Newcastle and Wollongong from which 342,000 tons were produced in 1861. Settlements like Goulburn, Yass and Queanbeyan in the south were taking on the role of minor regional service centres whose importance was enhanced because they were on main transport and stock-routes leading to the

Victorian border through Wagga Wagga, Albury and Deniliquin.³ In the north, Muswellbrook and Murrurundi developed as staging points on the track linking the gold-miners and pastoralists in the New England and Liverpool Plains districts with the Hunter Valley ports.

These developments and those during the following decade are shown in Fig. 10.2. The 1860s saw further urbanisation related to gold-mining at such places as Gulgong, Hill End, Trunkay Creek, Forbes, Grenfell, Young, Adelong, Tumut, Majors Creek, Araluen and Jembaicumbene; the consolidation of towns on stock and transport routes and the appearance of others, especially at river crossings, like Dubbo on the Macquarie and Hay on the Murrumbidgee; and the growth of ports such as Kiama, Nowra and Moruya in the south and Grafton in the north.

By 1871 the main outlines of the nineteenth century settlement pattern of New South Wales had appeared, with most of the changes during the next two decades being essentially an in-filling and intensification of the existing network. In particular, towns and villages in an area roughly bounded by Narrandera-June-Inverell were boosted by the westward movement of the wheat-sheep belt (see Chapter 12), and places along the north and south coasts received a brief fillip during the 1880s following the development of sugar growing and milling and the formalisation of the dairy industry. The other changes depicted in Fig. 10.3 are largely explained by the contraction or expansion of mineral workings. By this time gold was of little importance: settlements like Gulgong, Sofala and Araluen were on the decline and new rushes, such as to Temora, spent themselves within a few years.

Much more significant was the expansion of coal and copper mining and the opening up of stanniferous deposits in the New England area. Production of coal from the northern field at Newcastle, Greta and Singleton, the southern field at Bulli and Wollongong, and the newer western field at Lithgow rose to 1,320,000 tons in 1876 and 3,656,000 tons in 1889.⁴ During the 1850s and 1860s somewhat desultory attempts were made to mine copper ore, and after 1862 to smelt small quantities, at various places in the western districts of the colony. But it was not until 1870 that deposits in the Cobar area started to attract both miners and investment in smelters, the first of which was fired six years later. Ore and concentrate were carted 80 miles overland to Louth and thence along the Darling and Murray Rivers to Echuca (1,324 river miles) or, more usually, to Goolwa (1,390 river miles); the extension of the New South Wales railway system to Bourke in 1885 then reversed the flow towards the eastern seaboard. But by 1889, after producing 24,540 tons (copper content of ores and concentrates), or 40 per cent of the colony's output, the Cobar field was declining, having been crippled by 'drought, isolation, high wages, falling copper prices, and improvident mining'.⁵ The same fate was shared by later workings to the east and south, at places like Mount Hope (opened up in 1878), Girlambone (1880), and Nymagee (1880), which together produced 18,000 tons by the end of 1890.

In the north, on the New England tableland, alluvial and buried leads of tin were exploited in a rush beginning in 1871. Places like Tenterfield, Emmaville, Tingha

Fig. 10.2: Intercensal urban population changes in New South Wales towns of 500 or more inhabitants at start *or* end of period. Towns named **boldly** are those with variations of 1,500 or more: those named in *italics* identify most of the more important places mentioned in the text. Sydney has been excluded.

Fig. 10.3: Intercensal urban population changes in New South Wales towns of 500 or more inhabitants at start or end of period. Towns named **boldly** are those with variations of 1,500 or more; those named *in italics* identify most of the more important places mentioned in the text. Sydney has been excluded.

and Glen Innes boomed as the output of tin concentrate reached a peak of 7,700 tons in 1876 and a secondary one of 7,600 tons in 1881 and again in 1882. As was often the case, existing settlements, especially Tenterfield and Glen Innes, gained the more permanent benefit: others remained basically transitory camps which declined once the superficial tin-bearing alluvial gravels had been worked over.

Two other minerals also stimulated the growth of particular towns. Early experiments in iron-smelting at Nattai near Mittagong have already been mentioned in Chapter 4. These continued during the 1850s and led eventually to production on a commercial scale briefly from July 1864 to April 1866 and again in 1876-7. Meanwhile 70 miles north at Lithgow the smelter of the Eskbank Ironworks Company was brought into operation between 1875 and 1882 when, in circumstances explained in Chapter 12, the blast furnace was deliberately destroyed, although the works continued as a rolling plant and together with nearby coal-mines provided the main economic base for the town.

In the extreme west of the colony the Umberumbera silver lode gave rise to the small settlement of Silverton in 1882. The next year a syndicate applied for a mineral lease on Mount Gipps station 18 miles to the southeast in the hope of finding similar deposits: its shaft was unrewarding but became the basis of The Broken Hill Proprietary Company Ltd formed on 10 August 1885 to finance further exploration. For some months ore was sent to Melbourne and Silverton for experimental treatment, but on 6 May 1886 the company fired the first of its own smelters on the lease, the silver and lead ingots being hauled overland to the South Australian railhead at Petersburg (later renamed Peterborough), 165 miles to the southwest, and thence to the small wheat exporting town of Port Pirie on Spencer Gulf. As back-loading came provisions, machinery, components for smelters, and coke.⁶ In June 1887 the South Australian line reached the border at Cockburn which had already been linked to Broken Hill by the privately promoted Silverton Tramway.

Broken Hill was the only place in New South Wales which grew during this period with anything like the zest of Victorian gold-fields towns such as Ballarat and Bendigo. In April 1886 it was said to have '30 tents, 23 houses, 15 huts, 3 hotels, 2 blacksmiths' shops, 1 general store, and a few sheds and humpies':⁷ five years later the census enumerators counted 19,789 inhabitants thus making it the third largest settlement in the colony dwarfed only by Sydney and suburbs (383,386) and Newcastle and environs (50,705). But to all intents and purposes Broken Hill was physically part of South Australia and financially part of Victoria. On the one hand, it was not until 1927 that this town was connected to the New South Wales railway system; on the other, the affairs of The Broken Hill Proprietary Company Ltd were controlled from Melbourne for it was to this city that the early directors returned or retired.⁸ As a result Broken Hill 'lay beyond the effective ambit of Sydney except for matters of government (though even here relations between the two cities have sometimes seemed like foreign affairs negotiated between sovereign states)'.⁹

These urban changes are summarised by intercensal periods in Table 10.3. During the 1850s and 1860s most of the urban population, apart from that in Sydney itself, lived in towns of less than 2,000 inhabitants. By 1871 only Newcastle (with

Table 10.3 Town formation in New South Wales, 1851-91^a

Number of inhabitants	1851		1861		1871		1881		1891	
	Number	Population	Number	Population	Number	Population	Number	Population	Number	Population
500- 999	8	4,862	19	13,441	28	19,142	36	28,904	58	40,631
1,000-1,999	4	5,392	11	14,879	20	27,800	40	58,584	52	72,856
2,000-4,999	3	9,850	3	9,693	6	18,794	19	51,636	36	105,698
5,000-9,999	—	—	3	19,081	3	17,001	5	34,456	3	17,806
10,000 and over	—	—	—	—	1	16,473	1	24,571	5	103,216
Total	15	20,104	36	57,094	58	99,210	101	198,151	154	340,207
<i>Per cent of total population</i>		11.1		16.3		19.7		26.4		30.0
Sydney ^b	1	61,105	1	95,789	1	137,622	1	224,939	1	385,760
<i>Per cent of total population</i>		33.7		27.3		27.3		29.9		34.1

^a Town populations as given in census returns except for Newcastle where suburbs and nearby mining villages have been included. For any particular place the census population figure was sometimes given for an imprecisely defined 'town', sometimes for an 'urban' municipality, and sometimes for a rural 'municipality'. For this table the data available have been examined to enable the most consistent definition over the whole period to be chosen. Rural municipalities have been excluded if the average density was less than two persons per square mile.

^b Sydney defined on constant boundaries as the Metropolitan Police District plus Ryde and Hunters Hill municipalities (see discussion in text).

Source: New South Wales census reports 1851-91.

Table 10.4 Number and proportion of population in New South Wales and Victoria absorbed by metropolitan area, other towns, and rest of colony, during intercensal periods 1851-91

Intercensal period	Colony	Metropolitan area ^a		Other towns ^b		Rest of colony	
		Number	Per cent	Number	Per cent	Number	Per cent
1851-61	N.S.W. Vic.	34,684 107,650	20.5 23.2	36,990 124,321	21.8 26.9	97,810 231,006	57.7 49.9
1861-71	N.S.W. Vic.	41,833 71,625	27.3 37.5	42,116 90,748	27.5 47.4	69,172 28,833	45.2 15.1
1871-81	N.S.W. Vic.	87,317 74,209	35.3 56.7	98,941 4,155	40.0 3.2	61,229 52,454	24.7 40.1
1881-91	N.S.W. Vic.	160,821 200,222	42.2 72.1	142,056 36,399	37.3 13.1	77,890 41,121	20.5 14.8

^a Sydney defined on constant boundaries as the Metropolitan Police District plus Ryde and Hunters Hill municipalities (about 140 square miles altogether); Melbourne defined on approximately constant boundaries as the Metropolitan Board of Works area (about 132 square miles).

^b Towns of 500 or more population.

Sources: Derived from decennial census returns and Tables 6.5 and 10.3 where warnings are given about the validity of the town figures.

its suburbs and adjacent pit villages) had grown above 10,000 and only three others—West Maitland (5,383), Bathurst (5,515) and Parramatta (6,103)—had passed the 5,000 mark. During the 1870s another forty-three settlements with 500 or more inhabitants appeared, and towns in all size-groups grew faster than the population of the colony as a whole: even so, only Albury and Goulburn joined the ranks of those above 5,000. Between 1881 and 1891 another fifty-three existing or, occasionally, new towns rose above the 500 population threshold adopted here.¹⁰ Although some places (like Crookwell, Lismore, Corowa, Bungendore, Bourke, Taralga, Casino and Dungog) doubled their populations during this decade, others (such as Hartley, Emmaville, Tingha and Sofala) became a pale shadow usually as a result of declining mining activities. Overall, excluding Sydney and the special case of Broken Hill, the 1880s saw a slowing down in the rate of town growth; even so, they absorbed between them nearly 123,000 people or one-third of the increase in the colony as a whole. In 1891 the chief centres of population outside Sydney were Newcastle and environs (50,705), Broken Hill (19,789), Parramatta (11,677), Goulburn (10,916), Bathurst (10,129), West Maitland (7,295), Albury (5,447) and Orange (5,064).

The discussion so far can be summarised by comparing the course of urban development in this colony with that in Victoria (Table 10.4). Taking the forty-year period as a whole, non-metropolitan towns in New South Wales absorbed 33.7 per cent of the population increase as against only 24.0 per cent in Victoria. Of particular importance was the reversal of roles in the last two decades when the Victorian towns had all but stagnated whereas those in New South Wales grew by almost as many people as Sydney itself. Two related points flow from this. First, the 'anti-Melbourne' feeling which erupted in Victorian country towns in the 1880s is understandable since their combined total population grew between 1871 and 1891 at an annual average rate of only 0.5 per cent compared with Melbourne's 4.4 per cent. Second, this contrast, and the land speculation and commercial failures that in part sprang from it, have given rise in Australian historiography to a 'glorious Melbourne' syndrome which has diverted attention from Sydney's performance. There is no doubt about Melbourne's extraordinary rate of growth, nearly 20 per cent a year, during the 1850s which brought its population to 131,000 as against 96,000 in Sydney. But between 1861 and 1891 Sydney's growth averaged 4.7 per cent a year compared with 4.4 per cent by Melbourne, and during the 1880s both grew at the same average rate as the following tabulation indicates:

	Sydney	Melbourne
1861-71	3.7	4.5
1871-81	5.0	3.2
1881-91	5.5	5.5

Much depends, of course, on the respective definitions of 'Melbourne' (see Fig. 9.1) and 'Sydney'. The figures used here for the latter agglomeration represent the population of the Sydney Metropolitan Police District (SMPD) plus Ryde and Hunters Hill, or a constant boundary enclosing a land area of approximately 140 square miles. Ideally a moving boundary could be used so as to include only

contiguous built-up areas, but the detailed investigation required was unnecessary for present purposes since many of the factory data were published on the basis of the SMPD. In the 1890s Coghlan adopted a similar definition of Sydney¹¹ and it is quite misleading for McCarty to suggest that Coghlan used 'census figures for an area that grew from census to census as successive portions of the urban fringe achieved municipal status and were then added by the Statistician to the population of greater Sydney'.¹² All these figures exaggerate the population in the contiguous built-up area of Sydney—a point indicated in Fig. 10.4 where part of the boundary of the Metropolitan Police District plus Ryde and Hunters Hill has been added to a map prepared in 1881 (which, incidentally, also illustrates how topography influenced urban development). McCarty has argued, with some justification, that the population in the western suburbs of Granville, Auburn and Rookwood should be added to the 1891 metropolitan total as these districts had by this time attracted both housing and some major industrial establishments like Hudson Brothers Ltd: if this were done, the Sydney figure would be 391,744 and the average annual rate of growth from 1881 to 1891 would rise slightly to 5.7 per cent. These estimates for 'Sydney' can be summarised (in thousands) as follows:

	Coghlan	McCarty	Linge
1851	54	54	61
1861	96	96	96
1871	138	138	138
1881	225	225	225
1891	383	400	383

There is also room for argument about the area that should properly be described as 'Newcastle' during the second half of the nineteenth century. In 1851 the population of Newcastle and 'suburbs' was reported as 1,340, which presumably included the development at the tip of the Stockton peninsula on the northern side of the Hunter River (such as a tweed factory and a foundry and related dwellings), a village 4 miles to the south where the Burwood copper-smelting works was under construction, and nearby mining villages at Cook's Hill and Hamilton.

A proclamation in the *Government Gazette* dated 24 January 1850 announced the ending of the partial coal monopoly which had been enjoyed by the Australian Agricultural Company as the result of an agreement made in 1828. Shipments of coal over the wharves at Newcastle increased from 34,500 tons sent coastwise and 3,000 tons dispatched overseas (and to other colonies) during the year ending 30 September 1848 to 66,000 and 47,000 tons, respectively, in 1855, and 104,000 and 179,000 tons, respectively, in 1860.¹³ This expansion of the coal trade more than offset the detrimental consequences of the early gold-rushes, the scarcity and high price of labour having been largely responsible for the temporary shutting down of the Newcastle Coal and Copper Mining Company's smelter in 1854 and the permanent closure of the Newcastle Preserving Company's works in 1855. Newcastle clearly remained the shipping and trade centre, acquiring additional commercial activities including branches of the Bank of New South Wales in 1853 and of the Bank of Australasia in 1854. As a result the population of the City itself

Fig. 10.4: This extract from a *Map of the Country around Sydney from a Reconnaissance by Lieut. Parrott . . . 1881* is slightly simplified from an original in the National Library, Canberra (original scale approximately 1:42,240). The dashed line shows part of the boundary of the Sydney Metropolitan Police District (plus Ryde and Hunters Hill).

increased by 2,700 between 1851 and 1861, and the suburbs and nearby areas gained a further 3,700.

The next decade saw further important developments including the opening of several new mines such as those at Wallsend, Waratah, Hamilton, Lambton, New Lambton and Plattsburg; the installation, from 1861, of steam-driven coal-loading cranes on the wharves at Newcastle;¹⁴ the construction of an ever-increasing complex of coal tramways;¹⁵ and the start in 1867 of smelting at the Hunter River Copper Works at Port Waratah (see inset to Fig. 10.5) and other industrial operations elsewhere such as a sulphuric acid plant at Stockton (1863). Despite the spread of these activities and the erection of coal and copper handling facilities at Port Waratah in 1865, the Newcastle wharves continued to handle most of the coal trade, amounting in 1866 to 302,000 tons loaded aboard vessels bound for overseas or inter-colonial ports and 234,000 tons for destinations along the coast. The City of Newcastle, thus expanding commercially and industrially, increased its population by 3,860 between 1861 and 1871 as against only 1,380 additional inhabitants in the environs.

During the ensuing twenty years, taken as a whole, the contiguous suburbs and nearby settlements went ahead vigorously (increasing their population by 32,400) because of continued coal-mining developments,¹⁶ the further expansion of local-serving activities, and the opening of additional industrial establishments like the English and Australian Copper Smelting Company's works near New Lambton in 1872 and a tin-smelting works at Stockton at about the same time. In contrast, the growth of the City of Newcastle was slowing down, partly because of the physical limitations of the site (Fig. 10.5) and partly as a result of inhibitions on its trade and industry stemming from the political and commercial 'power' of Sydney, a point considered again later. Nonetheless, Newcastle always remained the chief business centre of the Lower Hunter district, the components of which had long been linked by their common dependence on coal and shipping but which by the 1890s were beginning to merge into a single urban entity as a result, for instance, of the inauguration of a passenger tram service between Newcastle and Plattsburg in 1888 (Fig. 10.6). This discussion of the urban morphology of the area reinforces Coghlan's assessment of the population of Newcastle and its suburbs over this period and justifies the adoption of his figures here:

Population in	1851	1861	1871	1881	1891
City of Newcastle	1,005	3,722	7,581	8,986	12,914
Other incorporated areas	—	—	1,928	13,285	36,996
Unincorporated areas	335	4,088	6,964	2,300	795
Total	1,340	7,810	16,473	24,571	50,705 ¹⁷

Transport and Communications

Prior to 26 September 1851, when a 14 mile stretch of railway between Sydney and Parramatta was opened, all freight had to be moved overland by bullock dray and horse cart or along the coast by steam and sailing vessel. Much of the impetus given

Fig. 10.5: Extract from a *Plan of the Port of Newcastle . . . 1882* slightly simplified from an original in the National Library, Canberra (original scale 1:6,000). The location of Port Waratah relative to Newcastle is indicated in Fig. 10.6.

Fig. 10.6: Urbanised areas near Newcastle in 1894: simplified from 'Map of the Newcastle District . . . 1894' (original scale 1:31,680), Department of Mines, Sydney, dated 7 March 1894, in the Archives Collection at The Australian National University.

to road building in New South Wales during the Macquarie period (1811–22) and later by Surveyor-General Mitchell (1827–36) was lost during the subsequent twenty years. At the end of 1836 Mitchell was informed that the making and repairing of roads in the colony would in future be the responsibility of the Royal Engineers who were thought to be in a better position to control 'the numerous and dispersed parties of dissolute convicts employed upon the roads'.¹⁸ Partly because of this administrative change and partly also because of increased traffic, the cessation of convict transportation in 1840, and the scarcity and high price of labour as a result of the gold-rushes during the early 1850s, the 'roads' deteriorated badly. Although hardly an impartial observer, Mitchell's summary of the situation in 1855 is worth recording:

the selection of the few lines of great road traversing this Colony, has at length been made, or their direction at least improved, by means of general surveys of the territory. The formation of the new lines was accomplished by convict labor: their preservation has been almost wholly neglected for many years. Those formidable works, of which, at one time, any country might have been proud, have been suffered to fall into decay; and roads upon which one man entrusted with every six miles, employed to let off water, and repair holes before they grow large, might have still continued good, are in a state of dilapidation by no means 'extraordinary' when it is for a moment considered that during

the last twenty years many of them have been left to the mercy of the elements and the public—which, instead of approving, finds grounds for censure, even in the ruin which itself creates.¹⁹

Legislation in 1857 and 1858 divided the responsibility for road building and maintenance between the Department of Public Works, Road Trusts, and municipal authorities. In particular, under The Main Roads Management Act, 1858 (21 Vic. no. 8), the government accepted responsibility for the construction and repair of the Great Northern road (240 miles from Morpeth to Armidale), the Great Western road (210 miles from Sydney to Wellington) and the Great Southern Road (380 miles from Liverpool to Albury). From 1858 to 1871 £860,000 (a quarter of which was derived from toll charges) was spent on these three routes alone but, even so, only 470 miles had been metalled or gravelled.²⁰ Four problems emerged. First, to eke out limited funds, the roads were built to a width of only 12 to 16 feet; later it was thought more economical in the long-run to construct or rebuild them up to 24 feet wide with a pronounced camber to facilitate drainage. Second, the use of gravelled surfaces, especially on sections of the Great Northern road, was found to be unsatisfactory since, paradoxically, the bridging of creeks and rivers enabled traffic to continue moving during the wet seasons and this cut up the roads before they had time to dry out. Third, the loads on two-wheeled drays increased from a couple of tons to 5 and to make matters worse the wheels on most vehicles, despite a differential toll, still had narrow tyres. During the latter part of the 1860s the authorities tried to overcome this by establishing weighbridges on the three main routes but, as the Commissioner for Roads noted in a nice understatement in 1871, this measure was 'rendered to some extent inoperative by the carriers diverging from the roads to avoid the toll-bars, or taking a different route'. Fourth, in the more densely settled areas the fencing of farms and runs confined traffic to the defined width of the road thus preventing teams making their own way through the bush to avoid the rain-filled ruts left by their predecessors. If these were the conditions on the three main highways, it is not hard to imagine the state of the so-called minor roads long stretches of which were little more than ill-defined tracks. For these reasons figures about the mileages of road opened during this period are not worth quoting.

Nonetheless, the 1860s saw a considerable improvement in the internal communications of the colony. Whereas in 1857 it took an average of sixty-five days to move a dray-load of goods from Sydney to Albury (380 miles) this could be accomplished in thirty days by 1864: similarly, the travelling time between Sydney and Orange (160 miles) was cut from twenty-four to thirteen days, and between Maitland and Murrurundi (100 miles) from twenty-one to eight days. Costs per ton-mile also fell (Sydney-Albury from 1/5d to 8d; Sydney-Orange from 3/5d to 11d; and Maitland-Murrurundi from 1/10d to 1/4d) although the extent of the reductions depended as much on the amount of traffic offering and competition between carriers as on improvements to the roads themselves.²¹ The speed, reliability and frequency of mail and passenger services also changed out of all recognition: by 1870 mail coaches were operating on 2,360 route-miles, or nearly

one-fifth of the postal network. A particularly important influence was the extension of Cobb and Co.'s activities from Victoria to New South Wales in 1862: Bathurst was chosen as the centre of the company's operations in this colony which extended over nearly 800 route-miles by the end of that decade.

Railways

Meanwhile an embryonic railway system was beginning to emerge. The possibility of building railways in New South Wales had been mooted as early as 1833 but it was only in 1845, when three companies were formed in London, that serious debate began about their financing and feasibility.²² Several attempts were then made to form local railway companies but it was not until late in 1848 that the first successful one was launched. This, the Sydney Tramroad and Railway Company, was incorporated the following year as the Sydney Railway Company and in 1850 started to construct a 14 mile link between Sydney and Parramatta. During the next few years the government became increasingly involved in the financial problems of the project, the costs of which greatly exceeded the original estimates. Moreover, official attitudes had changed: whereas previously the government had thought that the construction of railways was premature, it had become convinced by 1852 that

the time has arrived when without some energetic effort on the part of the Government the introduction of Railways into this Colony, now more than ever necessary to the development of its great resources, will be seriously retarded—it may be indefinitely postponed. . . .²³

This view was reinforced two years later by a Select Committee which heard evidence about the desirability of more lines and concluded that

The circumstances of the Colony are so completely changed since the year 1849, not only as regards the necessity for the formation of Railways, but also as respects the position of the Government, that your Committee consider the time has arrived when the construction of Railways ought to be taken up on a large and comprehensive system. Whatever may be the cost, your Committee feel that their general introduction into the Colony ought not any longer to be deferred.²⁴

Within three weeks, under An Act to Make Provision for the Construction by the Government of Railways in the Colony of New South Wales (18 Vic. no. 40), the government was empowered to purchase the assets of the Sydney Railway Company; early in 1855 the directors recommended that the takeover should be accepted, and the formalities were completed by an indenture signed on 3 September. The Railway Commissioners appointed by the government and the company itself pushed ahead with the line which was completed in August and formally opened the following month.

In 1853 the Hunter River Railway Company was formed to undertake the construction of a railway from Newcastle to Maitland 'and to such other place or places as may be thought expedient'. This was not, as sometimes supposed, a

locally inspired venture: indeed the *Maitland Mercury* of 27 April 1853, while welcoming the prospect of a railway in the area, thought it not 'fair to the general community, and more especially to the inhabitants of this district' that all the shares had been snapped up by the privileged few invited to attend an inaugural meeting in Sydney the previous week. The Hunter River Company tried to learn from the mistakes of the Sydney venture (two people being members of both Boards) but it soon ran into the same sorts of financial problems, and its assets and liabilities were also taken over by the government by an agreement signed on 30 July 1855. The 17 mile line to East Maitland was completed in December 1856 and formally opened to traffic three months later.

After the acquisition of the Sydney and Hunter Valley companies most railway building in New South Wales was undertaken by the government. Much of the effort during the 1860s and 1870s went into the construction of three 4' 8½" gauge trunk lines which had been seen by the 1854 Select Committee as a more efficient substitute for the three main roads. There was never much doubt about the general direction of these lines or the fact that Sydney and Newcastle were to remain their foci. The existing stretch from Sydney to Parramatta was to continue across Cumberland County, over the Blue Mountains, and westwards to the fertile and minerally well-endowed tablelands in the vicinity of Bathurst; another line was to branch off at Parramatta Junction (from 1878 known as Granville) and take a southwesterly route through the agricultural country around Goulburn and on into the grazing areas of the Riverina; and the existing Newcastle to East Maitland link was to be extended up the Hunter Valley, through the Liverpool Range, and on to the New England Tableland. Despite the classical simplicity of this arrangement, there was still plenty of room for controversy about the rate, financing and method of construction.

By 1863 the three lines had been opened as far as Singleton, Penrith and Picton (Fig. 10.7). Further construction was then delayed while two arguments were resolved. One was whether the government or private enterprise should be responsible for building and operating branch lines. The test case was a proposal by a private company to build a 3 mile branch to link the Hunter River port of Morpeth to the Great Northern Railway at East Maitland: at first the government thought that this (and other similar spur lines) should be left to private enterprise but, largely because of pressure from Hunter Valley residents, it changed its attitude during 1861. Thenceforward the government accepted responsibility for the construction and operation of both trunk and spur lines. The other argument revolved round the question as to whether lines should be built to more expensive English standards or on the cheaper but less durable American pattern. In part this was related to long-standing controversies about the gauge to be adopted, the efficacy of wooden versus metal rails, and the relative merits and economics of using steam locomotives or horse-drawn vehicles in the less densely settled parts of the colony. This latter debate persisted into the 1860s with Governor-General Denison (formerly a captain in the Royal Engineers) playing a leading role, asserting on several occasions

Fig. 10.7: Sections of railway opened in New South Wales during the intercessal periods 1851–61 and 1861–71.

that the railway on which horse power is used would under the present, and probable future circumstances of the Colony for several years to come, be the cheapest means of conveyance both for passengers and goods, and that it would be, therefore, advisable to adopt it on all the main lines of communication.²⁵

The upshot was a pause in trunk line activity during 1863 and 1864 to allow time for the 16 mile Blacktown-Richmond spur to be built as an experimental horse-drawn railway, but even while under construction heavier rails were substituted and it was opened in November 1864 as a steam line.

Fig. 10.8: Section of the Great Western Line from Emu Plains to Bowenfels. The average gradient from Penrith to Wentworth Falls is 1 in 51: a few stretches are as steep as 1 in 31 and considerable sections are 1 in 33. The Lapstone Hill Zig Zag was replaced by Glenbrook Tunnel in 1892. (Modified from J. H. Appleton, 'The Efficacy of the Great Australian Divide as a Barrier to Railway Communication', *Transactions and Papers*, The Institute of British Geographers, no. 33, December 1963, following p. 106.)

As a result of these controversies only 20 miles of railway—two branch lines—were opened during the three years to the end of 1866. In the meantime, however, it was decided (though not without dispute) to extend the three trunk routes, with equal priority and as standard weight locomotive lines, to Murrurundi, Rydal and Goulburn. It was unfortunate, in the light of subsequent argument, that some sections of these lines passed through unproductive and difficult terrain. In particular, the western line between Emu Plains and Katoomba climbed 3,250 feet in less than 32 miles, necessitating a zig-zag and considerable engineering works to avoid gradients of more than 1 in 30 (Fig. 10.8). By the end of 1870 the main lines had been opened as far as Aberdeen, Rydal and Goulburn but the high cost of these sections and the failure of contractors to keep to schedule led to a renewal of the controversy about the type of permanent way to be constructed in future. Hence there was another pause of three years before the Legislative Assembly authorised further funds which enabled the trunk lines to be completed by the end of 1880 as far as Gerogery in the south, Wellington in the west, and Gunnedah and Tamworth in the north (Fig. 10.9).

By this time, however, the aims and objects of the further expansion of the

Fig. 10.9: Sections of railway opened in New South Wales during the interdecennial period 1871-81.

Fig. 10.10: Sections of railway opened in New South Wales during the intercensal period 1881–91.

railway system were becoming increasingly diffuse and were being swayed by more pressures and persuasions at various levels of political complexity which can best be illustrated by three particular examples. First, it has been indicated in previous chapters that much of the trade and commerce of southern New South Wales was orientated to South Australia and Victoria and that in 1875 the latter colony introduced low rates on goods consigned by rail from Melbourne to the Riverina via Echuca. Thus a major influence on railway building in the southern part of the colony was a determination to re-orientate this trade (and, in particular, the export of wool) towards Sydney. The Great Southern Line reached the border town of Albury early in 1881 but was not actually 'linked' with the Victorian line to Wodonga (completed in 1873) for another two years.²⁶ Meanwhile a branch line was constructed from Junee to Darlington in 1881 and extended to Hay the following year, largely in an attempt to siphon off some of the traffic flowing along the privately owned, broad-gauge Deniliquin-Moama line connected to the Victorian system,²⁷ and another spur was opened between Narrandera and Jerilderie, about 35 miles from the border, in 1884 (Fig. 10.10). Construction of lines was, however, only one part of the story, for the Railway Department emulated the Victorian example of fixing specially low, and in some instances specially high, freight rates in an attempt to distort real distances in its favour. The discussion of freight policies is deferred until Chapter 12 so that the point need be illustrated only briefly here. When the Great Southern Line reached Albury goods consigned there from Junee and Culcairn were charged the normal ton-mile rates applicable to these distances, 99 and 30 miles respectively. But, in an attempt to deter Victorian goods from penetrating into New South Wales, higher charges were imposed in the opposite direction as though Culcairn were a further 15 and Junee a further 50 miles north of the border. Not uncommonly inter-colonial considerations overrode local interests. In this case Albury manufacturers seeking to compete in Wagga Wagga or Junee had to contend with these higher northbound charges for several years before being exempted late in 1885.²⁸ As against this, however, the southward expansion of the New South Wales system benefited Riverina residents in other ways. One major effect was to ensure *continuity* of supplies and reduce the need for storekeepers, who previously had had to rely on river-borne consignments, to buy large quantities during the winter months to tide them over the droughty summer. This was one reason why Melbourne footwear and clothing manufacturers found it difficult to retain their grip on the Riverina markets during the 1880s; storekeepers could now order regular supplies from Sydney and were thus able to reduce the capital tied up in unseasonable stock.

The second example illustrates how some of the details of railway building were swayed by parochial politics. In the New England area agitation for the extension of the Great Northern Railway into the northern districts grew during the latter part of the 1860s and intensified as the line pushed to Murrurundi in 1872 and to Tamworth in 1878. Local railway leagues were formed to try to influence the direction and scheduling of extensions, with parliamentary representatives being pressured to support local proposals and to vote against rival ones. In part this was

one aspect of the continuing struggle between major lobbies, like the selectors and the squatters, but it also reflected the fear of each district that it would be left behind in the race for prosperity. Local newspapers whipped up concern and helped promote rivalries: the *Glen Innes Examiner* editorialised on 13 October 1885, for example, that the 'chief aim of every elector should be to support the candidate who is most likely to advance the interests of the district'.²⁹ The avowed intention of the government was to carry the Great Northern Line through to the Queensland border and yet this could be accomplished by several possible routes. The one initially selected, taking a westerly course from Tamworth via Manilla and Inverell before swinging northeast to Tenterfield, would have benefited wheat farmers more than graziers. The government was eventually pressured into building two lines, one along the tablelands to Tenterfield and the other along the western slopes to Moree, both of which tended to advantage the pastoralists. Then came even more parochial argument as to which settlements should be included on these routes: originally the easterly line was to run direct from Uralla to Guyra but protests from Armidale residents made sure it was diverted through that town.³⁰

A third illustration of the complex influences impinging on railway development relates to the construction of the line between Hamilton Junction (2 miles west of Newcastle) and Sydney during the latter part of the 1880s. The extension of the Great Northern Line into the northern districts, the expansion of coal-mining, and the establishment of industries like copper-smelting all augmented the volume and value of trade passing over the wharves at Newcastle. During the 1870s, in fact, this port handled a greater tonnage of shipping than Sydney—a statistic largely explained by the frequent calls made by the small armada of steamships and sailing vessels engaged in the coal trade. The improvements in wharf accommodation and coal-loading facilities during the 1860s meant that even 1,000 ton vessels could clear out after only six to ten days instead of six to ten weeks (which led the *Newcastle Chronicle* to complain on 20 February 1869 that less money was being spent locally by the crews). Of the coal shipped (687,000 tons in 1871 and 965,000 tons in 1876), about a quarter was sent coastwise within New South Wales and the remainder exported to other Australian colonies, New Zealand, the Pacific islands, and more distant destinations including the United States. During the twenty-two years to the end of 1882 coal exports made up 84.5 per cent by value of Newcastle's inter-colonial and overseas exports (£8,854,000);³¹ the rest largely consisted of wheat, flour, and other agricultural and dairy produce.

It will be recalled from Chapter 3 that Newcastle was granted the status of a Free Warehousing Port in 1846 giving it the right to trade direct with other countries on the same terms as Sydney.³² Attempts were made in 1847 and again in 1852 to inaugurate a direct shipping service with England but the experiments turned out to be short-lived because of 'the limited steam-tug fleet, enormous time to discharge ballast and ship cargoes, limited wharf accommodation, and want of a railway from Muswellbrook'. Wool, tallow and, later, copper ingot continued to move down the coast from the Hunter River for transshipment at Sydney. For over thirty years not a single vessel cleared out of Newcastle for Europe direct. Every scheme was

frustrated. On the one hand, no Sydney agency was prepared to set up a branch establishment such as a wool-washing and dumping facility; on the other, no ship owner could take the risk of being cut out of the Sydney trade. The *Newcastle Chronicle* fulminated in frustration throughout the 1860s and 1870s though some of its exasperation was directed towards Morpeth (which in the 1870 and 1871 seasons shipped 48,400 bales of wool to Sydney compared with 16,800 from Newcastle) as well as towards the metropolis. It blamed the failure of attempts to begin direct shipments on the fact that some flockmasters were 'in the hands of their Sydney agents' while others were 'interested in the welfare of certain steam shipping companies', and argued that the government had occupied the whole of the waterfront thus leaving no site for a warehouse to sort, pack and press the wool. But the real villain was its southern competitor:

That much opposition to direct export from Newcastle is to be expected on the part of Sydney is but natural. That great central sponge, filled to repletion, but still craving more, will hardly like any squeezing.

Eventually, early in the 1880s the Great Northern Wool Dumping and Shipping Company (sponsored by Dalgety, Blackwood and Company, and Alexander Brown and Company) and the Newcastle Wool Dumping and Shipping Company established stores, wool dumping and, later, wool-scouring facilities, and inaugurated a direct shipping service on 9 September 1883 when the steamship *Gulf of Carpentaria* sailed for London (via Sydney, Melbourne and Adelaide). By the end of the 1883-4 season some 43,000 bales had been sent to Europe direct, 39,500 bales followed in 1884-5 and 48,600 bales in 1885-6.³³ Along with these consignments went shipments of copper ingot (regarded as an ideal bottom cargo for wool ships) being produced by Newcastle smelters at the rate of about 2,750 tons a year. Almost overnight the annual value of Newcastle's export trade trebled from £513,000 (average of 1881 and 1882) to £1,570,000 (average of 1883 and 1884), and its share of the colony's seaward exports jumped from 4.1 to 10.6 per cent. Even the possibility and practicability of a separate political unit based on Newcastle had been enhanced.

It is against this background, then, that the demand for, and debates about, a link between the Great Northern Line and the rest of the colony's railway system have to be seen. On 18 November 1879 the member for the Upper Hunter sought the support of the Legislative Assembly to have such a line built 'without delay' because of the expense involved in freighting tin, wool, coal and other produce of northern New South Wales by steamer to Sydney. He also pointed out that sheep and cattle had to be walked along hundreds of miles of narrow, bare stock-routes so that they arrived in the metropolis in poor condition. No one opposed the intent of the motion, although it was noted that if introduced three or four years earlier the scheme would have been regarded with indifference 'owing in some degree to its introducing fresh competition with the steam[ship] companies' in which several parliamentarians 'were thought to have an interest'. Nonetheless the motion was defeated because the government persuaded the Assembly that surveys for such

a line were already being pushed ahead as quickly as possible. When the formal proposals were submitted for approval two years later the debate on 1 December 1881 largely centred round whether the northern junction should be near Maitland or near Newcastle. In essence this line gained support for two quite different reasons: northern interests regarded it as a means of breaking the colonial steamship monopoly while the Sydney commercial world saw it as a way of frustrating Newcastle's long-term ambition to become an overseas trading port in its own right. The inauguration of direct shipping services from Newcastle in 1883 and the completion of this line five years later meant, paradoxically, that both ambitions were to some extent achieved although only vehement protests in 1888 prevented Newcastle being bypassed by trains running between Sydney and Brisbane. This latter episode is related in Chapter 12 where it will be shown how it triggered off an anti-centralisation movement in New South Wales.

Coastal shipping

The opening of the Newcastle-Sydney link to through traffic when the Hawkesbury River bridge was completed in 1889, and the extension of a south coast line to Kiama in 1888 and to Nowra (still the terminus) in 1893, affected but did not destroy the local coastal shipping services. Not only did these remain the chief link between Sydney and the northern and southern coastal areas for general cargoes, but they retained their grip on the transport of bulk commodities like coal from Newcastle and blue metal from Kiama.

The growing importance of these coastal services during the 1830s and 1840s was stressed in Chapter 3. Several attempts had been made by individuals and partnerships to operate regular services but the lack of capital, the unsuitability of some of the vessels, and poor management meant that few survived for very long. The Illawarra Steam Packet Company and the Brisbane Water Steam Packet Company, both formed in 1839, amalgamated soon afterwards as the General Steam Navigation Company, which was itself wound up in November 1841. Two factors explain much about subsequent developments. One was the high cost of entry into this industry because of the need to invest in wharves and repair facilities as well as in the ships themselves, the outlays on which increased during the period as the average size grew larger and iron, screw-driven vessels superseded wooden-hulled paddle-steamers. The other associated factor was that most companies tried to gain a foothold in the lucrative Hunter River-Sydney route; consequently they tended to provide only irregular and second-rate services to other districts which, feeling neglected, were tempted into setting up companies to meet local needs. Publicly and privately owned ventures gradually amalgamated and, once again, the requirements of particular areas were neglected in the struggle to keep afloat. This process can be illustrated by a brief review of the changes in the structure of some of the larger steamship companies operating on the main sections of the coast.

Much of the interest during this period centred, as mentioned already, on the trade between the Hunter Valley and Sydney. The original purpose of The Hunter's

Plate 12: In the late 1870s about one million tons of coal was being shipped annually from Newcastle mostly to Sydney, Melbourne and Adelaide. It was not until 1883 that the first vessel cleared out for a direct voyage to Europe. (*Illustrated Sydney News*, 23 March 1878.)

River Steam Navigation Company (incorporated on 1 September 1841 with a nominal capital of £40,000) was to operate a regular service between Morpeth-Newcastle and Sydney but, from the outset, its vessels went further afield. Despite growing dissatisfaction in the Hunter Valley about the quality of the service, a majority of the shareholders pressed for the concern to be reconstituted as The Australasian Steam Navigation Company (incorporated on 10 December 1851 with a nominal capital of £80,000) to enable it to diversify into the inter-colonial and overseas trades. The dissenting shareholders thereupon decided to go their own way and formed The Hunter River New Steam Navigation Company (incorporated on 21 December 1852 with a nominal capital of £40,000) which was to confine its activities solely to the Hunter Valley-Sydney route.³⁴ The *Sydney Morning Herald* of 16 August 1855 quoted the directors of this latter concern as reporting that three vessels, imported at a cost of £43,900 (about £72 per gross ton), had been put into service and £8,600 had been spent on wharves and installations at Morpeth and Sydney. By undercutting rates it quickly ate into the business of the Australasian Company until the two firms came to a pricing agreement. The interests of the Australasian Company were, however, continuing to spread, and in 1880 it passed over its goodwill on the Hunter Valley-Sydney run to the newly formed Newcastle Steamship Company Ltd. Thus, throughout the period there were nearly always two major companies operating on this route, although rate agreements limited the rivalry between them to speed and efficiency. Then in 1891 The Hunter River New Steam Navigation Company and the Newcastle Steamship Company Ltd merged, in the face of competition from the newly opened Newcastle-Sydney railway line and the slackening of trade due to the downturn in the economy, to form the Newcastle and Hunter River Steamship Company Ltd with a nominal capital of £100,000.

On the north coast the growing numbers of pastoralists and cedar cutters in the Clarence and Richmond River areas had to rely during the 1840s and 1850s on a large fleet of sailing vessels and the occasional visit by a paddle-steamer en route between Sydney and Moreton Bay. Dissatisfaction with this situation led to the formation of The Grafton Steam Navigation Company early in 1857 (with a nominal capital of £13,500) which operated a weekly service to Sydney. From this venture sprang The Clarence and Richmond Rivers Steam Navigation Company (incorporated on 9 May 1861) which raised its nominal capital four years later from £50,000 to £62,500. Then in December 1888 it was re-formed with a nominal capital of £150,000 as The Clarence, Richmond, and Macleay Rivers Steam Navigation Company Ltd. At various times other firms competed in the area, notably The Clarence and New England Steam Navigation Company (incorporated on 7 April 1866) which had a nominal capital of £30,000 but which had been able to raise less than half this amount by the time it was wound up in 1883. The process of public and private company formation, amalgamation and reconstruction in these northern waters virtually came to an end in 1891 when the two main survivors, The Clarence, Richmond, and Macleay Rivers Steam Navigation Company Ltd and the privately owned firm J. See and Company, amalgamated as The North Coast Steam

Table 10.5 Gross tonnage of main local steamship fleets operating within and from New South Wales, 1861-86

Steamship company		1861	1866	1871	1876	1881	1886
1. <i>Mainly coastal</i>							
Hunter River New Steam Navigation Company		830	1,222	2,082	1,883	2,658	4,066
Clarence and Richmond Rivers Steam Navigation Company		693	1,497	2,230	2,128	2,286	2,931
Clarence and New England Steam Navigation Company		—	346	359	1,057	603	—
J. See and Company		—	—	—	—	820	2,982
Colonial Sugar Refining Company		—	—	166	1,006	1,571	1,928
Illawarra Steam Navigation Company		1,230	983	879	1,566	2,051	2,847
Total							
tonnage		2,753	4,048	5,716	7,640	9,989	14,754
number of vessels		14	18	26	31	33	51
average tonnage of vessels		197	225	220	246	303	289
2. <i>Coastal, inter-colonial and overseas</i>							
Australasian Steam Navigation Company		4,541	9,671	11,519	12,888	17,041	25,428
tonnage		18	27	30	34	30	36
number of vessels		252	358	384	379	568	706
average tonnage of vessels							

Source: Calculated from the detailed data given in R. Parsons, *Fleets of Principal Steam Ship Owners Registering Vessels at Sydney N.S.W.*, [mimeographed], Adelaide, 1959.

Navigation Company. An important exception was the fleet commenced in 1870 by The Colonial Sugar Refining Company to service its mills on the Macleay and Clarence Rivers and to ship raw sugar to its Sydney and Melbourne refineries.

On the South Coast the story was much the same. Irregular services led to the formation of The Kiama Steam Navigation Company (incorporated on 3 October 1853 with a nominal capital of £7,000) which was reconstituted four years later as The Illawarra Steam Navigation Company and promptly absorbed the Shoalhaven Steam Navigation Company. Although some individual districts expressed discontent by founding their own ventures (like the co-operative shipping companies at Gerringong and Shellharbour) the Illawarra Company to all intents and purposes enjoyed a monopoly on the South Coast. In 1887 it found itself in the curious position of having £55,425 in paid-up funds and thus had to seek the approval of the legislature to raise its authorised capital from £50,000 to £150,000.

Information about the transport task performed by coastal shipping is fragmentary and relates mainly to the tonnage of vessels entering and leaving a few of the better-known ports of call. A surrogate measure—the size of the main fleets operating during this period—has been shown in Table 10.5 as a poor alternative: this excludes all sailing vessels (and it would be unwise to underestimate the work they did) as well as the steamships engaged in general trade that were owned and operated by individuals and small private firms. Over and above this again were the fleets of colliers operated out of Newcastle, Wollongong and Port Kembla by some of the coal-mining companies; increasing numbers of harbour and river ferries; and, of growing importance as steamships became larger and less manoeuvrable, a significant armada of tugs and droghers. There is no doubt that Sydney remained the focus of the coastal trade much as it did in the 1840s (Figs. 3.4 and 3.5). Since the coastal regions tended to be competitive rather than complementary in the types of goods being produced, the metropolis was their chief market and (until 1883) the only point of transshipment on to overseas vessels. Much of the finance for the larger coastal fleets came directly or indirectly from Sydney and it was here, too, that many of the larger vessels were built and most were maintained (a point taken up again in the next chapter). As against this, however, New South Wales was less involved directly in the Murray River trade than Victoria or South Australia: only a couple of dozen or so steamers were built (principally at Moama), registered, or owned in this colony.

Transport arrangements in the colony thus changed considerably during these four decades. The extension of the trunk railways beyond Cumberland County was seen as a substitute for further investment in major roads, so that after the mid-1860s much of the road-building effort went into creating lateral links and improving the network fanning out from the railheads. As the railways advanced the government contented itself with maintaining the main routeways, and building bridges and culverts on the minor roads with some additional work on particularly difficult or treacherous sections. Government expenditure on roads and bridges

(directly and through road trusts) totalled £6,214,000 from 1857 through 1880 and £6,941,000 from 1881 through 1890³⁵—minor amounts compared with outlays on other public works. Not surprisingly, Coghlan was able to comment in the mid-1880s that in many parts of the colony 'the only indications visible of the existence of a road are frequently the deep cut tracks of cart-wheels'.³⁶

Although a good deal of the produce of western and southern New South Wales 'leaked' to South Australia and Victoria, the expanding railway system (340 route-miles opened by 1871, 848 miles by 1881 and 2,193 miles by 1891) performed the major part of the remaining overland freight transport task. Until 1883, as explained already, nearly all seaward exports except coal were handled in Sydney either because they were railed in on the Western and Southern lines or because they were transferred there from the Northern line via coastal vessels from the Hunter River. From 1869 through 1882 the value of exports and re-exports through Sydney was about £112,924,000 (67.2 per cent of the total) and through Newcastle about £7,033,000 (4.2 per cent), with £48,002,000 worth (28.6 per cent) passing overland into Victoria, South Australia and Queensland.³⁷

It has been pointed out already that non-metropolitan town growth was sustained in New South Wales during the 1870s and 1880s (in contrast to the course of events in Victoria), but most of the people concerned were accommodated in an increasing number of relatively small places rather than in a few growth points. Aside from Sydney, Newcastle and Broken Hill, the six other places with more than 5,000 inhabitants in 1891 (Parramatta, Goulburn, Bathurst, West Maitland, Albury and Orange) together absorbed only 13,400 people between 1881 and 1891, representing an average growth rate of 3.1 per cent a year. Meanwhile, the 146 other central places expanded by 82,700, or by 4.9 per cent a year (Table 10.3). The great mass of these towns grew up as, and remained, servicing centres whose fortunes were tied to spatially restricted local economies. Although many of these places carried out various processing operations, such as flour-milling, butter making, sugar-milling, and copper and tin-smelting, even the larger of these towns failed to develop more than elementary industrial linkages. Only Sydney and, to a lesser extent, Newcastle, were sufficiently large and diverse to offer manufacturers significant external economies.

11 Manufacturing in New South Wales 1851 to 1890

By mid-century the outlines of industrial development in New South Wales were beginning to take shape. Apart from the production of everyday foodstuffs, clothing and building materials, essays had already been made into relatively capital-intensive ventures like sugar refining, gas-making, meat canning, wool-len-milling, and smelting of iron and copper, and into facilities like shipbuilding and repair yards. Although precise data are lacking, it can be estimated with the aid of a wide variety of literary sources that up to 4,700 people were occupied in manufacturing activities of all kinds. But events during the 1850s demonstrated that the industrial fabric was quite delicate and could quickly be torn apart: this, in turn, led some to advocate 'protection' as the appropriate political philosophy for the colony to follow.

The rise and rejection of protection

Emigration to the Californian gold-fields, which had been going on since 1849, virtually ceased in April 1851 when the first rushes to the New South Wales diggings commenced. Within a few weeks the first frenzied excitement had calmed down and disillusioned diggers were returning to their former occupations leaving no more than 1,000 or so on the fields themselves. Much more significant industrially were the rushes to Victoria that started in August for these produced a scarcity of labour, caused a rise in wages, and inflated the prices of raw materials like wool, tallow, skins and meat. They also promoted a marked increase—much of it speculative in character—in the value of retained imports (Table 11.1) which trebled the average consumption of such goods from £7.10.0 per head in 1851–2 to £21.18.0 in 1853–4. Judging from the production figures available for nearly a dozen colonial industries, these events do not seem to have affected manufacturing as immediately as is sometimes suggested. Thus the output of woollen cloth (despite the destruction by fire of the Stockton mill on 2 July 1851) averaged 188,000 yards during the three years 1852–4, soap production reached a peak of 3,750 tons in 1854, and the tonnage of shipping launched in 1855 far exceeded the total in any previous year. Most of the contrary examples must be related to other circumstances: hence the reduction in the output of manufactured tobacco from 328 tons in 1854 to 69 tons in 1855 (and in the acreage under tobacco from 731 in 1851 to a mere 8 in 1854) was largely brought about by the halving of the customs duty on imported manufactured tobacco (under 16 Vic. no. 7) to 1/- per lb.

There is no doubt, however, that by 1855 local manufacturers were finding themselves squeezed between increased costs of production and competition from

Table 11.1 External trade (seaward and overland), New South Wales, 1851-90^a
 (£000)

Year	Exports originating in New South Wales						Entrepôt trade	Retained imports
	Wool	Tallow	Coal	Gold ^b	Other	Processed and manufactured		
1851	828	114	12 ^c	468 ^d		151 ^e	224	1,340
1852	677	147	110 ^c	2,661 ^d		785 ^e	234	1,666
1853	1,000	135	81 ^c	1,781 ^d		504 ^e	1,023	5,319
1854	1,182	164	102 ^c	773 ^d		745 ^e	1,084	4,897
1855	1,078	123	59 ^c	209 ^d		541 ^e	874	3,795
1856	1,303	137	66 ^c	138 ^d		489 ^e		
1857	1,307	82	46	984	391	141	1,298	4,163
1858	1,151	53	89	995	343	162	1,093	5,636
1859	1,464	37	133	1,698	456	131	1,418	4,641
1860	1,214	29	184	1,876	379	177	898	5,860
1861	1,769	61	161	1,891	812	182	1,268	6,422
1862	1,801	104	245	2,715	914	212	1,595	4,983
1863	1,317	31	220	2,362	561	221	2,183	7,400
1864	2,416	101	214	2,952	772	314	2,350	6,167
1865	2,284	122	214	2,648	1,293	389	2,371	7,898
1866	2,830	52	301	2,925			2,614	8,021
1867	3,011	64	253	2,170	783	398	2,455	6,948
1868	2,960	144	292	1,810	326	311	2,046	5,054
1869	3,163	168	298	2,489	419	333	2,315	6,237
1870	2,741	227	268	1,590	1,345	401	2,070	6,323
1871	4,748	258	257	2,095	1,077	388	1,699	6,058
1872	3,343	180	308	2,125	1,320	528	2,039	7,571
1873	4,301	106	526	2,608	1,181	598	2,412	6,796
1874	5,010	104	632	1,898	1,247	791	2,450	8,526
1875	5,652	112	671	2,096	1,385	1,140	2,176	9,118
					1,730	1,211	2,200	11,290

1876	5,565	125	625	1,606	1,609	1,162	10,692	2,312	11,361
1877	5,256	148	649	1,833	1,424	1,395	10,705	2,421	12,186
1878	5,723	96	708	1,715	1,266	1,209	10,717	2,249	12,520
1879	6,491	216	695	715	1,454	1,205	10,776	2,311	11,888
1880	8,041	351	425	853	1,529	1,481	12,680	2,845	11,105
1881	7,150	267	418	1,928	1,411	1,721	12,895	3,154	14,255
1882	7,433	236	647	1,692	1,421	1,779	13,208	3,509	17,773
1883	9,599	359	830	1,706	1,525	2,111	16,130	3,756	17,204
1884	8,953	198	931	954	2,021	1,539	14,596	3,656	19,171
1885	7,247	196	967	1,636	1,762	1,150	12,958	3,584	19,881
1886	7,029	145	947	1,885	1,889	989	12,884	2,672	18,302
1887	8,911	242	961	1,394	2,682	1,282	15,472	3,025	15,782
1888	9,090	208	1,064	1,957	3,528	1,442	17,289	3,570	17,315
1889	10,621	198	1,319	453	3,581	1,251	17,423	5,872	16,991
1890	8,991	267	987	1,028	4,815	1,145	17,233	4,813	17,802

^a This table has been prepared from a variety of returns published in the *NSWBB* and *NSW/SR*. It is impossible here to give a detailed account of all the arithmetic involved. Briefly, the main problems resulted from the fact that the original sources do not fully document the exports originating within the colony and re-exports until 1876; prior to that year details are unambiguously stated only for wool and for total exports, beginning in 1869. Data about overland exports in 1867, 1868 and 1873 are incomplete so that estimates have been included for these years in the 'wool', 'other' and 'entrepôt trade' columns. The 'processed and manufactured' column is probably slightly understated between 1859 and 1875 because a few such items may have been included in the summaries of overland exports but the error is almost certainly very small.

^b Includes bar, dust and gold coin: from 1889 coin minted in New South Wales from gold originating in other colonies was no longer included among colonial exports.

^c Produce of New South Wales not distinguished from re-exports of imported coal.

^d The original source notes that these figures 'include a large portion of gold brought from the neighbouring colony of Victoria but the quantity cannot be accurately determined'.

^e Insufficient data to make detailed breakdown.

Sources: *NSWBB* and *NSW/SR*.

imports. Although labour became more abundant towards the end of 1854 (partly as a result of a renewal of officially sponsored immigration from overseas and the movement of disenchanted miners from Victoria) wage rates and raw material costs both remained higher than in pre-gold days. Manufacturers found themselves caught up in the realities of international commerce, as the Select Committee on the State of Manufactures and Agriculture in the Colony was told on 14 October 1862:

When the season is over in Britain, warehousemen must clear out their old stock of goods, and there is no way of doing so but by sale to an exporter, or by consignment to some foreign market. In the latter case the goods are hypothecated to some merchant at two-thirds of their value, which is drawn against them, or they are hypothecated to a bank, and drafts drawn upon the correspondents to two-thirds of their value or invoice price; and in many cases the goods immediately upon arrival at the foreign or colonial port must be sold to meet the drafts.

In simple terms, end of season lines were being 'dumped' in markets like Sydney and auctioned off at less than the prime manufacturing cost. Colonial producers also had to contend with other problems. Much of the plant and equipment was housed in unsuitable premises—several of the woollen-mills, for example, were operating in converted, multi-storeyed flour-mills with inadequate lighting and ventilation. Wage and piecework rates were three to four times higher than those in Britain, and colonial manufacturers were not only expected to pay cash for raw materials, fuel and services but were also obliged to extend credit to makers-up and retailers in order to compete with importers. In these circumstances some entrepreneurs (like the Dangars operating the Newcastle Preserving Works) gave up altogether, others (like John Byrnes who operated a woollen-mill at Parramatta) suspended operations—in this case for five years—until things settled down, and a few diversified into importing as well as manufacturing.

By early 1858 there was a growing labour surplus, especially in Sydney, and increasing pressure on the government to institute public works schemes. Hopes were raised in September-October by a new gold-rush to Port Curtis in Queensland but within a few weeks hundreds of disappointed and destitute diggers had returned to Sydney as the field proved to be rich but small. Some were given assistance to move to gold-fields within New South Wales but many joined the ranks of the unemployed which were being swollen by the arrival of assisted and unassisted immigrants. In September 1859 a Committee was set up to examine the 'condition of the working classes of the metropolis' and this heard evidence during the next few months about the poor housing conditions, crime, juvenile delinquency and unemployment: among other things, it learned of a house-to-house survey conducted by the police in the City of Sydney on 20 October 1859 which had revealed that 789 people were unemployed and about half of these had been out of work for longer than three months. Several industrialists testified about the depressed state of manufacturing; most blamed the excessive volume of speculative, cheap and often inferior imports which, several thought, could be curbed by the imposition

of modest import duties. The Committee gave these views a sympathetic hearing and, when presenting its views in April 1860, opined (p. 1273) that

the connection of cause and effect is in some measure to be traced between the fiscal laws of the Colony and the existing social evils, and they [the committee] consider a revision of our entire taxation a matter of necessity. We have the authority of eminent economists in support of raising revenue in a new country by the imposition of duties that would tend to foster manufacturing enterprise, and such encouragement to our own people, within well considered limits, would not be inconsistent with practical freedom in our commercial intercourse with the World, while no nation affords us an example of the establishment of manufactures without such encouragement. But it is respectfully submitted that we are not to follow blindly the course of other countries, but to be guided in our economical arrangements by such principles as are most applicable in the peculiar circumstances of our own.

Henry Parkes, the Committee's chairman, moved the adoption of the report in the Legislative Assembly on 8 May 1860 declaring that the most important part of the inquiry had been 'to induce a favourable consideration for native productions' but, despite growing budgetary problems and continuing unemployment, the Assembly was averse to 'protection' and refused to countenance such recommendations.¹

Although no detailed employment data are available, there seems little doubt that after reaching a nadir in 1855 and 1856 the total number of people engaged in what can be broadly termed 'manufacturing' then gradually increased, largely because of the spatial spread of activities like flour-milling, brewing and tanning, to about 6,300 at the beginning of 1862. This estimate partly depends on literary evidence and partly on the assumption that the average establishment in New South Wales did not differ greatly in size from that in Victoria at about this time: it seems reasonable to suppose, for instance, that the average flour-mill in New South Wales employed about the same number as its southern counterpart. Some care has to be exercised, therefore, when interpreting the findings of the 1859-60 Committee on the Condition of the Working Classes of the Metropolis and those of a Committee set up in 1862 to examine the State of Manufactures and Agriculture in the Colony for both relied heavily on the experiences and opinions of people engaged in import competing industries like woollen-milling and bootmaking. The general burden of the evidence paraded before this latter Committee was similar to that heard by its predecessor (hardly surprising since some of the witnesses were the same) and the blame for the lack of expansion—even the contraction—of some industries was again mainly sheeted home to the free importation of inferior goods. Its conclusions, presented on 12 December 1862 (p. 1043), echoed those of the previous Committee:

The witnesses are also of the opinion that an import duty of from ten to fifteen per cent. would correct the evil; and when it is considered that a duty must be levied to maintain the Government, and as it is of very little difference to the consumer on what goods this duty is imposed, but to the producer it is of the greatest importance whether it is laid on such

articles as he produces, or whether it is so levied as to take from his employment . . . your Committee, therefore, recommend that should it be found necessary to revise the tariff, the alteration should be so made that it will tend to encourage the manufactures and cultivation of the Colony.

The opposition to protection remained unmoved by these findings and the attempts of successive Treasurers to meet budgetary deficiencies by imposing specific or *ad valorem* duties on a wider range of commodities were defeated in the Legislative Assembly or the Legislative Council despite some show of support from people in Sydney, Maitland and Goulburn and from groups of manufacturers.² When the Cowper Ministry again assumed office in February 1865 it was forced to introduce, as an emergency measure, legislation to impose a duty of 1/- on every package imported (except livestock, goods in transit, flour, wheat, sugar and tea) and an additional impost of 20 per cent on all goods currently liable to import duty (except tea, sugar, brandy and gin) in order to reduce accumulated deficits, estimated to be about £800,000 at the end of that year. A few months later the government introduced more comprehensive customs proposals (29 Vic. no. 14) which altered some specific duties and, over and above the existing package charge, imposed from 21 December 1865 a general 5 per cent *ad valorem* impost except on items like hides and skins, tallow, wool, wheat, flour and unsmelted ores. In effect this was a compromise measure that suited all parties: it created the additional revenue needed to meet accumulated deficits and yet did not contain elements which could be construed as the thin end of protection.

By the end of 1865 serious debate about protection in New South Wales was all but over and, for the most part, local manufacturing had to develop during the remainder of this period under conditions of free trade. As a final fling, a Select Committee on the Unemployed, which was appointed on 1 November 1866 and reported on 4 December (a measure of the superficiality of its investigation), was turned into a platform for protection, recommending that an Act should be passed

to impose a duty of 20 per cent. *ad valorem* on all timber except in the log, furniture, carriages, and other manufactures of wood, boots, shoes, saddlery, and harness, and all apparel and slops, imported into this country after the 1st day of July, 1867.

No notice was taken of this report even though it expressed concern (pp. 623–4) about the unwillingness of manufacturers to take on apprentices and also about the paucity of employment opportunities for women and girls ‘too many [of whom] have been deprived of their only chance of obtaining an honest livelihood, by the crushing competition of the over-worked and under-paid needlewomen of Great Britain’.

The Demand for Manufactured Products

As in the case of Victoria, it is convenient to examine some elements of the demand for manufactured and processed goods by commenting in turn on the private and

Table 11.2 'Adult male equivalent' population in main divisions of New South Wales, 1851-91

Area	1851	1856	1861	1871	1881	1891
Sydney ^a	43,375	59,367	67,901	96,515	161,649	276,544
Rest of Cumberland County	14,148	18,469	20,436	19,870	n.a.	46,212
Cumberland County	57,523	77,836	88,337	116,385	n.a.	322,756
Other nineteen counties	52,710	78,529	113,654	147,627	n.a.	227,666
Rest of New South Wales	18,659	23,532	53,094	94,440	n.a.	265,413
Total ^b	128,892	179,897	255,085	358,452	543,487	815,835

^a Sydney defined on constant boundaries as the Metropolitan Police District plus Ryde and Hunters Hill.^b Excludes colonial marine, travellers, etc.*Sources:* New South Wales census reports 1851-91. Excludes estimated population of Queensland 1851 and 1856.

public sectors and on the development of external markets. One point should be clarified at the outset. Despite the emphasis given in previous chapters to the inter-colonial competition for the trade of the rich pastoral Riverina district of southern New South Wales, this made up less than 10 per cent of the area of the colony and at no stage contained more than 3 per cent of the population (which in round figures stood at about 5,500 in 1861, 12,000 in 1871, 23,000 in 1881 and 26,000 in 1891). Until the 1870s much of the Riverina was to all intents and purposes focused on Melbourne which was considered 'morally and socially' the capital for the district.³ During the latter part of the 1870s, as the Great Southern line from Sydney gradually extended towards and eventually into the area, the economic focus of the district began to change. Although a considerable proportion of the wool continued to flow south along well-established commercial and transport channels, the available evidence (including the decline in the volume and value of Victorian overland exports) suggests that orders for consumer goods were being redirected towards Sydney.

Private sector demand

The population of New South Wales grew by 951,000 in the forty years to 1891. A high average annual rate of increase of 6.8 per cent in the 1850s was followed by a much lower rate of 3.7 per cent in the 1860s then recovered to between 4.1 and 4.2 per cent during the remainder of the period. It is impossible here to discuss the demographic detail, but some of the main structural changes are indicated by the following ratios:

Ratio of	1851	1861	1871	1881	1891
Adult males to adult females	1.54	1.48	1.33	1.33	1.28
Adults to children					
under fourteen	1.56	1.73	1.52	1.66	1.76
Dependants to breadwinners	0.53	1.15	1.40	1.35	1.38

In particular, the alterations that took place between 1861 and 1871 reflect a generally high birth-rate, an almost equal increment of adult males and adult females (see Table 10.2), and the continuing dearth of job opportunities for women and girls. The spatial changes in the size, age and sex structure of the population have been shown in Table 11.2 in the form of 'adult male equivalents', a device used in previous chapters as a very broad surrogate indication of possible changes in demand over time and space for everyday consumer goods. This table points up the relatively rapid rate of growth in the nineteen counties (that is, the old settled areas outside Cumberland County) during the first half of the 1850s and the much slower growth there for the remainder of the period; the very considerable increment in the more distant pastoral districts during the latter part of the 1850s and the consistently high rate of growth thereafter; and the perceptible pause in the development of Sydney between 1856 and 1861 and the significant increments in the 1870s and 1880s. Other factors, of course, have to be borne in mind although not all can be quantified in a meaningful way. Butlin's index of effective industrial wage-rates for New South Wales shows a generally rising trend until 1879 (with

Table 11.3 Estimates of new capital formation and replacement outlays from the public sector in New South Wales, 1861-90^a
(£000)

Period	New or replacement	Railways	Telegraph	Water and sewerage	Bridges and harbours	Defence construction	Public buildings	Other miscellaneous	Total
1861-65	new replacement	1,798 215	97 22	161 15	381 65	26 8	399 75	23 —	2,885 400
1866-70	new replacement	2,470 291	65 42	181 13	351 132	12 8	349 100	101 1	3,529 587
1871-75	new replacement	1,895 465	111 40	189 27	488 284	121 10	424 139	156 2	3,384 967
1876-80	new replacement	5,107 1,181	199 66	390 23	1,105 465	143 14	1,693 235	133 5	8,770 1,989
1881-85	new replacement	12,499 2,761	196 86	2,586 62	1,885 530	254 13	2,880 269	419 1	20,719 3,722
1886-90	new replacement	6,815 3,649	123 101	2,430 123	1,573 566	369 33	1,630 326	659 16	13,599 4,814
Total		39,146	1,148	6,200	7,825	1,011	8,519	1,516	65,365

^a Excludes local government expenditures except in the case of water and sewerage. The original source should be consulted for an explanation of the derivation of these estimates and related qualifications. Expenditure on roads is excluded from this tabulation.

Source: Butlin, *Australian Domestic Product*, *passim*.

Table 11.4 Estimates of new capital formation and replacement outlays from the private sector in New South Wales, 1861-90^a (£000)

Period	New or replacement	Residential ^b	Shops and offices	Churches	Industrial	Mining	Agricultural and pastoral ^c	Shipping	Total
1861-65	new replacement	4,214 227	233 212	124 3	764 178	187 80	1,215 212	— —	6,737 912
1866-70	new replacement	5,294 301	469 250	154 6	1,127 296	— 98	829 311	28 —	7,901 1,262
1871-75	new replacement	4,008 420	618 318	98 10	1,849 452	85 81	7,776 715	301 —	14,735 1,996
1876-80	new replacement	5,584 489	1,065 354	132 11	2,241 752	278 183	22,995 2,704	302 —	32,597 4,493
1881-85	new replacement	20,545 727	1,647 506	169 15	3,251 1,047	174 271	14,007 5,328	345 —	40,138 7,894
1886-90	new replacement	12,741 941	1,881 553	246 19	—869 1,180	127 ^d 413	34,872 6,464	123 —	49,121 9,570
Total		55,491	8,106	987	12,268	1,977	97,428	1,099	177,356

^a The original source should be consulted for an explanation of the derivation of these estimates and related qualifications.^b Includes hospitals, asylums, hotels, guest houses and other inhabited premises.^c Includes tools, machinery and equipment and physical improvements such as dams, tanks, fences and farm buildings but excludes livestock, the clearing of land and land itself.^d Hall, *Stock Exchange of Melbourne*, p. 121 suggests that this figure is too low in view of the development of mining in the Broken Hill area during this period.Source: Butlin, *Australian Domestic Product, passim*. There are some discrepancies between Butlin's calculations of residential investment in his Table 149 (which are used here) and those incorporated in his Table 154.

temporary setbacks in 1864-6, 1868, 1871, 1874-5 and 1878) and then a slowly falling trend to 1890 (with low points in 1882-3 and 1886).⁴ Most of the comments made about Victoria in this connection (Chapter 8) apply with equal validity to New South Wales: consumer tastes and preferences appear to have changed as new products became available. Kerosene, for instance, was produced from local shale deposits during the 1860s, and 10,000 gallons a week were being made at the Waterloo (Sydney) works of the Oil and Shale Company by 1873.⁵ New foodstuffs, like aerated bread and canned ham, were appearing on the market⁶ and the proliferation of prepared foods, like soups, jellies, custards and infants' preparations, led to an increased demand for products like maizena (cornflour).⁷ Concurrently, the development of local agencies, travelling salesmen, and mail order catalogues formalised the channels of distribution and enlarged the markets available to Sydney-based manufacturers and retailers.

Of particular importance was the investment of private and institutional funds in residential and other buildings. Butlin has estimated that dwellings, hotels, guest houses, hospitals and other inhabited premises absorbed £52,400,000 in new investment⁸ and a further £3,100,000 on replacement outlays during the thirty years to 1890, together accounting for nearly a quarter of all public and private investment (Tables 11.3 and 11.4). Between the censuses of 1861 and 1891 a total of 158,600 permanent dwellings was erected: of these 50,050 brick and stone and 11,580 iron and weatherboard residences were built in the Sydney metropolitan area and 20,860 and 76,090, respectively, elsewhere in the colony. The high level of construction during the second half of the 1860s, largely in response to the lagged demand from the 1850s, fell off during the following decade especially in 1871, 1873 and 1879-80, and then resumed at a much higher level in the 1880s (with noticeable setbacks in 1886 and 1889). There is plenty of evidence of poor housing conditions in the late 1850s and early 1860s with six people crowded together in the average four-roomed dwelling. During the following decades the overall output of accommodation exceeded the growth in population so that room occupancy fell from 1.40 to 0.95 in the metropolis and from 1.48 to 1.06 elsewhere; at the same time the size of the average dwelling increased from about four to five rooms. Yet these developments were not accompanied by major changes in building materials. In Sydney, where there had been a marked swing away from wooden-walled construction in the 1840s (Table 4.6), brick and stone accommodation, already forming nearly 77 per cent of the total in 1861, had increased only slightly—to 79 per cent—by 1891. Elsewhere weatherboard and slab remained predominant with the share of brick and stone dwellings rising only from 18 to 20 per cent of the total housing stock.

It is difficult, beyond what has already been said, to quantify the demand stemming from residential building activity or to be sure of the relative importance of locally made as against imported supplies. The quantities of bricks made or of timber sawn were not recorded until 1886 and employment information (even then available only from 1877) provides a poor guide to output. The *Sydney Morning Herald* reported on 17 June 1870 that brickworks were being equipped with

steam-driven moulding machines which, for an investment of between £4,000 and £5,000, could daily turn out 15,000 bricks that took about half the time to dry before being fired. Later that decade continuous brick-kilns were introduced thus reducing labour inputs even further. Moreover, these same industries were not only supplying materials for other types of buildings in the private sector, like shops, offices, churches and factories, but also those required for central and local government offices, schools and public works. As was the case in Melbourne, goods lifts began to appear in warehouses in Sydney towards the end of the 1870s,⁹ and not long afterwards rising land values encouraged retailers and hoteliers to build upwards and to instal passenger lifts operating on various principles driven by gas, steam or hydraulic power. Farmer's department store in Sydney, for instance, pioneered the use of suspended cable passenger lifts in 1881 and at least one Newcastle department store had installed such a lift by 1888.¹⁰ These high-rise buildings were constructed with load-bearing brick walls which were as much as 6 feet thick at the bottom. About this time, too, cavity walls came into vogue as a way of checking the seepage of moisture. Impressive quantities of bricks and timber were used by railway contractors: thus on the 26 mile stretch linking the Great Southern line with Goulburn (27 May 1869) over 3,000 cubic yards of bricks were used in constructing culverts alone, and further quantities were required for the piers of the five stone and brick viaducts and for building the Goulburn railway station, goods warehouse (6,500 square feet), and carriage shed (4,800 square feet).¹¹ Perhaps all that can be safely concluded is that about 3,700 men were employed in brickyards, sawmills and lime-works in 1877, representing 12 per cent of the industrial workforce. This does not, of course, reflect the full extent of the demands generated by the investment in residential and other building activity. The iron trades benefited from the need for guttering and piping, and from the growing—almost obsessive—use of functional cast iron balcony railings and decorative peccadilloes. Local manufacturers had begun to imitate imported designs in the 1840s but during the 1860s and 1870s decorative ironwork of this kind was occupying the time and talents of a score or more Sydney foundries. According to the *Sydney Morning Herald* on 21 August 1868, Bubb's Victoria Foundry, which had 65 hands, had taken up

casting for house work generally, executing orders for builders or large contractors. In this they do a very large amount of business [12 tons a week], manufacturing pilasters, ornamental columns, balcony railing, wrought and cast iron palisading, and every description of iron work used in house-building.

The changes in housing standards also made room for increasingly ornate displays of furniture, elementary sanitary fittings and domestic appliances ranging from sewing machines to clothes washing equipment and even household ice-making machines.¹²

The massive investment in pastoral and agricultural activities, estimated by Butlin to have been £97,420,000 in new and replacement outlays during the three

decades to 1890 (Table 11.4), provided less direct stimulus to the manufacturing sector than might perhaps be imagined. Much of the pastoral investment went into improvements like dams, fairly crude station buildings (though some woolsheds, such as in the New England area, were impressive pieces of functional architecture), and perhaps 2 million miles of fencing of various kinds by 1890. Much of the material required for these improvements was found on the spot or, at least at first, was imported. Thus, John Lysaght Ltd (which operated the St Vincent's Iron Works at Bristol in England) established an agency, the Victoria Galvanised Iron and Wire Company, at Melbourne in 1880 and sub-agencies at Sydney and Brisbane. Independently of this, the brothers St John and Arthur Lysaght—apparently privately financed by their father—set up the St John Lysaght Galvanised Iron and Wire Netting works at Parramatta in 1884-5 with a weekly capacity of 26 miles of sheep and rabbit fencing material.¹³ It can be seen from Table 11.4 that much of the outlay on fixed assets on pastoral stations occurred towards the end of this period—from about 1874: indeed in 1870-1 577 of the 2,212 runs appraised had no improvements at all.¹⁴ Nonetheless large quantities of marketable waste timber were bought by the stations where it was used for slab-walled huts and for lining wells, and this was a critical influence on the viability of the sawmilling industry. More important was the demand for portable equipment. During the 1860s and 1870s steam-driven sheepwashing equipment came into vogue: according to the *Sydney Morning Herald* of 16 June 1868, for £600 P. N. Russell and Company in Sydney would supply a custom-built installation consisting of a 12 horse-power engine, a centrifugal pump, a storage tank and a receiver fitted with adjustable spouts along with the necessary piping. Other installations were less elaborate: some consisted simply of a dammed-up pool in a creek while others incorporated a boiler and vats for washing sheep in hot water. As the railway network extended into the pastoral areas, however, the economies in freight costs became marginal and an increasing proportion (from 17 per cent in 1873 to 82 per cent in 1890) of the wool clip was transported and exported in the grease. Local manufacturers also gained a good deal of business from the demand for wool-presses on stations and the much more elaborate hydraulic wool-dumping installations set up by the agencies at Sydney and in the 1880s at Newcastle. Although considerable interest was aroused towards the end of this period by various types of mechanical shearing machines, the number of installations was probably small even if a few were spectacular: by 1892, for example, Burrawang station (about 25 miles from Forbes) had installed eighty-eight shearing machines in what was claimed to be the largest shearing shed in the world.¹⁵ It is difficult to compile even an approximate estimate of the quantity and value of locally made equipment in use on stations. The construction of the ubiquitous dray was a small industry in itself: each bullock-drawn pole dray required about 6 hundredweight of iron castings for its tyres, axles and fittings, and the double shaft wagons (which could be drawn by horses) that superseded it used even more. Eight vehicles of this latter kind could be turned out in a week by an establishment employing twenty men and half a dozen apprentices.

During the three decades to 1890 the total area under all crops including sown pasture increased nearly fivefold to 1,241,000 acres. Concurrently the area sown to wheat only grew from 129,000 to 333,000 acres and thus occupied a mere 27 per cent of the total at the end of the period compared with almost half at the beginning. Apart from 1854 the colony remained a net importer of breadstuffs. Even so it is difficult to give a satisfactory explanation for the relatively feeble development of the agricultural implement-making industry in New South Wales which showed little capacity for innovation. At the 1870 Intercolonial Exhibition in Sydney local firms made a poor showing against the displays put on by the leading makers in Victoria and South Australia: the 'official report' thought it was because

A very large proportion of the agriculturalists of the Colony own small holdings, and are too poor to invest much in agricultural implements. It is common for the owner of a threshing-machine to move it to districts where farmers are sufficiently numerous to give him remunerative employment. The bad state of the country roads is the principal drawback to this convenient arrangement. In the newly-settled parts of the Colony the stumps are not sufficiently cleared away to allow of the use of reaping machines, and the wheat has mostly to be cut by hand. Stump-extractors have as yet been little used.¹⁶

Although the size of wheat farms increased during the 1880s (partly as a result of the growth of agricultural activities in the pastoral areas along the valleys of the Murray, Murrumbidgee and Lachlan), this was not accompanied by the introduction of the variety of equipment that had been developed in South Australia and Victoria to break in the mallee scrub country. New South Wales firms, particularly those in Sydney, met some of the demand for standard lines like ploughs and chaff-cutters but a wide range of machinery was imported from other colonies or from overseas. During the 1880s a few of the larger firms turned their attention to farm and station equipment as instanced by Hudson Brothers Ltd's 'Clyde' wind-driven pumping equipment which became a familiar sight in the Australian landscape,¹⁷ but endeavours like this were the exception rather than the rule.

More significant was the demand for processing machinery. It is convenient to defer the discussion of most of these activities until Chapter 12 where it will be shown, for instance, that the westward shift in the wheat belt and the abandonment of the coastal areas created a demand for more new flour-milling establishments than the total figures might suggest. Until the mid-1880s, when imported roller-milling machinery started to be used, most of the new and replacement equipment—engines, and smutting, cleaning and silk dressing machines—was supplied by Sydney foundries, some of which, like Chapman Brothers, maintained a special department to handle this part of their many-sided business. It was the Sydney foundries, too, that gained most from the rise, beginning in the late 1860s, of sugar cultivation along the northern coast of New South Wales (see Chapter 12).

In contrast to Victoria the demand for heavy mining equipment was much less important and came rather later. Among other firms, P. N. Russell and Company was making crushing plants during the 1850s but most were exported to Victoria.

It was claimed in 1858 that quartz crushing was 'at last becoming popular' but this is hardly borne out by the reports from the gold-fields themselves: indeed ten years later it was noted that the 'opening of the Emu Creek reefs, at the end of 1866, may be said to have given the first impetus to quartz-crushing as a business in the colony'.¹⁸ Even in the early 1870s, when there was another short-lived mining boom, barely a hundred steam engines were operating pumps or crushers throughout the gold-fields and many of these were working much below capacity. For instance, on 18 September 1872 the *Sydney Morning Herald* observed that only one of the four batteries erected at Hill End to crush quartz on commission from nearby claims was fully employed. The development of iron, copper and tin-smelting also created work for local foundries but the discussion of this can be deferred until the next chapter.

A particularly important stimulus to manufacturing came from investment in shipping. Butlin's figures (reproduced in Table 11.4) greatly understate the significance of this in three particulars. First, the tonnage launched prior to 1866 appears to have been ignored altogether. Second, the estimate of £21.12.0 per ton for steam vessels is far too low for either imported or colonial ships which in reality cost about three times as much:¹⁹ as against Butlin's figure of £1,099,000 it would be appropriate to substitute a figure of £8,947,000 (sailing-ships at £13 per ton and steam vessels at £65 per ton) to cover locally built ships and those imported and owned and registered in New South Wales.²⁰ Third, shipbuilding and repairing had an impact on the metal-working industries far in excess of factors that can be easily quantified. The sheer size of overseas vessels being operated to Sydney in the 1850s—such as the *Great Britain* (3,500 tons) and the *Golden Age* (2,864 tons)—pushed local foundries into new technical feats because of the complexity of the maintenance jobs that had to be undertaken and the limited time in which they had to be accomplished. The significance of this activity did not pass unnoticed by the *Empire* which observed on 5 December 1859 that 'to the great quantity of marine engines in use on our coast and river trade . . . is to be referred the main reason . . . for the comparatively far greater progress of Sydney in engineering'.

During the forty years to the end of 1890 a total of 703 steamships of 136,069 tons (and 2,948 sailing-ships of 369,890 tons) was registered at Sydney. From the painstaking work of Parsons²¹ it can be established that 418 of these steam vessels (26,717 tons) were built along the coast of New South Wales, 73 (11,724 tons) were launched along the Murray River or in other Australian colonies, and 212 (97,628 tons) were imported from overseas. Since the *Statistical Register* records a total of 525 steamships (41,316 tons) as having been built in New South Wales, it suggests (after deducting the Murray River vessels) that perhaps as many as 51 ships (10,378 tons) were built in the colony for export. The types and sizes of the 418 vessels are set out in Table 11.5 which indicates that by the 1870s the main demand was for screw-driven ships and that during the whole period the majority had wooden hulls. This latter fact helps to explain a good deal about the organisation of the shipbuilding industry. Most of the hulls were built, along with sailing-ships, by specialist yards of which there were at least a dozen operating in the Sydney area²²

Table 11.5 Details of steamships built in New South Wales and registered at Sydney, 1850-90^a

Period	Wood paddle-steamers		Iron paddle-steamers		Wood screw vessels		Iron screw vessels		Total	
	Number	Tonnage	Number	Tonnage	Number	Tonnage	Number	Tonnage	Number	Tonnage
1850-60	9	398	6	137	1	48	1	21	17	604
1861-65	8	566	7	846	4	1,071	2	271	21	2,754
1866-70	13	833	7	381	2	280	5	526	27	2,020
1871-75	10	520	1	95	40	1,743	7	784	58	3,142
1876-80	15	952	5 ^b	543 ^b	55	2,558	1	49	76	4,102
1881-85	22	2,507	3	436	119	5,532	5 ^c	418 ^c	149	8,893
1886-90	6	749	1	239	56	3,157	7 ^d	1,057 ^d	70	5,202
Total	83	6,525	30	2,677	277	14,389	28	3,126	418 ^e	26,717 ^e

^a Excludes vessels built on the Murray and Darling Rivers.^b Includes one steel paddle-steamer (86 tons) built in 1879.^c Includes one steel screw ship (77 tons) built in 1885.^d Includes three composite hullled ships (232 tons) built in 1886 and 1889.^e Includes the *Thomas S. Mort* (772 tons); the *Governor Blackall* (487 tons); 3 vessels of 300-400 tons (1,022); 14 vessels of 200-300 tons (3,417); 55 vessels of 100-200 tons (7,514); 112 vessels of 50-100 tons (7,989); and 232 vessels of less than 50 tons (5,516).Source: Calculated from data in Parsons, *Detail of Steamships Registered at Sydney N.S.W. prior to 1900*.

and nearly as many located along the coast especially at Brisbane Water and the rivers in the far north. Some shipbuilders, like Booth whose activities were described in the *Sydney Morning Herald* on 19 June 1868, also operated their own forest sawmills (at times the supply of timber to other users formed the predominant part of their businesses), and some had a yard in Sydney as well as another in the far north to which the shipwrights were sent when needed. Almost without exception these establishments bought in the boilers, engines, shafts and other fittings; of the 254 engines that can be attributed to particular makers, 199 originated in Sydney foundries, 4 in Newcastle and 51 overseas (mainly Glasgow).²³ Contrary to their popular image the leading engineering firms, most of which had marine facilities, did not venture far into new ship construction: only 33 vessels (4,066 tons) can be definitely attributed to The Australasian Steam Navigation Company, Mort's Dock and Engineering Company, the Atlas Engineering Company, and Vale & Lacy throughout this whole period. Moreover, only 23 of these (totalling 3,240 tons) had iron hulls and less than half were equipped with engines made in the builder's own foundry.

These firms devoted most of their marine facilities to the maintenance of the colonial fleet and those of companies trading to Sydney from overseas. All benefited directly or indirectly from the fact that until the opening of the Alfred Graving Dock at Williamstown (Melbourne) early in 1874 Sydney possessed the only two dry docks in the southern hemisphere, namely, Mort's Waterview Dock opened in March 1855 and the Fitz Roy (or Cockatoo Island) Dock opened in December 1858. It was originally intended that the latter—built, owned and maintained by the government—should be used exclusively for the upkeep of Royal Navy vessels but almost from the outset it was in fact hired out to private firms: by 30 April 1865, for example, it had accommodated sixty-six naval and ninety-seven merchant ships. The Waterview Dock was leased and sub-leased to local shipbuilders and the Peninsular and Oriental Steam Navigation Company until 1866 when Mort formed a partnership with Thomas Macarthur to take direct control of its operations. Subsequently on 1 July 1872 the assets were acquired by the Mort's Dock and Engineering Company (in which Mort was the majority shareholder) and this, in turn, was re-formed as the Mort's Dock and Engineering Company Ltd on 1 February 1875 with a nominal capital of £120,000.²⁴

The third major marine facility was the slip (completed in May 1855) and associated works belonging to The Australasian Steam Navigation Company: basically these had been set up to maintain and refit its own fleet but spare capacity was turned to advantage by carrying out work on overseas vessels and even on those belonging to its colonial rivals. Faced with mounting financial losses, increasing competition and complaining shareholders, the firm in 1886 asked Mort's Dock and Engineering Company for the terms on which it would undertake all its docking and repairs, but at a special board meeting on 1 November Mort's decided that it would not tender until its old rival 'had permanently closed' its facilities. Early the following year the Steam Navigation Company's assets were taken over by the British India and Queensland Agency Ltd, the fleet being operated by the

Plate 13: Mort's Dock and Engineering Company Ltd was one of the largest shipbuilding and repairing firms in Australia during the nineteenth century. The works, which occupied a 15 acre site at Balmain, Sydney, also turned out railway rolling stock, bridges and mining machinery. The graving dock (centre) was enlarged several times and when this photograph was taken in 1887 had a length of about 500 feet. (National Library of Australia.)

newly formed Australasian United Steam Navigation Company, and on 4 March 1887 the manager of Mort's Dock was authorised to arrange for the docking and slipping of all the new company's vessels. Then on 27 October 1887 the board of Mort's Dock decided to purchase the Steam Navigation Company's 'tools, goodwill, patent slip and other appliances for working same' for £15,000.²⁵

The concentration of these shipping facilities at Sydney was significant not only from a monetary point of view but also because it provided an opportunity for local firms to keep in touch with overseas marine technology at a critical stage in the colony's industrial development.

The absence of physical or financial output data for most industries during this period makes it difficult to be sure of the extent to which locally made products replaced imports, although the publicity surrounding each new venture gave an exaggerated view of the rate and significance of this process, as can be illustrated by a short account of paper-making in the colony. It was noted earlier that a paper-mill operated near Sydney briefly from 1818 but this activity was not taken up again until 1864 when a joint stock venture, the Australian Paper Company Ltd, was formed in Sydney with a nominal capital of £25,000. The Select Committee set up to examine the company's application for incorporation was told in April 1865 that 135 shareholders had already contributed £4,000 and that the directors had ordered machinery worth twice this amount from overseas. The mill came into production, at a site on the Georges River near Liverpool, at the end of 1867.²⁶ It was claimed that the plant had a capacity of 18 tons a week (about the amount being used by the *Sydney Morning Herald* and the *Empire* newspapers) although it is doubtful whether this level was reached until late in the 1870s. In fact by 1874 the venture had 'impoverished three companies' and was then acquired by the Sydney Paper Mills Company which set about enlarging the works and importing machinery able to make a greater range of papers. Some of the details are obscure but there appear to have been several problems. Its relatively remote location (chosen largely to ensure access to 50,000 gallons of clean river water an hour) created considerable overhead costs since an engineering shop had to be installed and accommodation for workers provided. The original machinery was capable of handling only rags but the proprietors found it difficult to maintain an adequate supply of these because of the high prices being offered overseas. Moreover it was this shortage of rags that had encouraged English manufacturers to turn to other raw materials, like straw and esparto grass, for the production of newsprint. At the same time printing methods were also changing and some of the major colonial newspapers were keeping abreast of these developments. Early in 1860, for example, the *Sydney Morning Herald* replaced its flat-bed presses with a 6-cylinder rotary printing machine (claimed to be the first such installation in the southern hemisphere) that could ordinarily make 12,000 impressions an hour, a capacity limited only by the rate at which individual sheets could be fed into it. Then in February 1876 this newspaper installed a 'Hoe-Webb Perfecting Press' which not only printed on both sides simultaneously (hence doubling the rate of production) but used continuous rolls of paper (thus reducing the number of operatives required

from eight to one). Although the smaller newspapers continued to use the older types of machines, a substantial part of the local market was being closed to the Paper Company by technical changes of this kind as the major metropolitan papers had to turn to overseas suppliers for newsprint in rolls, and the company's output continued to consist mainly of various types of wrapping paper. Less is known about the affairs of the only other paper-mill, operated by The London and New South Wales Paper and Fibre Company at West Maitland from 1871 to 1884:²⁷ the main interest is that this firm used corn straw as its raw material to make 'half-stuff' (dried pulp) for export to paper-mills in England, and brown wrapping paper for sale locally.

Public sector demand

Public investment in works, services and buildings amounted to over £65,000,000 in new and replacement outlays during the thirty years through 1890 (Table 11.3). In addition, government departments and instrumentalities spent considerable sums each year on stores and materials like stationery, hardware, uniforms and boots, and on services ranging from the upkeep of tugs on the Hunter River to the transport of government equipment.²⁸ There is a good deal of information available about government capital and operating outlays but it is not easy to re-sort so as to indicate its impact on various types of manufacturing: the *New South Wales Government Gazette*, for instance, seldom gave details of tenders accepted. In any case, for some firms government contracts had a particular importance that is difficult to quantify. In a letter to the *Sydney Morning Herald* on 5 November 1875, Thomas Mort drew attention to

one very important feature in respect to the Government work giving continuity of employment to the workshops of the port. I allude to the power to set a body of men at a moment's notice upon any work urgently required, or to effect repairs rapidly to a dismantled or broken-down steamer. It is the knowledge of this power that brings many an order to our workshops, and many a vessel into our port, which would otherwise go elsewhere; and without Government work as a stand by, it would be impossible to control this large source of revenue, and without this source of revenue it would be as impossible to keep the large ship-repairing establishments of the port going. I can personally speak for the establishment at Waterview Bay and state that the company never looks for profits from Government contracts, resting satisfied if they contribute their share to the surface expenses, and furnish the power to control what we style 'emergency work'.

During the latter part of the 1850s and early 1860s there was growing agitation, largely stemming from the problems of unemployment in Sydney, for a clearer policy about the placing of contracts with local manufacturers as against obtaining materials and equipment from overseas. Matters came to a head on 10 January 1862 when the Legislative Assembly debated a motion

That in future all railway plant, rolling stock, as well as all supplies required for the Storekeeper's department, and all other goods of

whatever nature required by the Colonial Government, should be supplied by contract, and that tenders be called for such supplies in the colony, and, if reasonable, accepted.

Much of the ensuing discussion concerned the extent to which the government should itself place contracts abroad and thus, in effect, compete with the colony's business community. Agencies of overseas firms, it was argued, were being disadvantaged because the early closing dates of some tenders meant that only local producers could meet the deadlines imposed. However, colonial manufacturers thought that they were being discriminated against since they were expected to tender competitively and yet make equipment, like steam cranes, to more exacting specifications and under closer supervision than their overseas competitors. Some of the free-trade members felt able to support the spirit of the motion on the grounds that it was appropriate for the government to support manufacturing in the same way as someone 'would protect a young tree, till it could stand and grow by itself'. Eventually, seventeen votes to twelve, the motion was carried in the amended form

That, in the opinion of this House, Tenders should in future be called for within the Colony, for all railway plant, rolling stock, supplies, and goods, required for the Public Service.²⁹

Taken literally, this could have been a meaningless resolution but it did in fact bring about a tightening up of contract procedures and meant that no department could afford to place orders indiscriminately outside the colony without appearing to flout the wishes of the legislature. There were, of course, individual 'scandals': when the Bathurst Farmers' Union complained in 1881 that South Australian flour was being used in the colony's asylums, the Colonial Treasurer explained that this practice had continued for ten years simply 'as a matter of departmental routine'. From time to time, especially when trade was dull, protests were made about the amount of work going abroad; on 7 June 1880, for example, 'upwards of 1,500 people' attended a public meeting in Sydney 'to take into consideration the necessity which exists, on account of the dulness of trade and overstocked state of the labour market, for the retention of all Government work within the colony'.³⁰ In this instance, people who tried to raise the issue of 'protection' were howled down on the grounds that it was a separate matter. But any signs of favouritism were also quickly nipped in the bud: thus experiments in 1883 to ascertain the suitability of locally made barbed wire for fencing alongside railways soon led to questions in the Legislative Assembly about the relative costs of this and imported materials.³¹

Most government contracts placed locally were for materials and equipment already being produced in the colony so that the main impact was to consolidate existing activities rather than to stimulate new ones. Nonetheless, the scale of some of the contracts probably widened the technical horizons and abilities of firms more quickly than might otherwise have been the case. Thus, Mort's Dock and Engineering Company took orders for warehouse columns in their stride but had

to instal new equipment to handle a contract for six cylindrical wrought iron piers for the bridge across the Orara River in the Clarence district. For many years this firm had been supplying apparatus for sheepwashes but it was a new experience to make equipment able to pump 170,000 gallons an hour up 100 feet for part of the Sydney water supply system. Or again, P. N. Russell and Company never before (or subsequently) tackled a task as complicated as the building of the iron steam dredge *Newcastle* in 1874 for service on the Hunter River.³²

Curiously enough in view of the Victorian experience and the enterprise displayed in other directions by the iron trade in New South Wales, there appears to have been no attempt to make cast or wrought iron water-pipes in the colony until 1890. Much of the explanation probably relates to the fact that until 1888 Sydney's water supply system—then totalling 68 miles of mains—was managed by the City Council, but in that year it was transferred to a newly constituted Metropolitan Water and Sewerage Board (consisting of members appointed by the government, the City Council, and other municipalities), thus making the supply of pipes subject to parliamentary scrutiny. One of the Board's first contracts was for the laying and sealing of 5 miles of imported pipes but the firm concerned failed to complete the job, because it 'could not get the molten lead to run completely round the joints', whereupon a relatively unknown concern, G. and C. Hoskins Enterprise Iron-works, came to the Board's rescue.³³ The Secretary for Public Works invited representatives of the leading iron-foundries to a meeting on 25 February 1889 to discuss the local manufacture of iron pipes required by the government and was reported next day by the *Sydney Morning Herald* as suggesting that

hitherto it had been taken for granted that the iron pipes required by the Government could not be manufactured in the colony, but . . . if a definite quantity of pipes was ordered, and the contract extended over, say, five years, the local manufacturers might be encouraged to erect the necessary works. [He] estimated that the pipes required for water and sewerage purposes during the next five years would amount to 100,000 tons, and he wished the local manufacturers to tender for this quantity at reasonable prices.

It may have been this interview that led the Hoskins brothers to invest £15,000 in a wrought iron pipe plant which, when formally opened in February 1890, was already making 1,500 tons of 24 inch diameter pipes for the government. Then in 1892 a contract for 20,000 tons of 3 inch to 18 inch cast iron pipes was shared between Hoskins and a competitor, Pope, Maher and Company.³⁴

Particular examples like this could be multiplied at length but it is more revealing to dwell on the policies of the Railways Department which was spending over half the colony's public investment outlays. By 30 June 1890, £30,555,000 had been expended on capital account by this Department and by the defunct private companies that preceded it. Of this, £26,213,000 had been spent on the construction of permanent way and associated works (including buildings), £3,460,000 on new locomotives and rolling stock, £628,000 on workshops, £246,000 on 'machinery', and £8,000 on 'furniture' (which is obviously too low). Despite the apparently

Table 11.6 Value of imported and locally made locomotives and rolling stock bought for government railways in New South Wales, 1852-90^a
(£000)

Period	Locomotives			Rolling stock			Total stock		
	Local	Imported ^b	Total	Local ^c	Imported ^b	Total	Local	Imported	Total
1852-55	—	20	20	28	—	28	28	20	48
1856-60	—	19	19	48	1	49	48	20	68
1861-65	—	90	90	60	18	78	60	108	168
1866-70	20	14	34	77	21	98	97	35	132
1871-75	50	113	163	147	11	158	197	124	321
1876-80	—	328	328	442	23	465	442	351	793
1881-85	75	445	520	764	40	804	839	485	1,324
1886-90 ^d	32	116	148	455	3	458	487	119	606
Total	177	1,145	1,322	2,021	117	2,138	2,198	1,262	3,460

^a Includes only rolling stock charged to capital account by the Railways Department (replacement stock was, in any case, of little importance during this period).

^b Includes freight, insurance and erection costs.

^c Includes value of components (such as springs and wheels) imported by the government and supplied to contractors. Some values calculated on the basis of current tender prices.

^d To 30 June 1890.

Sources: Compiled from various annual and special reports in *NSW & P* and Department of Railways, *New South Wales Steam Locomotive Data*.

detailed nature of the published railway accounts, it is difficult to disaggregate them into categories appropriate for present purposes: prime permanent way contracts, for example, sometimes included buildings, and contracts for goods sheds or stations covered related adjustments to track and signalling equipment. Each year, too, the railway reports set out itemised lists of materials and equipment bought overseas but these are an agglomeration of expenditures from both capital and operating accounts and cannot easily be used to evaluate separately the proportion of new investment, replacement or operating outlays that leaked overseas.

Much of the political and public interest in this aspect of railway policy focused on the acquisition of locomotives and rolling stock and, fortunately, it is possible to establish these details reasonably precisely (Table 11.6). About two-thirds of the £3,460,000 spent on rolling stock of all kinds by mid-1890 had been paid to colonial manufacturers although the detailed arithmetic is rather more complicated than the data in Table 11.6 may suggest. On the one hand (until the 1880s when the contract basis was changed), the steam-up cost of imported locomotives included expenditure within the colony for erecting, testing and putting each vehicle into working order. But, on the other, the cost of constructing rolling stock in New South Wales included outlays on components like springs and wheels that were imported in bulk by the Railways Department and supplied to the builders. It is probable that, taking all contracts together, such 'gains' and 'losses' very largely offset each other. These locomotive and rolling stock contracts reveal a good deal about the problems faced by both the manufacturers and the government.

Locomotives. Petitions from ironworkers and patriotic speeches in the Legislative Assembly did nothing to overcome the fundamental problem confronting anyone contemplating locomotive construction (as distinct from mere assembly) in the colony: unless there could be a reasonable assurance of a continuity of orders no manufacturer would risk the necessary investment in plant and equipment. This explains why in 1863 local manufacturers ignored a tender notice for locomotives all of which therefore had to be imported. Eventually the government grasped this point and on 5 October 1868 called tenders for

making at a schedule of prices, the whole of the Rolling Stock (inclusive or exclusive of Locomotive Engines) which may be required on the Government Railways, for a period of five years, from 1st January, 1869. Plans, specifications, and form of tender may be seen . . . at . . . Sydney Station.

This arrangement was strongly opposed by some of the senior railway staff. For example J. Whitton (the Engineer-in-Chief) wrote to the Commissioner for Railways on 4 February 1869 suggesting that

The proposal to have engines manufactured in the colony and for the contract to remain in force for five years appears to me extremely injudicious . . . in large establishments in England . . . where the subdivision of labor is carried out to its fullest extent, and where labor is not more than one-third the cost of labor in this colony, to obtain the same class of workmanship here for the same amount of money is

manifestly impossible. It must also be remembered that all the raw material has to be imported from England . . . if a contract be entered into for the manufacture of the class of locomotives now used, such contract extending over a period of five years, it would debar this colony from taking advantage of any improvements made during that period.

Even though their tenders were 22 per cent higher than overseas quotations for comparable vehicles, the two Sydney firms of Vale & Lacy (which had already built four engines for contractors) and Mort and Company were given contracts for twenty-two locomotives during the course of the next few years. This episode is worth considering in more detail since it illustrates the problems facing colonial manufacturers.³⁵

Firms had bid for the five-year contract on the understanding that 'at least thirty-five engines would be required during the period'. In July 1869 the two successful tenderers received their first orders for eight locomotives. While working on these, they discovered that the government was planning to buy six engines from Britain and promptly laid claim to this work under their long-term contract. In October it was given to the firms as an 'emergency' order. Since they were still engaged on the original eight, Mort's and Vale & Lacy had to import the six ready for assembly. Early in 1870 the contractors approached the Secretary for Public Works seeking further orders because otherwise they would have had to disband their locomotive departments. Thomas Mort renewed his plea in a letter to the Minister on 27 July:

We may mention that in order to undertake this work we went into a very large outlay for buildings, machinery, etc., that at the Dock Engineering Works alone being some £5000, and prepared ourselves for successfully carrying out the industry in the colony, so that eventually we might be able to compete with English manufacturers, at a profit to ourselves. We are now in the groove for doing so, but are pulled up at the very commencement by want of orders. . . .

In fact no further order was given until four tank engines were sought in August and two more in October 1871.

Towards the end of the following year the two contractors were asked to nominate a date by which they could deliver another eighteen engines but they pointed out that

in the present most exceptional state of the labour market (every new crushing machine taking a skilled mechanic away from us) it is quite impossible for us to state a time within which we could deliver the same, in fact we are of opinion that we should have to import the labour to manufacture them.

On 18 October the Minister gave the firms an ultimatum:

you will be good enough to inform me definitely whether you decline to supply the said engines within a reasonable time; if so, I shall be compelled to take steps to obtain the same from other quarters, holding you liable for any loss that may be thereby sustained.

Mort's and Vale & Lacy found themselves in a cleft stick for they felt 'called on to justify the action taken by the Government when they entrusted the construction of locomotives and rolling stock to local establishments' but were concerned that

Since this time last year there have been continuously increasing difficulties in the way of obtaining required materials from England, through strikes, reduction of hours of labour, and disinclination of manufacturers to accept orders. Our London correspondents say that they are in the hands of the manufacturers both as to price and time of completion, and advise us 'not to accept contracts for any work dependent on supplies from England'.

Much against their will they agreed to undertake the work and the contract was formally signed on 30 December 1872. Not long afterwards, when again pressed to give a firm delivery date, the contractors regretted that they were still

unable to escape from the embarrassment imposed on us by the irregularities of our *employes*. Even during the past few weeks there has been further occasions for our doubting the reliability of many of them, and we cannot but be apprehensive of still further difficulties . . . Indeed we apprehend that while the command of steady, skilled labour is so uncertain as at present, the very fact of our being under engagement to a fixed time would militate against the accomplishment of our object.

When pressed to start deliveries within twelve months, the firms saw no alternative but to import all the components and simply act as assemblers, noting wryly that in the absence of orders in previous years they had had to disband their locomotive shops while now 'we are called on to undertake an order in all but the final year of our contract equal almost to the aggregate of the whole of the orders issued during the previous portion of the term'. Mort and Company, apparently in association with Vale & Lacy, came to an arrangement with Robert Stephenson and Company (Newcastle-on-Tyne) to assemble eighteen of its locomotives and these were put in service between October 1874 and August 1875. Finally, the two firms shared an order in December 1873 for eight tank engines which were made locally and went into service during 1875.

Thus, as a result of the five-year contract running from 20 May 1869, Mort and Company built twelve locomotives (worth £36,180) and Vale & Lacy ten (worth £33,460) as well as assembling twenty-four imported engines. But this first attempt to initiate a significant branch of engineering in the colony must be regarded as an almost complete failure: the lack of a steady flow of orders (partly because of budgetary problems and partly because of uncertainties about railway building policies), the sharp rise in the costs of components in Britain and delays in delivery, and labour shortages and industrial unrest in the metal trades in New South Wales (discussed later), were all to blame. When the contract lapsed in mid-1874 colonial firms were no better equipped to build locomotives at reasonable prices than they had been at the beginning. Even such an enthusiastic advocate of colonial enterprise as Thomas Mort recognised that there were limits to what could be done locally:

we have not attempted—neither would it be wise under existing circumstances to do so—to bring out the machinery required for the manufacture of the wheels, steel axles, and tires. Had we to erect the costly plant to make these for our own comparatively small wants, it would involve an outlay, the interest on which would tell against the industry very seriously, and as it is upon the other portions of a locomotive that the chief portion of the hand-labour is employed, there is no object in handicapping the colonial manufacturer with it. When an iron and steel manufactory shall rear its head in the colony . . . then it may be that these heavy works may be profitably performed in the colony not only for ourselves but for our neighbours.

But in mid-1874 the colony did not have even one shop properly fitted out to make 'the other portions of a locomotive'.

In 1875 the policy relating to locomotive contracts came under review. The iron trades heard rumours that the leading firms were not going to tender for forthcoming locomotive contracts 'because they could not depend on the men', and on 20 October sent a delegation to the Secretary for Public Works to assure him that the workers were 'willing to enter an agreement for two or three years' with the employers. The Minister pointed out that the government had already delayed a proposed tender notice for five months because it would have been 'useless to have asked for tenders at a time when the disputes between masters and men were at their height, and though pressed for the engines the Government have been patiently waiting for a settlement of the question', that the delay could not continue much longer, and that orders would only be placed locally if the terms were reasonable. A fortnight later Mort wrote to the *Sydney Morning Herald* praising the 'statesmanlike answer' given by the Minister for it

clearly showed to the men the folly of aiming at unexceptionally short hours and unexceptionally high wages, if they wished to have employment upon the works required by the Government, inasmuch as such hours, with such wages, meant prices which the Government was not prepared to pay.

But Mort also took the opportunity to reply to some references by the Minister to events during the five-year contract and especially to the implication that the two firms, by importing some of the locomotives ready to assemble, had ignored the spirit and intention of the agreement. He wrote at length to 'show the public that the failure of the contractors to make all the engines . . . was, at any rate, not altogether their fault, neither was it entirely owing to strikes or rate of wages': the root cause was the lack of continuity of orders.

Now that employees and employers had had their say, the government decided to test the local market, and on 15 November called tenders in the colonies (including Victoria) for eighteen passenger and six goods locomotives. Simultaneously Beyer Peacock and Company were asked to cable a quotation from Manchester. No tenders were received from Australian firms for the passenger engines but Mort's Dock and Engineering Company Ltd and the Phoenix Foundry Company Ltd of Ballarat quoted £24,300 and £23,970, respectively, for the six

goods engines as against the Beyer Peacock price of £16,710 to which had to be added £2,100 for freight, insurance and erection. The reluctance of colonial firms to tender for the passenger locomotives, the 27 per cent higher price sought for the goods engines, and the subsequent decision to buy all the supplies from overseas were later explained by the Commissioner for Railways:

the state of the labour market in the Colony has been so unsettled as to deter tenderers from entering into contracts for the supply of rolling stock, except at much higher rates than formerly prevailed, and with inconvenient reservations as to strikes . . . if our colonial manufacturers decline to tender on reasonable terms, there will be no alternative but to import the necessary stock from England, or manufacture it in our own workshops.³⁶

In effect the government 'with every desire to deal liberally with colonial manufacturers' found itself unable to 'ignore the principles of free trade so far as to accept a colonial tender at so great an advance on English prices'. Thus, during the four years to the end of 1879 a further seventy-nine locomotives were imported at a total steam-up cost of £224,500.

The next episode in this saga began on 4 July 1878 when tenders were called for the supply of locomotives required for the following four years which was estimated to be forty passenger, forty goods, twelve mixed and eight tank engines. Three Sydney firms put in bids for 78 of the 100 engines:

Contract number	Number and type of locomotive	Tenders submitted (£)		
		Atlas	Mort	Vale
5	6 passenger	—	3,700	—
6	6 goods	—	3,830	—
8	4 tank	—	3,700	2,875
9	8 passenger	3,343	—	—
10	8 goods	3,483	3,830	3,475
11	6 mixed	—	—	3,325
12	20 passenger	3,343	3,700	—
13	20 goods	3,483	—	—

This resulted in offers being made to all three firms (the successful bids are shown in italics): the Atlas Engineering Company (forty-eight locomotives at £163,264) and Henry Vale and Company (eighteen at £59,250) accepted their contracts but Mort's Dock and Engineering Company Ltd rejected the suggestion that it should build twelve locomotives (£45,180) on the grounds that the order was too small to be worthwhile. The *Newcastle Morning Herald*, a persistent critic of the government's railway tendering policies, noted the anomaly of some firms refusing work because the orders were too puny while smaller firms were unwilling to put in tenders because the contracts were beyond their resources: it thought one solution would be for the rolling stock needed on the Great Northern Line to be the subject of entirely separate contracts.³⁷ Not all members of the Legislative Assembly were happy about the turn of events, although the government was able to defuse the issue to some extent by pointing out that the average subsidy on each of the sixty-six locomotives actually ordered was only £371 (£22,486 in total) rather than

the more extravagant figures being bandied about by its opponents.³⁸ Long before this, however, the Atlas Engineering Company had given notice that it would be unable to complete its contract (in fact it delivered, in 1881 and 1882, only six locomotives altogether) on the grounds that the government had resumed part of its site for Darling Harbour works. It is difficult now to be sure of the real reasons, but it may be significant that in August 1879 representatives of the Trades and Labour Council, engineers, pattern-makers, boiler-makers, and the Eight-hour Conference of Iron Trades met with the Secretary for Public Works to discuss the conditions imposed under the locomotive contracts. Among other things, the delegation considered it disadvantageous that work could be condemned without arbitration, that the contractors had to supply their own drawings, that progress payments were inadequate, and that materials ordered from overseas had to be paid for in advance by the firms concerned thus causing considerable overhead costs. It is not known what immediate result came from these representations (although they had repercussions later), but on 4 September 1879 the *Newcastle Morning Herald* expressed satisfaction about the agreement which had been reached. The other contractor, Henry Vale and Company, completed its contract in 1886 and was given an additional order for six locomotives which it delivered in 1887. Meanwhile, the Department of Railways, constantly the butt of criticism for inadequate services, was forced by these delays to place further orders overseas, a decision justified in the Legislative Assembly on 23 September 1885 by the Secretary for Public Works who claimed that no tenders had been received from local manufacturers in response to a further advertisement in March. There seems little doubt that the government was bending over backwards to try to assist colonial firms. The Secretary for Public Works explained, for instance, that as a result of representations from Lithgow ironworkers he had asked for tenders to be called without specifying certain brands of British-made iron as had been the custom, but that this had made no difference.

The whole subject of contracts for railway rolling stock became more sensitive politically during the 1880s, and successive administrations were keenly aware of the delicate balance that had to be achieved between supporting local industry and laying themselves open to the charge of squandering public money. During 1886 there was a pressing need for more locomotives but before committing themselves publicly the Department of Railways on 2 September 1886 sent a draft of a proposed tender notice to seven leading firms in New South Wales seeking their comments. Some of these were incorporated in the specifications when the tender notice for forty-four locomotives was advertised on 13 January 1887. Simultaneously the Agent-General in London placed advertisements in Europe. Subsequent events illustrate the muddled way in which 'policy' developed.

Two days before the formal advertisement appeared the Phoenix Foundry at Ballarat, which had apparently got wind of the forthcoming tender, wrote for more information and was sent a copy of the *colonial* specifications. On 19 January this same firm sought clarification as to whether these applied *only* to firms in New South Wales or to colonial firms generally. The Locomotive Engineer

Plate 14: Even though New South Wales led the other colonies in heavy engineering activities by 1890 only 54 of the locomotives required for the government railways had been made locally whereas 395 had been imported. Thus sightseers had many opportunities to watch locomotives being off-loaded at Circular Quay in Sydney and being carted off for erection at the railway workshops. (*Illustrated Sydney News*, 14 June 1879.)

recommended to the Commissioner on 25 January that the Phoenix Foundry should be 'treated as a foreign firm' but four days later the Commissioner suggested to the Secretary for Public Works that 'all colonies should be regarded as equal with New South Wales'. The Secretary, however, had notice of a forthcoming motion in the Legislative Assembly suggesting that orders for 100 locomotives should immediately be placed with local manufacturers. When the debate took place on 16 March it was pointed out that during the previous two or three years the five major rolling stock manufacturers in Sydney had had to reduce their workforce from 2,660 to 1,179 because of lack of orders. The Secretary sought, and obtained, postponement of a vote on the motion on the grounds that he would be in a better position to assess the situation after the tenders had closed in Sydney and London on 12 April and on the strength of a promise that he would deal with the 'colonial manufacturers, not only fairly but a little more than fairly' since 'there is no desire on the part of the present Government . . . to do anything but justice to the colonial contractors'. He had not, however, reckoned on the high tenders submitted by the colonial firms nor for the fuss stirred up among English manufacturers because the 'foreign' specification laid down that tenderers would have to find their own accommodation for setting up the locomotives instead of it being provided, as formerly, by the government. Thus, when the debate resumed on 22 April, the Secretary was little better informed than he had been in March and the Legislative Assembly resolved that

in view of the widespread distress amongst the iron trades, this House is of the opinion that the Government should take immediate steps to call for tenders in the colony only for the manufacture of 100 locomotive engines, and that the following be the conditions of such tenders:—That the construction of the said engines be carried out by labour already in the colony, and that only such material be imported as cannot be produced here.

Even before this resolution had been passed the Secretary had queried whether a simpler type of locomotive might be more appropriate. Whatever the motives for raising questions of design at such a late stage, the fact remains that on 25 April fresh tenders were called for twenty-five passenger and twenty-five goods locomotives 'to be manufactured within the colony'. Nine tenders were received but the prices were still unacceptably high. On the understanding that endeavours were being made by the colonial manufacturers 'to induce their workmen to accept a lower rate of wages, so as to admit of the engines being made in the Colony at more reasonable prices', the advertisement was again repeated, in the same terms as before, on 18 November. Although some firms put in lower bids (for instance the Atlas Engineering Company Ltd reduced its tender for goods locomotives from £4,010 to £3,840 and for passenger engines from £3,715 to £3,263) the government still felt unable to proceed since these prices were considerably in excess of the steam-up cost of comparable equipment being offered by British and European firms. In desperation, harassed by unemployed ironworkers, armchair critics in the colony, and a derisory trade press in England, the Secretary for Public Works met

groups of colonial tenderers at the Eveleigh Railway Workshops to help them, as the *Sydney Morning Herald* put it, 'arrive at a conclusion as to whether they may feel justified in making any alteration in the price submitted'. A few days later on 3 May 1888 the government announced its decision to accept local tenders provided that the price per engine did not exceed £3,000. When the tender box was again opened on 15 May 1888 it was found that Thomas Wearne and Company had quoted exactly £3,000 for both passenger and goods locomotives and the Atlas Engineering Company Ltd £2,989 for the passenger type alone. No doubt with a sigh of relief these two Sydney firms were each awarded contracts for twenty-five engines to be delivered within three years in the case of Atlas and five years in the case of Wearne. As the English journal *Engineering* pointed out on 6 July 1888, the first set of tenders was 60 per cent above British quotations, the second set was 50 per cent above, and the set finally accepted was 30 per cent above so that

it will be seen that this Government which climbed to office on the ladder of free-trade . . . has not scrupled to 'protect' the local manufacturing interests by granting them a bonus. . . .

Overseas manufacturers soon had the last laugh, however, because within a year both the Sydney firms had thrown up their contracts without delivering a single locomotive.

The net result of this long series of events was that by the end of 1890 colonial manufacturers had built 54 locomotives for the government railway system at a total steam-up cost of £177,204 whereas 395 imported engines had been put into service at a steam-up cost of £1,145,395 (of which about £47,000 was spent in the colony for erection).³⁹ It is impossible to make an exact comparison with the situation in Victoria because the composition of the locomotive stock was different and the financial data about imported supplies are incomplete, but it is known (Table 8.6) that 296 locomotives were built commercially at a steam-up cost of £1,062,000 whereas only about 125 were imported (perhaps at an overall cost of £369,000 using the New South Wales average as a possible guide). The available cost information suggests that New South Wales in fact 'subsidised' each locally built locomotive by about £464 (£25,100 in total) or perhaps 16 per cent above imported prices, whereas the Victorian government's 'subsidy' averaged perhaps £637 (£188,700 in total) or about 22 per cent. The difference in the unit subsidy probably reflects in large measure the higher overall costs of labour and fuel in Victoria: the total amount of public money each government was prepared to spend in this way illustrates their contrasting philosophies towards the support of local manufacturing.

A sequel to the New South Wales story has yet to be mentioned. On 14 May 1889 the Chief Commissioner for Railways wrote to his Minister explaining that the Department had been placed in an awkward position because of the long delay involved in trying to have locomotives built locally and the fact that the firms eventually selected had indicated their inability to proceed with the contracts. He suggested that steps should be taken to advertise for a complete locomotive

building works to be set up in the colony.⁴⁰ The idea gained support from the government, no doubt as a result of an intimation in August that a Leeds syndicate was prepared to set up a limited liability company with a capital of £200,000 for the purpose of establishing railway workshops in the colony on condition that it was given the monopoly of supplying locomotives and carriages for ten years. The *Newcastle Morning Herald* was, to say the least, enthusiastic about this venture since the proprietors sought a free grant of land at Newcastle from the government because of 'its central position in the Australian railway system, its harbour, and its being the centre of the Australian coalfield'. The government took the precaution early in 1890 of calling tenders for such a works indicating that the successful firm would be given an immediate order for 100 locomotives provided that deliveries could commence on 1 July 1891. On 14 February the Agent-General in London cabled that only one tender had been received, from the same Leeds syndicate by this time calling itself The Australasian Locomotive Engine Works Ltd, and this undertook to build main line locomotives at £65 per ton and tank engines at £70 per ton. Since these prices compared favourably with the current costs of imported stock, negotiations went ahead and resulted in an interim agreement being signed in London on 11 April. Meanwhile, the chairman of Hudson Brothers Ltd had gone to England the previous December to 'add a locomotive branch to the Company's business', and whilst there had 'allied himself' with the Leeds syndicate. The exact role played by Henry Hudson in this venture is not certain, nor is it clear whether the locomotives were to be built in Hudson Brother's existing plant or in a new works to be constructed for the purpose. The *Newcastle Morning Herald* kept an anxious ear open for any scraps of news about this scheme, noting for instance that the municipalities in the western suburbs of the metropolis were trying to make sure that the locomotives were built there rather than at Newcastle. What happened then is obscure (surprisingly little was said in the Legislative Assembly about the whole matter) but more than a decade later it was noted, rather blandly, that 'owing to some hitch in England—detailed particulars of which are not available—the whole project, after having reached such a forward stage, fell through'. The shareholders of Hudson Brothers Ltd were simply told early in 1891 that 'the proposal made by an English syndicate to undertake the manufacture of locomotives in the colony has been abandoned, and the provisional agreement has been cancelled'. However the *Newcastle Morning Herald* on 14 February 1891 believed the reason was that the scheme had 'resolved itself into a prospective fitting shop for putting together engines imported from England, and the Railway Commissioners very rightly put their big feet down on the attempt to make such a radical deviation from the original contract'. As if all this were not enough, the Legislative Assembly on 2 December 1891 passed yet another futile resolution that 'all future locomotives, cars, rolling stock, etc. required for the railways of this colony should be manufactured in the colony'. Suffice it to add that the next engine to be built commercially in New South Wales (by The Clyde Engineering Company Ltd) was not put into service until June 1907.

Rolling stock. The 1862 resolution of the Legislative Assembly also led to a reappraisal of the ad hoc arrangements that existed for purchasing goods and passenger rolling stock. Relatively small orders had been placed locally and overseas for wagons and carriages but no one colonial firm had been motivated to outlay the capital needed to set up a specialist workshop. As in the case of locomotives, the government decided in 1868 to advertise contracts running over five years. The tender of P. N. Russell and Company, one of the largest firms in New South Wales (already employing 345 men and boys) was accepted in June 1869, and it immediately invested £10,000 in a 42,000 square foot workshop which was opened with considerable pomp and circumstance eight months later.⁴¹ By the end of 1874 it had turned out stock worth £168,000. But Russell and Company, in common with the other large engineering shops, had been affected by labour disputes in 1873 and 1874 (discussed later), and after its contract lapsed in June 1874 other firms were reluctant to commit themselves too far ahead and were only prepared to take on small jobs.

Russell and Company, by now employing nearly 600 hands, closed down altogether early in 1876 in circumstances that remain somewhat obscure. There is reason to doubt the conventional wisdom that ascribes this event solely to labour problems, including the insistence on impractical working hours, low productivity, and high wages. A member of the Legislative Council suggested on 12 August 1884 that it was because 'they had made a fortune, and because they saw that they could not command the trade as they had been used to do'. More pertinent was the evidence given by former employees before the 1891 Royal Commission on Strikes, one of whom suggested on 30 April that 'there was some question of partnership involved', a view borne out later by a business acquaintance of P. N. Russell who explained that 'a serious disagreement existed among the members of the firm, one of whom feared the combination of the workmen in the future, and insisted on the winding up of the business forthwith'. Whatever the real reasons, the important point is that by far the largest rolling stock manufacturer disappeared from the colonial scene.⁴²

According to the Railways Department much of the rolling stock delivered between 1874 and 1878 was of poor standard since, in view of the uncertainties involved, manufacturers were not prepared to buy timber ahead of need and allow it to season. The government again called tenders on 5 December 1878 for a five-year supply of passenger and goods stock and on 31 December awarded contracts to the Sydney firms of Hudson Brothers Ltd (£207,000) and R. A. Ritchie and Company (£25,000) and the Newcastle firm of Moyes & Donald (£47,000). A brief account of the first-named firm is given later; it can simply be noted here that this contract led the company to erect new works on the western outskirts of Sydney at Clyde. Ritchie, whose existing factory was at Parramatta, opened a branch in the Newcastle suburb of Wickham to handle orders for the Northern Line after the business of the original tenderer, Moyes & Donald, collapsed in 1880.⁴³ When the government again called long-term tenders on 2 October 1883, the contracts were divided between three firms—Hudson Brothers Ltd (£141,000) and

Table 11.7 Composition of exports of manufactured and processed goods from New South Wales and Victoria, 1866-90

Category	New South Wales		Victoria	
	Value (£000)	Per cent	Value (£000)	Per cent
Refined copper and tin	14,060	52.1	136	0.5
Other metal goods	411	1.5	1,999	7.3
Apparel and slaps	44	0.2	3,184	11.7
Other clothing and textiles	157	0.6	811	3.0
Chemical products	779	2.9	736	2.7
Wooden products	300	1.1	764	2.8
Manufactured tobacco	2	—	9	—
Boats and vehicles	256	0.9	170	0.6
Leather	2,336	8.7	5,286	19.4
Boots and shoes	929	3.4	556	2.0
Other leather goods	238	0.9	278	1.0
Books and stationery	308	1.2	578	2.1
Preserved meat ^a	2,475	9.2	2,398	8.8
Refined sugar	1,685	6.2	2,470	9.1
Molasses and treacle	339	1.3	214	0.8
Flour	637	2.4	3,990	14.6
Butter and cheese	814	3.0	1,278	4.7
Other manufactured food	518	1.9	1,310	4.8
Beverages	416	1.5	527	1.9
Bricks and building materials	28	0.1	69	0.3
Miscellaneous	229	0.9	506	1.9
Total	26,961	100.0	27,269	100.0

^a Canned meat only.

Source: Calculated from Tables 8.8 and 11.9.

Table 11.8 Destination of exports of manufactured and processed goods from New South Wales and Victoria, 1866-90

Destination	New South Wales		Victoria	
	Value (£000)	Per cent	Value (£000)	Per cent
<i>Australia</i>				
New South Wales	—	—	10,112	37.1
Victoria	1,684	6.2	—	—
Queensland	3,319	12.3	671	2.5
South Australia	615	2.3	1,820	6.7
Tasmania	116	0.4	1,475	5.4
Western Australia	14	—	478	1.8
Sub-total	5,748	21.2	14,556	53.5
<i>Overseas</i>				
Great Britain	16,288	60.5	8,217	30.0
New Zealand	2,120	7.9	3,717	13.6
Other	2,805	10.4	779	2.9
Sub-total	21,213	78.8	12,713	46.5
Total	26,961	100.0	27,269	100.0

Source: Calculated from Tables 8.9 and 11.10.

Stephen Glasson (£110,000) for the Southern and Western Lines and R. A. Ritchie (£75,000) for the Northern Line. Then early in 1884 Hudsons took over Ritchie's business thus giving it an even greater share of these contracts.⁴⁴

This, of course, represents only the bare bones of the story, for items of rolling stock were also bought from other local makers or built in the Railways Department's own workshops; from time to time, too, carriages and wagons were imported including some surplus stock from New Zealand and patent tip-trucks from the United States. But enough has been said to assess the impact of these contracts on industrial development. First, although about two dozen firms produced various items of rolling stock during this period, only a handful received substantial orders and, like P. N. Russell and Company and Hudson Brothers Ltd, these were or became (by colonial standards) very large firms indeed. Second, most of these were fully integrated plants with Russells, for instance, moving into timber-working and Hudsons into founding so that they could handle the whole of the jobs themselves. And, third, most of these contracts went to firms in or near Sydney: a few relatively insignificant orders were given to foundries in Newcastle, Morpeth, Maitland and Bathurst but, as far as can be discovered, to no other places in the colony—a point taken up again in Chapter 12.

Export demand

New South Wales exports of products manufactured or processed within the colony from 1866 through 1890 were valued at £26,960,000 or about 9.6 per cent of all commodities sent overseas (see Table 11.1). Coincidentally this total is similar to the comparable Victorian figure of £27,269,000 although the composition and direction of the trade differed greatly. In particular, over half the New South Wales total consisted of refined copper and tin which were of small significance in Victoria (Table 11.7). The only other clearly identifiable products in which this colony held sway over its southern neighbour were carriages, wagons and related materials; and boots and shoes. In contrast, its exports of a wide range of goods, including apparel and slops; other clothing and textiles; leather; refined sugar; flour; and even dairy products, were less valuable than those from Victoria.

Some of the reasons for this emerge when the data are rearranged by destination (Table 11.8). It should be noted, however, that until the 1880s goods destined for one place were sometimes entered in the returns for a prior port of call: thus consignments from New South Wales may have been recorded as exports to, say, Victoria even though the ultimate destination lay elsewhere. At first sight it seems from Table 11.8 that New South Wales sent goods worth £5,748,000 to the other Australian colonies, but £1,436,000 of this consisted of refined copper and tin, much of which was subsequently sent to Europe at nominal rates as bottom cargo aboard wool ships.⁴⁵ Excluding these metals, the inter-colonial exports were valued at £4,312,000 or one-third of the net total. The contrasts with Victoria are obvious. Whereas this latter colony sent locally made commodities worth £10,783,000 to New South Wales and Queensland, New South Wales exports (net of copper and tin) to its northern and southern neighbours were valued at only

Plate 15: The Clyde works of Hudson Brothers Ltd began operating on a 20 acre site near Parramatta, Sydney in July 1883. About 300 employees turned out products ranging from railway carriages to agricultural implements and furniture. (*Sydney Mail*, 13 December 1884.)

£3,916,000. Part of this imbalance came about, of course, because of Victoria's grip on the Riverina market for a wide range of locally manufactured products (estimated in Chapter 8 to be worth £4,000,000) and also because New South Wales was a net importer, largely through Sydney, of items like agricultural machinery and flour. In only a few instances was the balance of trade the other way: ironically, while Melbourne manufacturers were sending footwear and saddlery valued at £463,000 into New South Wales (mainly into the Riverina), Sydney firms were putting £857,000 worth of the same goods on to the Queensland market. New South Wales exports to Tasmania, South Australia and Western Australia were insignificant at £396,000 (net of copper and tin) compared with those of Victoria at £3,773,000 (Tables 11.9 and 11.10).

The overseas exports of manufactured and processed goods from New South Wales during this twenty-five year period were valued at £8,588,000 compared with the Victorian total of £12,577,000 (both net of refined copper and tin, worth £12,625,000 and £136,000 respectively). Great Britain was the main market, taking £2,271,000 worth of preserved meat (more than half of this going in the 1880s when the Victorian exports were negligible), £2,028,000 worth of leather, and other items, like molasses, butter and sundries, valued at £960,000. Surprisingly, New South Wales sent relatively few manufactured or processed goods across the Tasman Sea to New Zealand, nearly two-thirds of the total (£2,081,000) consisting of refined sugar, a trade that disappeared altogether after 1884. The Victorian trade with New Zealand was not only greater (£3,717,000) but, as a comparison of Tables 8.9 and 11.10 indicates, a good deal more varied. The activities of The Australasian Steam Navigation Company and the commercial relationships that developed as a result of the coal trade out of Newcastle probably explain the relatively important markets for manufactured goods, like soap and shoes, that New South Wales developed in New Caledonia, Fiji and other Pacific islands.

Several aspects of the New South Wales external trade can be summarised. First, if all the exports of refined copper and tin, of preserved meat and leather to Great Britain, and of refined sugar to New Zealand are excluded, the value of the other manufactured and processed goods sent out of the colony amounted to £7,231,000 (very much less than the comparable Victorian total of £18,234,000). Second, about half this external income was earned from 1881 through 1890 (compared with two-thirds of that in Victoria). Third, New South Wales exports dominated those from Victoria only in Queensland and the Pacific islands, and this was true even of most individual commodities. And, fourth, the range of goods exported was fairly narrow with whole classes of commodities, like machinery and metal goods, and apparel and slops, being of small account. It is difficult to find wholly satisfactory explanations for these differences. Clearly one factor was the significance to Victoria of the Riverina market and the deliberate encouragement of the external trade, especially in apparel and slop clothing, by the drawback system which (as discussed later) was of little importance in New South Wales. Militating against New South Wales were the tariff barriers imposed by the other colonies although these may have been overcome to some extent by arrangements between

Table 11.9 Export of goods manufactured and processed in New South Wales, 1866-90^a
(£000)

Description	1866-70	1871-75	1876-80	1881-85	1886-90	Total
Metal goods						
Refined copper	213	1,032	1,514	1,938	1,009	5,706
Refined tin	—	916	2,003	3,187	2,248	8,354
Machinery	38	58	15	23	41	175
Other	14	16	23	49	134	236
Clothing and textile goods						
Apparel and slops	3	—	2	32	7	44
Cordage	2	10	19	16	25	72
Woollen piece goods	7	2	1	—	—	10
Other	1	15	9	8	42	75
Chemical products						
Fertilisers	21	39	69	124	165	418
Soap	19	19	30	36	21	125
Glue	2	8	14	22	23	69
Drugs and medicines	2	3	7	11	11	34
Acids	2	3	5	9	26	45
Other	3	2	6	28	49	88
Wooden products						
Carriage materials	10	20	22	31	20	103
Furniture	6	13	10	21	11	61
Other	29	46	17	23	21	136

Tobacco (manufactured)	1	1	—	—	—	2
Boats and vehicles						
Carriages, carts and wagons	44	52	51	54	18	219
Other	3	10	10	7	7	37
Leather and leather goods						
Leather	167	536	440	603	590	2,336
Boots and shoes	112	202	260	248	107	929
Saddlery	28	50	79	55	26	238
Books and stationery	3	3	31	39	232	308
Food (manufactured)						
Preserved meat	131	497	558	870	419	2,475
Refined sugar	354	260	782	289	—	1,685
Butter and cheese	235	180	169	121	109	814
Flour	216	38	58	110	215	637
Molasses	83	122	53	42	39	339
Other	40	56	56	128	238	518
Beverages	35	32	111	110	128	416
Bricks and building materials	3	6	3	12	4	28
Miscellaneous	5	21	25	55	123	229
Total	1,832	4,268	6,452	8,301	6,108	26,961

^a Also includes articles wholly or partly made up from imported materials. A comparable analysis of the Victorian data is available in Table 8.8.

Source: NSW/SR.

Table 11.10 Destination of exports of goods manufactured and processed in New South Wales, 1866-90^a (£000)

Destination and description	1866-70	1871-75	1876-80	1881-85	1886-90	Total
Victoria						
Refined copper	—	184	230	27	36	477
Refined tin	—	162	164	2	1	329
Leather	2	13	7	10	9	41
Books and stationery	1	—	2	9	117	129
Butter and cheese	78	14	15	2	13	122
Flour	1	—	11	60	56	128
Molasses	2	4	36	34	21	97
All other	40	41	64	62	154	361
Queensland						
Refined copper	—	—	1	6	5	12
Refined tin	—	4	54	197	14	269
Boots and shoes	88	168	222	163	60	701
Butter and cheese	99	103	96	74	39	411
Flour	179	19	30	26	134	388
Refined sugar	219	84	30	6	—	339
All other	187	236	200	272	304	1,199
South Australia						
Refined copper	—	143	162	1	2	308
Refined tin	—	23	3	6	8	40
Boots and shoes	2	1	3	37	25	68
Butter and cheese	2	5	13	11	2	33
All other	3	11	24	26	102	166
Tasmania						
Refined copper	—	—	—	—	—	—
Refined tin	—	1	—	—	—	1
Fertilisers	—	3	5	8	2	18
Boots and shoes	—	2	8	17	2	29
Books and stationery	—	—	3	2	9	14
All other	3	9	13	13	16	54

Western Australia	—	—	—	2	2	4
Leather goods	—	—	—	1	8	10
All other	—	—	1	—	—	—
Great Britain	208	701	1,111	1,367	741	4,128
Refined copper	—	703	1,666	2,713	1,819	6,901
Refined tin	98	464	377	547	542	2,028
Leather	123	464	492	796	396	2,271
Preserved meat	76	113	6	1	8	204
Molasses	14	34	15	11	51	125
Butter and cheese	11	33	49	172	366	631
All other	—	—	—	—	—	—
New Zealand	—	—	3	8	5	16
Refined copper	—	—	3	5	13	23
Refined tin	16	22	45	69	50	202
Fertilisers	4	12	15	16	11	58
Carriage materials	15	15	12	3	—	45
Carts and wagons	23	7	12	14	5	61
Leather	15	13	9	3	1	41
Boots and shoes	39	5	4	1	—	49
Butter and cheese	131	174	742	270	—	1,317
Refined sugar	57	53	70	60	68	308
All other	—	—	—	—	—	—
Other destinations	4	4	8	529	219	764
Refined copper	—	22	114	263	394	793
Refined tin	4	12	18	40	93	167
Fertilisers	8	17	29	34	18	106
Soap	4	27	55	68	13	167
Preserved meat	21	19	17	20	22	99
Flour	55	122	183	217	132	709
All other	—	—	—	—	—	—
Total	1,832	4,268	6,452	8,301	6,108	26,961

^a Also includes articles wholly or partly made up from imported materials. A comparable analysis of the Victorian data is available in Table 8.9.

Source: NSW/SR.

manufacturers and importers: Forster & Sons, Sydney's leading iron bedstead maker, was in 1879 paying half the 20 per cent duty imposed in Victoria by allowing importers an extra 10 per cent discount for this purpose.⁴⁶ Another factor was the development in Victoria of firms specialising in agricultural machinery, quartz-crushing plant and meat preserving equipment, which were able to take advantage of their accumulated experience and economies of scale to compete on external markets—a case in point being the fitting out of the Goulburn Meat-preserving Company's works in 1870 by a Melbourne firm that had made the equipment for several of the Victorian meat preserving ventures.⁴⁷ Even more difficult to evaluate is the significance of the commercial and financial links between manufacturing firms, branch factories and agencies. There is a good deal of evidence that Victorian entrepreneurs set up agencies and branches in markets like New South Wales, Queensland and New Zealand, and that Victorian émigrés in places as far apart as Western Australia and New Zealand tended to turn to that colony for sawmilling, transport and mining equipment. In contrast, few examples have been found of New South Wales manufacturing firms which tried to spread their activities spatially in these ways.

Some of the influences on the export trade can be illustrated by circumstances in the leather goods and preserved meat industries.

Leather goods. British trade returns indicate that from 1866 through 1880 about 9,200 tons of tanned, tawed and curried hides were imported from New South Wales compared with 21,400 tons from Victoria. The explanation only partially lies in the relative numbers of cattle slaughtered (although there must be reservations about the accuracy and completeness of the reported figures). Much more important was the fact that New South Wales was sending the bulk of its hides in a raw state—22,760 tons to Great Britain during these same years as compared with only 5,220 tons from Victoria. Contemporary accounts suggest, in turn, that this was largely because of the scarcity of tanning materials, especially wattle bark, most of which had to be imported from Hobart or from Portland in Victoria. Putting together scattered evidence, it appears that wattle bark made up about 11 per cent of the cost of landing Sydney leather in England as against only 4 per cent of that from Melbourne. This seems to have promoted and perpetuated closer links in New South Wales between leather processing and final manufacturing and to have encouraged keener interest in export markets for finished goods. The first point is difficult to measure quantitatively except by reference to individual cases, but the second is clearly reflected in the export returns showing that New South Wales sent out footwear, saddlery and harness-ware worth £731,000 from 1866 as against similar goods valued at £362,000 from Victoria. Taken together these circumstances may help to explain why footwear factories in Sydney appear to have been better equipped in the 1870s than their counterparts in Melbourne. During the period from 1881 through 1890 New South Wales increased its exports to Great Britain of both raw hides (27,690 tons) and leather (14,800 tons) which may reflect the growing use of cheaper tanning substitutes and also the reduction in external sales of manufactured leather goods (to £393,000) as footwear factories began to

appear in traditional markets like Queensland. Meanwhile Victorian exports of leather to Great Britain (23,600 tons) and of all leather goods (£427,000) both increased because the domestic market became over-supplied, especially during the first half of the decade, and external sales became more attractive as a means of disposing of surplus stock.

Meat preserving. The development of this industry in New South Wales provides several striking contrasts with the situation in Victoria described in Chapter 8. The first company was incorporated in London on 16 November 1865 to process and cure cattle meats and manufacture beef extract, a process that had been developed by a German chemist, von Liebig, and proved on an industrial scale at a plant in Argentina during the previous year. One of the main promoters of the Australian Meat Company Ltd was C. G. Tindall, a 'gentleman' living in England who owned several pastoral properties in the Clarence River district, and in 1866 the works was established on one of these, 'Ramornie', beside the Orara River 4 miles south of Copmanhurst.⁴⁸ For Tindall this venture was simply forward integration into a potentially more profitable outlet for his surplus cattle than boiling down or salting. His own pastoral properties were the main source of the livestock with other animals being brought in only when prices were low. The Ramornie works began operating in September 1866 and landed its first consignment in London on 30 January 1867, thus pioneering the new wave of preserving companies. Indeed late in 1867 the success of the Ramornie venture was being cited to potential shareholders in the proposed Melbourne Meat Preserving Company (which did not commence slaughtering until September 1868) as an example to be emulated.

The second venture was also financed overseas although it may have originated from a meat-curing works operated in 1858-9 by a settler named Clarke Irving on the lower Clarence River. H. M. Whitehead, a provision merchant of Limehouse in London, acquired Irving's freehold and leasehold property and in 1865 set up the Clarence River Meat-preserving factory near the township of Lawrence, the chief shipping point for the pastoral area stretching north of the Clarence River inland to Tenterfield. In turn, these assets were taken over, as from 31 December 1873, by a new firm, Whitehead and Company Ltd, incorporated in London on 10 October 1874 in which Whitehead himself held most of the issued shares.⁴⁹

Although one or two other small works (like that of the Pambula Meat Preserving Company on the South Coast)⁵⁰ were operating at this time, there was nothing like the upsurge of company formation and promotion that took place in Victoria. Only two public companies appear to have been launched in the colony. The first originated at a public meeting held in Goulburn on 21 October 1869 which set up a provisional committee to investigate the processes being used elsewhere.⁵¹ As an interesting example of the way ideas flowed, information was sought not from the longer established Clarence River works but from the Pambula Meat Preserving Company and the Melbourne Meat Preserving Company Ltd. The process used by the latter company was the one adopted when the deed of settlement was signed on 15 January 1870 forming the Goulburn Meat-preserving Company which was incorporated with limited liability the following October.⁵² By this latter date the

company had called up half its nominal capital of £15,000 in £1 shares (most of which seems to have been subscribed by local businessmen and pastoralists), bought a disused flour-mill ('not altogether suited for carrying on meat preserving in the most economic manner'), installed plant made in Melbourne, and was ready to begin slaughtering. But, as in the case of so many of the Victorian companies, a combination of technical problems, a rise in wool and hence livestock prices, and the poor response to its products in London, brought about its collapse in 1872.⁵³

Meanwhile, following a meeting on 16 March 1870, the prospectus of the Sydney Meat-preserving Company, with a proposed nominal capital of £25,000 in £5 shares, was issued and gained sufficient support to enable an indenture to be signed on 10 June 1870 by eighty-five people who pledged themselves to the tune of 2,307 shares. On this basis the company went ahead but was unable at first to acquire a suitable site near Sydney, and found that the incorporation procedures took longer than anticipated and that the shareholders showed a marked reluctance to consolidate their convictions with cash.⁵⁴ No sooner had the company begun operations on a site near Rookwood (Fig. 10.4) in May 1872 than it, too, was faced with the problems caused by firming livestock prices and a declining lack of interest by pastoralists whose wool incomes were rising. Moreover, after reaching a peak in 1872, British demand for preserved meat fell and the average London invoice price for New South Wales produce dropped from 6.3d per lb in 1869 to 5.5d in 1873. Ironically, just as the overseas market was on the downturn, the company suddenly gained the confidence of shareholders: at a meeting called late in April 1873 to explain that the paid-up capital of £14,800 was insufficient to enable it to carry on, an additional £11,500 was subscribed 'in a very few minutes', and less than six months later it had been decided to issue a further 3,000 £5 shares. It is not without significance, too, that the manager of the works had been sub-manager of the Melbourne Meat Preserving Company's works.⁵⁵

The revival of demand for preserved meat in Europe, and especially in Great Britain, in 1875 brought relief to existing ventures and encouraged at least four more private firms into the industry. Among these were the Crown Meat-preserving Company which commenced slaughtering at Shamrock Hill near East Maitland in October 1876;⁵⁶ the Bunnerong Meat Preserving Works established at Bunnerong (Botany Bay) in 1876 or 1877 as part of a very large integrated operation, handling over a million sheep a year, which also included livestock raising on two properties on the Liverpool Plains and another in Queensland, a stock and station agency business, slaughtering for fresh meat, tanning, and wool-scouring;⁵⁷ and two others, the New South Wales Canning Factory and W. Preston and Company, which were both established at Rozelle (Sydney) in the late 1870s or early 1880s and remained in operation until at least 1905. In Victoria, it will be recalled, no new public or private meat preserving companies were formed after 1872 and the temporary revival of canned meat exports later in that decade largely represented the attempt by existing public companies to recoup their losses. In New South Wales the revival and subsequent expansion of canned meat exports was only partly based on the first generation of companies and owed much to this new group

of ventures, all of which were in private hands. By 1879 New South Wales had taken over Victoria's role as the leading Australian exporter of canned meat: during the four years to the end of 1882, for instance, Great Britain imported 12,333 tons (worth £649,000, or 5.6d per lb) from New South Wales as against 8,113 tons (valued at £336,000, or 4.4d per lb) from Victoria. A comparison of Tables 8.8 and 11.9 shows that from 1881 through 1890 the value of canned meat exported to all destinations from New South Wales was treble that of its southern neighbour. Bearing in mind that similar processes and machinery were adopted in both colonies and that London was the main market for most of the output, it is difficult to escape the conclusion that the New South Wales industry, though not without its share of failures, was more successful in the long-run because it was largely financed from private sources and in several instances was carried on as an integrated pastoral and industrial operation.

Meanwhile interest, at first somewhat lukewarm, was being shown in experiments to find alternative ways of shipping meat to Europe. It is convenient to give a brief account of these here, not only because they were technologically significant in themselves but also because they provided the foundation for developments in other industries, particularly dairying, discussed in Chapter 12. In 1857 Augustus Morris, the manager of a Murrumbidgee pastoral station, tried to form an Association of Australian Stock Owners to finance experiments for this purpose but met with little support.⁵⁸ Independently in Sydney in 1860, P. N. Russell and Company, which had already built three refrigerating plants to the order of the inventor James Harrison of Geelong for installation at Melbourne, Bendigo and Adelaide, erected a fourth machine under licence which formed the basis for a subsidiary, the Sydney Ice Company. Soon afterwards E. D. Nicolle took out a patent in Sydney for a refrigerating plant operating on a different principle—the exchange of heat involved during the liquefaction of ammonia gas—and two of these were built by the Sydney Ice Company for its own use in place of the Harrison machines. At about this time Nicolle and Morris realised their common interests and by September 1866 were ready to seek public support for the trial of a machine, capable of holding 3½ tons of meat, with which ships could be fitted so that

the superabundant meat of the Australian colonies can be introduced into the European and Asiatic markets in the same condition, both in regard to freshness and quality, as it is daily supplied in our own local markets.

But, in the words of the *Sydney Morning Herald*, 'those whose interest it most certainly was to give every encouragement to the project held aloof, and a trial of its values might, perhaps, have been indefinitely postponed had not the matter been brought under the notice of Mr. Thomas S. Mort' (who had, in fact, consented to be the treasurer for the publicised experiment). At this point, then, an eccentric enthusiast, an ingenious inventor, and a beneficent backer joined forces to conjure the reality from an idea. Nine years—and numerous experiments later—Mort, the main shareholder in the newly formed New South Wales Fresh Frozen Food and

Ice Company Ltd (registered on 30 July 1875 with a nominal capital of £250,000)), was ready to conduct the cream of colonial society round the freezing works that had been built at the head of Darling Harbour and its associated slaughtering establishment at Bowenfels (near Lithgow) 93 miles away by rail. He took this opportunity to explain that for the time being operations would be confined to the provision of fresh meat for the Sydney market although the export of frozen meat still remained a longer-term objective. A month later, on 13 November, Mort was approached to see whether he could suggest any means by which an experimental shipment could be organised. When he explained that the main problem was shortage of finance ('my venture has proved so much more costly than I ever contemplated, that I do not feel justified, single-handed, in incurring the further outlay required for the purpose'), an appeal was launched for subscriptions to cover the costs of shipping a trial cargo of meat to England. Although adequate funds were received or promised, it was not until 1877 that the Mort-Nicolle refrigerating plant was ready to be installed in space chartered on board the *Northam*. At the last moment, just before the meat was to be loaded, the machinery broke down (the accounts disagree about the cause) and the ship's agents, refusing to countenance further delays for repairs, ordered the vessel to sail without any meat on board on 18 July. It was then left to a London firm with connections in Queensland, McIlwraith McEacharn and Company, to charter the *Strathleven*, equipped with a Bell-Coleman compressed-air refrigerating plant developed in Glasgow, and to land the first consignment of frozen meat from Australia in London in February 1880.

The publicity given to this event has tended to obscure the fact that prior to 1890 only 9,753 tons of frozen meat (valued at £195,000) were shipped from New South Wales, almost all of it to Great Britain. Basically only part of the total problem had been solved for there was still a need to provide refrigerated rail transport from country districts and adequate cold storage facilities at the shipping ports. Several inland meat freezing companies were initiated (as at Wagga Wagga, Goulburn and Maitland) but the only proposal to come to anything during the whole of the 1880s was the Orange Slaughtering and Frozen Meat Export Company, and even this collapsed within a few years of commencing operations in 1881, perhaps because its meat 'suffered in conveyance from Orange to Sydney' when it became 'thawed . . . softened, and then pressed out of shape'.⁵⁹ To be fair, the Railways Department did recognise the importance of the efforts made to ship fresh meat to London and began testing the claims of three different systems of refrigerating railway freight vans in the middle of 1880. But these experiments apparently made little impression because the first refrigerated van was not put into service until 1889.⁶⁰ Thus, the real development of the frozen meat trade only commenced in the 1890s. Already, however, small country chilling works had been set up at Narrandera and Tenterfield and very small consignments started to arrive in Sydney, in individual car-loads, beginning on 8 February 1890.⁶¹ Most of this country-killed meat was consumed in Sydney. Until 1892 virtually the whole of the export trade was in the hands of the New South Wales Fresh Food and Ice

Company but in that year shipments began from the Sydney works of the South Coast and West Camden Co-operative Company and from the Aberdeen (Hunter Valley) works of The Australian Chilling and Freezing Company Ltd.⁶²

Tariffs

As in Victoria, the main sources of ordinary funds available to the New South Wales Treasury were: (i) railway, tramway (from 1884), post office and similar earnings; (ii) land sales, rents and fees; (iii) customs and excise duties; and (iv) miscellaneous tolls and charges. Since the income from the first source was fully committed to meet operating costs and interest charges, a better appreciation of the significance of customs legislation can be gained by considering it in relation to the remaining sources, described here as 'net revenue'. Slightly obscuring the analysis are the arrangements by which Victoria (1867-74) and South Australia (1867-84) made lump sum payments to New South Wales in connection with the Murray River trade. These amounts (totalling £343,000 from Victoria and about £252,000 from South Australia) and £431,000 directly collected at the border posts by New South Wales up to 1877 cannot be allocated between items: as a result the precise incidence of changes in the customs schedules prior to 1884 is not fully revealed by the series set out in Fig. 11.1.

Tariff legislation

During 1865 three measures were introduced which placed new or additional charges on most goods imported into the colony. Two of these, a package duty and an increased impost on all but a few of the items already subject to duty, were short-term measures due to lapse at the end of 1867. Although the 1/- package charge was arbitrary and indiscriminating (since footwear was generally imported in standard-sized 'trunks', it added about 1.1 per cent to the invoice price of slippers but only 0.4 per cent to that for men's shoes), it was generally accepted as a necessary evil because of the colony's budgetary problems: in the thirty-one months it contributed £118,000 to consolidated revenue. Concern mainly centred round the imposition from 21 December 1865 of a 5 per cent duty on all goods (except a short free list, mainly of raw materials) not already subject to specific duties. The commercial world mounted a vigorous campaign against the ad valorem principle on the grounds that it would affect the entrepôt trade (then running at over £2,000,000 a year) and would encourage fraud and abuse.⁶³

By the end of 1870 the ad valorem duties had generated revenue totalling £710,000 which, along with the Murray River payments by Victoria and South Australia amounting to £216,000, accounted for 13 per cent of net revenue. With the cash flow from land sales and fees declining absolutely and relatively [Fig. 11.1(c)] and expenditure exceeding income, the government proposed amendments to the customs schedules, including increased specific duties and the revival of the package duty, which along with other revenue-raising devices were to replace the ad valorem impost. These proposals, however, were defeated, and the incoming

Fig. 11.1: Graph (a) shows the percentage contribution to net colonial government revenue (i.e. total revenue minus earnings from railway, tram, water supply, post office and telegraphic services and minus income in the form of interest payments and loans recouped). Graph (b) indicates the percentage contribution to net revenue disaggregated by commodities: prior to 1877 the Murray River duties were not allocated between commodities (see text). Graph (c) sets out the actual revenue from customs duties. (Source: 'Abstracts of the Public Accounts of the Colony of New South Wales, Statement of Revenue and Receipts on account of the Consolidated Revenue Fund', NSWV&P(LA).)

Martin Ministry obtained support for a customs schedule (34 Vic. no. 21) that in March 1871 raised some existing specific duties (but halved the duty on opium), imposed specific duties on 138 new items, and retained the 5 per cent ad valorem charge on many of the others (although the free list was considerably enlarged to include such goods as pig iron and paper-making materials). Together these changes produced an estimated £61,000 additional revenue, or an increase of 10 per cent, during the year ending 30 June 1872, and this was enough to meet the immediate budgetary needs. In the meantime the revenue from land sales and rents had risen appreciably (from an average of £488,000 in 1870–1 to £989,000 in 1872–3), and this provided the opportunity for further legislation (37 Vic. no. 5) which on 1 January 1874 abolished the 5 per cent ad valorem impost and exempted thirty-six items on which specific duties had been levied less than three years before. The graphs in Fig. 11.1 reflect these alterations. The income from the pre-1871 set of specific duties continued to rise (as these were generally staple items that had a low elasticity of demand and were not easily replaced by local products) thus partly compensating for the halving of the revenue as a result of this latest revision of the schedules. Nonetheless, the total contribution of customs duties to

net revenue, now again bolstered by greater income from land sales and rents, diminished from 42.7 per cent in 1872-3 to 24.0 per cent in 1876-7.

Two other legislative measures (43 Vic. nos. 16 and 17) became effective before the end of this decade. To try to make up for a decline in land revenue from £2,326,000 in 1878 to £1,632,000 in 1879, the duty per gallon on imported spirits was raised in December 1879 from 10/- to 12/-, on sparkling wines from 6/- to 10/-, and on other wines from 4/- to 5/-. Simultaneously, the excise duty on locally made spirits was also raised from 9/5d (or 10/-) to 12/- per gallon.

The revenue from land sales and rents, which had briefly recovered in 1881 and 1882, fell away markedly during the next two years and this led to the imposition of an excise duty on manufactured or cut tobacco (1/- per lb) and on cigars and cigarettes (2/6d per lb) as from 20 February 1884 which generated £279,000 by the end of 1886. Simultaneously the customs duty on manufactured tobacco was raised to 3/- per lb (from 2/-) and on cigars to 6/- (from 5/-) thus maintaining the differential enjoyed by local producers. The opportunity was also taken to include stearine among the dutiable items: it will be recalled (Chapter 8) that the imposition on 1 March 1883 of 1d per lb duty on this commodity, by executive action, had led to a legal tussle between the Collector of Customs and the Apollo Stearine Candle Company Ltd of Melbourne, the case in the end being taken to the Privy Council for a decision. These changes produced useful income but not nearly enough to offset the fall in land revenue which in 1886 declined to its lowest level since 1879. At the same time public works expenditure was increasing and the consolidated revenue fund had been in deficit on current account each year since 1883. Even so, successive Treasurers shied away from manipulating customs imposts as a means of solving the colony's budgetary problems until eventually on 18 May 1886 the Jennings Ministry grasped the nettle and submitted a restructured schedule of duties to the legislature. A full analysis of these proposals has been made by Patterson so that only a brief summary is needed here. There were to be increases of duty on several of the 'old' staple items (such as coffee, malt and hops) and on some of the 'new' items (like biscuits, candles and timber); duties were to be restored on a dozen or more of the commodities that had been taxed briefly from 17 March 1871 to 31 December 1873 (including screws, soap and galvanised iron sheet); specified duties were to be levied on some forty new items; and a 5 per cent ad valorem impost was to be placed on all other imports except those nominated in a free list. Predictably, this rekindled the free trade versus protection argument both within and beyond the legislature, and pressure groups bombarded the government with petitions: 4,325 merchants and traders signed documents arguing against the reintroduction of ad valorem duties; 3,856 people wanted government expenditure curtailed and a property tax instituted; and 82 electors in Hume sought a 25 per cent impost on luxury items, a tax on the earnings derived in the colony by people living overseas, and 6d per gallon excise duty on beer since the existing arrangement was virtually giving protection to the brewers. Other petitions demonstrated the usual clash of interests: while the printers opposed the proposed duties on paper and board, the bootmakers and saddlers sought a 20 per cent duty

on competing finished goods. Despite these pressures the Jennings Ministry stuck to most of its proposals (though the addition of bar, rod, plate, sheet, bundle and hoop iron to the free list was seen as a significant victory for the manufacturers) and these were incorporated in an Act (50 Vic. no. 16) assented to in September but made retrospective to 7 April 1886, the date on which the duties had been applied under executive authority.

The Jennings tariff had the effect of raising customs revenue from £1,760,000 (38.1 per cent of net revenue) in 1885 to £2,069,000 (43.8 per cent) in 1886, with most of the increase being derived from the reimposition of the ad valorem duty (£274,000). The new schedule was to have remained in force for three years, but in February 1887 the Parkes Ministry was elected to office on a free trade platform and immediately set about the task of finding alternative ways of solving the colony's budgetary problems. One step was the reorganisation of the loan program and the curtailment of outlays on public works and on the public service; another was to increase the excise duty on locally manufactured or cut tobacco from 1/- to 1/3d per lb and on colonial spirits from 12/- to 14/- (effective 30 March 1887); and yet another was to impose an excise duty of 3d per gallon on colonial beer as from 27 September 1887. The effect of this and the previous excise enactments was to raise the revenue derived from locally made spirits, tobacco and beer (excluding licence fees) from a mere £12,200 in 1883 to £258,000 in 1888.

These actions paved the way for a review of the Jennings tariff. On 11 May 1887 Parkes's Treasurer, Burns, presented his proposals to the Legislative Assembly. First, from 7 April 1887 the duty on seventy-one of the items listed in the schedule to the 1886 Act would remain as before. Second, from 1 May 1887 the existing duty on hops (6d per lb) and malt (9d per bushel) would be discontinued. And, third, from 1 October 1887: (i) all ad valorem duties would be discontinued; (ii) seventy-six of the items listed in the 1886 schedules as liable to specific duties would be exempted; (iii) the duties on biscuits, candles, chocolate and cocoa would be reduced; and (iv) the duties on several alcoholic products would be increased from 12/- to 14/- per gallon, and on methylated spirits from 2/- to 4/- per gallon. Once again the special pleading and petitions of pressure groups were all but ignored: the employees of the Sydney Paper Mill Company for instance sought to have the duty on brown and wrapping paper (3/4d per hundredweight), which was first imposed on 17 March 1871, retained

as we have received notice from our employers that, should this duty be abolished, we must submit to a reduction equal to twenty-five per centum on our present wages, otherwise they will be compelled to close the mills.⁶⁴

In the event virtually all the original proposals were incorporated in legislation (51 Vic. no. 8) assented to in July, which thus gave manufacturers and importers alike time to prepare for the price and other changes that were expected when the new schedules came into effect on 1 October. This schedule of duties, which remained in operation until 2 December 1891, reduced the total revenue from customs from

£2,012,000 in 1887 (which, of course, included the income from the ad valorem duties for the first nine months) to an average of £1,890,000, or about one-third of net revenue, during the next three years.

The tariff and manufacturing

Taken as a whole the customs and excise legislation had a considerable effect on industrial development in New South Wales. Before examining the incidence, level and timetabling of the duties themselves, some attention must be given to the regulations concerning drawbacks on imported goods. It had been a long-standing principle of customs legislation in the colony that drawback ('the lawful return of duty paid, on exportation of goods') was allowed on nearly all commodities brought into the colony (except spirits and tobacco and, after 1879, wine and beer) when subsequently shipped out again.⁶⁵ This system helped to ensure that Sydney retained a significant entrepôt trade in commodities like tea and coffee. Although the regulations left a good deal of discretion in the hands of customs officers they were only intended to apply to goods which were being sent out in their original containers or which had been repacked under supervision. Under a consolidating and amending Act in 1879, stricter conditions were imposed which limited the claims to goods that had not been altered, tampered with or mixed with any other article. Claimants had to declare that

the said goods, wares, and merchandise are in the same packages and in the same state and condition in all things as they were when duty was paid thereupon at the Port of—.

Apart from some minor amendments eight years later, this was the system in operation until the end of the period under review.⁶⁶

It was pointed out in Chapter 8 that drawbacks in Victoria were restricted to a fairly narrow range of commodities prior to the Drawback Act, 1871 which, under numerous regulations promulgated from 1872 on, allowed drawback to be claimed not only on entrepôt goods but also on an increasing range of locally made or processed commodities that incorporated materials on which duties had been paid. No such extension of drawback on customs duties was given to manufacturers in New South Wales with the exception that when an excise duty was imposed on tobacco, cigars and cigarettes on 20 February 1884 (by 47 Vic. no. 12) these products could be made under bond for export and exempted from payment of duty on imported leaf.

At various times the customs and drawback legislation disadvantaged some significant manufacturing industries in New South Wales. Thus whereas the Victorian schedules deliberately placed on the free list raw and semi-finished materials like iron, lead and zinc in the form of pigs, bars, rods, plates and plain sheets, all these products became subject in New South Wales to the package duty (equivalent, as levied, to about 6/8d per ton) between 25 May 1865 and 31 December 1867; to a 5 per cent ad valorem duty between 21 December 1865 and 16 March 1871; and to a specific duty of 10/- per ton in the case of iron bars, rods, plates and sheets

(pig being added to the free list) and of 40/- per ton in the case of lead pipes and sheets and zinc sheets and rolls between 17 March 1871 and 31 December 1873.⁶⁷ In short, for the best part of nine years at a critical stage in the colony's industrial development, the metal trades had to contend with an artificially induced increment, averaging about 8 per cent, in raw material costs. Not surprisingly, the founders and engineers felt that they were being disadvantaged in comparison with their competitors in Victoria and Queensland. In April 1871 Thomas Mort petitioned the Legislative Assembly seeking drawback of the duty paid on imported iron used in new ships, bridges and machinery that were subsequently exported, and a couple of years later twenty-three iron-founders signed a petition along similar lines, pointing out that

unless the concession now prayed for be granted, in spite of the large advantages which this Colony possesses in her extensive workshops and cheap fuel, the whole of the neighbouring Colonies will be absolutely closed against the iron manufacturers of New South Wales, as they indeed are already to a very large extent.⁶⁸

Insofar as they can be relied on at this level of detail, the trade statistics lend support to the iron-founders' point of view: aside from such commodities as refined copper and tin, lead sheet and scrap iron, New South Wales exports of locally made metal goods were valued at only £121,000 from 1865 through 1873 compared with £286,000 worth from Victoria. This contrast is too great to be explained simply by differences in reporting or valuation procedures: in 1873 alone, for instance, the respective figures were £16,000 and £56,000. The duties on raw materials affected a much wider spectrum of colonial industry than the metal trades alone. It was said that the 10/- per ton duty on tin-plate added about ¼d per lb to the cost of canning preserved meat, and this was probably no exaggeration.⁶⁹ The significance can best be appreciated by noting again that the London invoice price for New South Wales preserved meat seldom rose much above 6¼d per lb and in 1873 it was 5¼d per lb (and these figures included shipping costs).

Earlier in the chapter it was suggested that by the end of 1865 serious debate about protection and free trade was to all intents and purposes over, although the polemics continued and were always in the background. From time to time various organisations emerged, especially during periods of unemployment, to further the cause of protection as a political philosophy, but there is little evidence that they had much practical effect. The 5 per cent ad valorem impost charged between 21 December 1865 and 31 December 1873 and again from 7 April 1886 to 30 September 1887 cannot be regarded as a protective duty, but the influence of the specific imposts cannot be dismissed so readily. First, in ad valorem terms some were quite high especially on the lower quality, cheaper lines. For example, the 1d per lb duty on candles imposed in March 1871 was roughly equivalent to a 6 per cent impost on the landed price of wax candles (which retailed at 2/4d per lb), of 16 per cent on composite candles (10d), of 20 per cent on mould candles (8d), and 25 per cent on tallow candles (6d). Second, several of the commodities subjected to specific

duties in 1871 and which remained dutiable after the 1873 Act were, like paper and maizena, being produced by industries that had just been established in the colony. This is not to assert that there was an element of deliberate protection in the schedules, but it seems reasonable to suppose that maizena manufacturers, for instance, would have been helped by an impost, equivalent to about 12 per cent, on imported substitutes. In contrast the meat preserving companies and those distilling kerosene and paraffin from shales⁷⁰ were not helped by the inclusion of preserved meat and petroleum products on the free list. Third, even though the general level of the tariffs remained much lower than those of Victoria, the problems of balancing the claims of various industries still remained. Thus in 1873 the timber merchants suggested to the Legislative Assembly that they would be placed at a disadvantage if the duties on doors and sashes (1/- each) and galvanised iron sheets (40/- per ton) were removed without also exempting timber (1/- and 2/- per 100 super feet, respectively, for undressed and dressed) and plain iron sheets (10/- per ton). In fact the first three duties were left untouched and Simon Zollner, who operated at Sydney the only galvanising works in the colony, was no doubt gratified by the addition of plain iron sheets to the free list while the duty on galvanised sheet and on galvanised wares (60/- per ton) remained intact. It is not difficult to find contrary examples. At no stage was a specific duty placed on woollen cloth (or on clothing and apparel) but during most of the 1870s and 1880s there were imposts on process materials like olive oil (6d per gallon, or about 25 per cent) and soda crystals (20/- per ton, or about 20 per cent) which were extensively used in the woollen industry.⁷¹

These examples illustrate that over the period as a whole the instances of particular industries which probably gained some assistance from ad valorem duties on competing or substitutable imports can be matched by others which received no help at all. Among others, Coghlan suggested that the Jennings Ministry was 'the first Government in New South Wales to adopt a policy savouring of Protection' when it introduced its customs legislation in 1886.⁷² But an item by item comparison of these schedules and the ones enacted in 1871 gives only limited support to this proposition. At first sight it might appear that duties were imposed on a significantly wider range of items but in fact some of these (stearine, preserves and miscellaneous kinds of confectionery) were merely a more elaborate listing of commodities already covered, while others (dynamite, preserved milk, milk foods, fish paste and so on) were recently developed products. This leaves a residue of important new dutiable items, including such foods and drinks as aerated waters, sarsaparilla, preserved meat, meat extract, and various prepared foods; metal goods like bolts, nuts, spikes, safes and iron doors; and miscellaneous products including gelatine, glue, naphtha, pitch, tar, plaster and wax. In addition, some existing imposts were raised, including those on candles and starch, from 1d to 1½d per lb; biscuits from 1d to 2d per lb; sashes, doors and shutters from 1/- to 2/- each; paint from 40/- to 60/- per ton; dressed timber from 2/- to 3/- and undressed timber from 1/- to 1/6d per 100 super feet; fancy soap from 120/- to 186/8d per ton; and some manufactured grain products from 1/- to 9/4d per hundredweight. As against

this, a large number of the specific duties (such as on common soap, screws and galvanised iron sheet) were not changed, and others (such as on butter, laths and manufactured zinc products) were reduced. Moreover, some duties that had been abandoned at the end of 1873 (such as on iron sheets and shapes, iron tanks, and hand-tools) were not renewed; others (like those on gunny bags and whiting) were discontinued.

This list, which is illustrative rather than all-embracing, indicates that when examined as a whole the Jennings tariff of 1886 no more 'savoured' of protection than that of the Martin Ministry in 1871. It is true that during the course of the legislative processes one or two proposals (such as a 10/- per ton duty on pig iron and shapes which *may* have been a gesture to help the Eskbank Ironworks Company) were discarded but, on the other hand, there was no suggestion that specific duties should be levied on some activities favoured by protectionists in Victoria like the manufacture of footwear, clothing and woollen cloth. There is little in the Jennings tariff to conflict with the earlier generalisation that what some manufacturers (e.g. sawmillers and biscuit bakers) may have gained on the roundabouts, others (e.g. butter and zinc-ware makers) probably lost on the swings. And in any case, the tariff was enacted as a temporary measure due to expire on 7 April 1889.

Rarely during the forty years to the end of 1890 were revenue proposals adapted to give overt assistance to local manufacturers. But one example was the legislation (26 Vic. no. 18) introduced in 1862 to permit the establishment of bonded distilleries and bonded sugar refineries. Much of the interest then and now must centre on the latter proposal for it indicates the deep-seated concern felt, naturally enough, by the Sydney commercial world at any steps that might give local industry a chance of competing on an equal footing. From the sugar refiners' view the point was simple enough. Although under 19 Vic. no. 14 of 14 September 1855 the customs duty on refined sugar (6/8d per hundredweight) was one-third greater than that on raw or 'bastard' sugar (5/-), part of this apparent advantage was eroded because 8 per cent by weight of the raw material consisted of adulterants which had to be carted out of the refinery.⁷³ The Colonial Sugar Refining Company claimed that in this way over the previous five years it had paid out £13,700 in duties on dirt. Related to this was the limited colonial market for treacle so that most had to be exported without any allowance being made for the import duty paid on the raw material. As if this were not enough, officers of the Customs Department had little notion of the differences between 'raw' and 'refined' sugar and thus levied the differential rates partly on dubious information about the state of technology in the countries of origin and partly on advice from the sugar importers. Moreover the manufacturers did not fail to draw attention to the situation in Victoria where the refining of sugar in bond had been permitted since July 1860. The main argument of the merchants was that this facility would enable The Colonial Sugar Refining Company to obtain a monopolistic grip on the market. Eventually, however, the legislation was passed although as a concession to the importers its application was delayed until 1 May 1863 to enable them to clear their stocks. Three further points

can be noted. First, throughout this period, sugar millers and refiners in New South Wales were at a disadvantage compared with their overseas competitors because distilleries could not be housed under the same roof as other operations; entrepreneurs thus had to choose between erecting a separate building, selling their molasses to an existing distillery, or simply pouring them down the drain.⁷⁴ Second, the privilege of refining in bond did not (as in Victoria) mean the granting of drawback on exports of refined sugar.⁷⁵ Third, over the years changes in the excise on colonial spirits and the duties on imported supplies obscured the original logic of the differential between them which was clearly not (as sometimes suggested) intended as a measure of protection. Through much of the 1850s and 1860s the duty on locally made spirits—in effect rum—was 6/5d per gallon, a rate chosen because under the technology then available 8½ gallons of rum could be made from 1 hundredweight of raw sugar on which 5/- (equivalent to 7d per gallon) had been paid in duty. Together the 7d in customs duty and the 6/5d in excise duty meant that local distillers paid exactly the same as the 7/- impost on the imported product. Similarly, between 29 November 1865 and 9 December 1879 the two duties were 9/5d and 10/- respectively. Their equalisation from then on did not represent a harsher attitude towards the colonial industry but simply a recognition that most of the rum was being distilled from locally grown, and therefore duty free, sugar.

The only other instances of direct assistance relate to excise and customs duties on tobacco and beer. On the same day, 20 February 1884, that a 1/- per lb excise duty on manufactured and cut tobacco became effective, the customs duty on similar products was lifted from 2/- to 3/-, and the firms involved were also given the privilege of manufacturing in bond so that exports would be excused from excise. Or, again, the impact of the 3d per gallon excise duty on beer imposed on 27 September 1887 was softened by the termination of the customs duty of 6d per lb on hops and of 9d per bushel on malt as from 1 May 1887.

Three substantive points emerge from this analysis. First, it is difficult to find much evidence, unless individual incidents be taken out of context, of protection or of deliberate assistance to particular industries. Second, even if seen as 'neutral' in terms of the free-trade: protectionist controversy, the structure, timetabling and executive application of the customs duties appear to have had the effect of mildly advantaging some industries and marginally disadvantaging others. Third, an important aspect in comparison with the Victorian system was the taxation of some basic raw or semi-processed materials (especially, in the earlier years, metals and metallic sheets and shapes) and the lack of drawback arrangements then or later for locally made products incorporating dutiable materials. Butlin has made the suggestion, at once plausible but difficult to prove, that

Victorian tariffs, by reducing the freedom of entry of goods into Victoria, made the whole of Australia less attractive to British exporters. Hence it is impossible to unscramble the effects of free trade and tariff policies in each colony.⁷⁶

As against this, however, it can be argued that the drawback regulations in Victoria

were contrived in such a way that manufacturers there, especially of apparel and slops, were able to fulfil something of the role which British exporters may thus have abandoned or perhaps failed to exploit. This relates to another aspect of colonial tariff policies and trading relationships that should not be overlooked. It was suggested in earlier chapters that the Victorian customs schedules helped to encourage surplus capacity in some industries during the latter part of the 1870s and early 1880s and that this led to dumping on external markets, especially in New South Wales. As early as 1878, for example, John Vicars, one of Sydney's leading woollen cloth makers, complained that

in consequence of the want of a reciprocity agreement between the colonies, the Melbourne tweed manufacturers, who turn out more tweeds there than they can use, occasionally swamp this market with tweeds at a price of 6d or 1s a yard under local prices, in order to clear off their surplus stock to the injury of local buyers.⁷⁷

Comments in a similar vein were also made by clothing and footwear manufacturers.

Nonetheless, taking a long-term view of what happened, the absence of protection in New South Wales may have been a blessing in disguise in that some of the misallocation and waste of productive resources which became evident in its southern neighbour during the 1880s were minimised, if not altogether avoided. As a contemporary observer suggested, the 'Australian experiment indicates that a protective tariff . . . can divert capital and labor from certain channels into others, but it is not shown that it increases the aggregate wealth and prosperity of the community or the number of persons engaged in manufacturing enterprises as a whole'.⁷⁸

Subsidies and Bonuses

New South Wales did not at any stage during this period offer rewards, bonuses or other kinds of financial encouragement to new or existing industrial activities. There was no parallel to the inducements advertised in Victoria for the initiation of industries like woollen and worsted weaving or paper-making. Indeed the only formal measure of this kind appears to have been a curious Act passed on 22 August 1862 to encourage cotton-growing—but without stipulation as to quantity or use—by offering grants of land to 'Associations' that might be set up for this purpose. Some moves were initiated in 1874 to make provision for bonuses of (i) £4,000 and £2,500 for the first and second firms, respectively, to manufacture 4,000 tons of railway rails from local ores; (ii) £3,000 and £1,500 for the first and second firms to manufacture 2,000 tons of plate iron for locomotive and ship-building; (iii) £2,000 and £1,500 for the first and second firms to manufacture 1,000 tons of tin-plate or (iv) 1,000 tons of galvanised iron; and (v) £500 for the first firm to make 250 tons of hydraulic cement. But the Cabinet decided to withdraw them from the supplementary estimates and to place them on the loan estimates for 1875. This was not in fact done and, despite attempts in the Legislative Assembly on 6

and 23 April 1875 to have a £5,000 bonus for 1,000 tons of cast iron made from local ores added to the supplementary estimates for that year, the proposals for premiums do not appear to have been taken any further.⁷⁹

Moreover, there is little evidence that colonial manufacturers benefited greatly from 'hidden' subsidies in the form of contracts being placed locally despite lower overseas tenders. From time to time there were exceptions as the earlier discussion of locomotive purchases makes clear: the contracts let locally for sixty-six railway engines in 1878 were about 11 per cent above overseas quotations and those accepted ten years later for fifty engines were 30 per cent above the foreign bids. This was not the result of a more lenient attitude since, in the meantime, harsher conditions had been imposed on overseas firms which now had to quote steam-up rather than merely delivered prices. It is difficult to calculate the actual 'subsidy' involved: among other things there were detailed differences in the colonial and overseas specifications even for the same class of locomotive, in the method and timing of progress and final payments, and in the extent to which work was supervised. Other uncertainties arise because the government itself bought certain components overseas and provided these to contractors. Fortunately, however, the total in-service cost of each locomotive is known and it can thus be calculated that the fifty-four engines actually delivered by colonial manufacturers by 1890 cost about £25,000, or 16 per cent, more than the overseas equivalents. In Victoria the 296 locomotives made there cost approximately £189,000, or 22 per cent, more than the probable price of imported stock. Hence, the contrast between New South Wales and Victoria lay not so much in the level of assistance but in the sum total of public money spent in this way, and this is true even after considering the whole amount (£68,000) which would have been expended by New South Wales if all its contracts had been fulfilled.

Judging from the number of 'returns to orders', a close watch was kept on the level and propriety of government contracts, but there is little in the resulting voluminous and detailed correspondence to suggest that Ministers or their departmental officers were deliberately favouring either manufacturers or importers. An exception was Charles Lyne (Secretary for Public Works between 2 November and 21 December 1885 and again from 26 February 1886 to 19 January 1887) who admitted in the Legislative Assembly on 16 March 1887 that whenever the opportunity arose he

accepted colonial tenders at a percentage above the outside tenderer. If one tender was sent in under which a great deal of the material would be imported, and another tender was sent in under which as much as possible of the material would be manufactured in the colony, I invariably accepted the latter tender.

When very large investments were contemplated some companies sought guarantees from the government in advance. During the latter part of the 1880s several proposals emerged for the manufacture of iron and steel, possibly as a belated response to a tender called by the government in October 1883 for the supply of

150,000 tons of steel rails to be manufactured in the colony, if necessary using imported materials. Thus on 31 October 1888 Albert Leahy wrote to the Colonial Secretary (Parkes) seeking an assurance that tenders from a local iron and steel manufacturing firm would be shown preference. He again wrote on 31 May 1889 explaining that in the meantime he had been to England and interested some people in forming a company for this purpose but

Before incurring the heavy liability attaching to the laying down of a suitable plant . . . I desire to ascertain whether the Government is prepared to guarantee—(a) That, for a term of seven (7) years from the commencement of local manufacture, all iron and steel required for use in connection with Government railways, bridges, and other public works shall be ordered from the abovementioned company, subject of course to the conditions relative to quality and cost being favourable; or (b) that, for a term of seven (7) years, the Government will include in the Customs tariff a specific import duty of 40s. per ton on imported iron, and 60s. per ton on imported steel.⁸⁰

Hardly surprisingly the government refused to write a blank cheque and then tie its hands in these ways.

Not long afterwards Joseph Mitchell, a member of the Legislative Council, came forward with a similar proposition. For several years Mitchell had been interested in exploiting iron ore deposits in various parts of the colony and in December 1889 went to England to try to obtain support for two prospective smelting companies. Encouraged by a favourable report from a Scottish iron expert, Mitchell wrote to Parkes on 3 September 1890 about these proposals:

I would suggest that in view of the enormous demand for Railway Material notably Steel Rails & fastenings that you give an order for say 50,000 or 100,000 tons of Steel Rails, time for delivery to extend over Five Years . . . Price to be ruled by London Prices with all attendant charges added, delivered in Sydney. This would give to the Syndicate an assurance of work for a given time and be a great incentive to them to start as quickly as possible . . . As the erection of these works entail an outlay of some £300,000, my Syndicate are anxious to obtain what assistance yourself and colleagues may be able to grant.⁸¹

A month later Mitchell was informed that

The matter . . . has been brought before the Cabinet and after discussion it has been decided that it is impossible to give such an order as you desire. The Minister however wishes me to assure you that when the Department is prepared to invite tenders for Railway iron the conditions shall be made as favourable as possible to the Colonial Manufacturer consistent with what he considers to be the policy with which the Government is identified.⁸²

This letter also pointed out that to go through the motions of obtaining tenders in England merely to find out the price on which to base colonial orders would be unfair, and that any arrangement of this kind 'would commit the colony to a most undisguised policy of protection'. As a sequel, the Railways Department on 13

February 1891 (and again on 19 July 1892) sought tenders for the manufacture of 175,000 tons of steel rails

from material to be entirely manufactured and finished in the Colony of New South Wales, out of iron-ore raised in the Colony, and other necessary minerals the natural product of, and with coal, coke, or other fuel, smelted, gotten, and raised within the said Colony. . . .

No local (or overseas) tenders were received so that, as the *Newcastle Morning Herald* observed on 7 July 1891, 'Mr Mitchell's trip had been in vain'. But he was nothing if not persistent for when the government made another attempt in 1896 to have 150,000 tons of steel rails manufactured in the colony,⁸³ Mitchell again formed a syndicate with which the government was negotiating until Mitchell's death late in 1897.

The Course of Industrial Development

There must be some uncertainty about the precise course of industrial development in New South Wales until the latter part of the 1870s because of the total absence of employment data in the annual factory returns published in the *Statistical Register*. These only contain information about numbers of establishments which by itself is not very useful, and about the physical output of a few commodities like woollen cloth, soap, candles, manufactured tobacco, refined sugar, tallow and rum. The use of decennial population census data was rejected for present purposes, as in the case of Victoria, because of the confusion between 'makers' and 'dealers' and the difficulty of allocating sensibly broad categories like 'general labourers'. The best that can be done is to evolve a factory workforce series by assuming that the average establishment in each industry was about the same size year by year as its counterpart in Victoria. The results are detailed in Appendix 1 and depicted in Figure 11.2. There is no gainsaying that considerable reservations must be felt about a series derived in this way even though it does conform reasonably well with available literary evidence.

Factory employment seems to have grown rapidly during most years in the 1860s (except 1867) and then continued expanding at a slower, but fairly steady, rate until 1874. During the following eleven years the pace of growth again quickened, although with noticeable pauses in 1879 and 1884, but then stagnated from 1885 to 1887. A modest recovery, peaking towards the end of 1890, preceded the downturn into the depression of the 1890s. The suggestion that there was a respectable growth in factory industry during the 1860s (perhaps absorbing 9,300 workers between 1863-4 and 1869-70) may appear to run counter to the general theme of the evidence given before the Select Committees set up to examine the condition of the working classes in the metropolis (1859), the state of manufactures and agriculture (1862), and on the unemployed (1866). But the witnesses involved in these inquiries represented only a very narrow range of activities most of which were particularly susceptible to competition from speculative imports. Little was heard, for example, about the iron trades, about the modest but not insignificant development of

Fig. 11.2: Estimated total employment in New South Wales factories 1861–2 to 1900. See Appendix Table A1.1 for explanatory notes (the lower employment figure for 1892 has been used here). No data are available for the last nine months of 1891.

service industries in the growing number of country towns (Table 10.3), about the development of sawmilling in the northern coastal areas of the colony, or about the workers being absorbed by individual projects such as oil shale refining, ship-building and food processing elsewhere.

The evidence presented to these Committees does, however, cast light on three aspects of industrial development during this early part of the period. First, there was an increasing emphasis on elementary forms of mechanisation: as one woollen manufacturer explained in 1862, 'in a colony like this, where labour is high, the object is to obtain machinery to economize labour as much as possible'.⁸⁴ By this time machines were being used to sew clothes and the uppers of shoes, to stamp out and prick soles, and to rivet boots;⁸⁵ four years later it was claimed that such equipment had become 'general among shoemakers' and 'largely used' in making up slops.⁸⁶ Or again, steam sawmillers were able to quote 3/- for cutting up 100 super feet of cedar whereas by hand it cost 7/-. Sometimes, too, new processes or techniques cut down labour inputs; manufacturers discovered that when woollen cloth was dyed in the piece instead of in the yarn it reduced the number of reelers and winders. Second, both the adoption of machinery and the division of the processes between workers enabled more children to be employed. Thus in 1862 one woollen-mill employed thirty-four adults and eight boys and eight girls under sixteen years of age, while another had thirty-three adults and eighteen lads of whom the youngest was only nine. The leading footwear manufacturer described how the introduction of riveting machines had enabled him to employ three or four boys making children's boots—'a description of boot we never could get made here by men [who were paid on a piecework basis], as it does not pay them'.⁸⁷ Since

children in woollen-mills were being paid only 7/- to 10/- per week as against 42/- to 45/- for adult males, this was a useful way of reducing costs and promoting competition with the products of English textile mills where wages were barely one-third the colonial rates. The longer-term effects were also significant because it meant that young lads learned only a small, repetitive and often unskilled part of a trade like shoemaking (described in 1866 as being now 'totally divided') and in various ways this hastened the change from craft to factory methods of production.⁸⁸ Third, it is clear that by the early 1860s some elementary forms of outwork, whereby certain processes were undertaken at home, were well established in Sydney and also perhaps in the larger country towns. Some woollen yarn was being woven and slop clothing made up in this way, but at this stage it was mainly confined to the footwear trade. It embraced both simple situations in which a bootmaker took work home at night so that 'the younger branch of his family' could assist him to increase his piecework earnings, and more formal ones in which a 'chamber master' contracted to supply a stated number of finished or partly finished pairs of boots or shoes to a manufacturer who then disposed of them to the trade under his own name. It is difficult to know how important this system had become, although the *Sydney Morning Herald* reported on 25 September 1868 that some firms were buying in as much as one-quarter of their stock.

Colonial manufacturing adapted itself to circumstances like this in two ways during the 1860s and 1870s. In several industries the small and medium-sized firms began to specialise in certain lines or in supplying particular kinds of markets. By 1868 at least five kinds of producers had emerged in the finished leather goods trade: the maker-wholesaler supplying country storekeepers and external markets (especially Queensland); the large contract producer; the manufacturer supplying retail traders direct; the small maker supplying the wholesalers; and the chamber masters working on their own behalf.⁸⁹ There were, of course, other permutations: one tannery was supplying both the leather and complete boot riveting plants to independent makers and buying in the completed articles; some chamber masters employed lads to assist them or sublet work to men working at home; and a few retailers hand made shoes to order in a workroom at the back of the shop. Some manufacturers only undertook certain processes: several in Sydney did nothing else but cut out, block and close uppers (using kangaroo leather from Tasmania and calf leather from Europe) which were then supplied to the smaller firms nearby and in the country; others simply finished, waxed and polished since these were unwholesome processes, requiring the constant use of gas, that were disliked by the other hands in crowded workrooms. Although different in detail, the same sorts of moves towards specialisation were taking place in a wide range of activities including metal-working, wood-working, printing and the manufacture of clothing.

Some firms, however, tried to cope with these problems by integrating backwards or forwards as circumstances dictated or allowed. Thus shipbuilders established forest sawmills, The Colonial Sugar Refining Company set up cane crushing plants, and bootmakers operated tanneries. Similarly, sawmillers in coastal areas moved into shipbuilding, and tanners began to make saddlery or

Table 11.11 Factory employment by industry class in New South Wales and Victoria, 1877-78, 1883-84 and 1889-90^a

Class of industry		1877-78		1883-84		1889-90	
		N.S.W.	Victoria	N.S.W.	Victoria	N.S.W.	Victoria
I	Non-metallic mineral products	401	650	442	1,166	670	1,034
II	Bricks, pottery, glass, etc.	2,004	1,261	3,466	1,902	2,305	3,629
III	Chemicals	447	918	563	1,154	869	1,173
IV	Metals, engineering	3,203	4,598	4,845	7,365	6,064	10,958
	Railway workshops	795		1,594		2,229	
	Coaches and wagons	1,049		1,848		1,958	
	Boats, ships and slips	779		742		1,123	
V	Jewellery	109	396	136	350	220	416
VI	Textiles	362	1,255	533	1,281	376	1,193
VII	Skins, tanning, etc.	2,730	2,413	2,945	2,491	2,871	2,462
VIII	Clothing	6,718	5,987	5,103	8,856	6,980	8,215
	Footwear	1,915	2,470	2,125	4,088	2,481	3,819
IX	Food, drink and tobacco	5,706	5,282	7,384	6,729	9,840	7,668
X	Sawmilling and joinery	1,978	3,018	4,294	4,503	4,772	6,612
XI	Furniture, cabinets, etc.	732	961	1,151	1,854	1,448	2,345
XII	Paper, printing, etc.	1,175	2,497	2,345	3,989	4,672	5,530
XIII	Musical instruments	10	55	4	56	—	51
XIV	Miscellaneous	47	279	105	465	714	515
XV	Power and light	182	218	313	393	532	617
Total		30,342	34,015	39,938	49,068	50,124	59,431

^a For detailed notes see Appendix Tables A1.2 and A1.5 from which these data were drawn.

footwear. A classic case illustrating these processes was the business of W. H. Hudson which was founded as a small carpentry shop in 1855, undertook Sydney building contracts in the 1860s, established a bush sawmill in the Myall Lakes area, became known as Hudson Brothers in 1866, and obtained a contract two years later for the manufacture of railway 'keys' (cedar wedges used in permanent way construction) which required the installation of two 400 ton hydraulic presses.⁹⁰ This first contract with the Railway Department led to others including one for building rolling stock which induced it to set up engineering and blacksmiths' shops. When awarded long-term railway contracts in 1878 the proprietors decided to build new works at Clyde, west of Sydney near Granville (see Fig. 10.4), at a cost of about £25,000. Then, as related later in the chapter, it was decided to float the company publicly as Hudson Brothers Ltd to help finance this and other proposed developments including the manufacture of agricultural machinery and implements.

The first official factory employment figures, for the year ending 31 March 1878, indicate that two-thirds of the labour force was engaged in (i) the manufacture of clothing and footwear, (ii) metal-working, and (iii) the preparation of food, drink and tobacco; these groups continued to dominate the industrial scene for the remainder of this period although by 1881-2 metal-working had taken the lead. The absolute size of the factory workforce was considerably less than that in Victoria (Table 11.11) and the composition, though broadly similar, reflected the strengths and weaknesses of each colony. By the 1880s the New South Wales clothing, footwear, textile and metal industries were lagging behind those of its southern neighbour and this was only partially compensated for by the greater emphasis on food, drink and tobacco and on shipbuilding and repairing. Taken together the activities associated with building and construction—bricks, pottery, sawmilling, joinery and furniture—made up 15 to 20 per cent of the manufacturing workforce and this was of considerable importance because such activities were particularly susceptible to fluctuations in internal economic conditions.

This last point is illustrated in Fig. 11.3 where it can be seen that employment in Class II (mainly representing brickworks) doubled between 1877-8 and 1885-6 as a result of the increased investment in residential building and public works; it then started to decline (and in fact continued to do so until 1896), thus reflecting the reduction in outlays on housing and on railway and other government projects during the latter part of the decade (see Tables 11.3 and 11.4). Possibly some saving in labour inputs may have come about because of further investment in brick-making machinery, but undoubtedly the main cause was the fall in total output, from at least 244,000,000 bricks in 1886-7 (the first year in which production was recorded) to 185,000,000 in 1890-1, and 92,000,000 in 1894. The sawmilling industry also went through a phase of rapid expansion until 1885-6 and then managed to hold its own despite the downturn in building and construction. There were three main offsetting factors. First, the upsurge in investment in the pastoral industry during the second half of the 1880s, often in sparsely timbered country, led to an upsurge in demand for building materials for improvements, like shearing sheds and

Fig. 11.3: Estimated factory employment in nine industrial classes in New South Wales 1877-8 to 1900. In 1889-90 the categories shown accounted for 94 per cent of the estimated total. The roman numerals refer to the classes detailed in the source, Appendix Table A1.2.

fencing, which could only be met in the quantities required by the mills on the coast processing indigenous or imported timbers. Second, in the Riverina area sawmillers were regaining some of the ground lost to Victoria as a result of that colony's laissez-faire attitude to forestry during the 1870s described in Chapter 9. Third, the raising, as from 7 April 1886, of the customs duty on undressed timber from 1/- to 1/6d and on dressed timber from 2/- to 3/- per 100 super feet may have made the local product more competitive: those were two of the very few instances in which specific duties in New South Wales exceeded those south of the border where they were, respectively, only 1/- and 1/6d per 100 super feet.

It is also evident from Figure 11.3 that the clothing, tanning and footwear industries made little progress after 1877-8. By the early 1880s clothing manufacturers in New South Wales were having to compete with imports from Victoria

as well as those from Britain. There is evidence that the Melbourne clothing trade tried to solve some of its problems by dumping standard lines like shirts and trousers on the New South Wales market at discounted prices, a procedure encouraged by the elaborate drawback system sponsored by the Victorian government. This practice was probably aided and abetted by Sydney wholesalers: it is known that from time to time contractors fulfilled government orders for uniforms by sending imported cloth to be made up in Melbourne where the labour costs were lower.

Only two points need to be made about the other series depicted. First, the downturn in the metal trades in 1886 and 1887 was largely, perhaps even mainly, the result of the delays in awarding government contracts for items like railway rolling stock caused by the high price of labour: it was claimed in the Legislative Assembly on 16 March 1887 that Mort's Dock and Engineering Company Ltd had been forced to run down its workforce from 1,100 in 1885 to 450 in 1887 and Hudson Brothers Ltd from 760 to 390. Second, the absolute level of employment in the food, drink and tobacco group, and to some extent its rate of growth, is exaggerated by the inclusion of the labour force engaged in sugar-mills which operated for no more than six months each year: these establishments were signing on about 1,200 hands during the crushing seasons at the end of the 1870s and up to 2,500 in the mid-1880s.

Hardly anything can be said about investment in plant and machinery, the value of gross or net output, or even the quantities of goods produced. In this respect the New South Wales factory statistics are poor in comparison with those of Victoria for no attempt was made to ascertain even the approximate value of plant and machinery until 1886, and the inclusion of the value of land with that of buildings considerably reduces the usefulness of this series, started two years later. Moreover all these data were then published only as totals for each industry and for each electorate, thus precluding an analysis of the characteristics of the factories in Sydney as against those located elsewhere. Some use is made in the next chapter of the annual information available concerning woollen cloth produced (from 1851 to 1890) and flour ground (1877 to 1890) but most of the remaining physical output data are of little interest here. The quantities of sugar refined and rum distilled largely relate to the practices, policies and vicissitudes of two firms; the figures for the tobacco manufactured are not broken down by products; and the annual outputs of soap and candles appear to have been largely based on guesswork (as a note in the *Statistical Register* for 1885 indicates). Then in 1886 information was collected for the first time about the production of bricks, boots and timber, but again little use can be made of this data: for example, the heading 'quantity of timber sawn, etc.' is ambiguous, and it is uncertain whether 'boots' embraces shoes and whether the output shown includes the pairs bought in from makers outside the formal factory system.

Table 11.12 Manufacturing companies registered in New South Wales, 1875-90^a

Year	Authorised nominal capital (£)	Number of companies engaged in								Total
		Bricks and pottery	Chemicals	Metal products	Brewing and malting	Dairy products	Flour-milling	Other foodstuffs	Tanning and leather	All other ^b
1875	467,000	—	1	1	—	—	—	1	—	3
1876	25,000	—	—	—	—	—	1	1	—	2
1877	—	—	—	—	—	—	—	—	—	—
1878	20,000	2	—	—	—	—	—	—	—	2
1879	5,125	—	—	—	—	—	—	—	—	2
1880	16,000	1	—	—	—	1	—	2	—	2
1881	69,500	—	—	—	—	—	—	—	—	2
1882	572,000	1	—	—	2	—	—	—	—	3
1883	106,000	1	—	1	—	—	3	1	1	9
1884	114,500	2	—	3	1	—	2	1	—	8
1885	125,000	—	—	—	2	—	—	1	1	6
1886	515,200	3	1	1	—	—	—	1	—	2
1887	1,828,000	2	—	1	2	2	1	2	—	10
1888	1,412,000	—	3	1	5	7	2	3	—	12
1889	304,100	1	1	2	1	14	3	—	—	20
1890	167,700	2	1	—	1	12	4	2	2	24
Total	5,747,125	15	10	10	14	36	18	16	4	5
										128

^a Includes only companies registered under the Companies Act, 1874 (37 Vic. no. 19). Excludes gas-works, newspaper and mining-smelting companies. Only first registration of each company listed.

^b Sawmilling (2), tobacco (2) and woollen-mill (1).

Source: Extracted from *Register of Public Companies*, vol. 1, Corporate Affairs Commission, Sydney.

Table 11.13 Manufacturing companies with nominal capital of £100,000 or more registered in New South Wales, 1875-90

Registration number	Registered name	Date of registration	Initial authorised nominal capital	Date of winding up
1058	Colonial Sugar Refining Company Ltd	1/7/87	£1,500,000	still operating
947	Tooth and Company Ltd	30/6/88	£900,000	still operating
428	Hudson Brothers Ltd	28/3/82	£300,000	12/11/96
654	New South Wales Fresh Frozen Food and Ice Company Ltd	30/7/75	£250,000	7/8/89 ^a
189	Castlemaine Brewing and Ward Brothers Company Ltd	24/11/87	£250,000	21/3/1921
56	Australian Drug Company Ltd	10/7/86	£250,000	12/5/1903
380	Great Northern Brewing Company Ltd	14/3/88	£150,000	7/11/89
518	Lysaght Brothers and Company Ltd	29/10/86	£150,000	28/6/1920
539	Marshall's Paddington Brewery Ltd	6/8/88	£125,000	9/2/1903 ^b
573	Mort's Dock and Engineering Company Ltd	1/2/75	£120,000	12/6/90 ^c
813	Sawells Tobacco Company Ltd ^d	1/5/82	£110,000	2/7/97
915	Sydney Soap and Candle Company Ltd	25/7/85	£100,000	3/10/1912 ^e

^a Assets acquired by new company of same name (nominal capital £120,000) registered 7/8/89 and wound up 9/2/1900. Re-registered in 1900 (nominal capital £220,000) and absorbed in 1952 by Peters Consolidated Milk Industries Ltd.

^b Reconstructed as Marshall's Co-operative Breweries Ltd.

^c Reconstructed and continued operating until 1958 when voluntarily liquidated.

^d Changed name to Eagle Tobacco Factory Company Ltd on 10/9/91.

^e Absorbed by Lever Brothers Ltd.

Source: Extracted from *Register of Public Companies*, vol. 1, Corporate Affairs Commission, Sydney.

Formation and Financing of Manufacturing Companies

Only a partial picture can be obtained of the process of company formation and financing during the first twenty-five years of this period because public documentation of business affairs did not start until the Companies Act (37 Vic. no. 19) became effective on 19 July 1874. Prior to that time industrial firms were family businesses, partnerships or, rarely, incorporated joint stock companies. The latter required a private Act which was a costly and time-consuming procedure but brought the advantage of limited liability. Nine manufacturing companies, with a total nominal capital of £575,000, became incorporated in this way.⁹¹ Four were established to mine and process oil-bearing shales and these all had had their capital fully subscribed by the time the drafts of their Bills were submitted to the legislature. A few details were recorded by the Select Committees which made a brief formal report on each Bill but little other documentation seems to have survived.

The Companies Act, 1874 stipulated that no company, association or partnership consisting of more than twenty persons could be formed to carry on any business for 'the acquisition of gain' unless registered under this or some other Act (such as 24 Vic. no. 21 relating to mining companies). By the end of 1890 a total of 1,123 companies had been registered (compared with 1,397 over the same period in Victoria where much the same legal obligations applied), of which 133 (520 in Victoria) had some form of manufacturing activity as a primary aim. Five were simply re-registrations of existing companies, thus leaving 128 firms that were incorporated *de nouveau*. More than half were formed during the last three years of the period and many of these were associated with butter making and flour-milling (Table 11.12). The records of the defunct companies, now held by the New South Wales Archives Office, are very incomplete; few companies bothered to send in regular returns and it was not until the 1890s that the Registrar started to keep a closer check. Nonetheless, the material that is available gives some insights into the process of company formation.

The figures for authorised nominal capital shown in Tables 11.12 and 11.13 are an unreliable guide to the amount and timing of new and actual investment but, in the absence of anything like complete data about paid-up capital, at least provide some indication of the potential total commitment. Many of the companies were formed to acquire the assets of existing concerns. The translation of The Colonial Sugar Refining Company (a partnership formed on 1 January 1855) into a limited liability company on 1 July 1887 with a nominal capital of £1,500,000 is a case in point since at that stage paid-up funds stood at £400,000 in £20 shares subscribed to £10. The immediate purpose was to effect an amalgamation with the Victoria Sugar Company Ltd: when this formally occurred on 2 August 1887, paid-up capital was raised to £600,000 with 20,000 shares paid to £10 and £200,000 in fifteen-year debentures being issued in respect of the Melbourne company's assets. Then the following year 4,711 shares paid to £10 and £36,300 in debenture stock were issued in New Zealand in payment for the assets of the New Zealand Sugar Company. For

the most part these adjustments represented a reorganisation of existing investment funds rather than a means of raising new capital.

A second example was the translation of Hudson Brothers from a private partnership to a public company soon after it had won a long-term railway rolling stock contract and decided to erect new works at Granville. The prospectus circulated early in 1882 proposed that the nominal capital should be £300,000 in £1 shares of which 100,000 would be issued to the proprietors and regarded as fully paid-up and the remaining 200,000 would initially be called to 12/6d (i.e. £125,000).⁹² Coily, the prospectus explained that 'the profits are too large to disclose the amount to an uninterested public' but that to satisfy potential investors the firm had submitted its books to an independent accountant who verified that 'the business is a growing one [the work done in 1872 totalled £35,762 and in 1881 £204,114]', that 'the profits have grown also', and that 'the business has a large capital in it, but needs still more to keep pace with its growth'. For the first three years after the company was formally registered on 28 March 1882 all seemed to be going well, with the promised 10 per cent dividends being paid until 30 June 1885. In the meantime the Clyde Works had been opened on 31 July 1883; the Bathurst branch 'considerably increased'; the Parramatta works and business of R. A. Ritchie had been purchased early in 1884 and used as the basis for an agricultural machinery and implement-making department; and Ritchie's branch plant at Wickham near Newcastle (along with its contracts for rolling stock) had also been acquired and completely rebuilt at a cost of £8,500 after a fire in October 1884. The first hint of trouble came during the half-year ending 31 December 1885 for which no dividend was recommended because the government had not paid the firm for work undertaken on a temporary water supply scheme for Sydney. By the time this account was settled the other business of the firm had been affected by increased competition and a general downturn in trade, and the directors thought it advisable to use this payment to reduce the company's indebtedness to the bank: hence, for the second half-year running, no dividend was paid. Things became worse during the last half of 1886 and through 1887, and it became obvious that the company's affairs would have to be reorganised. Accordingly, it was decided to close the Redfern plant and concentrate all operations at Granville, to call up the remaining capital (£75,000), to run down stock on hand (from £203,000 to £53,000 during the year ended 31 December 1887), and to reduce external indebtedness. These measures, and especially the smaller amount payable in interest, enabled the firm to make a small profit on current operations during 1888, but because of deductions on other accounts the business as a whole still showed an overall loss. The shareholders in February 1888 had resolved to reduce the firm's capital by £60,000 but because of legal complications this step was not formally approved until December. Any advantages that might have accrued were offset the following year by rises in the cost of freight and materials and these, in turn, forced the firm to seek further economies by transferring its head office from the centre of Sydney to Granville, reducing the capital of the company to £150,000, and authorising the

issue of preference shares to the value of £60,000 (the uncalled portion of which, £48,000, was available as security to the bank).

During the latter part of 1889 the shareholders were given some hope of better times by the news that the firm had been given additional rolling stock contracts and that the chairman had gone to England to try to ally Hudson Brothers Ltd with a syndicate which proposed to manufacture locomotives in the colony but, as indicated earlier in the chapter, these proposals eventually fell through. Nonetheless with the Clyde and Wickham works operating to capacity and employing over 1,000 hands between them, the company felt able to start paying dividends again in 1890 and 1891 although at the rate of only 5 per cent a year. Yet this return to prosperity was short-lived. During the last few months of 1891 the Wickham branch ran out of work and ceased operations soon afterwards; once the existing rolling stock contracts and some other important orders (like the engines, boilers and power plant for North Shore Cable Tramways) had been completed, the Clyde works was kept going by undertaking jobs at cost. Not only did the depression reduce the amount and type of work available, but the company was forced to start realising some of its assets at the low prices offering so as to reduce external liabilities. Adding to its problems, an attempt to lower wages and salaries resulted in a five-week strike early in 1895 just at the moment when the economy was beginning to show a 'healthier tone'. At first it was hoped that the company's fortunes would revive with the general return to prosperity, but on 4 November 1896 the shareholders decided that the firm could not 'by reason of its liabilities continue its business' and should go into voluntary liquidation. The plant was subsequently acquired by The Clyde Engineering Company Ltd.

A third example was the formation of the Sydney Soap and Candle Company—an amalgamation of the New South Wales interests of two firms. One was Upfold & Gillies's soap-making business which was established in Newcastle in 1866 and extended to the metropolitan area six years later as the Sydney Soap Company.⁹³ The other was the Melbourne-based Apollo Stearine Candle Company Ltd whose Sydney branch had received a setback in 1883 when customs duty was suddenly levied on stearine. During 1884 the two firms started discussing the possibility of pooling resources. But in 1885 the Melbourne firm merged with a local rival to form J. Kitchen and Sons and Apollo Company Ltd and it was under this name that the negotiations were completed. Nominal capital of the Sydney Soap and Candle Company was set at £100,000 in £5 shares: Upfold and his partners were allotted 4,336 and J. Kitchen and Sons and Apollo Company 3,450 shares, considered fully paid-up in each case, as compensation for their various assets in New South Wales. Manufacturing operations were divided between a new works at North Waratah (Newcastle) opened in February 1886, and an existing smaller factory in Sydney. By 1912–4, when the company was absorbed by Lever Bros Ltd, paid-up capital stood at £70,000.⁹⁴

Two other examples, illustrating both the growing importance of the chemical and drug industries and the complexities of entrepreneurial relationships, were the formation of Elliot Brothers and Company in 1875 and the Australian Drug

Company which acquired the Sydney business of E. Prosser and Company in 1886. Evan Prosser and T. W. Kempthorne were wholesale druggists, importers and general merchants in New Zealand who in 1876 went into partnership with the Melbourne firm of Felton Grimwade. Two years later the resulting business was reconstructed into what later became known as the New Zealand Drug Company. Kempthorne remained in New Zealand but Prosser moved to Sydney where he established a pharmaceutical manufacturing business.⁹⁵ On 10 July 1886 the Australian Drug Company was registered to acquire Prosser's business with a nominal capital of £250,000 in £1 shares. The original intention had been to issue only 45,000 shares called to 10/-, but within four months 46,000 shares had been taken up and paid to 5/-; of these 26,000 were bought by four people in Sydney, 14,000 by six in Melbourne (including David Beath, James Munro and J. A. and T. Kitchen), 5,000 by Eugen Schiess in London and 1,000 by Francis Kemp in Manchester. By August 1891 additional calls had brought paid-up capital to £34,825 (of which £13,100 was subscribed by members of the Kemp family resident in Australia and Great Britain), but the company was becoming increasingly indebted to the National Bank of Australasia Ltd which in July 1895 was allocated 9,000 preference shares deemed fully paid-up. Eventually the company was reconstructed in May 1903, and in 1931 sold its trading section to Elliott Brothers Ltd.

Less is known about the financial arrangements of this latter firm which originated as a wholesale drug importing and distributing business in Sydney in 1857. During the mid-1860s the establishment of works to make kerosene, galvanised iron and stearine candles increased the demand for sulphuric acid which until then had been little used except for making soda water. Elliott Brothers found it difficult to import adequate supplies because shippers were reluctant to handle large quantities of a dangerous cargo and decided to make the acid themselves. Building commenced in 1865 and on 23 June 1866 the *Sydney Morning Herald* was able to report that the Balmain Chemical Works was in full operation. An outbreak of liver fluke in the northern pastoral areas about this time encouraged the firm to start making powdered sulphate of iron, and bones from local abattoirs were turned into superphosphate of lime fertiliser. This not only marked the beginning of the chemical industry in New South Wales but also, through the increased demand for containers for acids, chemicals, pharmaceuticals and 'remedies', led to the establishment of factories making glassware. By 1872 the Balmain Works was turning out sulphuric, nitric and hydrochloric acid, powdered sulphate of iron, muriate of zinc, superphosphate of lime, and soft soap, and a branch was set up at Brisbane to handle the growing Queensland trade. On 30 June 1875 the firm was registered with a nominal capital of £97,000 and re-registered as Elliott Brothers Ltd ten years later with the same nominal capital, subsequently increased to £700,000 in October 1911 and £1,000,000 in June 1920. In 1930 Elliott Brothers Ltd of Sydney and Taylor Elliotts Ltd of Brisbane (the result of an earlier amalgamation of the Queensland businesses of Elliott Brothers and Prosser and Company) became part of the association known as Drug Houses of Australia Ltd.

Several of the companies were formed to acquire the rights to patents or

inventions such as shearing machines (Wolseley Sheep Shearing Machine Company Ltd, 1887-91; Silvers Patent Sheep Shearing Machine and Flexible Shaft Company Ltd, 1889-94; and The Australian Shearer Company Ltd, 1889-94), manufacturing techniques (Arnold's Patent Compressed Felted Leather Company Ltd, 1889-91; Australian Barbed Wire Company Ltd, 1883-4; and Bulli Coke Company Ltd, 1889-96), or concoctions purporting to preserve wood (Anti-Ant Manufacturing Company Ltd, 1888-?), to disinfect and deodorise (Cattanach Chemical Works Company Ltd, 1888-92), to utilise night soil (NSW Poudrette and Ammonia Manufacturing Company Ltd, 1886-91), or to explode (Neokratine Safety Explosive Company of New South Wales Ltd, 1890-1). In most instances the inventor or patentee was allocated a third or half the nominal capital in shares deemed to be fully paid. As the dates indicate few survived for long, sometimes because the invention proved sufficiently good to be taken over by a larger local or overseas manufacturer but usually because it turned out to be a failure. A few did not even get off the ground but most seem to have attracted some, necessarily speculative, funds. The Australasian Powder and Explosives Manufacturing Company Ltd, for instance, was registered in May 1884 to acquire and enlarge Carl von Bieren's gunpowder works at Narrabeen: half the capital of £16,000 was issued to von Bieren in the form of fully paid shares and the other half was subscribed in a matter of months by fifty-five people, mainly resident in Sydney, none of whom took up more than fourteen shares apiece. But the company had a short, if turbulent, career since von Bieren refused to divulge 'his secrets' and this led to a Supreme Court action and winding-up order in August 1888. Although some of the companies may have been ill-conceived, few seem to have been floated for fraudulent purposes, despite the haphazard way in which the Companies Act was policed.⁹⁶

More than half the manufacturing companies were registered with a nominal capital of less than £10,000,⁹⁷ and this included most of those set up outside Sydney and Newcastle. Apart from eight flour-milling companies (at Cowra and Tamworth in 1887, at Dubbo and Wellington in 1888, at Wagga Wagga in 1889, and at Cootamundra, Mudgee and Young in 1890), the only other country concerns setting their sights higher were a sugar-mill on the Richmond River (1884), a meat freezing venture at Bourke (1885) which did not come to anything, a meat preserving company that proposed to re-open the works at Maitland (1887), a brewery at Lithgow (1888), a woollen-mill at Queanbeyan (1888) and a chilled meat plant at Deniliquin (1890). Most companies floated in country areas were small affairs relying almost wholly on local support. Hence the Albury Iron Foundry and Agricultural Implement Manufacturing Company Ltd was established in November 1883 with a nominal capital of £2,000 in £1 shares: the £1,886 subscribed by March 1885 all came from local residents except for £50 paid by the Melbourne agents of the Belgian Export Iron Company. Or, again, the Ballina Steam Saw Mill Company Ltd was initiated in 1881 by a sugar-cane grower (who subscribed £500), and three publicans, a storekeeper, a blacksmith and a builder (each of whom invested £20). The Registrar of Companies did not discover until September 1893

(itself an illustration of the laxity of record keeping) that the sawmill had been 'consumed by fire years since' and 'was a dead loss to all concerned'.

Of particular importance was the formation of thirty-five companies from 1887 through 1890 to make butter and cheese—an episode detailed in the next chapter. Comment here can be confined to the Kiama and Gerringong Milk Condensing Cheese and Butter Company Ltd registered in October 1880 with a nominal capital of £6,000 since this again illustrates the care with which the early official company records must be treated. The *Register of Public Companies* was annotated in July 1893 to the effect that this concern 'was never formed' whereas in fact it started to send condensed milk by coastal vessel to Sydney early in 1881 and continued to do so, whenever butter prices were low, until taken over by the New South Wales Fresh Food and Ice Company Ltd in March 1886.⁹⁸

This analysis of public company formation exposes only a small part of total entrepreneurial activity. In some industries, like the manufacture of clothing, footwear and biscuits, not a single firm was registered during this period, while in others, such as tanning, sugar-milling, brewing and woollen-milling, it was the exception rather than the rule. This was in marked contrast with the situation in Victoria where four times as many public companies were spawned in the manufacturing sector over the same period. The reasons are far from clear and this remains an aspect of the industrial development of the two colonies that requires more detailed investigation taking into account such factors as the relative availability of, and alternative uses for, speculative capital; the direct and indirect effects of Melbourne's role as the financial 'focus' of southeastern Australia during the 1870s and 1880s; the short-term and long-run structural adjustments occurring in the two economies; and, possibly, a dilution of corporate entrepreneurial activity resulting from the much larger land area of New South Wales, its wider range of climatic and hence farming conditions, and its greater variety of significant natural resources.

Because of the importance of the role played by family firms and small partnerships in New South Wales it is unfortunate that few relevant business papers from this period appear to have survived (or are available for inspection). On the whole, subsequent reminiscences, souvenir company histories, and secondary accounts are of little value in explaining the circumstances and processes of industrial development. Occasionally some hints are given *en passant*: the origins of the furniture factory and foundry operated in the 1880s by the Sydney retailer Anthony Hordern and Sons, for example, lay in the need to repair furniture and iron bedsteads damaged during the journey from Europe, and a printery was later established to make store stationery and to produce the country order catalogues for which the firm had been famous since the 1860s.⁹⁹ A good deal of research has yet to be done, too, into the role of banks and merchant houses which extended credit to small enterprises, and into the significance of investment by external firms (such as the Melbourne manufacturers discussed in Chapter 8) that established branches in Sydney or came to arrangements with firms already operating there.

One other source of investment funds must be mentioned. In Chapter 4 it was indicated that direct government involvement in manufacturing ceased early in the 1830s. The only industrial activities with which the New South Wales government was directly associated during the remainder of the nineteenth century were the Government Printing Office (established in 1841), the Mint (established in 1855) and the railway and tramway workshops. During the 1880s, however, local governments started to invest in gas and electricity undertakings; by the end of 1890 there were municipal gas-works at Bathurst (in which £20,826 had been invested), East Maitland (£7,000), Liverpool (£6,500), Orange (£13,300) and Wagga Wagga (£15,000), and municipal electricity-generating plants at Lambton (£6,350) and Tamworth (£3,099).¹⁰⁰ When facilities of this kind were taken over by municipalities there was usually a considerable reduction in prices (sometimes resulting in a loss on operating account). At Wagga Wagga the charge for gas was reduced to 10/- per 1,000 cubic feet (compared with 17/6d when the works was operated privately); at Orange the price was set at 8/- for heating and 8/9d for lighting (previously 12/6d); and at Bathurst, where there was still a competing private gas-works, the price was reduced to 3/4d (as against 10/-).

Factory Legislation and Working Conditions

It was not until 14 December 1875 that the social conscience of New South Wales was stirred sufficiently to appoint a Select Committee 'to inquire into . . . the employment of persons of tender age in trades, professions, and callings, unsuited to their years', thus marking the first tentative step towards factory legislation. By this time, it will be recalled, the first Victorian Factory Act, inadequate though it was, had been in operation for the best part of two years. There the concern had largely sprung from the conditions under which young girls were being employed in clothing workrooms; in New South Wales, however, attention was also focused on the kinds of jobs being done by young boys especially in brickyards and tobacco factories. This Select Committee on Employment of Children heard evidence that several hundred lads aged from eight to fourteen worked ten hours a day as 'puggers-up', that is they carried clay and sand for the brickmakers in yards where there was no machinery. Each man hand made bricks on a 'stool', of which there were three to five per kiln, at the rate of 1,500 to 2,000 per day: the boys thus had to shift up to 8 tons of materials to keep pace. The men were paid on a piecework basis and each found and paid a lad (in some cases his own son) for whom the brick company itself took no responsibility. Similarly, the 'twisters' working in tobacco factories hired and paid boy assistants who were not included on the firms' books and hence it would seem most unlikely that these lads would have been included in the factory returns provided by proprietors in 1877-8 and later years. During its visits, the committee found twelve-year-old girls operating steam-driven sewing machines in clothing factories, young lads employed (not apprenticed) in putting together boots by machinery, and children working from six in the morning until six at night in poorly lit, stuffy woollen-mills nearly all of which were converted

flour-mills. Little attempt was made to investigate circumstances in the 'informal' industrial world of Sydney: whereas the spokesman for David Jones and Company proudly asserted that the firm employed no one under fourteen in its tailoring department, he claimed complete ignorance about the conditions under which millinery and dresses were made since all this work was 'given out'. In any case the Committee had heard and seen enough to conclude that the time had arrived to regulate the employment of children and the premises in which they were working. The report was quietly received and quickly shelved; the subject of factory legislation remained dormant, if not entirely forgotten, until early in 1886.

Perhaps the main reason, apart from a more laissez-faire attitude towards business practices in general, was the lack of any public outcry about the conditions under which females were employed in the clothing trades. The problems in Victoria were seen, at least editorially, as yet another example of the social evils spawned by protection. There is no doubt, however, that the various systems of outwork, which first began to appear in the late 1850s, had become part and parcel of the clothing and footwear industries during the 1860s and 1870s. The *Australian Town and Country Journal* noted on 30 March 1878 that nearly all the 'large [softgoods] warehouses give out their work' with some of the sub-contractors themselves employing as many as sixty or eighty hands in small workshops or in their own homes. Most clothing factories used outside workers, some regularly, some mainly to cope with the busy periods prior to Christmas and Easter, and some to obtain particular types of goods (David Jones and Company, for instance, 'entrusted ladies of great taste' living as far away as Windsor 'to manufacture delicate fancy works' for sale in its Sydney shop). A journalist surveying a dozen of the leading clothing establishments in Sydney found that they employed 547 workers on their premises and 639 more outside. By this time the use of outside workers in the footwear trade was declining, partly because of union activities (though, unlike its counterpart in Victoria, membership of the Boot Trade Union embraced both factory hands and outworkers), partly as a result of the long-term decline in the apprenticeship system, but mainly because of the evolution of relatively large, mechanised factories in which the division of labour between the seven main processes was becoming all but complete. In 1891 the bulk of the footwear was being made in sixty factories which employed an average of 47 operatives apiece, or a total of 2,262 males and 544 females. Only about a dozen of these firms were giving out jobs to people off their premises—usually 'special work of the higher quality' because 'the employers have not room in the factories to accommodate the people they employ'.¹⁰¹

At the census taken on 5 April 1891 about 17,000 people claimed to be engaged in tailoring, dressmaking and the manufacturing of other types of clothing. Over 4,000 were working on their own account, and it can be estimated that another 6,000 were employed in tiny workrooms in private houses or in association with shops trading in women's apparel 'found in almost every street in the city, and in every town and village in the country'. The line between 'makers' and 'dealers' was very fine if, indeed, it really existed at all, and the census returns gave equal weight to

women who worked for a few hours each week to earn pocket money and those who toiled for up to eighty hours as the sole breadwinner in a household. So far as the evidence goes, it suggests that there were probably no more than about 7,000 people working under formal factory conditions and this, therefore, is the figure incorporated in the estimates prepared for this book. Necessarily, as emphasised in previous chapters, the distinction between 'factory hands' and 'manufacturing workers' is somewhat artificial in the case of the clothing trades as can be illustrated from the surveys carried out under the Census and Industrial Returns Act in 1891. These were by far the most penetrating and authoritative industry studies made anywhere in Australia during the nineteenth century and there is thus even more reason to regret that a proposed general report which was to have embraced 'all the leading industries' and to have discussed, among other things, 'the displacement of labour by machinery' and 'the return upon capital invested' was never published and does not appear to have survived in manuscript.

The *tailoring trade* was divided into three main sections. First, there were factories employing an average of about forty hands where slop clothing was made wholesale: most were located above retail shops and wholesale stores. Second, there were workrooms associated with retail outlets where much of the work was made to measure for the order trade: these had about thirty hands apiece (although one of the forty-three visited had 248 and another only 3) and provided generally poorer working conditions than the factories. One workroom, for example, consisted of

a narrow space from 15 feet to 20 feet long by 5 feet wide. Originally it was an open passage way between two buildings, along which the drainage was carried off. The space has been roofed in with glass, and forms the workroom for six girls and one man.¹⁰²

And, third, there were the private residences where people were mainly engaged on order, slop or contract work. Some were directly employed by particular factories and workshops which supplied the cloth cut to measure and paid for the garments by the piece; others received their jobs through sub-contractors and, as in Victoria, it was this system that led to abuses. The survey did not, however, find evidence of 'sweating' (defined as 'the practice of taking contracts by middlemen, who sublet them at a price so low that the unfortunates who do the work are compelled to toil for extremely long hours to make a scant livelihood') and, in particular, rejected assertions that 'Polish and other Jews [were] the greatest offenders' by observing that 'they are for the most part respectable workers, the charges against them being utterly unjust and without foundation'. Nonetheless, it was not uncommon for a woman at home to have to sew for twelve or even fourteen hours a day (for a net return of about 4½d an hour) if she was supporting a family. As a general rule factory employees were on weekly wages while outworkers and order hands were paid by the piece, a system that was almost inevitable 'because the room available in factories is not equal to the accommodation of one-third of the hands employed'. Outside workers were the first to suffer

when trade was slack: order hands making coats, vests and trousers could reckon on about two months enforced idleness a year which meant that their actual annual earnings were about £114. As against this, 'in the absence of any law regulating workshops, the conditions of work for outside hands are likely to be preferable to those of the ordinary factory'. The normal working week in factories and workrooms was 48½ hours but pieceworkers spent another 2½ hours on average finishing off jobs at home. Most factories and the larger workrooms used steam-powered sewing machines with each garment being handled by four or five girls: 'complete' hands, able to make up the whole of a garment or suit, generally worked in the higher class tailoring establishments or at home. Although it was legal for children over the age of twelve to be apprenticed, this was largely used as a means of obtaining cheap labour rather than developing skills; as a result there were 'a great number of unqualified and incompetent workers, who rove from factory to workshop, and finally gravitate into the ranks of the poorest paid home-workers, or into the employ of the lowest class of sub-contractors'.

Dressmaking was also divided between three types of establishments. First, retail drapers operated workrooms as a means of promoting the sale of materials from which their profits were largely derived. Since the main concern was with reputation, skilful hands were employed at premium weekly wages.¹⁰³ Seventeen such workshops, with nearly 700 hands, were inspected during the course of the survey: the accommodation in the larger ones was found to be 'generally good' whereas that associated with the small retail shops was cramped, dingy and dirty. Second, there were dressmaking workrooms operating independently of any other business, and usually situated in 'good private dwelling-houses'. Working conditions were 'fair' with weekly wages about 10 per cent below those paid in retailers' workrooms. Nominal working hours ranged from forty-four to forty-eight per week but the girls were expected to stay behind for up to nine hours without overtime payment. Third, dressmakers working at home entirely on their own account or on piecework for shops trading in women's apparel formed 'a large proportion of those engaged in this industry'. Usually they worked alone, or employed one or two assistants, in small rooms in terraced houses or cottages where the light and ventilation were often bad and the 'accommodation generally of an inferior description'. In the eighty-one establishments surveyed there were 100 principals and 114 assistants. Dressmakers working in their own homes usually earned more than those employed in retail workrooms: the average net income, after deducting the wages paid to assistants (about 11/5d and 13/8d for skirt and bodice hands, respectively), being 39/9d.

The wage structure in the clothing industry was, in fact, very complex, and averages can be quite misleading. This point can be illustrated by examples of some of the weekly wages paid to a sample of 700 workers.

	Retailers' workrooms		Dressmakers' workrooms	
	Range	Average	Range	Average
Improvers	12/6 to 3/6	7/10	16/- to 5/-	6/10
Skirt hands	22/6 to 11/6	15/9	25/- to 7/-	14/5
Bodice hands	25/- to 12/-	18/-	25/- to 10/-	16/-
Heads of tables	50/- to 25/-	31/-	30/- to 25/-	28/6
Head dressmakers	140/- to 30/-	71/-	100/- to 20/-	58/-

Excluding the highly paid head dressmakers, skirt-drapers, and forewomen and the apprentices who received a nominal wage or no pay at all, the average weekly pay for ordinary hands in retailers' workrooms was about 14/- as compared with 12/8d in dressmakers' establishments. Including all classes of dressmakers in both types of workrooms, from improvers at 5/- to head dressmakers at 140/-, the average wage was found to be 17/6d per week. Actual earnings were, however, affected by other circumstances. Machinists receiving more than 20/- per week were usually expected to provide their own machines which cost 2/- to 2/6d per week to hire. Moreover, during the two slack seasons (January-February and June-July) it was 'customary for employers to reduce their expenses by granting compulsory "holidays" ' so that many girls were in effect periodically laid off thus reducing their annual earnings to £32 or £33 a year.

The *whitework and related trades* (women's underclothing, children's clothing, house linen, blouses, mantles and so on) were carried on in factories and workrooms attached to drapery establishments and also by individuals at home. Most of the factory girls were paid regular wages amounting to about 11/10d (the average for all grades, except cutters and forewomen, combined) for a forty-eight-hour week, but employers kept their costs down by transferring slow hands on to piece rates and efficient pieceworkers on to weekly rates. Homeworkers in this branch of the clothing industry fared badly for they had to combine the tasks of machining and finishing without the aid of the steam-powered machinery which was in general use in the factories. Their average gross weekly wage was about 14/9d (or 11/9d net after allowing for machine hire, cotton and travelling expenses) for an average of fifty-eight hours work. In other words they earned less than 2½d an hour compared with about 3d an hour for the general run of the factory employees with whom they were competing.¹⁰⁴

The general tenor of these surveys suggests that the working conditions in Sydney clothing factories during the latter part of the 1880s were not as oppressive as in those in Melbourne, and this may help to explain why the first factory legislation in New South Wales was delayed until 1896. As mentioned earlier, nothing came of the recommendation made in 1876 by the Select Committee on Employment of Children, and it was left to Dr Renwick, a medical practitioner of Redfern, to introduce a private member's Bill in the Legislative Assembly on 5 February 1886. Three weeks later Renwick was appointed Minister for Public Instruction and, almost unconsciously, the Jennings Ministry adopted his 'Regulation of Factories and Workshops Bill' as a government measure. During the second reading speech on 16 July, Renwick explained that his sole concern was the

welfare of young children in factories. Among other things, the Bill proposed that no one under the age of twelve should be employed in any factory, workroom or workshop; that no one under fourteen should be so employed without certification that he or she had attained a basic educational standard; that no female should work more than eight hours a day; and that factories should be regularly inspected. While there was fairly general sympathy for the spirit of the Bill, clause by clause it was watered down to protect what were seen as the rights of employers and employees and to prevent the creation of a small army of inspectors empowered to stick their noses into the private affairs of individual firms. Eventually in October the amended, but still useful, Bill was sent to the Legislative Council. The tenor of the debate there can best be summarised by an observation made on 19 October 1886 during the second reading stage: 'I think we ought to be very careful that we do not, by way of legislation or otherwise, interfere with the progress which our industries are now making'. Given the mood of the Council, it was perhaps just as well that the Bill lapsed (due to the dissolution of the Twelfth Parliament in January 1887) while still in the committee stage.

It was again left to Dr Renwick, by now a member of the Legislative Council, to reintroduce what was to all intents and purposes the same Bill in the Upper Chamber on 14 March 1888; after hours of debate during the next four months it was forwarded to the Assembly where it was reintroduced on 4 December only to lapse before even reaching the second reading stage because of the dissolution of the Thirteenth Parliament in January 1889. During the next few years several Bills were drafted but not put before the legislature. Meanwhile, partly as a result of representations from the Trades and Labour Council,¹⁰⁵ steps were taken to administer more effectively the provisions of the Public Instruction Act, 1880 whereby children between the ages of six and fourteen were obliged to attend school for not less than seventy days each half year. Another step was the passing of the Apprentices Act, 1894 which raised the legal age at which children could be indentured from twelve to fourteen,¹⁰⁶ and restricted the hours to not more than forty-eight per week.

On 16 July 1896 the Minister for Public Instruction introduced a new Factories and Shops Bill to the Legislative Assembly by pointing out in his second reading speech that it covered much the same ground as the Bill submitted ten years previously. In effect, so far as factories were concerned, it embodied many of the general principles on which English legislation had been based (and the inclusion of shops was simply an extension of these principles). With one exception mentioned later, the Bill was refined in detail rather than in substance during its passage through the legislature, a process completed on 12 November 1896. Along with detailed regulations gazetted subsequently (25 January 1897), the Act (60 Vic. no. 37) laid down minimum standards of sanitation, safety and other aspects of working conditions in factories which were taken to embrace

(a) any office building, or place in which four or more persons are engaged directly or indirectly in working at any handicraft, or in preparing or manufacturing articles for trade or sale; and includes

bakehouses, laundries, and dye-works in which four or more persons are engaged; but does not include any building or place in which the persons engaged in working are shown to the satisfaction of the Minister to be all members of one family, and in which steam or other mechanical power is not used;

(b) any office, building, or place in which Chinese are so engaged; and

(c) any place or building where steam or other mechanical power or appliance is used in manufacturing goods or packing them for transit. . . .

It was incumbent on the occupiers of such premises to register, to keep certain records relating to both inside and outside employees, and to permit access by factory inspectors. Some of the most important clauses regulated the employment of children and females: in brief, no one aged between thirteen and fourteen could work in a factory without special permission from the Minister; no male under eighteen and no female could work continuously for more than five hours without a meal break; no male under sixteen and no female could be employed for more than forty-eight hours a week except that with ministerial permission such people could work up to three hours overtime (at the rate of time and a half) for not more than three consecutive days and for not more than thirty days in any one year; no male under sixteen or female under eighteen could be employed inside or outside a factory before 7 a.m. or after 6 p.m. (except on approved overtime); no female could be employed during the four weeks following her confinement; and no one under stipulated ages could work at or near certain restricted trades and processes.

As in Victoria a few years previously, an attempt was made to use this factory legislation in New South Wales as a vehicle for protecting Caucasian furniture manufacturers from their Chinese competitors.¹⁰⁷ Something of the flavour of the antagonism can be gathered from one of the surveys carried out under the Census and Industrial Returns Act, 1891¹⁰⁸ which began by commenting that 'furniture making is the only manufacturing industry in which Chinese have exercised an influence prejudicial to Australian workmen' but went on to note that 'their opposition, however, is now much less powerful than it was three years ago, and under the operation of the Chinese Restriction Act it will presently disappear'.¹⁰⁹ To be fair the report also suggested that the Chinese furniture factories, almost all of which were concentrated in the heart of Sydney, were too readily being blamed for all the problems faced by the industry. This, it suggested, came about

not so much by reason of the output of the Chinese factories, as from the prejudice raised in the minds of all classes against all locally made goods. Chinese competition was, in reality, directed, not against the local maker, but against the importer of cheap furniture from the East end of London, and so successfully that this class of goods has now almost ceased to be imported.

The Chinese were accustomed to working twelve hours a day: their habits were simple, their wants few and their expenses small. Most lived where they worked in buildings described as being

mostly of the ramshackle order, and on that account the ventilation as a rule is sufficient, but the stench is tolerable only to Chinese nostrils. The sanitary condition of their workshops is for the most part poor in the extreme, but it must be said in their favour that the workers invariably bathe at the close of each day's labour.

Even by 1891 the Chinese Restriction Act had enabled the employees to exert pressure on the factory owners: 'men who were satisfied with 15s. or 20s. a week before the Restriction Act was passed . . . now demand and receive a regular wage of 25s. to 30s. with board and lodging'. In reality, after allowing for board and lodging—reckoned to be worth 9/- a week, the wages and work of the Chinese were approaching 'more nearly those of Australians'. This finding was borne out at about the same time by a Royal Commission investigating several aspects of the Chinese way of life in Sydney. It discovered that there were 'in the immediate vicinity of the metropolis Chinese cabinet factories large and small employing over 400 hands' but found it

gratifying to learn that although the Chinese workshops continue to increase, the aggregate number of Chinese employees has shown a downward tendency; and, further, that with the stoppage of Chinese immigration and the lapsing of indentures under which new arrivals were compelled to work for a certain period at excessively low rates, the remuneration of men in the Chinese factories has advanced until at the present time, bearing in mind that the Chinese are comparatively slow workers, it is not greatly below the local European standard for the same class of work.¹¹⁰

These, then, were the circumstances which led the Factories and Shops Act, 1896 to define *any* office, building or place in which Chinese were making goods as a factory whereas four hands was the minimum for those employing Europeans. However, on 21 October 1896 the Legislative Council (like its counterpart in Victoria a few years previously) drew the line at the further discrimination implied—and intended—by the clause in the Bill which laid down that 'all furniture, of which wood forms a part, manufactured or prepared either wholly or partly in New South Wales shall . . . be stamped . . .', for this was clearly extraneous to the purposes of the remainder of the legislation. The clause was dropped.

The Act notionally became effective on 1 January 1897 but it was some months before the factory inspectorate was appointed and at work. At first the Act was applied only to a specially created 'Metropolitan Factories and Shops District' which embraced most of the electoral districts in the eastern part of Cumberland County including the newly developing industrial suburbs (like Granville) beyond the western boundaries of the Metropolitan Police District (Fig. 10.4). This area contained nearly two-thirds of the factory workforce of the colony. Two years later the 'Newcastle Factories and Shops District' was created so that by the end of the century about three-quarters of the factory hands in New South Wales were, at least nominally, covered by this legislation.¹¹¹

Employees and Employers

The formalisation of manufacturing activity in New South Wales was accompanied by a change in the attitudes of, and relationships between, employees and employers. During the 1830s and 1840s several trade organisations, such as a Cabinet Makers' Society and a Typographers' Society, came into existence to protect the interests of members. With varying degrees of success they tried to persuade employers to maintain or raise piecework rates, to limit the numbers of apprentices being signed on (since this was regarded as a form of cheap labour), and to engage only properly skilled operatives.¹¹² During the 1850s and 1860s these organisations conducted their affairs largely independently of each other though occasionally they made cash donations to other societies to demonstrate support during a particular dispute. In 1871 the Sydney Trades and Labour Council was formed (although not all the societies were affiliated to it) and, among other things, provided a means of making representations on issues of common concern. This was achieved in various ways, one being the appointment of a 'Parliamentary Committee' in 1884 to consider and make recommendations about items of legislation, and another the sponsorship of public protest meetings. Thus, a gathering on 29 May 1877 decided to petition the Legislative Assembly against the system of assisting

numbers of labourers both skilled and unskilled into New South Wales, belonging to trades and callings which from the authentic returns from the different Societies affiliated to the Trades and Labour Council, under whose auspices the meeting was convened, are stated to be already over-crowded and that numbers of their members are unable to find employment. . . .

Early in 1884 the officers and members of the Trades and Labour Council again petitioned the Parliament on the same subject, arguing that assisted immigration 'is a violation of the Free-trade policy of New South Wales, as it protects the capitalist against the labourer' and that it 'unduly interferes with the law of supply and demand'.¹¹³

By the late 1870s it was becoming recognised that many of the problems were common to labour movements in all the Australasian colonies and, beginning in 1879, a series of Intercolonial Trades' Union Congresses was arranged.¹¹⁴ It was not, however, until the third meeting in 1885 that the members consisted of delegates from, rather than simply nominees of, all the colonies (except Western Australia). By their nature, subjects such as immigration, working conditions, juvenile labour, the eight-hour system, and the encouragement of native industries (a euphemism for 'protection'), produced a good deal of rhetoric and a certain amount of disagreement. Something of the flavour of the long-winded debate on the latter topic at the 1885 meeting was captured by the editor in his introduction to the official report of the proceedings:

New South Wales is at the mercy of a clique of importers and shop-keepers, who, while impudently assuming the rôle of people's rep-

representatives, have made Sydney one vast magazine for the 'cheap and nasty' products of the inadequately remunerated labour of Europe, and of imported Chinese. The monopolist squatter and the monopolist importer divide the country between them, the first has stifled agriculture, and the second has crushed out manufactures.¹¹⁵

But not all the New South Wales delegates would have accepted this as a fair summary since some had declared themselves opposed to any system of protective duties which one saw as 'an artificial and forcing process that never could create healthy and prosperous industries'. Nor did it adequately reflect some of the bitterness that emerged during discussions about immigrants and especially those from Asia. At the 1885 meeting, for instance, the delegate from the United Furniture Trade Society of Victoria not only wanted to see Chinese arrivals charged an entry fee of £30 and their employers charged an annual tax but also that it should become compulsory for Chinese 'to denationalise themselves by cutting off their pigtails, and adopting European clothes and customs'.¹¹⁶ On the other side of the coin, much of the discussion of issues as diverse as the legalisation of trade unions, the inspection and safety of steam boilers, the payment of parliamentarians, and the need for a system of workers' compensation was to the point. Occasionally, too, it was appreciated that some fundamental differences between the colonies affected both employers and employees; hence the ironmoulders recognised that because there were fewer large provincial centres in New South Wales compared with Victoria and most of the metal-working firms were concentrated in Sydney, competition between them for contracts and between tradesmen for jobs was more intense. It is difficult to evaluate the practical results achieved by these Congresses, but the mere presence at the 1885 Sydney meeting of two representatives of the Victorian Tailoresses' Union, for instance, prepared the ground for the formation of the Clothing Machinists' Union and the Tailoresses' Union in New South Wales later in the decade.

No attempt can be made here to trace the development of the individual trade organisations, some of which operated intermittently and had only a handful of members, or to detail the numerous, but usually short-lived, disputes in which they were involved. The recognition of such associations and the protection afforded to their funds by the Trade Union Act (45 Vic. no.12) passed on 16 December 1881, along with the growing interest in union activities generally, encouraged the formation of many additional organisations, especially during the late 1880s and early 1890s. Whereas there were only twenty societies affiliated to the Trades and Labour Council and eight or nine others in existence in June 1888, by the end of 1890 there were sixty-eight affiliated organisations with a total membership of 40,000, and half a dozen more besides.¹¹⁷ Not all, of course, were concerned with manufacturing industries. Many operated strike, sickness and funeral benefit schemes and restricted membership to qualified tradesmen.

During this period the main disputes in the manufacturing sector were those involving the metal trades and these had a considerable impact on the industrial development of New South Wales. As early as 1853 the iron trades agitated for a

reduction in working hours from sixty to fifty-eight per week: some employers acquiesced, others only partially so. The men bought space in the leading newspapers, such as the *Empire* of 28 September, to give their version of what happened:

The firm of P. N. Russell and Co. [by far the largest employer] promised to do so by a certain time, and his workmen patiently waited until the period came, and then trusting to his candour, reminded him of his promise; but, instead of that honourable gentleman fulfilling his word, he denied it, and refused to comply. The consequence was that on Saturday, September 17th, the workmen (with some exceptions), left at 4 o'clock, and refused to resume their work unless their reasonable request was complied with.

The men remained on strike for some weeks before Russell gave in, but labour relations in this firm and in the metal trades generally remained uneasy. Three years later there was agitation in the metal trades for a reduction in daily working hours from ten to eight but this appears to have been granted only to the employees at The Australasian Steam Navigation Company's works. Russell and Company became involved in further labour disputes, now over wage reductions, in 1859-60 and again in 1861. In the latter case, for instance, Russells proposed to reduce wages, which averaged 7/11½d per day of ten hours, by 10 per cent claiming that this was necessary because of increased competition from Melbourne and Sydney works. Most of the men walked off the job in May and, supported by donations totalling £1,600 from sympathetic unionists in New South Wales and Victoria, remained on strike until October when, largely because of disunity among the trades concerned, they started drifting back to work without much to show for their efforts.¹¹⁸ Contemporaneously, there was growing agitation for government contracts to be placed locally: the *Sydney Morning Herald* was generally sympathetic but pointed out on 29 August 1861

that it entirely depends on the workmen themselves whether the work [such as the building of railway carriages] shall be done in the colony or imported. A great deal of work has been lately imported which might have been equally well done, and more quickly and conveniently done, in the colony, but for the price of labour, and the impossibility of depending upon it at any price . . . We have in the colony capital, labour, skill, and material, yet we do not reap from the combination of these elements the wealth and prosperity that we might, because labour is in a chronic state of insurrection, or always bordering on it.

During much of the following decade there was considerable unemployment in the engineering trades (especially severe in 1867 and 1870-1)¹¹⁹ and thus conditions were not propitious for further concerted action, although there were still disputes in particular works such as at Mort and Company's dock in 1868. During 1872, however, circumstances were changing: among other things Russell and Company were hard pressed to keep to schedule with its long-term railway rolling stock contracts and Mort and Company had come to an arrangement with Robert

Stephenson and Company to assemble imported locomotives on its behalf. The time thus seemed ripe for another attempt to secure an eight-hour day. Accordingly, in April 1873 a combined deputation from the newly formed Trades and Labour Council and from the men employed on the Great Northern Railway waited on the government to try to persuade it to introduce the eight-hour day in the public sector. Premier Parkes prevaricated. Later that year the iron trades employees decided to take direct action.

Because of the long-term significance of this episode, it is necessary to detail the issues involved. On 11 October delegates appointed by the ironworkers issued a notice to the employers which declared in part:

We therefore determine that, on and after the first day of November next, eight hours shall constitute an average day's work—that is, we will work from 6 a.m. to 4 p.m. on Mondays till Fridays, and from 6 a.m. to 1.30 p.m. on Saturdays during the summer months, with 45 minutes to breakfast and one hour to dinner; and in winter months from 7 a.m. till 5 p.m. on Mondays till Fridays, and from 7 a.m. till 1.15 p.m. on Saturdays, with 45 minutes to breakfast and 45 minutes to dinner, and we require an advance of hourly wages as per schedule attached:—
Wages, from 6d. to 8d. to advance 1d. per hour; ditto, from 8d. to 9d., 1½d. ditto; ditto, from 9d. to 1s., 1½d. ditto; from 1s. upwards 2d. per hour. The above advance to be made on wages as paid on 1st July 1873.

The wage demand was thus equivalent to an increase ranging from 12 to 16.5 per cent. A few days later Mort's Dock and Engineering Company dismissed a handful of men including, somewhat tactlessly, two of the delegates; this inevitably led to a strike which the company tried to end by accepting the proposed hours of work and offering 1d increase in wages. But on 21 October the men decided to hold to their original demands, Mort's conceded them, and work there resumed on 23 October. That day, however, the men at P. N. Russell and Company's works went on strike, and on 24 October the *Sydney Morning Herald* carried an advertisement by this company accepting the wage demands (which also included the payment of overtime at the rate of time and a quarter for the first two hours, and time and a half thereafter, 'each day to stand its own merits') but declaring that the hours of work, summer and winter alike, would be from 7.30 a.m. to 5 p.m. on Mondays till Fridays with one hour for dinner, and from 7.30 a.m. to 1.00 p.m. on Saturdays. But the men reaffirmed their demand for two meal breaks and a couple of days later Russells accepted them. By the end of the month most of the other employers had also fallen into line, and in mid-November the government-operated railway workshops followed suit.¹²⁰ The men's victory seemed complete.

Meanwhile the employers were becoming increasingly concerned about the inefficiencies introduced by the rearranged working day: in particular, the afternoon shift of two hours barely gave time for the forges to be prepared and casting to commence before work ceased. On 31 December, therefore, three companies gave notice that on and after 2 January 1874 their working hours would be from 7.45 a.m. to 5.15 p.m. with a dinner break from 12.15 to 1.15 p.m. Soon afterwards,

on 3 January, six other major employers also tried to impose the same hours with only one meal break in the day¹²¹ and the men walked off the job. There is no need to detail the attempts made during January and February to settle the dispute. The employers' viewpoint was expressed by the chairman of the Iron Trades Employers' Association (the formation of which is discussed later) in a letter to the *Sydney Morning Herald* on 23 February which read in part:

And whatever force there may be in the argument that men working only eight hours can intensify their effort so as to make these proportionately more productive than more extended labour, this cannot be said of machines: clearly neither these, nor the skilled workmen in charge, can give ten hours work in eight.

Eventually, on 2 March 1874, the Eight-hour Conference of Iron Trades and the Iron Trades Employers' Association signed an agreement whereby there was to be one meal break during winter months and two during the summer. Prophetically, the *Sydney Morning Herald* commented on 5 March: 'the amount of employment to be furnished in the iron trade must of course depend to some extent upon the cost of the work. Very high prices will necessarily restrict it, and there is a limit which cannot be passed with safety'.

These events had a considerable impact on the industrial development of New South Wales for the best part of two decades. The truce reached in March 1874 was at best uneasy, and the possibility of further industrial disputes made manufacturers chary about taking on long-term government contracts for rolling stock and compelled them to submit tenders for railway locomotive construction which were not only much higher than their overseas competitors but which also contained reservations about delivery dates in the event of further disputes. The government, which had already delayed the tender notices in the hope of industrial peace, could do little else in the circumstances but place the contracts overseas. Once begun, the vicious circle continued. The Colonial Secretary summed up the situation in a letter to the Agent General in London on 27 December 1877:

I learn beyond doubt that by reason chiefly of difficulties arising between the large employers and trades-unions, there is not at present in this Colony any employment, or any prospect of employment, for engineers or moulders, or in fact for any workers in any branch of the iron trade. You would do well therefore to discourage or refuse assistance to persons of this class who propose to emigrate.¹²²

Whereas 329 metal-workers were given assistance to migrate in 1877 the number dwindled to a mere 36 in 1880.¹²³ Mort's Dock and Engineering Company Ltd, which a few months earlier had rejected a locomotive contract because it was regarded as too small to be worthwhile, decided in October 1879 to reduce the wages of its pattern-makers by ¼d an hour (or by about 3.4 per cent) 'with the concurrence of the men, who accepted them rather than be thrown out of work'.¹²⁴ Given the depressed state of the industry, the Eight-hour Conference of Iron Trades could do little more than express its regret at

the possibility of a disturbance of the friendly relations that have existed for many years between Mort's Dock and Engineering Company and the workmen, and . . . most respectfully and earnestly urge upon the directors of that company not to make any further reductions, inasmuch as we find that they are not paying more than other firms in the iron trade.

This conciliatory attitude, apparently matched by some understanding of the problems faced by employers, was again indicated by a guarantee dated 20 September 1880 addressed to J. P. Franki, Manager of Mort's Dock and Engineering Company, by the Eight-hour Conference of Iron Trades which declared

That this conference, in the event of Mort's Dock and Engineering Company being the successful tenderers for the motors and locomotives required by the Government, do guarantee to discountenance any general demands that may be made amongst the workmen beyond the present current rate, or any other concessions besides the rules and customs of the trade at present in vogue, while the work is being performed. That this conference, although not prepared to guarantee a sufficiency of skilled labour should it be scarce, will promise to do all in their power to obtain it. This guarantee is given on the understanding that the company, in the event of a superabundant supply of labour, will not ask the workmen to accept a reduction of the present current rates.¹²⁵

In the event Mort's did not obtain the locomotive contract in question. Meanwhile, however, the award of long-term rolling stock contracts to Hudson Brothers and locomotive contracts to Henry Vale and Company had helped to reduce unemployment in the engineering trades by 1881-2 to its lowest point since the early 1850s. Indeed towards the end of 1881 some of the leading firms, including The Australasian Steam Navigation Company Ltd and Hudson Brothers, attempted to overcome a shortage of smiths by lengthening working hours to ten a day and this, on top of the wage reductions in 1879, was seen by the men to be a negation of the advances achieved eight years previously. A spokesman at a meeting of 250 members of the iron trades in September 1881 pointed out that

The men received extra pay for overtime, but it was not that they wanted. Eight hours' work was all they wanted, and if they were not able to do all the work in that time, they thought that extra labour should be employed.¹²⁶

Accordingly the meeting resolved to take 'action to discountenance the attempts now being made to systematically work overtime'. Hudson Brothers, which was being pressed to maintain its delivery schedules, tried to keep the peace by giving a wage increase of 1d an hour.

The next dispute began in August 1882. Early that month the fitters and turners at The Australasian Steam Navigation Company's works sought, and almost immediately received, an increase of 2d an hour 'on account of the high cost of living'. Not to be outdone, the same trades employed by Mort's Dock and Engineering Company made a similar request but this was taken by Mort's to the

Iron Trades Employers' Association. On 11 August all member firms resolved to give a 1d an hour increase as from 1 September. Subsequent negotiations led the Association on 24 August to offer 1d an hour advance immediately and to promise to consider a further increase of 1d three months later, but Mort's employees persisted in their original demands (equivalent to a 13 per cent increase in wages) and went on strike on 25 August. Five days afterwards the Iron Trades Employers' Association resolved that 'the works of all members of the association be closed against all fitters, turners, and blacksmiths on and after 15th September, 1882, until the dispute be settled satisfactorily'. Negotiations during the next few days failed to reach a compromise, and on 9 September the men decided to go on strike 'and remain so until their demand was satisfactorily met'. At about this time the employers asserted that they had been misled by the 'assurances of good faith' promised by the employees in their agreement of 20 September 1880 and had therefore

entered largely into Government contracts with the view of keeping as much work as possible in the country, and decided also to omit the strike clause which they had been accustomed to insert in all large contracts. Even at an advance of one penny per hour, the employers must lose considerably on contracts on hand, and the present action of the men will tend to lessen the confidence hitherto placed in them.¹²⁷

The employees retorted that this assurance had been given to one company only and since it had not obtained the locomotive contract in question the agreement had long since become null and void. There is no need to pursue the details further: on 16 October the men resumed work on the strength of an agreement which increased the hourly rate by 1d and the payment beyond eight hours to double time. The *Sydney Morning Herald* on 14 September again took the opportunity to remind its readers of the long-term implications of disturbances of this kind:

Violations of understandings and disputes that are not to be settled by peaceful compromise, cannot fail to cut away the ground upon which only industrial enterprise can take firm root and flourish.

The real consequences of this dispute became apparent four years later. In 1886 the Railways Department was again critically short of locomotives to operate a railway system that had been greatly expanded during the first half of the decade, but it was clear to employers and employees alike that colonial tenders would have little chance of success unless an assurance could be given that delivery schedules would be met. As indicated earlier in the chapter, drafts of a proposed tender notice for forty-four locomotives were submitted for comment to seven of the leading colonial engineering firms on 2 September 1886, thus giving them advance notice of the government's intentions. It was, presumably, more than mere coincidence that on 15 September the New South Wales branch of the Amalgamated Society of Engineers, in conjunction with the boiler-makers and ironmoulders, entered into agreement with the employers

that for a period of three years we should not ask for an increase of wages or a reduction of hours, and we, on our part, agreed not to cease labour. That was done to give them confidence in any tenders for work that they might put in.¹²⁸

Details have already been given of the way the government called tenders for the locomotives in January 1887, again in April, and yet again—after being assured that colonial manufacturers were trying to induce their workmen to accept lower wages—in November. There is some evidence that employers did try to negotiate some reductions in hourly wage rates but without success for the tenders still remained unacceptably high. The government made a final effort by calling fresh tenders in May 1888 but the two firms, Thomas Wearne and Company and the Atlas Engineering Company, to which the contract was then awarded both threw it up shortly afterwards. Although other factors may have been involved there must be a strong presumption that the stand taken by the unions on wage rates and on the eight-hour issue made it well-nigh impossible for the manufacturers and the government between them to meet the popular demand that all railway equipment should be made in the colony.

Employers' organisations

Manufacturers were slow to create formal organisations to act as forums for the discussion of problems of mutual concern or the expression of views on topical issues. Although they were eligible to belong to the Sydney Chamber of Commerce, founded on 29 March 1851,¹²⁹ it is doubtful whether factory owners had much in common with the views of the majority of importers and wholesalers. This is a topic, however, that awaits more detailed investigation because by no means all industrialists favoured protection and some, including several of the leading footwear manufacturers, combined the functions of importing, making and dealing. Although groups of manufacturers sometimes got together to take collective action, such as by petitioning Parliament, the first formal organisation¹³⁰ appears to have been the Iron Trades Employers' Association which came into existence during January or February 1874. Whereas in October 1873 the employers each negotiated with their employees individually, discussions with the men early in 1874 were conducted (on both sides) on a collective basis which reduced the chance of one firm being played off against another. Hall is correct in asserting that this Association (which survived into the twentieth century) was 'probably somewhat loosely knit for many years' and that its meetings were most likely held on an ad hoc basis 'as circumstances required'.¹³¹ It appears to have lapsed in the late 1870s only to be revived during the iron trades dispute in 1882.

At the end of July 1885 a meeting was called to consider the formation of a Chamber of Manufactures.¹³² The prime mover was Archibald Forsyth, the owner of a rope-making works, who suggested that its initial purpose should be to press for

such an alteration of the tariff as will place manufacturers here on a fair basis to compete with those of Europe, America and the adjoining

colonies, so far as a moderate duty, say 10 per cent, will do so on articles now made here and others that appear suitable.¹³³

The objects of the chamber ranged from disseminating information to arbitrating in disputes between members and between employers and employees. Some effort also went into representing the manufacturers' point of view. On 24 July 1886, for instance, the *Sydney Morning Herald* reported that a delegation had tried to convince the Minister for Works of the need to modify tender conditions and specifications so that local firms could compete on more equal terms, and in December that same year an attempt was made to persuade the Minister responsible for the 'Regulation of Factories and Workrooms Bill' (then before the Legislative Council) to make some of its provisions less restrictive.

Much of the Chamber's time and energy was, however, devoted to promoting the protectionist cause, largely by sponsoring a more broadly based organisation that eventually became known as The Protection Union of New South Wales. The close connection between the two is clear because a dozen or so of the colony's leading industrialists (like W. M. Alderson, A. Forsyth, C. Hoskins, J. Toohey, J. Vicars and T. Wearne) were members of both committees. Yet, despite proselytising forays into country areas and 'monster meetings' in Sydney, the protectionists were soundly beaten at the Legislative Assembly election early in 1887. The Protection Union continued to press its point of view but, apart from a brief interlude in 1889, the advocates of free trade remained in office until 1891 when the newly elected Dibbs Ministry reintroduced ad valorem duties.¹³⁴

The Chamber of Manufactures broadened its horizons in 1887 and 1888 by taking part in the three Intercolonial Free-trade Conferences mentioned already in Chapter 8. There was, of course, nothing new in the idea of a customs union between the colonies;¹³⁵ developments of this kind in Europe, such as the *Zollverein* in Germany, had not gone unnoticed by the metropolitan press whenever the wrangle over border duties in southeastern Australia came to the fore. The *Sydney Morning Herald* on 23 May 1876 went to the heart of the matter by declaring:

Nothing can be more senseless than that these colonies, members of the same empire, should have sentinels from the Customs-house pacing their borders, and repressing the free interchange of produce as much as if they were foreign States, and owed allegiance to different Sovereigns. Such a condition of things, side by side with our aspirations for federation, may well excite the ridicule of English statesmen and the English Press. The first step towards federation must be a rectification of tariffs; and that must not be in the way of protecting each other against foreigners and the mother country.

By the time the manufacturers met a dozen years later, circumstances if not ideologies had changed considerably. In particular, inter-colonial markets had become indispensable to Victoria as the *Age* said on 14 November 1888:

The industry of the colony is developing in a greater ratio than the domestic demand, and it is consequently highly expedient that a timely

effort should be made to create a protected market for our surplus production in the other colonies. This is a selfish motive for advocating intercolonial free-trade, it is true, but in such matters communities as well as individuals are prompted to action by self interest.

Although the desirability of, and advantages to be gained by, the removal of barriers to intercourse between the colonies were widely recognised, the issue could not be divorced from the broader debate about protection and free trade. The former group was, generally speaking, in favour of free trade between the colonies but sought protection against the rest of the world; the latter saw this as the thin end of the wedge—as the ‘smuggling in’ of protection under the guise of a movement towards free trade. ‘The same policy’, judged the *Sydney Morning Herald* on 16 November 1888, ‘will not suit both’. Perhaps the significant point, in the present context, is that the representatives of the New South Wales Chamber of Manufactures at these inter-colonial discussions, despite their protectionist advocacy at home, were solidly in favour of removing tariff barriers between the colonies: ‘we are not afraid’, declared one, ‘of Victorian competition’.

12 The Geography of Manufacturing in New South Wales 1851 to 1890

This chapter examines the relative importance of metropolitan and non-metropolitan factory activity in New South Wales during the forty years to 1890. Sydney has here been defined as the Metropolitan Police District plus Ryde and Hunters Hill Municipalities, the boundaries of which are shown in Fig. 12.3, but it should be noted that during the 1880s some manufacturing establishments were being located (e.g. the flour-mill of Brunton and Company in 1888) or re-located (e.g. the railway rolling stock works of Hudson Brothers Ltd in 1883) in the developing area between Sydney and Parramatta. In 1884 it was even being said that 'Granville is destined to become the Birmingham of New South Wales'.¹

The spatial processes within the metropolis were not unrelated to those in the remainder of the colony. The forces involved were complex to the point where it becomes difficult to be sure of, and even harder to separate, cause and effect: the spatial reorganisation of manufacturing within the metropolitan area and between this and the rest of the colony resulted from countless changes in the milieu acting and reacting on each other. Technological developments were of fundamental importance—the introduction of new brewing and flour-milling techniques, for instance, affected the entrepreneurial and spatial organisation of these industries at both the macro- and micro-levels. Or again, the invention and adoption of mechanical power brought with it a train of consequences. In the clothing and footwear trades it speeded the physical and institutional separation of workplace and residence; in a broad range of other activities the investment in machinery, the incorporation of the steam (or, less often, the gas) engines to drive it through complex arrangements of shafts, pulleys and belts, and the reorganisation of the manpower needed to make the best use of it, all brought home the inadequacies of existing industrial premises no matter whether they were located in Sydney, Newcastle or Wagga Wagga. It was in Sydney, however, that these problems manifested themselves first and most acutely and where the public and private infrastructural investment was available to help solve them.

Some of these incongruities were already becoming apparent even at the beginning of this period. Thus the 1849 legislation to control slaughtering, tanning and other noxious industries in and near the City of Sydney (see Chapter 4) was followed in 1866 by an Act (29 Vic. no. 16) that attempted to mitigate nuisance from smoke in the more densely populated parts of the colony. By this time, too, some manufacturers were finding it difficult to operate efficiently in their existing premises: thus a woollen miller told the Select Committee on the State of Manufactures and Agriculture on 7 October 1862, that if he were to build a new

factory, it would be put up 'in a different way' because 'the mills that are now erected in England have only a ground floor'. The realisation of the advantages of single-storey factory layouts is by no means, as sometimes imagined, a twentieth century phenomenon.

The contours of metropolitan and non-metropolitan factory development

By mid-century a substantial number of industrial establishments had been set up outside Sydney and it seems reasonable to assume that this spread of manufacturing and processing activity persisted during the next twenty-five years. But it would be pushing the available data too far to try to disaggregate spatially the employment estimates for these earlier years. The publication from 1877–8 of annual factory workforce figures for the 'Metropolitan Police District' on the one hand and all 'Country Police Districts' on the other provides some sort of basis for an employment series disaggregated by sex and area (Appendix Table A1.3). In this first year perhaps 11,800—about 40 per cent—of the factory hands earned their livelihood outside Sydney, the main activities being sawmilling (1,250); sugar-milling, as distinct from refining (1,060); brick, tile and pottery making (1,020); tanning and fellmongering (830); and the manufacture of coaches and wagons (620), saddlery and harness-ware (500), clothing (c. 500), flour (460) and footwear (460). Miscellaneous other trades, like meat preserving, brewing, lime-burning and smelting, employed a further 5,100.

The course of events from then on is depicted in Fig. 12.1. Between 1877–8 and 1885–6 the non-metropolitan male workforce appears to have grown at a slightly higher rate (about 7.8 per cent a year) than that in Sydney (about 6.2 per cent) to reach a peak of 20,200; it then stabilised at between 18,000 and 19,000 for three years, made a slight recovery to 19,650 in 1889–90, but became affected by the depression in 1890–1. In Sydney, too, growth slowed during the latter part of the 1880s but peaked again briefly in 1890–1 before declining rapidly and steeply into the depression. While there can be some argument about the precise timing of the start of the decline, there is no doubt that the nadir was reached throughout the colony in 1893.

The course followed by the female factory workforce was quite different. After 1878–9 the level of activity in the clothing industry declined sharply and remained in the doldrums from 1880–1 until 1884–5. At the time this was explained by the 'dumping' of slops and other apparel by Victorian manufacturers, and it is certainly true that recorded imports from that source rose from £100,000 in 1879 to £209,000 in 1884 which would have been enough to deprive some 750 to 1,000 girls of their livelihood. Since most of the clothing industry (apart from the order trade) was concentrated in Sydney, this downturn was mainly reflected in the female factory workforce series for the metropolitan area (Fig. 12.1). By 1885–6 the main female-employing activities were again picking up (significantly, as Fig. 9.1 shows, those in Melbourne simultaneously started to decline), and climbed to a peak in 1890–1 before also collapsing into the depression.

Fig. 12.1: Male and female factory workforces in Sydney and the remainder of New South Wales from 1877-8 to 1900 ('Sydney' is defined in Fig. 12.3). The data are drawn from Appendix Table A1.3.

Elsewhere in the colony there were few industrial employment opportunities for women and girls. In fact by about 1880 the female factory workforce had stabilised at between 700 and 800, most of whom spent their days sewing up clothes at small, country town dressmaking shops. (The 1883-4 'peak' shown in Fig. 12.1 appears to have been simply an aberration of collection or compilation.) The female factory workers in country areas were among the last to feel the effects of the depression in the 1890s, although its impact then was both more severe and longer lasting.

Taken together these events, and especially the depressed conditions in the clothing trades, meant that Sydney's share of the colony's factory workforce actually declined from about 60 per cent in 1877-8 to about 56 per cent during the first half of the 1880s. Sydney then not only regained lost ground but by 1890-1 was accommodating over 64 per cent of the factory employees. The important point is that during the last dozen or so years of this period manufacturing, measured in terms of employment, was *not* rapidly concentrating in the metropolitan area at the expense of the remainder of the colony. But, even so, there was no doubt about the industrial supremacy of the metropolis or—to anticipate a later discussion—the role played within that area by the City of Sydney itself (Figs. 12.2 and 12.3).

During the 1890s, however, Sydney began to forge ahead more swiftly: as Coghlan noted in the middle of the decade,

There has been some tendency for the number of hands employed in the metropolitan district to increase faster than those in the other portions of the Colony. The facilities for the establishment of large industries in and around Sydney are considerable—a commanding position as regards communication with the outside world, propinquity to the coal-fields, easy communication with the chief seats of raw production in the Colony, density of the population, and abundant water supply—these have tended to centre in the metropolitan district all the chief industries. In the extra-metropolitan districts the principal works are saw-mills, smelting works, sugar-mills, and flour-mills, or industries of a domestic character intended to meet a day-to-day demand, or for the treatment of perishable goods.²

Such forces did not, of course, emerge overnight, but were the end result of a number of influences that had been gathering momentum for several years. These can best be examined by a series of case studies illustrating what occurred to (a) ubiquitous industries, (b) industries processing agricultural and pastoral produce, (c) industries based on forest and mineral resources, and (d) a heterogeneous group of other activities. These must be prefaced by some account of the role played by railway freight rates.

Railway Freight Rates

All that can be contemplated here is a broad outline of the freight rates charged on the New South Wales railway system, emphasising the absolute level of charges, the low rates devised to try to attract traffic that might otherwise have passed across or along the Murray River, and the special rates applied at various times to particular commodities or places.

Before 1868 the rate structure was comparatively straightforward, although the frequent publication of new tariff sheets containing detailed amendments suggests that the railway authorities were sensitive to short-run changes in demand and were experimenting with different ways of attracting traffic. Hence, between October 1856 and February 1858 there were five classes of freight charged from 3d to 1/- per ton-mile; this was changed into a three class system at 3d to 9d per ton-mile, and then replaced in March 1860 by a uniform tariff of 3d per ton-mile for all commodities.³ The standard charge for the 34 miles from Sydney to Campbelltown—the temporary terminus of the Southern Line (Fig. 12.4)—thus became 9/- per ton (the early rate schedules did not always keep precisely to the computed figures). Yet another arrangement came into operation on 1 May 1861 whereby minerals, bricks, cement and similar commodities were charged approximately 3d per ton-mile and most other goods approximately 4½d: this remained virtually unchanged for the next six years.

By the end of 1867 the Southern Line had been opened to Moss Vale and the Western Line to Blackheath, and the growing matrix of origins and destinations meant that the charges adhered more closely to the ton-mile rates set at 3d, 4½d, 6d and 9d for Classes 1-4. The opportunity was also taken to introduce a modest

Fig. 12.2: Factory employment in electoral districts in New South Wales during the year ending 31 March 1890. Except in the case of the Sydney Metropolitan Police District as a whole, it is not possible to allocate spatially the omissions and additions detailed in Appendix 1. The proportional circles are on the same scale as those shown in Fig. 9.3. (Source: NSW/SR, 1889, pp. 422-3.)

Fig. 12.3: Factory employment in the local government areas within the Sydney Metropolitan Police District (plus Ryde and Hunters Hill municipalities) during the year ending 31 March 1890. The area within the boundary shown is approximately 140 square miles. The proportional circles are on the same scale as those shown in Fig. 9.1. (Source: NSWSR, 1889, p. 422.)

form of tapering with real distance being reduced by 1 mile in every 5 for goods consigned at least 15 miles: a 1 ton boiler could be sent the 77 miles from Sydney to Mittagong for £2. 8. 6 instead of £2. 19. 9, and a 4 ton load of bricks for £3. 13. 3 instead of £3. 17. 0. Three months later in 1868 the freight schedule was compli-

Fig. 12.4: This map identifies the places named during the discussion of railway freight rates. The distances shown are those from Newcastle on the Northern and Northwestern Lines, and from Sydney on the others. They refer to mileages used in the rate books during this period and are slightly different from those which apply now.

cated by the creation of a Special Class on which 1d per ton-mile was charged in the 'up' direction (that is, towards Sydney) and 1½d on the 'down' journey: in addition a compulsory levy of ½d was made on perishable or easily damaged goods (flour, grain, paper, and so on) thus making the rates 1½d in the 'up' and 2d in the 'down' directions.

A revised schedule coming into effect in June 1869 abandoned the elementary tapering system introduced eighteen months earlier; instituted a basic charge for the first 15 miles (in effect, a terminal fee) plus the appropriate rate per mile thereafter; and slightly raised most of the rates. But, almost before the ink had had time to dry, the Special Class rates were again altered and most of the directional differentials were eliminated.

This sufficiently illustrates the nature of railway freight charges during the earlier part of this period. Between December 1867 and September 1876 no fewer than eleven rate schedules were gazetted, reflecting the constant experimentation with rating systems, the policies of six ministries, the expansion and growing complexity of the railway system, the appearance of new commodities (like preserved meat and kerosene shale), and the emergence of industrial and regional pressure groups. The effect of these changes on a group of representative materials and finished products has been set out in Table 12.1. By and large, apart from the curiously high rates effective between 1 June and 5 September 1869, the level of charges stayed much the same on most commodities during this nine-year period. It seems doubtful whether the differentials charged on some commodities for 'up' and 'down' journeys had much spatial impact because most operated for only short periods. On occasion the bias was even reversed: thus, between 1 March 1868 and 30 May 1869 the rates on hides favoured the 'up' journey to Sydney but from 6 September 1869 they favoured 'down' consignments. The tariffs for the Northern Line were published separately and not always simultaneously with those for the Southern and Western Lines, but there were few significant differences, so that Table 12.1 is reasonably representative of the railway charges as a whole.

The rate sheet that came into effect on 18 September 1876 fully introduced the concept of tapering (which, it will be recalled, was not adopted in Victoria until July 1885). The basic ton-mile charges were discounted by 10 per cent for every mile beyond 100, by 20 per cent for every mile beyond 150, and by 40 per cent for every mile beyond 200. Although these arrangements applied to all three trunk lines they barely affected the Northern Line which at this stage terminated at Murrurundi, only 119 miles from Newcastle. On the Southern Line (opened as far as Binalong a few weeks later), for example, they reduced the cost of sending a 1 ton consignment from Sydney to Goulburn (134 miles) by about 2.6 per cent and from Sydney to Yass (187 miles) by about 6.6 per cent. Directional differentials applied to only seven commodities, but these had a considerable impact as the following examples indicate:

Commodity	To Sydney from		From Sydney to	
	Goulburn	Yass	Goulburn	Yass
Colonial wine, pig and scrap iron, preserved meat	£0.17. 5	£1. 2.11	£1. 5. 8	£1.13.11
Iron bar and plate	£1. 5. 8	£1.13.11	£1. 9. 1	£1.18. 3
Hides	£2.15. 2	£3.13. 6	£1. 5. 8	£1.13.11
Kerosene oil, leather	£2. 4. 6	£2.19. 3	£2.15. 2	£3.13. 6

The opening of the Western Line as far as Orange in April 1877 and the Southern

Table 12.1 Railway freight rates charged in New South Wales on representative commodities, 1867-75

Commodity	'Up' or 'Down'	1 December 1867 ^a	1 March 1868 ^a	1 June 1869 ^a	6 September 1869 ^a	1 July 1870 ^c	1 August 1871 ^c	1 May 1873 ^c	9 November 1875 ^c
Agricultural machinery	U + D	*6d	*6d	7d	7/6 + 5½d	7/- + 5d	7/- + 5d	7/- + 5d	9/- + 7d
Bricks (4 ton lots)	U	3d	3d	1½d	2/6 + 1½d	3/6 + 2d	4/9 + 2½d	4/- + 2½d	3/- + 1½d
	D	3d	3d	1½d	2/6 + 1½d	3/6 + 2d	5/6 + 2½d	4/- + 2½d	3/- + 1½d
Boilers	U + D	*9d	*9d	3d	7/6 + 5½d	7/- + 5d	7/- + 5d	7/- + 5d	7/- + 5d
Cement	U + D	*4½d	*4½d	5½d	4/- + 4d	5/- + 4d	6/- + 4d	6/- + 4d	6/- + 4d
Copper ingot	U + D	3d	3d	5½d	4/- + 4d	7/- + 5d	6/- + 4d	6/- + 4d	6/- + 4d
Copper ore	U	3d	1d	1½d	2/6 + 1d	3/- + 1½d	4/- + 2½d	3/- + 1½d	3/- + 1½d
	D	3d	1½d	1½d	2/6 + 1d	3/- + 1½d	4/9 + 2½d	3/- + 1½d	3/- + 1½d
Flour (per 2,000 lb)	U	*4½d	1½d	1½d	2/6 + 1½d	3/- + 1½d	3/- + 1½d	3/- + 1½d	3/- + 1½d
	D	*4½d	2d	4½d	2/6 + 2d	3/- + 1½d	4/- + 2½d	3/- + 1½d	3/- + 1½d
Hides	U	*4½d	1d	4d	4/- + 4d	5/- + 4d	7/- + 5d	7/- + 5d	7/- + 5d
	D	*4½d	1½d	4d	2/6 + 1½d	3/6 + 2d	4/9 + 2½d	4/- + 2½d	4/- + 2½d
Iron pig	U	3d	1d	1½d	2/6 + 1d	5/- + 4d	6/- + 4d	6/- + 4d	6/- + 4d
	D	3d	1½d	1½d	2/6 + 1d	5/- + 4d	6/- + 4d	6/- + 4d	6/- + 4d
Leather (in bundles)	U + D	*6d	*6d	4d	4/- + 4d	5/- + 4d	7/- + 5d	6/- + 4d	6/- + 4d
Millinery (in cases)	U + D	*9d	*9d	7d	7/6 + 5½d	8/6 + 6d	9/- + 7d	9/- + 7d	12/- + 9d
Sugar	U + D	*6d	*6d	7d	7/6 + 5½d	8/6 + 6d	9/- + 7d	7/- + 5d	7/- + 5d
Timber undressed	U	3d	3d	1½d	2/6 + 1½d	4/- + 2½d	5/6 + 2½d	5/- + 2½d	5/- + 2½d
	D	3d	3d	1½d	2/6 + 1½d	4/- + 2½d	6/- + 4d	5/- + 2½d	5/- + 2½d
Timber dressed	U + D	*4½d	*4½d	7d	4/- + 4d	7/- + 5d	7/- + 5d	7/- + 5d	7/- + 5d

^a Charge calculated on the basis of a rate per ton-mile for the whole distance, *minus* an allowance of 1 mile on every 5 miles beyond 15 miles for the whole distance, *plus* a terminal charge of 2/- on class 2-4 goods (marked with asterisk). Thus, a ton of agricultural machinery sent from Sydney to Picton (53 miles) would have been charged 21/6d (6d × 43) plus 2/-, or 23/6d.

^b Charge calculated on the rate per ton-mile × distance: thus agricultural machinery to Picton would have been charged 30/11d (7d × 53) per ton.

^c Charge calculated on the basis of a set amount for the first 15 miles plus the rate per mile for the remaining distance: thus agricultural machinery to Picton would have been charged, in July 1870, 7/- plus 15/10d (5d × 38) or 22/10d.

Source: NSWGG, *passim*.

Line to Bomen (North Wagga Wagga) in September 1878 enabled the Railways Department to start trying to capture some of the traffic that had been moving from the west and south of the colony towards Melbourne. One step was to reduce the rate on refined copper from 4d to 2½d per ton-mile to induce the Cobar mining companies to send their products 240 miles southeast to Orange for transmission by rail to Sydney instead of 80 miles northwest to Louth, along the Darling and Murray rivers to Echuca, and thence via rail to Melbourne. More generally significant was the granting from 13 September 1878 of an additional 20 per cent discount on all goods in Classes 1-4 carried more than 300 miles: its effect can be illustrated by comparing the charge per ton applicable between Bomen and Sydney:

Class	Without discounts	With existing discounts	With additional discounts
1	£5. 2. 4	£4. 3. 6	£3. 6.10
2	£6. 7. 5	£5. 3.10	£4. 3. 1
3	£8.17. 7	£7. 4. 7	£5.15. 8
4	£11. 8. 9	£9. 6. 4	£7. 9. 1

The existing system of discounts reduced the cost distance between these two places from 304 to 248 miles and this additional 20 per cent discount reduced it to 198 miles. People at places like Junee just less than 300 miles from Sydney also took advantage of it by arranging for consignments to be sent to, say, Bomen and then a few miles back again. The savings per ton were, undoubtedly, worthwhile:

Class	Sydney to Junee direct	Sydney to Bomen	Bomen to Junee	Sydney to Junee via Bomen
1	£4. 0. 1	£3. 6.10	£0. 6. 8	£3.13. 6
2	£4.19. 7	£4. 3. 1	£0. 7.10	£4.10.11
3	£6.18. 7	£5.15. 8	£0.10. 2	£6. 5.10
4	£8.18. 8	£7. 9. 1	£0.13. 6	£8. 2. 7

In this roundabout way, considered to be perfectly legitimate by the Attorney-General,⁴ Junee residents 'moved' themselves, in 'cost-distance' terms, 35 miles nearer Sydney.

On 3 February 1881, coinciding with the opening of the Southern Line to the border at Albury, a new freight schedule (a) made the additional 20 per cent discount applicable only to Class 1 and Class 2 goods carried distances of more than 340 miles, and (b) set £6.10.0 and £7.10.0, respectively, as the maximum charge per ton for Class 3 and Class 4 commodities consigned more than 307 miles. These concessions, applying between any points on the railway system in both the 'up' or 'down' directions, were really designed to distort the space between Sydney and Albury which in cost-distance terms was reduced by 100 miles for Classes 1 and 2, by 124 miles for Class 3, and by 163 miles for Class 4. At the same time, higher than scheduled rates were applied on commodities moving in the 'up' direction from Albury to Culcairn and Junee thus pushing these places in cost terms further away from the border. This unusual step, taken to counteract the rebates allowed by the Victorian railways on goods consigned to destinations north of the Murray River, turned out to be a weak weapon because the rate by bullock team from

Wodonga to Wagga Wagga was only 35/- or a good deal less than the 40/- to 87/9d being charged for sending Classes 1-4 goods by rail.

The normal tapering rates, the additional 20 per cent discounts, and the fixed charges beyond certain minimum distances, all applied in both directions so that the real space between any two points on the railway systems was equally distorted. The few exceptions—such as lower rates on pig iron, preserved meat and jam consigned in the 'up' direction towards Sydney—benefited only a handful of country-based firms.

By October 1882 the Northern Line had advanced to Uralla, the Northwestern Line to Narrabri, the Western Line to Nevertire, and the Southwestern Line to Hay (Fig. 12.4). The revised rate schedule which came into effect on 4 October 1882 to take account of these extensions, along with another arrangement gazetted less than a fortnight later, both marked the beginning of changes in policy which were to have considerable spatial ramifications. First, the 20 per cent additional discount on Classes 1 and 2 commodities was now given only on consignments originating from, or dispatched to, Sydney over distances of more than 340 miles. At the same time, the maximum charges on goods carried to or from Sydney for distances of between 307 and 380 miles were set at £6.10.0 (Classes 1-3) and £7.10.0 (Class 4), and, for distances of more than 380 miles, at £5.10.0 and £6.10.0. Sydney's position as the focus of the system was further enhanced by a second concession. On 16 October a 6 ton truck rate of £20 came into operation which applied only to goods dispatched *from* Sydney to points 305 miles or more away on the Southern and Southwestern Lines. Overnight, metropolitan merchants and manufacturers were able to reach places like Wagga Wagga and Coolamon and beyond for £3.6.8 per ton which was the usual charge for Class 1 goods for 228 miles, on Class 2 goods for 166 miles, on Class 3 goods for 115 miles, and on Class 4 goods for a mere 88 miles.

Not surprisingly, these rate differentials led to petitions and protests which continued for much of the decade. People at Junee pointed out that it cost them £6.18.7 to obtain a ton of Class 3 goods from Sydney whereas people at Wagga Wagga, 22 miles further down the line, could get theirs for £3.11.11 less; manufacturers at Goulburn complained that their Sydney rivals could land commodities in Class 1 at Culcairn, in Class 2 at Wagga Wagga, in Class 3 at Cootamundra, and in Class 4 at Harden more cheaply than they could. Manufacturers elsewhere were unhappy about other anomalies in the freight rates. Two brewing companies at Orange wrote to the Commissioner for Railways in December 1882 drawing attention to the fact that it cost them £4.4.4 to send a ton of beer 149 miles west to Nevertire (then the terminus of the Western Line) whereas Sydney beer could be carried the 341 miles there for only 6/1d per ton more. This was because the metropolitan breweries benefited from an arrangement whereby beer sent more than 340 miles was charged at Class 2 instead of Class 3 rates and, in addition, was eligible for the discount on consignments sent more than 340 miles from Sydney. Since, on the one hand, the Orange breweries had to freight their hops, malt and sugar (perhaps making up about one-third of the weight of the finished product)

from the seaboard and, on the other, the Sydney breweries probably enjoyed some economies of scale, it is not difficult to see how railway freight policies were beginning to help metropolitan firms enlarge their market areas at the expense of those in the country. This same example also illustrates how inter-colonial competition was beginning to overshadow local interests. The chief reason for allowing a discount to places on the Western Line more than 340 miles from Sydney was to counteract the growing practice of people at Cobar obtaining their supplies from Melbourne via Albury and Narrandera: the freight policies thus contrived to make Sydney both the cheaper source for general goods and the cheaper outlet for refined copper. The short-run intention was to help New South Wales compete with Victoria but a longer-term effect was to enhance the role of the metropolis within the colony itself.

The distances on the Northern Line were insufficient to bring any of the additional discounts into operation and only the ordinary schedule rates applied. Even so, people found cause for complaint. As a nice reversal of the representations from Orange, a brewing company at Newcastle wrote to the Minister for Public Works in January 1883 protesting that since the freight to Uralla on colonial wine was only £1.15.0 per ton, the charge of £6.3.11 on beer was excessive. The feeble nature of its argument—illustrative of a good deal of the agitation about railway rates in the 1880s—is demonstrated by the following extract from its letter:

It may be argued that to reduce the rate would be detrimental to the interest of the up-country brewers; but that would be protection. The material they make their beer from, viz., hops, malt, and sugar, does not come to more than one-third . . . of the weight of beer, that is, the material is only one-third of the weight of the manufactured article; so in sending beer up the country, it is necessary to pay freight on two-thirds water.⁵

The curious logic that, since water had little intrinsic value, the freight on beer was too high did not impress the Commissioner for Railways who pointed out that the existing tapering system 'saved' the Newcastle firm £2.12.3 per ton over this distance. The comparison between beer and wine rates was considered irrelevant, moreover, because the latter had for many years been kept low as a matter of social policy (itself a revealing comment) to try to encourage people to turn to a more wholesome alternative than spirituous liquor. Further investigation showed that the firm's real 'object in seeking a reduction in the rate was to supply the navvies engaged on the railway [then being constructed north from Uralla], who were now being supplied by the local brewers of Tamworth and Armidale'.

The published files of the Railways Department make it clear that all complaints about freight charges were examined carefully and were often taken into account during revisions of rate schedules. Thus, on 25 June 1883 the additional 20 per cent discounts were made to apply only to the Southern and Southwestern Lines (a change facilitated by the opening, during that month, of the Western Line to Nyngan, only 80 miles from Cobar). As a matter of detail, the opportunity was also

taken to heed the brewers' representations by reducing the freight on beer from Class 3 to Class 2 rates irrespective of distance.

On the Southern and Southwestern Lines the arrangements were: (i) a continuation of the 20 per cent discount on Class 1 and Class 2 commodities sent to, or originating from, Sydney travelling more than 340 miles; (ii) a maximum charge of £5.10.0 per ton on *any* class of goods dispatched *from Sydney* to points more than 305 miles away; and (iii) a continuation of the £20 6 ton truck rate on Classes 1-4 goods sent *from Sydney* for more than 305 miles. The significance of this latter concession has already been explained. Taken together the first two introduced an 'up' and 'down' differential on 1 ton lots of commodities in Class 3 (e.g. machinery, tinware and many groceries) and Class 4 (e.g. acids, furniture and millinery) consigned more than 305 miles to or from Sydney. This can be illustrated as follows:

Class	Wagga Wagga-Sydney (309 miles)		Narrandera-Sydney (347 miles)	
	'up'	'down'	'up'	'down'
1	£4. 4. 6	£4. 4. 6	£3.13. 8	£3.13. 8
2	£5. 5. 1	£5. 5. 1	£4.11. 8	£4.11. 8
3	£7. 6. 4	£5.10. 0	£7.19. 7	£5.10. 0
4	£9. 8. 7	£5.10. 0	£10. 5. 8	£5.10. 0

Expressed in another way, Class 3 and Class 4 commodities were, in effect, carried at no additional cost beyond, respectively, 206 and 151 miles.

On the Western and Northern systems the usual rate-book charges were made, with distinctions between 'up' and 'down' movements applying on only a handful of commodities. As these lines were extended, the tapering rates adopted in 1876 increasingly worked in favour of firms located in Sydney and Newcastle. For example, it cost brewers at Orange 3.32d per gallon (assuming 4 hogsheads—220 gallons—to the ton) to send beer to Nevertire compared with 6.17d per gallon from Sydney whereas at Nyngan, 36 miles further down the line, the respective charges were 3.97d and 6.66d per gallon. The translation of a commodity from a higher to a lower rated classification (the reverse process being rare) also benefited Sydney and Newcastle firms as can be seen from a comparison of the freight (in pence per gallon) on beer consigned to Uralla from three competing sources before and after 25 June 1883 when it was moved from Class 3 to Class 2:

From (miles)	Class 3 rates	Class 2 rates	Per cent reduction
Newcastle (245)	6.76	4.86	28.1
Tamworth (63)	1.99	1.45	27.0
Armidale (15)	0.49	0.38	22.2

Two amendments were incorporated in a new schedule effective on 1 October 1885. First, the maximum charge of £5.10.0 for a 1 ton consignment of any class of goods from Sydney to destinations on the Southwestern Line was made to apply after 340 miles (instead of 305 miles) which simply raised the 'down' charges to a few relatively unimportant places like Coolamon and Grong Grong. Second, and much more important, the clause relating to the additional discount of 20 per cent

on Class 1 and 2 goods was reworded from 'between Sydney and Stations . . . distant over 340 miles' to 'from Sydney to Stations . . . distant over 340 miles' on the Southern and Southwestern Lines. This put paid to any prospect that manufacturers could locate at an intermediate point like Albury with the intention of serving both the Sydney and Melbourne markets.

By this time the critics of the railway freight rate policies were becoming more vociferous. Although many of the assertions were factually incorrect or used exaggerated and implausible examples,⁶ it was true as has been shown that some sections of the rating system worked in favour of metropolitan firms and, on occasion, benefited those in one country town more than another. A continuing *cause célèbre* was that Junee people could save from 5/1d to 94/9d per ton on Classes 1-4 goods by having 6 ton truck loads sent on from Sydney to Wagga Wagga and then returned the 22 miles at ordinary rates. What also continued to irk the storekeepers there were the specially high rates imposed on Victorian commodities consigned north from Albury: Class 3 goods, for instance, were charged £4. 7. 0 in the 'up' direction as against £2.18. 0 the other way. With some justification the Junee district saw itself as a badly treated victim of the inter-colonial border manoeuvres. But the Commissioner for Railways met this and similar criticisms by defending the existing arrangements:

Uniform mileage rates, which some large number of persons advocate, because of the apparent justice of this mode of charging, would have no other effect than to enhance unduly the value of property and the development of its resources within a certain area of the shipping ports or markets of disposal, and to render unprofitable for cultivation all land beyond that area. Differential rates are therefore absolutely necessary for the development of the resources of a country and to create traffic for its railways, even in circumstances in which the element of competition for the traffic is absent. In cases where the traffic is competed for by opposing systems of carriage, or by different routes to reach the same, or perhaps another central market, the introduction of anomalies in the rates of charges is carried necessarily to a degree which, to the uninitiated, seems absurd.⁷

When generalisations of this kind had failed to satisfy the advocates of uniform rates, departmental officers carried out an investigation of the likely effects of such a policy. They concluded that 'if an equal mileage rate were adopted on these lines [in southern New South Wales], Victoria would secure nearly all the traffic south of Cootamundra, while we should lose all the traffic (salt, oil-cake, and woolpacks excepted) between Junee and Albury', and supported this view by calculating that the uniform rate to Cootamundra from Sydney (253 miles) would be £6. 6. 0 per ton for the bulk of the freight as against £5. 8. 0 per ton from Melbourne (323 miles). The commissioner also emphasised that the main way in which Victorian competition had been met had been by introducing the £20 6 ton truck rate in October 1882 'which, while it offered a lower average rate per ton than formerly, had also had the effect of securing full loads for the waggons, and so yielded about

as much revenue per waggon . . . thereby securing the traffic without loss'. The nub of the problem was that

after the success that has attended the efforts of the Department to secure, against keen competition, the trade of our Colony, any action that may be taken to alienate it will be greatly to be deplored, not only in the interests of the Railway Department and its revenue, but of the Colony generally, the commerce of which will be, in a material degree, prejudicially affected.

Despite these calls for a complete reorganisation of freight rates, most of the changes during the remainder of the decade tended to add to existing anomalies. Early in 1886 a £30 6 ton truck rate was instituted for goods consigned from Sydney to Bourke which had been linked to the railway system the previous September. This meant that Sydney beer could be landed there at 5.45d per gallon compared with 5.76d from a brewery at Orange nearly 200 miles closer. A few months later a 'deferred truck rate' system was started whereby Classes 1-4 commodities consigned to Wagga Wagga and beyond on the Southern Line or to Narrandera and beyond on the Southwestern Line could be held at the Redfern (Sydney) depot until a truck load of not less than 6 tons was made up. The charge for this was £4 which, although 13/4d higher than the normal truck rate, meant a considerable saving (from 12/1d to 125/8d in the case of goods to Narrandera) on ordinary tonnage rates. Small businesses in Sydney were thus given access to truck rates and placed on a more equal footing with their larger competitors.⁸ Then on 4 June 1889 a truck rate of £27 for general merchandise consigned from Newcastle (and of £30 from Sydney) to Guyra and beyond was gazetted. This not only reduced the cost of Newcastle's products in the northern districts of the colony but gave it an advantage over other Hunter Valley towns: beer could be consigned from Newcastle to Tenterfield for 4.91d per gallon (as against 6.71d previously) whereas it cost a competitor at West Maitland, 20 miles nearer, 6.44d. Equality (and equanimity) were restored on 23 July and 17 September 1889 when the truck rate was also applied to goods consigned, respectively, from West Maitland and Morpeth. These were the first and only instances in which a truck rate concession was given to inland towns and well illustrated the fear of the Railways Department that once one place received such a favour others nearby would demand similar treatment. Thought had previously been given to freight concessions that might encourage manufacturing at inland towns but any such arrangement had been dismissed as unworkable because of the onus it placed on railway staff to try to differentiate between locally made products and those originating elsewhere that were simply being reconsigned, and as undesirable because dishonest railway employees might be given inducements not to pursue their enquiries too closely.

As a counter-balance, some measures were retained or initiated that assisted country-based industries. The long-standing lower 'up' rates to Sydney (and, from 1885, to Newcastle) on leather and preserved meat, which, it was claimed, had been established to encourage exports, were continued and in 1888 were supplemented by a few specific special rates. The kerosene works at Hartley Vale and Joadja were

aided by reduced charges on crude oil, refined kerosene and candles sent to Sydney and on tin plate and empty containers in the opposite direction; similarly, paint, pottery and iron manufactured at Lithgow were granted advantageous rates. In the total scheme of things, however, these concessions did not amount to much. The only important change in policy was the introduction of a 'milling-in-transit' arrangement whereby country millers were able to retain the advantage of tapering rates when wheat was processed during the course of its journey to the seaboard: the details of these arrangements, gazetted early in 1888, are considered later.

It can be seen how railway freight rates, especially in the peripheral parts of the colony, tended to operate in favour of Sydney. But, to be fair, no evidence has been found to suggest that this came about as a result of deliberate manipulation by metropolitan interests. By itself the tapering of rates, which had become a common railway practice in other countries, would probably have been only mildly beneficial to Sydney. The main distortion of real space, and the appearance of anomalies in the rates to nearby towns, resulted from the introduction of truck and maximum charge rates in areas where there was inter-colonial or modal competition. Given the determination of Victoria to try to retain its markets in the southern and western parts of New South Wales and the propensity of settlers in these areas to orientate themselves to the cheapest sources and outlets, it would be unrealistic to imagine that relatively small-scale manufacturers in country centres like Goulburn or Orange could have done much business in these markets. If New South Wales had been deprived of the revenue from wool on the 'up' journey and general supplies and station materials in the 'down' direction, the chances are that rail freight rates would have been generally higher, whereas in fact during the 1880s the rates on a wide range of categories were reduced. The great virtue of the truck rates was their simplicity: any scheme to apply them to consignments originating in other towns would have been extraordinarily complicated and would have created even more anomalies. The Newcastle-West Maitland-Morpeth situation described earlier is one example; another was that the quantity of goods emanating from smaller towns was insufficient to make up truck loads to particular destinations on a regular basis. It seems fair to conclude that while Sydney undoubtedly gained at the expense of some country towns, their loss would probably have been even greater if New South Wales had remained indifferent to Victoria's commercial ambitions.

Ubiquitous, Market Orientated Industries

During the forty years to 1891 the non-metropolitan population of New South Wales increased sixfold from 120,000 to 750,000. A rough appreciation of the possible absolute and relative changes in the demand for day to day consumer goods can be obtained from the decennial increases in adult male equivalents:

Decade	Non-metropolitan	Metropolitan	New South Wales
1851-61	100,800 (7.9)	24,500 (4.6)	125,300 (6.9)
1861-71	75,300 (3.4)	28,600 (3.6)	103,900 (3.5)
1871-81	117,600 (3.8)	65,100 (5.3)	182,700 (4.2)
1881-91	162,900 (3.6)	114,900 (5.5)	277,800 (4.2)

The average annual growth rates, shown in brackets, indicate that after the more hectic 1850s, the increases during the remainder of the period settled down to between 3.4 and 3.8 per cent. After the mid-1850s growth in the old 'settled areas' outside Sydney was comparatively slow (Table 11.2) whereas more distant parts of the colony displayed vigorous growth. About 336,000 people settled (or were brought up) beyond the limits of the twenty counties, increasing the proportion of the colonial total there from a mere 13 per cent in 1851 to 31 per cent forty years later.

The usual emphasis on land settlement in Australian historiography has tended to divert attention from the concurrent process of town formation, the basic statistics of which were given in Table 10.3. Outside Sydney the ratio of urban to rural inhabitants changed from 17:83 in 1851 to 22:78 in 1861, 27:73 in 1871, 38:62 in 1881 and 46:54 in 1891. But, as indicated in the previous chapter, most of the towns that had emerged by 1891 were small: apart from Newcastle, the exceptional case of Broken Hill, and Parramatta (which, though physically separate, was becoming an outlier of the metropolis), the only 'country' towns to have achieved any measure of success were Goulburn, Bathurst, West Maitland, Albury and Orange, none of which had more than 11,000 inhabitants.

Also important from the present point of view was the fact that these settlements were spread over a large area and separated by tracts of sparsely populated country. Measures of density can be quite misleading because they take no account of areas unsuitable or unavailable for settlement but, as a rough guide, the density of the non-urban population in the nineteen counties outside Cumberland County averaged no more than four persons per square mile: even in relatively intensively settled areas like the Hunter Valley it seldom reached above fifteen persons. Furthermore, in several areas, towns apparently close together were in fact separated for most practical purposes by rugged terrain or unbridged rivers prone to flooding.

The picture that emerges, then, is of a network of relatively small settlements each serving the needs of a confined area. Jeans has rightly emphasised that New South Wales 'towns were true urban places, rarely containing farmers or farm workers, who lived instead on the properties, so that they could not be compared with English "villages"'.⁹ Even the smaller ones contained a surprisingly wide variety of functions which further enabled and encouraged them to lead separate existences. Moreover, in general, towns appear to have grown not so much by increasing the *range* of functions as by replicating the number of units engaged in each: church vied with church, pub with pub, and blacksmith with blacksmith. Although a full investigation has yet to be completed, Higman's observation, relating to the northern coastal areas of New South Wales, that 'large towns were

distinguished by the number of functional units they contained, not by their support of a wider range of functions'¹⁰ seems to have been broadly true of the colony as a whole.

Taken together these circumstances militated against the development of higher order centres serving a wider regional market. Manufacturers were thus caught up in a cause and effect situation: the available market remained too small to allow economies of scale and they were less able, therefore, to withstand competition from Sydney-made or imported goods, and this, in turn, limited the potential market still further. In those towns which did manage to forge slightly ahead, the sales available to any particular enterprise were restricted by the appearance of additional, equally small-scale, competitors. For these reasons a wider range of industries tended to be 'ubiquitous' than in Victoria where the later development of inland towns, the spatially more compact form of urbanisation, and the rapid emergence of a better defined urban hierarchy appear to have limited the number of activities that can properly be described in this way. This remains as yet a tentative hypothesis derived from fragmentary literary evidence. Suitable business records for country firms making, for instance, boots, beer or wagons that would enable the point to be examined further are, unfortunately, almost completely lacking. It can be noted, however, that in 1878, when there were fewer than 100 places with 500 or more population in non-metropolitan New South Wales, the *Statistical Register* recorded in country districts 279 brickyards (averaging 4 hands each); 184 saddlery and harness-making establishments (3.5 hands); 119 'cordial' and aerated water factories (3.5 hands); 103 coach and wagon works (6 hands); 89 tanneries (5 hands); and 39 agricultural implement-makers (6 hands).

Evidence about the extent and possible overlap of market areas for 'ubiquitous' products is obscured in several ways. First, sales of commodities like beer or boots beyond the local area were sometimes boosted by temporary circumstances such as the presence of itinerant railway construction gangs¹¹ and the hesitation of the railhead at some places for several years—for five at Murrurundi, for instance, and three at Orange. Second, country manufacturers sometimes also acted as agents for imported or Sydney goods: only 40 per cent of the boots railed out of Goulburn to the Riverina during the first quarter of 1887 were made in that town. Third, the viability and circulation of country newspapers (and hence, to some extent, the geographical range of advertising and reporting) were affected by the imposition of a postal charge of 1d per copy between April 1864 and October 1873: before and after this period newspapers were exempted.

It seems to have been rare even for particular firms to break out of this system. Few instances have come to light of, say, a small foundry building up a particular line of business and gradually establishing a colony-wide name for itself as occurred from time to time in Victoria. One major reason, explored later, was the virtual absence of backward linkages with industries like gold and copper mining, and the failure of other stimuli to emerge in their place: much of the sugar-milling equipment used on the North Coast, for instance, was obtained in Sydney or overseas. This had the further consequence that few country firms were able to

accumulate the skills, plant or capital to undertake government contracts (which required a surety to be lodged before the formalities could be completed), even for relatively simple work such as the supply of railway wagons despite the fact that the government provided much of the equipment like wheels, axles, buffers and drawbar springs.¹² Moreover, firms like Duncan Sims and Company at Morpeth did not enhance their image by submitting tenders without even sighting or sending for copies of the specifications. By trial and error the Railways Department learned that only three or four manufacturers outside Sydney—at Newcastle, West Maitland and Bathurst—could be relied upon to stick to specifications and schedules.

Occasionally, nonetheless, a firm (like the one at Dubbo which advertised the quality of local 'mineral waters') or a group (such as the workboot manufacturers in Goulburn) established something of a reputation for quality or reliability and managed to penetrate more distant markets. Thus, during the first three months of 1887, the Goulburn bootmakers dispatched 21 hundredweight of their wares 175–200 miles (to places like Wagga Wagga); 26 hundredweight 201–250 miles (Yerong Creek, Narrandera, etc.); 31 hundredweight 251–300 miles (Albury, Jerilderie, etc.); and 8 hundredweight 320 miles to Hay.¹³ As was suggested in the earlier discussion about railway freight charges, the introduction in October 1882 of the £20 6 ton truck rate from Sydney made it difficult for country firms to maintain—much less extend—distant connections of this kind. It can be roughly calculated, for instance, that a pair of boots retailing at 5/- could be dispatched to Hay from Sydney (454 miles) for 1.8d and even all the way from England for 2.6d whereas the freight on a pair made 320 miles away in Goulburn would have been about 5.2d.

Brewing

The brewing industry illustrated several of these points. During the 1840s and 1850s about a dozen small breweries were established outside Sydney, mainly by the proprietors of hotels in places like Goulburn, Bathurst and Maitland, but it was not until the late 1860s that specialist brewing firms began to emerge. The contrast with the situation in Victoria is striking. In 1871, when country brewing in that colony was reaching its zenith with 100 establishments in operation, there were no more than 20 breweries functioning in country districts of New South Wales. Then during the next twenty years, while the number of country breweries in the southern colony was diminishing, the number in New South Wales continued to grow until it reached a peak of 62 in 1887.

Several factors help to account for these contrasts, not the least of which was the difference in the numbers of males aged fourteen or more in the country areas of the two colonies:

	Adult males (000s) outside the metropolitan areas in	
	New South Wales	Victoria
1861	104	198
1871	134	191
1881	194	205
1891	277	244

Since this segment of the population presumably consumed most of the fermented liquors, these figures speak for themselves. Moreover, in New South Wales per capita consumption of beer may have been slightly less (possibly because of the partial substitution of wine and spirits).¹⁴ Contemporary observers noted the relatively slight development of brewing in New South Wales and put this down to the fact that

The taste for colonial ale and porter was developed in Victoria more extensively and very much earlier than here; for the people of New South Wales continued in their allegiance to 'British Beer' long after 'Colonial' was the principal malt liquor of our southern neighbours; and the ale of Castlemaine became an extensive article of commerce among us, almost before Sydney had more than a second brewery of her own. Then, there was the Hobart Town ale, for which several agencies were established here. . . .¹⁵

But during the 1870s this situation began to change. Tooth and Company's Kent Brewery (whose only real opposition had been from Marshall's Paddington Brewery founded in 1856) found itself having to compete against Toohey's Standard Brewery (1871), the Castlemaine Brewery (1870) and the Waverley Brewery (1874), the latter two being established by a Victorian and a South Australian partnership, respectively. Some stimulus to local brewing may have been provided by the customs duties of 3d and 6d per gallon on beer imported in barrels and bottles, effective from 29 November 1865, which were increased to 6d and 9d on and after 9 March 1871. But there appears to be substantial agreement that

when a branch of the Victorian Castlemaine firm settled down in Sydney and began to supply an article equal in every respect to that produced in the sister colony, our established city breweries found that it was time to look to their laurels and to keep pace with the improvements then going on . . . This brewery may be said to be the pioneer of the new state of things in brewing, the introduction of the light Castlemaine ale having driven the old-fashioned colonial ale, known familiarly as 'stringy-bark', completely out of the market, substituting for it a good, sound, and wholesome drink that is fast superseding in public estimation the heavier ales imported from England.¹⁶

This was confirmed by J. M. Toohey, hardly a disinterested witness, in evidence to the Intoxicating Drink Inquiry Commission in August 1886 when he commented that

Until the establishment of the Castlemaine Brewery and our own brewery a large firm here did not care what kind of beer they brewed.

Competition made a complete alteration. The brewers imported first-class men, and there was a keen race between us for public taste. This necessarily led to the production of a better article.

Even so it seems that Sydney brewers showed less enterprise than their Melbourne counterparts in adapting their plant and processes to overcome climatic problems or to adopt new brewing techniques: during the course of his evidence Toohey said that it would be impossible to produce lager beer because of the low temperatures required, and in fact 'bottom fermentation' was not undertaken until 1896, twelve years later than in Victoria. The Commission noted that poisonous fusel oil had been found in analyses of Sydney beer but chose to blame weaknesses in the existing legislation rather than the brewers who,

for climatic reasons, are obliged to brew (practically) all the year round, and they cannot be condemned for brewing at higher temperatures than are obtainable in countries favoured by a colder climate.¹⁷

Nonetheless towards the end of the 1880s processes were being set in motion that led to the entrepreneurial and spatial concentration of brewing in Sydney during the 1890s and the first few decades of the twentieth century. Almost simultaneously in 1888 two of the chief brewing firms were converted into public companies: Tooth and Company Ltd on 30 June with a nominal capital of £900,000 and Marshall's Paddington Brewery Ltd on 6 August with a nominal capital of £125,000. By this time, too, the struggle between the leading breweries to secure outlets by 'tying' hotels was intensifying. Under this system, which was said to have been started in Sydney in the mid-1870s by the South Australian owners of the Waverley Brewery, a brewer would advance a third or half the capital required for a publican to acquire a hotel on condition that he bought all his supplies of beer from that firm. No one could (or would) give the Intoxicating Drink Inquiry Commission a firm estimate of how many of the 820 or so licensed premises in the metropolitan area were tied in this way but several witnesses thought that it might be about half. However, it was given an indication of the outlays involved by a return showing that in the mid-1880s five Sydney breweries held bills of sale for £57,550 in respect of eighty-eight hotels. Apart from this there was growing competition for the bottle trade which had been stimulated by the Licensing Act, 1882. Because licensed premises had to close at 11 p.m. instead of midnight and were prohibited from trading on Sundays, people took to buying bottled beer to see them through the weekends. One effect was to boost annual imports of bottled beer from about 570,000 gallons (average of 1877-9) to 1,210,000 gallons (average of 1884-6), without any compensating fall of imports in the wood, and this forced metropolitan brewers to invest in, or enlarge existing, bottling plant to try to hold their share of the market.

The picture that emerges, then, is that during the 1880s the Sydney brewers were largely preoccupied with the struggle for the metropolitan market. One example was the amalgamation and eventual collapse of the firms operating the 'Australian' and the 'Castlemaine' breweries. Briefly, the first-named establishment was set up

as a private company in the suburb of Waterloo towards the end of 1886 by the three Cornwell brothers who had been employed by the brewing firm Tooth and Company.¹⁸ They built the business up using tied house outlets although these were mainly held under terminable leasehold rights without the option of renewal, thus making them easy prey in due course for other brewers. On 11 March 1890 the Cornwells agreed to amalgamate their business with that of the Castlemaine Brewery founded in 1870 as a private concern by Fitzgerald & Prendergast, a Victorian partnership, and converted into a public company in November 1881.¹⁹ At the time it was made to appear as though the Castlemaine Company had taken over Cornwell's Australian Brewery, but in reality it was the other way about since the Cornwell brothers were appointed to the senior managerial positions and their interest was reflected in the name—The Australian Brewery and Wine and Spirit Company Ltd—by which the new business was known. It is difficult to understand why the Cornwells should have entered into such an arrangement since in June 1889 the Castlemaine Company had a bank overdraft of £38,000 (a liability transferred to the new venture) and grossly over-valued assets (sold subsequently for less than one-third of the book price). One possibility suggested by Webster is that this amalgamation might have been engineered with the aid of a bank by astute competitors who saw this as a means of eliminating two rival breweries from the Sydney scene.²⁰ By further extending credit to £53,000 in 1891, £57,000 in 1894, £69,000 in 1898 and £80,000 in 1901, the bank encouraged the Australian Brewery Company to over-extend its operations and thus put itself in no position to meet a sudden demand for the repayment of the overdraft. Faced with organised attempts by creditors to force it into insolvency and the gradual acquisition of its tied houses by competitors (which reduced the demand to one small brewing a week), the shareholders in May 1906 agreed that the Australian Brewery Company should be wound up voluntarily.

Manoeuvres of this kind absorbed resources that might otherwise have been devoted to breaking into the country market. It is true that some metropolitan firms employed travellers to work up their connections, but it appears that Sydney brewers had not as yet enmeshed country pubs in their tied house arrangements possibly because 'a great many' were already controlled by Sydney-based spirit importers.²¹ But the details of this story have yet to be unravelled: cynically it might be imagined that these merchant houses were not unhappy to allow people to choose between imported spirits and the products of small, local breweries. It was unusual prior to 1890 for metropolitan firms to become formally associated with country producers: yet, not content with breaking into the Sydney trade in 1870, Fitzgerald & Prendergast formed an association four years later with a small Newcastle firm, Wood Brothers, to finance and operate a brewery there which could serve the Hunter Valley market.²²

Little is known about the structure and organisation of country brewing until 1882 when details of brewers' licences began to appear regularly in the *Government Gazette*. By the end of that year fifty-two individuals or partnerships outside the metropolitan area had paid the £20 fee under the Licensing Act, 1882 which was

Fig. 12.5: Location of breweries licensed in New South Wales under 45 Vic. no. 14 (19 December 1881) in 1882 and 1890. No output data are available. (Source: NSWGG, 1882 and 1890, *passim*.)

basically the only form of 'control' exercised by the government. Most towns of any consequence supported at least one brewery (Fig. 12.5) and a few managed to support two and, exceptionally as at Tamworth, even three.

During the next eight years several processes were taking place simultaneously. First, in some places the intensification of competition led to amalgamations or takeovers: the formation in 1888 of the Albury Brewing and Malting Company, for example, gave this firm the monopoly of the trade in that area. Second, some breweries disappeared from mining areas (like Cobar and Hill End) which had had their day, and others appeared in places (like Captains Flat, Broken Hill and Silverton) where new thirsts had arisen. Third, although most of the breweries were owned and operated as independent concerns, some multi-plant firms emerged: at one stage, for instance, Lindsay's Brewing Company (with its head office in Melbourne) operated breweries at Bourke, Hay, Hillston, Cobar and Orange; Jones & Lincoln brewed at Hillston, Jerilderie, Cootamundra, Narrandera and Wagga Wagga; and the Inch Brothers had plants at Carcoar, Hill End and Hartley. Few of these small brewery chains survived into the twentieth century, an exception being E. & R. Resch which set up works at Wilcannia (1882), Cootamundra (1883) and Silverton (1885) and then established itself in Redfern (Sydney) during the late 1890s. Output from these country concerns ranged from 50,000 to 200,000 gallons a year in the early 1880s and it is doubtful whether even their combined production matched that of the largest Sydney firm which was said to be making about 5,000,000 gallons.²³ In the dozen cases where information is available, investment ranged from £400 to £25,000 with the majority being less than £3,000. These figures probably also included the aerated water and cordial-making plants which most country breweries ran, often under the same roof, as logical extensions of their businesses. Occasionally, as at Young in 1885, a successful aerated water manufacturer installed a small brewing plant, with a capacity of perhaps 1,500 hogsheads

a year, to retain his existing connections.²⁴ As against this, some 'breweries' although formally licensed were makeshift affairs: a dozen or so of those in mining areas disappeared after only four or five years, having passed through several hands in the meantime.

Although the spatial pattern appeared to stay much the same during the 1880s (Fig. 12.5), except for the appearance of breweries in some of the far-flung parts of the colony, circumstances were in fact changing. The extension of the railway system, the reclassification of beer from Class 3 to Class 2 rates in June 1883 (thus saving 1.4d per gallon over distances of 150 miles, and 2.1d for 250 miles), and improvements in the stability and hence travelling qualities of fermented liquor, all tended to advantage metropolitan brewers. The latter firms were also able to gather their raw materials more cheaply: hops were largely imported and sugar was made on the spot. Not only was there a bias in favour of the 'up' rates on barley (mainly produced near Tamworth and in a triangle roughly bounded by Bathurst, Dubbo and Wagga Wagga), but the considerable difference between the freight on malt and on barley offset the two-fifths loss in weight during the malting process and tended to orientate malting to the market. Whereas most country breweries had to buy in their malt, the larger Sydney firms set up their own malt-houses thus achieving internal economies; moreover, being centred at the focus of the railway fan, they were also able to draw supplies of barley from several parts of the colony.

Country brewing was also affected by legislative changes. In fact during 1881 it was in some danger of being wiped out overnight when the Parkes Ministry inserted a clause in the Licensing Bill (No. 2) that based the brewer's licensing fee on the quantity of beer made during the preceding twelve months. The fee was to be £10 for an output of 100 barrels (about 5,000 gallons) or less, and £5 per additional 100 barrels to a maximum of £200, which meant a tax of 2/- per barrel on a brewery making 100, 1/- on those making 4,000, and 2½d on those making 20,000 barrels a year. The country brewers quickly pointed out that since most of them produced only 1,000 to 2,000 barrels, this tax would absorb 21 per cent of their profits (which they said were 5/- per barrel); the Sydney brewers, on the other hand, with outputs of 20,000 barrels or more and profits of 7/6d 'owing to the economy of manufacturing on a large scale', would be deprived of less than 2 per cent of their profits.²⁵ Parkes backed down, with some show of reluctance, and substituted an annual brewer's licence fee of £30 in the City of Sydney and £20 elsewhere. Nonetheless, country brewers were disadvantaged by the Sunday closing of pubs under the Licensing Act, 1882 because, unlike their metropolitan counterparts, few could afford to invest in bottling plants and so cater for changes in drinking habits. The next blow came in September 1887 when an excise duty of 3d per gallon was imposed on beer. This it was said not only raised overheads in the breweries—even the smallest of which now had to formalise its book-keeping methods—but also reduced wholesale margins because the publicans, already under pressure because of the obligation to improve amenities (including the need to have four instead of only two bedrooms in constant readiness for house guests) and the loss of Sunday trade, reckoned that they could not pass this impost on to the consumer. In the

larger towns the traditional pattern of trade was being disturbed by yet another quirk in the 1882 Act: new publicans' licences in the City of Sydney or any municipality could only be issued after approval by ratepayers but, by Section 35,

Notwithstanding any vote in the negative taken in and for any area . . . the Licensing Court may grant licenses . . . for hotels within such area containing not less than twenty rooms suitable for public accommodation in addition to the standard accommodation . . .

In this way both the opportunity and the incentive were given to well-heeled Sydney-based interests to move into and eventually dominate the country trade; more immediately it helped to change the ratio of hotel licences to population from 1:228 in 1870 to 1:325 in 1890 and 1:444 in 1900.

Together, these circumstances began to destroy the simply spatial relationships that had existed between the production and consumption of beer, a process that resulted in no fewer than twenty-five country breweries ceasing operations during the 1890s²⁶ and a further eleven by 1911. The future pattern was marked by three processes which took place simultaneously: the amalgamation of Sydney brewing companies (for instance, Resch's Waverley Brewery was taken over by Tooth and Company Ltd in 1929); the appearance of 'regional' breweries elsewhere in New South Wales;²⁷ and the absorption, one by one, of the surviving country breweries by metropolitan interests (thus, Tooth and Company Ltd acquired the Maitland Brewing Company in 1913, the Goulburn Brewery in 1920, the Newcastle-based Castlemaine Brewery and Wood Bros & Company Ltd in 1921, and breweries at Wagga Wagga and Narrandera in 1924).²⁸ By 1930 there were only five breweries operating outside Sydney and most were simply branch plants of metropolitan concerns.

Agricultural and Pastoral Based Industries

About a quarter of the non-metropolitan factory workforce—estimated to have reached a peak of 21,000 in 1885–6—was engaged in the processing of agricultural and pastoral produce including sugar-milling (2,600), flour-milling (660) and tanning and fellmongering (640). In view of Jean's survey²⁹ of the general developments and spatial adjustments taking place in the land industries during this period and the land legislation that accompanied them, attention can be focused here on flour-milling, the processing of sugar-cane and the emergence of a factory-based dairy industry.

Flour-milling

Before discussing the flour-milling industry as such, it is necessary to consider briefly the causes and timing of the westward shift of wheat-growing. In 1850 about 125,000 acres, or less than 2 per cent of the alienated area, were under cultivation in the Settled District (the twenty counties). Most of the farms were along the Hawkesbury-Nepean and Lower Hunter Rivers, with smaller pockets in the Shoalhaven area of the South Coast and around the inland towns of Bathurst,

Goulburn and Yass. By this time, too, many pastoral stations in the Settled District had a few acres planted to crops like wheat for domestic consumption. In the pastoral districts beyond, agriculture was prohibited under the terms of the leases except to supply the stations' own needs (although some, such as at Tenterfield, did in fact offer their surplus for sale): most of the 9,000 acres cultivated in this way were near Queanbeyan and Albury in the south and Tamworth and Armidale in the north. Over half the colony's cultivated area was under wheat which was being grown to meet the demand in two, essentially separate, markets. In the interior wheat was grown in fragmented localised pockets orientated to the demands of nearby settlements and surrounding pastoral areas, the deficit being made up by wheat from the coast. The main coastal market—the metropolitan area—obtained its supplies from the Hawkesbury-Nepean and Hunter River districts and from external sources (illustrated for 1846 in Fig. 3.4).

Robinson has argued convincingly³⁰ against the usual view that the gold-rushes first caused a severe disruption in the agricultural industry in New South Wales and then later stimulated expansion: this point is of some significance when disentangling the factors leading later to the westward shift of wheat-growing. Robinson's analysis indicates that instead of initial decline and subsequent recovery, the 1850s were characterised by a progressive decline in the production of wheat per head of population, an intensification of the shortage of breadstuffs in the main urban coastal markets, an increasing reliance on imported supplies, and the continued separation of the inland and coastal markets. With one main exception, the expansion of wheat-growing beyond the Dividing Ranges occurred mainly on the tablelands and eastern margins of the adjoining slopes; production intensified in *existing* areas which thus began to have regular surpluses available for sale in the pastoral districts. Robinson's argument, then, is that 'although the areas of surplus production in the inland had become more clearly defined, the region as a whole remained one of deficit, or variable consumption, and no evidence has been found to suggest any kind of breakdown in the essential separation of local inland markets and the vast deficit area of the coast'. The exception to the essentially local nature of inland production, boosted briefly here and there by the demand from nearby transient gold-mining settlements, occurred in the Albury area where more wheat was grown than required for local needs and small quantities of surplus flour were available for sale to the Ovens gold-field in northern Victoria.

Between 1861 and 1876 the area under wheat in New South Wales showed a modest increase from 128,000 to 148,000 acres, but this disguises a dramatic shift in location as can be seen from the changing percentages in three main divisions of the colony:

	Coastal areas	Remainder of Settled District	Rest of New South Wales
1861	48.5	35.1	16.4
1866	14.6	56.3	29.1
1871	10.9	52.9	36.2
1876	5.2	47.0	47.8

Two main processes were involved which, though they occurred simultaneously, were not causally linked. There was a very considerable reduction in the area under wheat in the central coastal districts which had been the traditional granary of the colony: the acreage here fell, with some fluctuations, from over 60,000 in 1861 to less than 8,000 in 1876. The cause was partly a series of adverse seasons early in the 1860s but mainly the outbreak, in epidemic proportions, of a fungoid disease commonly known as stem rust (*Puccinia graminis tritici*). Although hopes were raised from time to time, as in the 1869–70 and 1870–1 seasons, the long-run effect was to cause farmers to turn to other crops such as maize, oats, tobacco and even fruit-growing. The deficiency of breadstuffs in the central coastal market was overcome almost entirely by increased net imports which grew (in terms of wheat equivalents) from an annual average of 780,000 bushels (1856–60) to 1,250,000 bushels (1861–5) and then to 1,500,000 bushels (1871–5).

The simultaneous expansion of wheat production in the inland areas was, as emphasised already, an entirely distinct process: the coastal and inland markets remained separated by the friction of distance. The Southern Line had reached Goulburn in May 1869 but did not advance even 30 miles further to Gunning until November 1875; the Western Line was not pushed through to Bathurst until April 1876 nor the Northern Line to Tamworth until October 1878. By the early 1870s, it is true, some wheat and flour was being sent to Sydney from the railhead at Goulburn and some was being carted from the Northern Tablelands to the upper Hunter districts, but the quantities involved were small and, other than in exceptional circumstances, could not hope to compete with imported supplies, especially from South Australia.

It is not necessary here to enter into the controversy about the efficacy or otherwise of the 1861 Land Acts which introduced measures designed 'to make the acquisition of land easy to every prospective settler, and to establish an industrious yeomanry upon the soil'. The important point for present purposes is that freehold farming in the lands beyond the settled districts rose from complete obscurity in 1861 to a position of complete dominance in the industry by 1878. Whereas the cultivated acreage on freehold property in the Settled District increased from 126,000 in 1862 to 172,000 in 1870 and to 213,000 in 1878, that elsewhere in the colony at these same dates expanded from 39,000 to 110,000 and then to 252,000. Much of this occurred in, or as extensions of, the districts that had begun to attract wheat-farming in the 1840s and 1850s: the Bathurst, Orange, Carcoar and Goulburn districts increased their combined share of the wheat acreage from 18 per cent in 1861 to 32 per cent in 1871; the Wagga Wagga and Albury districts from 6 to 13 per cent; and the Armidale and Tamworth areas from 2 to 7 per cent. The market remained in the growing areas themselves and in the pastoral districts between and to the west of them: the growth of population beyond the Settled District in the decade to 1871 meant an increase in the annual demand for breadstuffs by this latter date of perhaps 450,000 bushels. In short, this inland expansion of wheat-growing, though facilitated by the Land Acts, was essentially a response to the rise of the inland market except in the case of the Albury district which in good seasons

expansion in the South Western Slope and Riverina Divisions of the colony: their combined share of the wheat acreage rose from 26 per cent in 1871 to 37 per cent in 1881 and 56 per cent in 1891 (Fig. 12.6). The 1880s saw the emergence of a more distinct wheat belt, 75 to 100 miles in width, running from Dubbo in the north through Parkes, Forbes, Grenfell, Junee and Wagga Wagga to the Victorian border. In the Riverina, wheat-farming, which had previously been concentrated in a narrow strip between Albury and Corowa, also began to develop in the vicinity of the railway line, opened in September 1884, between Narrandera and Jerilderie. This southwesterly extension, and growing dominance, of wheat-growing was influenced by a series of factors including the Crown Lands Act, 1884 that made a fundamental change to the conditions on which land could be leased or bought in an attempt to reduce the conflict between pastoralist and farmer. But other circumstances were also changing. On the one hand, pastoralists were beginning to appreciate that fundamental structural shifts were in train which, by the end of the 1880s, were enhancing both the absolute and relative returns available from wheat as against sheep. In the 1890s these led to an increasing diversification of the pastoral economy and the widespread adoption of share-farming arrangements. On the other, agriculturalists in these newly developing areas were beginning to understand, and because of the larger size of their holdings were starting to adopt, 'improved' farming techniques like mechanisation, seed selection and moisture conservation, and to appreciate the advantages to be derived from combining cropping and grazing in various rotations. Thus railway development has to be seen not only as providing a short-term solution and incentive to wheat-growers but also as facilitating the fundamental changes that occurred in the rural economy towards the end of the century.

With this background in mind, attention can now be focused on developments in the flour-milling industry. The expansionary phase, noticed in Chapter 4, continued during the 1850s when an additional fifty steam-mills were erected, mostly in the Hunter Valley and on the South Coast but also in the central tablelands (Table 12.2). There were, basically, three kinds of investors. First, there was a more clearly emerging group of specialist flour-millers whose main business was dealing (and, not infrequently, speculating) in wheat and processing flour. For example, John Sharpe invested £3,500 in the Bush Bank Steam Flour Mill near Kiama in 1856 thus avoiding the need for local farmers to send their wheat to Sydney for processing. Second, country storekeepers saw flour-milling as a fairly natural extension of their trading activities: some bought wheat and sold flour on a formal basis, while others ground individual consignments of wheat to order and covered expenses by retaining 10 to 15 per cent of the produce. Third, in the more remote areas pastoral stations still felt the need to be self-sufficient: in the New England district 'Tenterfield', 'Gostwyck', 'Ingalba' and 'Bundarra' stations each established their own steam-mills during the 1850s.³¹ Overall, developments during this decade did little more than formalise the existing spatial pattern which in the inland areas, where even at the best of times a farmer could spend a month or more taking a load of wheat 50 miles to a mill and returning home again, was geared

Table 12.2 Flour-mills in New South Wales, 1851-89^a

Division	1851		1859		1869		1879		1889
	S	WW	S	WW	S	WW	S	WW	SW ^b
<i>Coastal</i>									
North Coast	—	—	—	—	2	—	—	—	—
Hunter and Manning	18	10	36	14	24	3	19	—	16
Cumberland	19	19	19	7	23	6	16	2	7
South Coast	11	8	18	8	24	3	13	—	1
<i>Tablelands</i>									
Northern	3	5	7	—	15	2	16	1	8
Central	10	7	22	3	33	2	31	—	22
Southern	5	5	9	3	12	5	15	3	17
<i>Slopes</i>									
North Western	—	—	1	—	3	—	4	—	11
Central Western	—	—	—	—	1	—	5	—	5
South Western	2	4	6	4	18	3	19	4	17
<i>Plains</i>									
North Central	—	—	—	—	—	—	1	—	2
<i>Riverina</i>	—	—	—	—	—	—	1	—	4
Total	68	58	118	39	155	24	140	10	110

^a Steam (S), and Water and Wind (WW) mills only; animal-powered mills are excluded.

^b In 1889 there were 107 steam-mills and 3 windmills.

Source: NSWSR. (The Divisions are shown in Fig. 12.6.)

closely to local supply and demand. The replacement of windmills and water-mills by steam-driven machinery made gristing more reliable and reduced labour costs but did little to change the parochial nature of the operation.

The sharp decline in coastal wheat production during the 1860s was paralleled by a reduction in the number of mills in the Hunter and Manning and South Coast Districts from seventy-six in 1859 to fifty-four a decade later. Among the first to go were the windmills and, more particularly, the water-driven mills which were not only less efficient but which were adversely affected by the run of abnormal seasons: one mill on the Paterson River was idle for five seasons on end due to floods and droughts. The appearance of stem rust in the Kiama area led John Sharpe early in 1864 to strip his mill, migrate to Ballina on the Richmond River, and to re-establish himself there as a sugar-cane grower and miller.³² As wheat acreages dwindled some mills managed to keep in business by processing other crops like maize and oats or by sawing timber. A few even bought imported wheat: thus a Wollongong mill managed to survive into the 1880s by shipping 'all its wheat from Sydney'.³³ But such palliatives as these simply delayed rather than curtailed the process of adjustment and by 1879 a further eight mills in the Hunter and Manning

District and fourteen on the South Coast had ceased operations, the buildings themselves being turned to a variety of other uses ranging from tobacco-curing to butter making. The result of this process was to concentrate coastal milling in fewer, and generally larger, establishments like the five-storey brick mill at West Maitland which, with four pairs of stones, could produce 70 tons of flour a week.

The Sydney mills, however, were less affected by the decline in coastal wheat-growing since they were able to make up for the dwindling supplies from the Hunter Valley and South Coast by increasing their imports of breadstuffs from South Australia and Tasmania and to some extent from overseas. It is probable that much of the grain imported, averaging about 700,000 bushels a year during the 1860s (Table 12.3), was processed in the metropolitan area, which had about one-third of the colony's milling capacity. Judged by the technology of the day, the leading Sydney establishments like Wearne's Anchor Mill and Barker's City Mill—which it was claimed in 1871 had weekly capacities, respectively, of 200 and 130 tons of stone-ground flour³⁴—were well equipped and were keeping abreast of overseas developments in grain drying and smutting equipment and in methods of screening and purifying flour. In this way they were able to retain perhaps half the coastal market for flour in competition with other New South Wales mills (about 10 per cent) and imported supplies (about 40 per cent): necessarily this is only a rough assessment based on assumptions about the output of the smaller mills in the area and the per capita consumption of flour. But the significant point is that, although the coastal area became more dependent on external sources of breadstuffs, the proportion imported in the form of flour increased only slightly (from about 46 to about 49 per cent) during the fifteen years through 1875 (Table 12.3). Some of this increase may in any case have resulted from the activities of Sydney millers themselves, a few of whom set up their own branch mills in South Australia (like the Goolwa mill owned by Barker and Company).

The development of flour-milling in the inland areas, especially in the Tablelands and South Western Slope Divisions where no fewer than thirty-four additional steam flour-mills were built during the 1860s, was a more complex episode. In part it was simply a reflection of the absolute increase in the wheat acreage in existing areas and the inability of the generally small mills already there to cope with the seasonal peaks. It was a response, too, to the areal spread of wheat-growing and the fact that the expense of carting produce any distance was an impossible burden for smallholders, many of whom were trying to eke out an existence on the returns from no more than 20 or 30 acres of wheat: the *Sydney Morning Herald* claimed in August 1865 that some farmers in the Goulburn area were so poor that they even had to borrow money to enable them to have wheat gristed for their own use. Yet these, seemingly obvious, explanations are too simple for they leave out of account the changing relationship between the millers and the communities in which they operated. It will be recalled from Chapter 4 that one of the factors leading to the spread of milling into the country areas during the 1830s was the manipulation of wheat and flour prices by Sydney firms. The disappearance of makeshift mills driven by horse, cattle, wind, and water-power, the appearance of a new group of

Plate 16: Flour-mills, such as Wearne's Anchor Mills in Bathurst Street, Sydney, were often substantial structures. The grindstones were usually located on the ground floor and the products were then carried up several floors to be sifted, screened and bagged. During the 1880s, when roller milling was introduced, the grain was hoisted to the upper floor and then passed through the various processes by gravity feed. (*Australian Town and Country Journal*, 13 May 1871.)

Table 12.3 Wheat and flour produced and traded, New South Wales, 1861-90^a
(000)

	1861-65	1866-70	1871-75	1876-80	1881-85	1886-90
Wheat (bushels)						
Grown in New South Wales minus seed grain	5,583	8,629	7,694	12,807	18,678	19,980
Net imports of wheat	3,421	3,604	3,857	2,972	1,829	5,344
Total wheat apparently available for milling in colony	9,004	12,233	11,551	15,779	20,507	25,324
Flour (short tons)						
Net imports of flour ^b	64	75	82	137	168	257
Apparent quantity milled in New South Wales ^c	203	275	260	355	461	570
Millers' returns of flour made ^d	n.a.	n.a.	n.a.	n.a.	448	592

^a Estimates of the quantities of seed used vary considerably: here an allowance has been made at the rate of 1.25 bushels per acre in the 1860s declining to 0.75 bushels per acre in the late 1880s.

^b Allowances have also been made for trade in bread and biscuits.

^c Assuming an output of 45 lb of flour per bushel.

^d Derived from *NSW/SR*, 1892, p. 459.

Source: Calculated from *NSW/SR*. See also Table 9.6 for similar Victorian data.

farmers operating in some cases at little more than subsistence level, and the formalisation and commercialisation of gristing facilities and practices, now enabled country firms themselves to take advantage of the same situation. Literary evidence suggests that collusion between millers to buy cheaply and sell dearly and to charge exorbitant rates for custom gristing was not uncommon, perhaps even widespread, especially in the Settled District. In August 1865, for example, the two millers at Goulburn were said to have set flour prices 35 per cent above wheat prices instead of the more usual 12 per cent, and to be charging 1/6d per bushel to grist wheat instead of 1/- or even 6d elsewhere. The result here and in other towns was to set in motion schemes for co-operative or joint stock mills in order to thwart such practices. Not all these proposals came to anything and some of those that did lasted only a few years: the New England Flour Mill, which was built by a joint stock company formed by local farmers in 1867, was offered at auction in 1869, leased in 1871 and sold for £3,800 in 1874.³⁵

Not much is known about the sources of finance for country mills, which at this stage meant an investment of about £3,000 for a plant capable of producing 20 tons of flour per week. Some were established as adjuncts to storekeeping businesses (as at Orange, Mudgee and Young); others, like two of those at Bathurst, were established as branch mills by the smaller Sydney millers; and a few emerged almost literally from the grassroots as is illustrated by the following account of the origins of a mill at Forbes:

The decline of the mining industry caused the town to be abandoned rapidly . . . Under these circumstances Messrs. Nicholas and Reymond took up a selection a few miles from Forbes with a view to practically testing the capability of the land for growing cereals, the land until then being supposed to be fit only for pastoral occupation. The results were so encouraging that they proceeded to erect a flour mill. They were not disappointed. Grain farming increased, and with the completion of the mill, which was commenced in 1872, a large trade sprung up, the flour finding its way down the river [the Lachlan] to Hillston, while in other directions it reached Nymagee, Cobar, and even South Australia. . . .

This extract from the *Australian Town and Country Journal* of 3 January 1885 emphasises again the tentative way in which wheat-growing extended into new areas and the fact that the market in this pre-railway phase lay towards the west and northwest rather than towards the coast.

It took some time for the flour-milling industry to adjust structurally and spatially, particularly on the southwestern slopes, to the expansion of the wheat acreage that accompanied the extension of the railway system during the 1870s and 1880s. Although the distribution of mills in 1891 (Fig. 12.7) may give the impression that there was a corresponding general shift of this activity towards the south and west, the reality was less simple and the processes more involved.

The railways dramatically cut the cost of transporting wheat and flour and reduced the regional variations in the prices of breadstuffs which were now strongly influenced by conditions on the Sydney market (itself affected by circumstances

Fig. 12.7: Approximate distribution of flour-mills in New South Wales at decennial intervals 1861–91. The main wheat-growing areas (after Robinson, 'Some Influences on the Wheat Frontier in New South Wales', pp. 212a and 353a) at about these dates are also indicated.

in the main breadstuffs exporting areas). From May 1873 the basic rate on both wheat and flour was 1½d per ton-mile irrespective of distance or direction. Then in

September 1876 the tapering principle was introduced which, as explained earlier, discounted the basic charge by 10 per cent for every mile beyond 100, by 20 per cent for every mile beyond 150, and by 40 per cent for every mile beyond 200. Twelve months later the basic rate on wheat and grain was itself reduced to 1½d and then again in October 1882 to 1d for distances over 75 miles. Finally in June 1883 a 6 ton truck rate came into operation which itself incorporated an additional element of tapering. These changes can be illustrated by a comparison of the charge payable on a 6 ton consignment of flour or wheat sent from various places to Sydney (Newcastle in the case of Tamworth) or vice versa:

	Goulburn (134m)	Bathurst (145m)	Tamworth (182m)	Wagga Wagga (309m)	Jerilderie (412m)
1874	£5. 7. 6	—	—	—	—
1876	£5. 6. 0	£5.12. 0	—	—	—
1878	£4. 2. 0	£4. 8. 0	—	—	—
1880	£4. 2. 0	£4. 8. 0	£5. 2. 6	£7.17. 0	—
1882	£3.14. 0	£3.18. 6	£4.14. 0	£6.13. 6	—
1884	£3. 8. 4	£3.11. 5	£4. 3.10	£5.14. 7	£6.16. 5

During the 1870s and early 1880s the railway freight rates worked in favour of country millers who were supplying the Sydney market in competition with metropolitan mills. About 1,700 lb of flour could be obtained from a ton of wheat and, after allowing for the fact that the Railways Department reckoned 2,000 lb of flour to the ton, this gave the country miller a freight advantage of about 16 per cent. Moreover, there was a ready market in most inland districts for the by-products of milling, mainly used as animal feed, because of the extension of settlement into areas where natural herbage for horse and bullock teams was less abundant. As against these factors, however, the independent country miller had to pay agents to place his produce on the metropolitan market, much of which had become formally or informally tied to Sydney millers who either owned or had long-term contracts with major outlets like bread and biscuit bakeries.

Then, as the wheat acreage and yields in the 'older' areas on the central tablelands began to decline during the 1880s, millers there had to rely increasingly on supplies of grain brought in by rail. At the beginning of that decade, for example, William Conolly's mill at Goulburn was obtaining most of its supplies from places down the Southern Line as far as Wagga Wagga.³⁶ The effect of the tapering rates introduced in 1877 then became more significant. Take, for instance, the railway freight charges faced by three millers located at Gerogery, Goulburn and Sydney, each of whom wished to place flour made from wheat grown at Gerogery on the metropolitan market. Calculated on the basis of 1 ton consignments, the Gerogery miller would have paid £101 to freight 80 short tons of flour 368 miles to the metropolis while it would have cost the Sydney miller £120 to convey the necessary 95 long tons of wheat over the same distance. The Goulburn man would have faced two charges: £88 for 95 long tons of wheat carried 234 miles and £49 for 80 short tons of flour carried 134 miles, or a total of £137. Although in detail the comparison would have been affected by the prices of wheat, flour, bran and pollard, the general

result of the tapering rates and the lack of any milling-in-transit concessions was to reduce the viability of wheat processing at intermediate points except insofar as the mills there could draw on locally grown grain.

Milling-in-transit concessions were apparently introduced for the first time in October 1887.³⁷ The arrangement was couched in these terms:

A rebate of the difference between the local tonnage rates and the *through* rate plus 1s. 9d. per ton, will be allowed on wheat consigned from country stations to country flour mills (on the Up journey), and re-consigned in the shape of flour, bran, and pollard to Darling Harbour. If the traffic is carried at truck rates, the rebate will be allowed on the same basis. In computing the rebate the lesser tonnage will always be taken.

The example quoted in the rate-book of a Goulburn miller obtaining wheat from Gerogery and consigning 80 tons of flour to Sydney illustrates the arithmetic involved:

80 tons, Gerogery to Goulburn, at 18/6d per ton	£74. 0. 0
80 tons, Goulburn to Sydney, at 12/4d per ton	£49. 6. 8
Total	£123. 6. 8
80 tons, Gerogery to Sydney, at 25/3d per ton	£101. 0. 0
80 tons, terminal charge, at 1/9d per ton	£7. 0. 0
Total	£108. 0. 0

The rebate therefore was £15.6.8. Since the calculation was based simply on tonnage and made no allowance for the fact that 95 long tons of wheat were required to make 80 short tons of flour, the effect on the rebate was to reduce the Goulburn miller's total freight bill by 11 per cent from £137 to £122 or to almost the same as that of a Sydney competitor which, as indicated previously, was about £120. Even so, however, it remained substantially greater than the costs borne by millers in the newer, more distant, wheat-growing areas.

Meanwhile the economics of the industry were being affected by the change from stone-milling to roller-milling, the technical aspects of which have already been discussed. The first two roller plants in the colony were both installed towards the end of 1883, one being at J. & J. Hayes's mill in Goulburn (itself an interesting development in the light of the previous discussion) and the other in J. Pemmell and Company's establishment in Sydney.³⁸ Other firms soon followed suit and by 1890 the bulk of the colony's wheat was being roller ground³⁹ for, as in Victoria, 'this much desired and popular patent flour' sold at premium prices. The new technology had two main consequences. One was a greater emphasis on the varieties and milling characteristics of the wheat bought since these now more closely influenced the grades and baking qualities of the flour that could be produced. The other was a doubling or trebling of the initial investment needed to set up even a relatively small country mill: depending on the nature of the building itself and the ancillary equipment installed (which, among other things, could include 'basic', 'improved' or even 'extra-improved' purifiers, silk screening-

machines, and grain and wheat handling devices), fixed costs rose from about £3,000 for a stone-mill to anything from £5,000 to £7,000 for a roller-mill of similar capacity.

These factors were not without spatial significance. Millers in Sydney benefited from even greater economies of scale and were advantageously located to draw on supplies of the better quality colonial wheats and those imported from overseas depending on fluctuations in prices, seasonal conditions and local circumstances. In the 'older' tableland wheat-growing areas, however, decreasing acreages, lower yields and poorer wheat qualities left scope for fewer mills to operate economically. Here the sequence of events was both important and unfortunate. The temporary resurgence of wheat-growing in these areas during the latter part of the 1870s and the manipulation of wheat and flour prices by the existing millers led to a revival of the movement for co-operative or joint stock ventures to serve the interests of local farmers. As a result mills (as at Yass, Bargo and Bombala) erected early in the 1880s were equipped with stone-grinding facilities which in a year or two were superseded technically. Nonetheless they helped to boost wheat farming and at this local level delayed the process of readjustment. For example, at Bombala on the southern tablelands near the Victorian border

Prior to the start, early in 1882, of the Joint Stock Flour Mill Co., the majority of the shareholders in which are local farmers, the millers ruled the price of wheat here. The company has given a great impetus to this branch of agriculture, and brought the ruling price of wheat this year up to from 5s to 5s 6d per bushel.⁴⁰

This venture was more fortunate than most because the railway only reached Cooma, 50 miles to the north, in May 1889. Elsewhere the story was different. Thus even the longer-established millers, at places like Tamworth, Uralla and Armidale on the northern tablelands, soon discovered that the railway freight charges on imported Adelaide flour (which in 1880 was being 'brought as ballast to Newcastle at the trifling price of one shilling per ton')⁴¹ were more than offset by the higher prices people were prepared to pay for fine white flour compared with their best quality, but coarse and brown, product. Some (as at Armidale) tried to meet the challenge by installing roller plant, but declining wheat acreages made this an unattractive form of investment except at more remote places, like Inverell on the margin of the northwestern slopes which was not linked to the railway system until March 1902.

Meanwhile in the South Western Slope and Riverina Divisions the extension of the acreage under wheat was not immediately accompanied by a significant increase in milling capacity. A few new establishments were opened but, like the one built at Jerilderie early in 1885, these were mainly in the hands of small private companies which equipped them with grindstones. The adoption of roller-milling came in two stages. What happened first was that existing privately owned mills (as at Murrumburrah, Wagga Wagga and Albury) were equipped with the new machinery—usually in addition to, rather than instead of, grindstones—in 1885 and

1886. Then, beginning in 1888, there was a sudden rush to form roller-mill companies in a dozen or so towns along the length of the emerging wheat-belt from Dubbo in the north to Albury in the south.⁴² About half of these were co-operatives but the others were public companies that were beginning to attract Sydney and, to some extent, Victorian capital.

There do not appear to be any data which can be used to quantify these changes in terms of mill output in different localities or railway movements of wheat and flour. From 1877 the Railways Department published annual totals of 'grain' and flour freighted over the Southern and Western Lines on the one hand and the Northern Line on the other, but these reveal nothing about origins and destinations. Nonetheless the qualitative evidence presented already indicates some of the complexities of the influences involved in the spatial organisation and reorganisation of flour-milling, and underscores the superficiality of the view that there was a simple, almost static relationship between farming and processing. Aside from changes at the regional level such as have been illustrated, the thirty years to 1890 also saw the urbanisation of rural-based industries like flour-milling. Nor, of course, did the 1880s see the end of the spatial adjustments: indeed the train of events leading during the twentieth century to an increasing concentration of flour-milling capacity in Sydney was only just starting.

Sugar-milling

The development of the sugar-milling industry in New South Wales provides a good illustration of the way in which rural processing activities provided a further stimulus to metropolitan manufacturing. The decline of coastal wheat-growing encouraged farmers to experiment with other crops, of which, beginning about 1864, sugar-cane was one. Initially much of the acreage was located on the Hastings and Manning Rivers but farmers elsewhere, even as far south as Kiama, were also trying their luck. The cane was mainly grown in limited quantities in association with other crops like maize on small freehold farms, there being 'a disinclination towards the plantation system, on the ground that it will require the introduction of cheap coloured labour'.⁴³ By the end of the decade it was becoming recognised that because cane was susceptible to frost damage the more northerly the latitude the better the result: largely for this reason farmers along the Manning River abandoned this crop in the early 1870s and those along the Hastings River followed suit three or four years later.

Meanwhile, sugar cultivation had commenced beside the Macleay, Clarence and Richmond Rivers further north: early in 1869 these had, respectively, 750, 820 and 30 acres under cane out of the total of 2,900 acres in New South Wales. The cultivated land consisted of narrow water-front strips along the banks of these rivers, and was largely devoted to maize which could be moved to Sydney cheaply using water transport. But falling maize prices during the 1860s had encouraged farmers to turn to sugar as a partial substitute, again almost entirely dependent on river and coastal transport. Just as the cultivation of sugar-cane was in an experimental stage, so were the related crushing operations. There were two types

Fig. 12.8: Location maps of the northern coast of New South Wales identifying the central sugar-mills mentioned in the text.

of mill. First, several farmers set up small, home-made, animal-powered plants to crush their own cane and helped pay for them by processing the crops of their neighbours. Second, some steam-driven mills were being established as commercial speculations by entrepreneurs, only a few of whom were also growers. Most of these were poorly designed and amateurishly operated. The Clarence River Sugar Company, which in 1869 erected the first mill in the district at Belmore near Uralla (Fig. 12.8), invested £1,870 on a crushing plant made in Sydney by Chapman and Company, £920 on a building, and £260 on a wharf but this venture collapsed eighteen months later without paying a dividend. In 1870 Edward Chowne put up a steam-mill, also at Uralla, but this too was a failure.⁴⁴

The Colonial Sugar Refining Company began to take an interest in the expanding sugar-cane acreages in the northern districts, and in July 1868 advertised in the *Clarence & Richmond Examiner* that 'on being assured that a sufficient area has

been planted, to warrant the required outlay, they will be prepared to establish central sugar mills in the principal sugar growing areas'. In August 1869 the company's shareholders were advised that it was erecting the Darkwater Mill on the Macleay River and the Southgate and Chatsworth Mills on the Clarence River, all of which commenced crushing in 1870. In addition the Grafton and Carrs Creek Sugar Company, mainly financed by local investors, also established a mill on the Clarence a few miles above Grafton. By 1871 many of the initial teething problems had been overcome and the industry appeared to be firmly established with five steam-mills on the Macleay River, eight on the Clarence, and one on the Richmond as well as twenty-seven more operated by animal-power. The dominance of the Clarence River was enhanced still further in 1873 when, because supplies of cane proved inadequate due to frost damage, The Colonial Sugar Refining Company shifted its Darkwater establishment there (renaming it the Harwood Mill) and added a distillery.

The backward integration of this company into sugar-milling was a logical step for a number of reasons. First, it helped to ensure the retention of its almost monopolistic control of refining capacity in the colony. Second, it enabled the company to obtain a growing proportion of its raw materials without paying the import duty of 5/- per ton, and it could exercise more control over quality. And, third, the sugar-mills were in themselves a worthwhile operation: during their second season in fact they had become 'the chief source of the company's profits'.⁴⁵ Initially the company relied on the price mechanism to obtain its supplies, all of which were grown on smallholdings with a mean area under cane during the 1870s of no more than 16 acres.⁴⁶ But as additional privately owned steam-mills appeared the company started entering into long-term agreements with farmers to ensure continuity of supplies and to raise the quality.

Conditions on the Clarence River began to change during the latter part of the decade following a major flood in 1876 and a succession of dry summers and frosty autumns. Carrs Creek Mill, the only one operating above Ulmarra, was destroyed by fire and not rebuilt, leaving growers in the upper Clarence district with little incentive to continue cane production. Elsewhere farmers reverted to maize or diversified into new crops and livestock raising. By 1881 there was excess milling capacity. The Southgate, Harwood and Chatsworth Mills of The Colonial Sugar Refining Company could handle 2,000 tons of cane per week but the Southgate had been standing idle for two seasons; the Belmore Mill had re-opened in 1877 but operated much below capacity and was closed again in 1881; and the forty-three privately owned small mills, each with an average capacity of 7 or 8 tons of cane per week, were barely able to make ends meet.⁴⁷

These problems created further interest in sugar cultivation along the Richmond River 60 or so miles further north, and during the late 1870s and early 1880s both farmers and small mill-owners began to migrate there.⁴⁸ A fairly typical story is that of George Martin who emigrated to the colony from Scotland in 1853 and took up farming in the Hunter Valley; ten years later he bought 48 acres near Grafton on

the Clarence River which was sown to wheat and maize. When sugar cane was introduced into this area in the early 1870s

he adopted the new crop, putting in twenty acres during the first year, and the following season planting an additional area of twenty acres. He sold a portion of his cane the first season; and in the ensuing one he erected for himself a mill possessing a capacity of three quarters of a ton per diem. The plant cost him the sum of £650 in addition to the necessary extra expenses involved in fitting and erecting the machinery, besides building the sheds. He continued to work the mill for a number of years, mostly using all his own cane, of which he had forty-eight acres planted . . . Not being enabled to extend his farm as he desired he sold out in 1879, resolving to come over to the Richmond River district, which was then beginning to make headway, and was being extensively settled. Upon his arrival he purchased 151 acres, selecting 379 adjoining—thus making a total area of 530 acres . . . In the first season he lost no time in making a start, beginning by planting ten acres with cane. The following year he purchased the necessary plant for the mill giving the Atlas Company, of Sydney, the order for the machinery . . . [In 1884] he added a vacuum pan to the rest of the plant, with a view to improving the quality of the sugar turned out. The cost of the present machinery as it now stands was something over £2,000. Last season Mr. Martin produced ninety tons of sugar . . . as [his three eldest sons] assist on the work of the farm and in the mill, it is only during the busy season that extra labor has to be employed, when some fourteen hands are engaged for about three months.⁴⁹

Sugar-cane cultivation was further fostered in the lower Richmond area when in 1881 The Colonial Sugar Refining Company established its Broadwater Mill which, with three sets of double-crushing rollers able to dispose of 900 tons of sugar-cane in a twenty-hour day, was by far the largest establishment of its kind in Australasia. The Company continued to buy its cane from smallholders most of whom had no more than 15 to 20 acres planted to this crop. In addition by the early 1880s there were about thirty small mills in the district, several of which had been erected by farmers in the 'Big Scrub' (an elevated area of rich volcanic country on the northern side of the river) where they had established themselves in the hope that sea breezes would minimise the risk of frosts. The significance of this area was enhanced when the Richmond River Sugar Company Ltd (incorporated in October 1884 with a nominal capital of £25,000) set up a mill and plantation at Rous, inland from the river port of Wardell, that was able to process 160 tons of cane daily into 'mill-white' sugar worth nearly as much as the refined product.⁵⁰ Meanwhile on the Tweed River further north farmers were also taking up the cultivation of sugar-cane, and this led The Colonial Sugar Refining Company to erect the Condong Mill in 1880 which initially drew supplies from its own plantation as well as from individual growers but then reverted to its policy of relying entirely on smallholders.

During the 1880s world sugar prices fell, from about £20 per ton in 1881 to £12 in 1886-7, and a slump in the New South Wales market reflected these changes.

As a result, the small mills started to close because they were technically inefficient and unable to extract more than half the juice from the cane, and because they suffered all the diseconomies associated with processing only 2 or 3 tons of cane a week. Even the smallest steam-driven mill required from eight to twelve hands, and these had to be employed in competition with the labour needed for cutting and transporting the crop. To add to the problems, many of these small mills, each of which represented an investment of £1,500 to £2,000, had been built with borrowed money, and the depressed prices made it increasingly difficult for owners to meet their obligations. Hence the number of steam-mills in the Clarence, Richmond and Tweed River districts, which had reached a peak of eighty-six in 1884, fell to fifty-seven in 1886, thirty-six in 1888 and thirty-one in 1890. There thus developed a clearer separation between grower and processor and an increasing reliance on the 'central' mills, especially those of The Colonial Sugar Refining Company at Chatsworth and Harwood (which were merged in 1888) and Southgate (but removed to Queensland in 1885) on the Clarence; at Broadwater on the Richmond; and at Condong on the Tweed. Between them these accounted for about 62 per cent of the raw sugar produced in New South Wales during the early 1880s and 71 per cent at the end of the decade.⁵¹

The main linkages of the North Coast sugar industry were with Sydney. Although some raw and 'mill-white' sugar was sent to Brisbane and Melbourne and a certain amount sold locally, most was shipped to the metropolis where it was handled by commission agents or by The Colonial Sugar Refining Company itself. Unlike the wheat and flour-milling industries, it was circumstances there (themselves influenced by the Company's desire to prevent prices being depressed by competition and by the state of the world sugar market) that directly and indirectly affected conditions in the growing areas. This intimate relationship with a centre several hundred miles to the south was also fostered by the costs and difficulties of overland communication between these northern valleys and fomented by inter-river rivalries.⁵² Similarly the backward linkages were also mainly with Sydney. Firms like Mort and Company and P. N. Russell and Company were well placed in the 1860s to fabricate cane-crushing machinery, evaporating pans and centrifugal drying equipment because they were also fulfilling orders for plant of this kind in Queensland and New Caledonia. Higman has shown that Sydney foundries made the equipment for forty-five of the small mills built between 1868 and 1912, a Newcastle foundry supplied another set, and sixteen came from overseas. The important point is that only two sets were manufactured in the region itself, both by the Clarence Engineering Company at Maclean. It is not without significance, too, that the machinery for eight of the nine central plantation mills was imported, the other set being constructed in Sydney. The engineering and shipbuilding trades in the metropolis also gained from the orders for new ship construction, maintenance and repairs from the companies serving the North Coast, including the fleet of steamships operated by The Colonial Sugar Refining Company itself (Table 10.5).

The North Coast sugar-milling industry was also important because of the size

and characteristics of the workforce involved. The cane-cutting season lasted from August to December and reached its peak in September-October. A system evolved whereby The Colonial Sugar Refining Company advertised for labour each year in the Sydney and Melbourne press, guaranteeing a minimum of five months work. The Company used some of this temporary labour force in its own mills and some as cane-cutters who were supplied to the smallholders with whom it had agreements. The owners of the smaller mills relied on the advertisements to attract more men than the Company required to provide also for their needs. In these circumstances the published figures for employment in sugar-mills, which rose to a peak of 2,650 in 1887, must be treated cautiously because some of the men taken on by the Company as cane-cutters may have been lumped in with those working in the mills themselves. This possibility is suggested by data in the *Statistical Register* for 1892 when 675 of the 1,468 hands engaged in sugar-milling were shown as employed 'outside the factory'. Moreover, it is uncertain how many of the 'inside' hands were kept on the books throughout the year or taken on just for the season, an uncertainty aggravated in the case of the 'small mills' as they were sometimes used for timber-working and chaff-cutting during the first few months of the year. Neither of these issues has been resolved satisfactorily and no adjustments therefore have been made to the published data incorporated in Fig. 12.2 or set out in Appendix 1. Yet there can be no doubt that there was a substantial real increase in sugar-mill employment during the early 1880s and that this formed one of the main components in the continuing growth of the non-metropolitan factory workforce. But, as has been shown, many of the benefits accrued both directly and indirectly to Sydney rather than to the region concerned.

The processing of dairy products

The decline of wheat-growing on the South Coast of New South Wales in the 1860s led farmers there to seek alternatives which included sugar (briefly in 1863-4), maize, potatoes and the processing of animal products including meat canning, bacon and ham curing, and cheese and butter making. It was no coincidence then that this decade saw the establishment of Munn's Merimbula Maizena Works in 1867 and the Pambula Meat Preserving Works in 1868, and a continuing search for ways of improving the quality of cheese.⁵⁹ Butter making by this time was a well-established adjunct of other farming activities and carried on under much the same conditions as those in Victoria. On the South Coast advantage could be taken of a regular steamship service to dispatch supplies each week to Sydney: weekly shipping notices published locally show that from Kiama alone The Illawarra Steam Navigation Company collected 435 tons in 1863-4, and 525, 494 and 515 tons during each of the next three years. It is not known how much of this butter was re-consigned to places outside the colony but the quantities involved were probably small. Several companies were formed early in the 1870s (such as the Central Illawarra Butter Company and the Shellharbour Butter Export Company) to try to escape the uncertainties of the Sydney market by developing an export trade with Britain. But after a brief success the difficulties there proved just as great: the

ending of the Franco-Prussian War in January 1871 restored the normal pattern of trade in Europe and colonial butter could not hope to compete on the London market with supplies from France, Germany and Sweden. The problems were essentially the same as those faced by Victorian producers: poor quality, mixed consignments and unsuitable packaging. As the *Australian Town and Country Journal* reflected on 1 July 1871, 'if butter should be made so carelessly and dirtily that it will not keep sweet during the short voyage to Sydney, how can it be expected to stand a long voyage to London?'. The main external markets remained, therefore, Queensland, New Caledonia and other Pacific islands, and it was these that absorbed four-fifths of the 1,700 tons of New South Wales butter exported during the five years 1876-80.

Meanwhile by 1875 there was agitation about the milk supply for Sydney's 170,000 people. For some years Thomas Mort had been experimenting with ways of preserving milk by refrigeration but it took time to discover that agitation during chilling overcame the main obstacle, the separation of the cream from the milk. This simple advance enabled him to go ahead in 1875 with plans to rail chilled milk to Sydney from the Berrima district after first consolidating his various projects in the New South Wales Fresh Food and Ice Company Ltd, incorporated on 30 July. Then in 1883 this Company installed cream separators at its depot near Mittagong (76 miles by rail from Sydney) to convert its surplus supplies of fresh milk into butter, thus inaugurating the factory production of butter in New South Wales. The Company also turned its attention to the South Coast in 1882 with a short-lived scheme to ship fresh milk to Sydney, followed the next year by a proposal that it should sponsor a co-operative which eventually opened as the Pioneer Dairy Factory at Kiama in June 1884.⁵⁴ As its name suggests, this was the first building in Australia erected specifically as a dairy factory and it therefore had a very significant 'demonstration' effect. It served also as a warning to would-be imitators: it was not centrally situated with respect to its suppliers, the boilers and machinery were too close to the main building, and it failed to make use of gravity flow for handling the fresh and skimmed milk.

Contemporaneously with these developments came the formation in July 1881 of the South Coast and West Camden Co-operative Company which was brought into being because of the 'unsatisfactory manner in which the business of the dairymen had been attended to in Sydney'. It was hoped that by setting up a central marketing agency based in the metropolis, better and more uniform prices would be obtained and a channel created through which seasonal surpluses could be exported to London thus preventing undue competition on the domestic market.⁵⁵ This did nothing, of course, to solve the problem of quality, and it soon became apparent that false hopes had been raised by the first few consignments which had reached Britain on board refrigerated vessels in 1880 and 1881: whereas such exports were valued at £13,000 and £6,500, respectively, none at all was dispatched to Europe in 1883 and only a few hundred tons during the next few years. In any case the butter producers' problems were coming closer to home. Not only did the Illawarra area suffer a series of droughty seasons from 1883 to 1885 but at the same

time net imports rose from 285 tons in 1881 to 750 tons in 1883 and to 1,460 tons in 1885 largely as a result of the rapid emergence of the factory system of butter making in New Zealand.

Despite its inadequacies the Pioneer Factory was able to sell its produce to the Fresh Food and Ice Company for 3d per lb more than the rate for best quality dairy butter⁵⁸ and this practical illustration of the advantages of the co-operative principle led to the formation, beginning at 1885, of the Albion Park, Unanderra, Dapto, Wauchope and Woodstock factories (the last two being at Jamberoo) all of which were operating by early 1888, using the South Coast and West Camden Co-operative Company (by now equipped with cool stores in Sydney) as their marketing agent. Typical of them was the Albion Park Company which invested £2,300 in land, premises and machinery (including six steam-driven de Laval separators) and commenced production in November 1885: a year later 1,550 of the 2,000 £1 shares had been taken up by sixty-eight people of whom fifty-five were producers. In addition the Fresh Food and Ice Company opened the Omega Butter Factory at Gerringong as a proprietary concern in March 1885.

Fig. 12.9: Butter factories and private cream separators operating in New South Wales in 1888. (Based on Dowling, *Dairying in Australasia*, following p. 16.)

This was an extraordinary episode in that, apart from the Mittagong depot of the Fresh Food and Ice Company, all seven butter factories operating in Australia early in 1888 could be encompassed by a circle less than 12 miles in radius (Fig. 12.9). Most of the milk was carried no more than 3 or 4 miles: producers further away

installed separators on their farms and continued to make their own butter. It is small wonder then that this area attracted delegations from other colonies and from other parts of New South Wales; in April 1888, for instance, the Victorian Royal Commission on Vegetable Products toured the district and on their heels came a group of farmers and businessmen from Orange. It became in fact an almost classic example of the spatial diffusion of an innovation from a point location. But these visitors were only just in time because the opening of the coastal railway from Sydney as far as Kiama in October 1888 and the inauguration of a 'milk train' service four months later brought the district within the metropolitan whole milk zone. Some butter factories began processing only the evening milking or re-opened for a short period each year to handle the surplus from the spring 'flush'; others simply became whole milk collecting depots.

Beginning in July 1888 there was a rush elsewhere to form butter factory companies, seven being registered by the end of that year, fourteen in 1889, and twelve in 1890 (Table 11.12), almost all having a nominal capital of between £1,000 and £3,000. In addition at least a dozen private factories also came into operation. They tended to be concentrated in four main areas. First, the shift into whole milk in the Kiama-Wollongong district left existing town milk suppliers on or near the Southern Line from Camden to Bowral with no alternative but to take up butter making, and factories were thus established at places like Cobbitty, Camden, Picton, Bowral, Robertson and Kangaloon. Second, from just south of the coast whole milk area to the Shoalhaven River and west into the Kangaroo Valley, no fewer than thirteen factory companies were organised in less than thirty months: the problem there was that whole milk could not be conveyed more than a few miles by road before being chilled in preparation for the rail journey to Sydney.⁵⁷ Third, farmers on the central and southern tablelands, affected by the westward shift of the wheat belt, declining yields and poor seasons, saw butter as an urgently needed solution to their problems. It is not difficult to imagine the comparisons made by the party from Orange between the apparent prosperity in the Kiama area with that back at home where, according to the *Australian Town and Country Journal* of 28 April 1888,

Fully one-half of the land . . . [was] lying waste . . . for the simple reason that the owners do not know what to do with it. The portions they have cleared and fenced will not pay to crop; the returns being small and prices low; and the bushland will not pay to clear for the same reason. If they get an extra number of cows together they flood the local market; and the consequence is that they cannot sell at any reasonable price. They are not in a position to export the butter, as it would not pay in small quantities; and to wait to get quantity together would cause it to become stale; and, as a result, nothing would be got for it were it sent away.

The factory set up a few miles south of Orange in 1888 as a result of this visit initiated a secondary demonstration effect: within a few months butter companies were also formed in the vicinity of Cowra, Crookwell, Taralga, Wellington,

Gulgong and Mudgee. In this latter district, for instance, the agricultural industry was said to have undergone a complete change because farmers were able to feed fodder to stock on the spot instead of sending it down over a long stretch of railway to find an unpaying market, to use skim milk for pig raising and hence bacon and ham production, and to sell butter and smallgoods on the metropolitan market. Fourth, there is clear evidence, too, that butter making under factory conditions spread to the North Coast of New South Wales as a direct result of experience gained in the Kiama area. For instance, A. J. Walmsley, who had worked at the Pioneer and Albion Park factories, migrated to the Richmond River area near Lismore in 1886 and by October had set up a small establishment using a Danish separator and a Kiama-made churn. As the local correspondent of the *Australian Town and Country Journal* pointed out on 23 October 1886,

The enterprise of Mr. Walmsley in the construction of the factory, will be emulated by many others, throughout the fertile lands of the 'big scrub', and considerable impetus will thus be given to the industry, which seems destined to become one of the most important on the Richmond River.

By the end of 1890 butter factories, owned publicly or co-operatively, were operating at Rous, Tuckurimba and Woodburn in the Richmond River district, and at Kempsey, Smithton and Warneton on the Macleay. Dairying was being taken up as one among a number of alternatives to sugar growing, the future of which seemed uncertain: not the least advantage of co-operative butter factories was that they paid their suppliers once a month instead of once a year like the central sugar-mills.

Prior to 1890 the market for butter remained almost entirely within the colony and in Queensland: exports to Britain during the five years through 1889 were valued at only £31,000. Although factory butter was an improvement over the farm product, the proliferation of small factories—many of which were turning out no more than a ton a week—did little to overcome the obstacles to building up dependable sales in London. At first New South Wales butter had an advantage over the supplies sent from Victoria because most of it was consigned under two 'marks', those of the Fresh Food and Ice Company and the South Coast and West Camden Co-operative Company. Even so neither of these companies could exert close control over processing or intra-colonial transport, much of which was performed without refrigeration. Following the example set in 1889 by The Fresh Food and Frozen Storage Company Ltd and The Melbourne Chilled Butter and Produce Company Ltd in Victoria, the Fresh Food and Ice Company in 1890 began processing cream railed to its Sydney works, thus inaugurating the 'central' factory system in New South Wales.

In the Richmond River district on the North Coast, industry leaders were becoming keenly aware by the middle of 1892, when no fewer than thirteen local factories were operating, of the need to adopt the central factory system. There, kegs of butter had first to be conveyed by road or on board droghers to the shipping

ports whence they were carried as deck cargo in the hope that the current of air produced by the speed of the steam vessels would keep them cool during the journey to Sydney. A preliminary meeting of representatives of the shareholders in local co-operative factories was held at Clunes in November 1892 to discuss the formation of the Richmond River Fresh Food and Cold Storage Company with a nominal capital of £5,000. Interest, at best lukewarm, was further dashed when it was discovered that an offer from the South Coast and West Camden Co-operative Company to subscribe 10 per cent of the capital had been made without the authority of its directors.⁵⁸ Months went by as the shareholders of what eventually became known as the North Coast Co-operative Company Ltd sorted out these problems and also differences among themselves on such matters as the choice of a location for the new works. But by the time butter making eventually commenced at its Byron Bay central factory, the company had lost the initiative because the New South Wales Creamery Company Ltd had already established a central factory at Lismore and this had siphoned off some of the co-operative's potential suppliers. The Creamery Company itself was a Sydney-based organisation that came into being in 1894 largely as a result of dissatisfaction in the Shoalhaven district with the management of the South Coast and West Camden Co-operative Company which had run into financial difficulties because of its policy of exporting produce at low prices in an effort to keep domestic prices firm. Not to be outdone, the Fresh Food and Ice Company opened a central factory at Grafton in 1896 barely four years after the first local factory in the Clarence River district had been established at Ulmarra in 1892.

These northern developments were paralleled by similar ones on the South Coast where central factories were set up at Milton in 1891 and Berry in 1895 and subsequently at other places. Thus by the mid-1890s the spatial organisation of butter making was again changing: the role of many of the district factories was being relegated to that of separating stations which forwarded cream to the central establishments equipped with refrigerating plant. However, unlike the situation in Victoria, where by 1892-3 42 per cent of the factory butter was being made in Melbourne from cream sent in by rail, in New South Wales the bulk of the output continued to be churned out in the producing areas themselves: about 87 per cent of the 4,500 tons made in 1892-3 was processed on the South Coast. The main reason was simply that cream would have deteriorated if shipped coastwise to Sydney: even in 1905 the central factories were still finding it difficult to persuade the shipping companies to provide adequate refrigerated space for butter aboard coastal vessels.

Forest and Mineral Resource Based Industries

New South Wales was endowed with a relatively wide range of mineral resources but although this led to the establishment of various processing plants it did not, in turn, form the basis for related manufacturing and fabricating activities. The mining and processing plants handling copper, tin or iron created only a trivial

amount of work for the local equipment manufacturers since the smaller companies used fairly primitive methods and the larger ones imported their smelters, engines and haulage gear from overseas. These activities added a further dimension to the colony's secondary industry without becoming an integral part of it in the sense that changes in their prosperity had little relationship to, or impact on, the course of manufacturing generally.

Gold production in New South Wales during the forty years to 1890 totalled 8,967,000 fine ounces, or barely 13 per cent of the Australian total. From this flow two points of comparison with the situation in Victoria. First, most of it was obtained by hand methods with relatively little investment in steam-driven mining machinery and crushing plant: the sporadic, scattered and uncertain demand thus provided little incentive for specialist equipment firms to emerge in the main mining districts. Second, there was less need for timber for both mining and fuel so that the forest cover in inland areas of New South Wales was not attacked as ruthlessly during the 1850s and 1860s as that in Victoria. Then when very large quantities of wood were required for the copper and tin mining and smelting industries during the 1870s and 1880s, much of it was cut and used in the New England and Cobar districts which were remote from the colony's main stands of building and construction timber. At first milling operations in these latter forests were carried on with a minimum of fixed and infrastructural investment but, as the following discussion shows, attempts were made towards the end of this period to prevent wasteful exploitation and hence encourage a spatially more permanent form of forest sawmilling.

Forest sawmilling

Earlier chapters have referred to the development of the timber industry along the coast of New South Wales. By the end of the 1830s gangs of sawyers had all but worked out the accessible stands of cedar from the inlets and estuaries near Sydney and from the escarpment paralleling the narrow coastal strip in the Illawarra and Kiama districts to the south, and were moving into northern river valleys like the Hastings, Macleay, Bellinger, Clarence, Richmond and Tweed. In 1846 these were supplying three-fifths of the timber shipped coastwise to Sydney (see Fig. 3.5).

On 1 November 1861 regulations were published, as provided for by the Crown Lands Occupation Act, 1861 (25 Vic. no. 2), which enabled applicants to obtain a general timber-cutting licence at a cost of £6 per year or a hardwood licence only at £2. Minor amendments were made in July 1864, and more significant ones late in 1866 when both the licence fees were halved. At this stage, therefore, anyone who had bought a personal, non-transferable, annual licence for £3 was entitled to cut any quantity or quality of timber

upon any Crown Land, whether under lease or otherwise, not measured for sale, or dedicated to any public purpose, and not within half a mile of any City, Town, Village, or head station, and not forming part of an enclosure of less extent than 1,000 acres, and not specially exempted by notice in the *Government Gazette*.⁵⁹

Such specific exemptions were first proclaimed in February 1871 'to protect some of the magnificent forests of brush and hardwood in the Clarence Pastoral District, and the flooded red-gum forests on the Murray River'.⁶⁰ During the next ten years 461 such reservations (amounting to 5,315 square miles) were made, of which 250 (2,670 square miles) were exempted from the operation of the ordinary timber licences. Until September 1878 these exempted reserves were worked under permits granted by the authority of the Minister or the Executive Council but this system was abused: along the Murray River, for instance, 'enormous quantities of timber were cut under the colour of permits issued for specific purposes, *i.e.* local works'. Despite the appointment of forest rangers beginning late in 1875, a good deal of wastage took place as timber-cutters roamed round the whole of a reserve felling only the best trees.

Various proposals were made for controlling cutting in forests, but it was not until 2 April 1878 that the Legislative Assembly resolved that regulations should be made, under the Land Acts Amending Act, 1875 for the management of timber reserves throughout the colony; these became effective on 1 October 1878. Forests on Crown land were categorised either as 'State Forests' or 'Timber Reserves'. The former were divided into blocks of about 5 square miles, and sawmillers could obtain the exclusive right to work a block for up to three years by purchasing a licence at a minimum upset price of £10 per square mile. In addition, royalty was payable on all timber felled at the rate per 1,000 super feet of 10/- on cedar, ironbark and red gum, and 5/- on other timbers. After the mature trees had been extracted, the blocks were closed to allow regeneration; in the Murrumbidgee pastoral district, which contained the main red gum stands, not more than one block in four could be opened for timber cutting in each successive five years. 'Timber Reserves', to which simpler regulations applied, were created in areas where the demand for timber was small and confined to local needs. Then, by regulations gazetted under the Crown Lands Act, 1884, sawmillers were charged royalties of from 2/6d to 12/6d per 1,000 super feet depending on an assessment of the grade of timber.

Thus New South Wales became the first colony to make at least some effort to control forest sawmillers, although a good deal of criticism was expressed at the Royal Commission of Inquiry on Forestry in 1907. The Acting Chief Forester of the Department of Lands, for example, complained on 22 July 1907 that

From inception the laws relating to forestry, and under which it has been administered, were those designed for the occupation and settlement of the public estate, and embodied no aim for the maintenance of forests in perpetuity, or for their treatment on scientific or systematic principles, nor did they include any policy of conservation or reproduction, which was not subject to the requirements of occupation.

The Commission thought that one of the reasons for this was that 'probably no section of business under Government control has experienced greater vicissitudes in its management or less consideration than that connected with our forests'. The small branch formed in 1877 to administer the forestry regulations was at first

attached to the Lands Department, transferred to the Mines Department in 1878, moved back to the Lands Department in 1888, proclaimed a department in its own right in 1889 and placed under the Colonial Secretary, transferred to the Mines Department in 1892, and re-established as a branch and attached to the Lands Department in 1897.

Hardly surprisingly in these circumstances the records relating to sawmilling in New South Wales during this period are poor. During the 1880s the Forest Branch kept a record of the quantities of timber felled in State Forests on which royalty had been paid, yet this represented only a fraction of the total output. In 1884 14,569,000 super feet were cut by holders of Forest Licences but over 58,000,000 super feet of sawn timber, as well as innumerable logs, piles, girders and pieces, were shipped from coastal ports: millers in the Richmond River area alone sent out 13,700,000 super feet over and above that cut under Forest Licences. But these shipping figures were, at best, a poor guide as they considerably understated the quantities involved. Whereas the six licensed sawmillers in the Myall River and Lakes area paid royalties on 5,577,000 super feet, less than one-tenth of that amount was recorded as having passed through Port Stephens, the only practicable outlet.

Aside from its use as a local building and fencing material, indigenous timber found its way on to three main markets. First, the red gum forests along the northern bank of the Murray River east and west of Echuca were opened up during the 1860s and 1870s at the same time as those on the Victorian side. The collapse of the market for railway sleepers (precipitated by the imposition of an export duty on red gum by the Victorian government in 1879) gave a temporary boost to the New South Wales industry but eventually it, too, declined in 1885: licensed sawmillers operating in the Murray forests paid royalty on 9,085,000 super feet in 1884 but on only 3,976,000 super feet the following year.⁶¹ Second, there was a growing demand for wood as a fuel by the copper and tin mining companies at inland smelters. References in half-yearly reports suggest that about 3.3 tons were required per ton of copper ore smelted: on the basis of the types of timber being used, it can be calculated that during 1884 in the Cobar area alone about 70,000,000 super feet of timber would have been needed to produce the 6,600 tons of refined copper.

Third, sawmilling activities along the coast were largely orientated to the demand in Sydney. In 1885 the officers of the Forest Branch estimated that 63,000,000 super feet had been shipped out of twenty-nine ports and there seems little doubt that much of this was consigned to Sydney, a market that was being glutted by increasing quantities of softwood building boards imported from the West Coast of North America. Competition among local producers was further intensified later that year when some northern firms lost part of their Queensland trade as a result of an increase in customs duties there. To make matters worse, the royalty on first quality timber felled in State Forests was raised from 10/- to 12/6 per 1,000 super feet in August 1885: since this was charged on the log and made no allowance for wastage, the effect was to increase the impost in terms of dressed timber from 20/-

to 25/-. Sawmillers working forests on Crown land were in fact paying a higher rate of royalty on first quality timber than was being charged in customs duty on imported supplies. This was to some extent remedied in April 1886 when, after protests by the North Coast timber industry, the customs duty on dressed timber was raised from 20/- to 30/- and on rough and undressed timber from 10/- to 15/- per 1,000 super feet. But the damage had already been done, and during 1886 over ninety sawmills went out of operation. Since these tended to be the smaller ones, employing no more than four or five hands apiece, the long-term effect was to enable the remaining firms to reorganise themselves both structurally and spatially. It was at this point that the conservation measures, progressively introduced during the 1870s, became important for they meant that in New South Wales, unlike Victoria, forest sawmillers were not forced into remote, inaccessible, high-cost areas, and were in a better position, therefore, to meet the problems of the 1890s.

Copper-smelting

Two, almost separate, copper-smelting industries developed in New South Wales: one based essentially on coal and the other on ore. It will be recalled from Chapter 4 that the possibility of smelting imported copper ore using Hunter Valley coal was being considered in 1845 and led to the establishment of the Rosemorrin Smelting Works at Lane Cove (Sydney) which operated briefly from 1849, and the Burwood Smelting Works near Newcastle which worked intermittently during the 1850s and 1860s.

There was thus no novelty in the decision by the Wallaroo Copper Mining Company in 1866 to set up a smelter near Newcastle: what was new was the intended scale of its operations. Since 1861 the company had been shipping Hunter River coal 1,100 nautical miles to its works located about halfway along the eastern side of Spencer Gulf in South Australia. This was a profitable method of processing better quality ores, but the increased quantity of coal required made it uneconomic to smelt ores of less than 8 per cent copper content. The solution was to ship poor grade ores to the fuel source, an operation that was accomplished at little additional cost because the vessels had previously been returning to Newcastle in ballast. In August 1866 the Wallaroo Company obtained the lease of 10 acres near the Waratah Coal Company's wharf upstream from Newcastle (Fig. 10.5) and there erected the Hunter River Copper Works which came into operation in 1868. By the early 1870s the seventeen furnaces were processing 21,000 tons of ore each year into 1,500 tons of fine copper (see Fig. 13.7).⁶² From all accounts this appears to have been an efficient operation: into one end of the plant came ore along a horse-drawn tramway from the wharf a quarter of a mile distant, and into the other ran a light, raised railway that hauled coal direct from the nearby mine. The Waratah Coal Company (established in Sydney in 1862) not only benefited from having a significant captive market on its doorstep but used the works as a means of disposing of waste or 'small' coal which otherwise had to be dumped away from the mine because of the danger of spontaneous combustion. The procedures for handling materials were quite sophisticated, an electric telegraph system being employed, for example, to

call up coal in the qualities and quantities required (about 10 tons to smelt 6 tons of ore).⁶³ Despite its technical efficiency, the Hunter River Copper Works was, by its very nature, a comparatively high-cost operation which could only remain viable while world copper prices were high. Whereas ingot copper was worth £90 per ton in New South Wales in 1872, its value had halved by the end of the 1880s: since there seemed little prospect of prices recovering, it was decided to close down the Waratah works in 1893, throwing 100 men out of employment. The property was acquired by The Broken Hill Proprietary Company Ltd in 1896 as a possible site for a plant to treat sulphide ores and concentrate (which required roasting before they could be successfully smelted) to replace the operations at Broken Hill as the increased coal requirements had made the continuation of processing at an inland location uneconomic: in fact, however, it later used the site for its first iron and steel works.

In 1870 the English and Australian Copper Company, which had been associated with the South Australian copper industry for the previous twenty years also decided to erect a smelting works at Broadmeadows near Newcastle which was brought into use in June 1872. This relied on ore shipped from South Australia, Queensland and New Caledonia and also on ore processed on commission for local mining companies. It was a smaller plant than the one at Waratah, turning out 1,230 tons of copper ingot in 1876-7 and 1,460 tons in 1877-8,⁶⁴ and it continued operating (though sometimes much below capacity) into the twentieth century.

Several attempts were made during the 1860s to bring the original copper works at Burwood into regular operation but without success. After the owner, James Mitchell, died in 1869 a bid was made to form the Newcastle Smelting Company Ltd but it gained little support. Then it was operated for a year by a partnership before passing into the hands of the Mount Perry Copper Company which in June 1872 began sending small quantities of regulus from its Queensland mine for refining.

By mid-1872 therefore three copper-smelting works were operating within a stone's throw of Newcastle. During the seventeen years through 1884 the net imports of copper ore into New South Wales (to all intents and purposes, Newcastle) amounted to 340,000 tons which suggest that between them these works turned out at least 50,000 tons of ingot copper. Then during the six years to the end of 1890 they are known to have produced 16,260 tons valued at £945,000.⁶⁵ The entire reason for their location near Newcastle was the availability of coal of which they consumed perhaps 3 per cent of the whole output from the northern field. Directly and indirectly they provided employment for about 500 men and boys (including miners and carriers) and in this sense played a significant role in the local economy. But there is no evidence that they gave much stimulus, either through forward or backward linkages, to other secondary industries: nearly all the plant, for instance, was brought from overseas. The one new activity encouraged in the district was the manufacture of firebricks—a useful but hardly dramatic development.

Elsewhere in New South Wales, beginning in 1863, copper-smelting was

undertaken at the mines themselves using local supplies of timber as fuel. It is not relevant here to trace the progress of the colony's copper-mining industry, and in any case the available records are very incomplete. It is sufficient to say that during the 1860s speculators were beginning to realise that winning copper ore was one problem but refining it was another, and investors soon learned to regret the impetuosity with which they subscribed to schemes for building furnaces in the bush. Those built by the Carangara Company near Orange, for instance, were soon found 'to be altogether unsuited for the work of copper smelting': as a correspondent of the *Sydney Morning Herald* observed on 12 September 1865,

I was told that it was a magnificent sight to see these furnaces at work, and to mark the beautiful and varied colours that the flame and vapour from them assumed. Alas! as the shareholders admired the splendid sight, they little thought that it was the copper that furnished it, and that their hopes of a dividend were dissolving into air in the brilliant colours that elicited their raptures.

Smelting was associated with mining in this way to try to reduce freight costs on the ore which in inland areas in the 1860s amounted to about 1/- per ton-mile. Ingot copper weighed only one-seventh as much as the ore and, being clean and compact, was sought as a backloading at keen rates by carriers.

From 1866 about half a dozen smelters were operating at any one time in proximity to the mines. At first the largest plant was that run by the Cadiangalong Mining Company near Orange which processed its own ores as well as supplies brought from nearby mines into 300 to 400 tons of ingot copper a year. Taken together these inland plants produced about 6,000 tons of ingot from 1863 through 1875 or roughly one-third of the colony's total, the remainder being made from imported ores at Newcastle. Then in 1876 the first smelting works on the Cobar field came into operation at the Great Cobar Mine followed later by others at places like Nymagee and Girilambone. By the standards of the day these were very large ventures: during the 1880s the Great Cobar Works smelted 186,000 tons of ore into 19,600 tons of ingot, while 50 miles to the southeast the Nymagee Works processed 100,000 tons into 12,400 tons of ingot, between them accounting for 77 per cent of all the copper made from locally mined ores. At the best of times the remoteness of the Cobar field would have made these ventures expensive to build, operate and maintain; when seasonal conditions turned against them, they became very marginal indeed. During the 1882 and 1883 drought the Great Cobar Copper-mining Company could not maintain a supply of firewood (which it was using at the rate of 65,000 tons a year) and found itself having to store 1,200 tons of metal because no carriers were prepared to risk their teams over 240 miles of drought-stricken tracks to the nearest railhead at Orange. But more significant was the long-run fall in copper prices which forced the Great Cobar Company to shut down its operations in 1889 and others to follow suit soon afterwards.⁶⁸ Exports of copper derived from both local and imported ores, which had been worth an average of £437,000 a year during 1882-4, were valued at only £89,000 a decade later. Thus, this period saw yet another processing activity rise to some importance and then,

in this case largely as a result of changing circumstances on world markets, pale into insignificance without making much lasting impression either structurally or spatially on the industrial development of the colony.

Iron-smelting

The following, fairly detailed, discussion of iron-smelting has been included for two reasons. First, it provides a good illustration of some of the realities of the process of 'industrialisation' as it occurred in New South Wales. Second, although it was of minor importance spatially during this period, the outcome of the episode was that early in the twentieth century Australia's first significant production of iron and steel occurred at a high-cost and risky inland location. Two separate ventures were involved, one near Mittagong and the other at Lithgow (Fig. 12.10), and it is convenient to consider each of these in turn.

Fig. 12.10: Location map identifying places mentioned in the discussion of the Fitz Roy and Eskbank ironworks.

Mittagong. The partnership mentioned in Chapter 4 that was formed in 1848 to exploit the iron deposits near Mittagong set up The Fitz Roy Iron and Coal Mining Company in 1851 with a nominal capital of £8,000 to finance further development. Attempts to smelt with charcoal made on the spot proved unsatisfactory and therefore 950 acres of coal-bearing land were leased from the government. To exploit this and pay for a rolling plant, nominal capital was raised to £100,000 and then to £200,000 although in fact much of this was issued in the form of bonuses

to existing shareholders. At the end of January 1855 the 3,424 shares were held by only thirty-two people nearly all of whom were resident in Sydney. Little more had been achieved by early 1857 when one of the shareholders bought the whole of the company's assets for £11,500, but this change of ownership did not advance the project any further, nor did yet another company formed later in 1859.⁶⁷

In 1862 a Melbourne businessman, B. W. Lattin, leased the works from the owners, and installed Enoch Hughes (the proprietor of a Melbourne foundry) as manager.⁶⁸ Hughes negotiated a contract to supply the Railways Department with rails for the Southern Line and set to work to rebuild the plant, a process that over-extended Lattin's resources and eventually led to seizure of the entire works under a bill of sale for £2,000. Unexpectedly, the shareholders again found themselves in control of a plant that was now all but operational, and to raise additional funds (and in the process to issue themselves with £14,000 worth of shares deemed to be fully paid-up) they formed the Fitz Roy Iron Works Company in 1863. Now that the venture had a sporting chance of becoming a commercial reality it attracted investment funds from Sydney businessmen like E. Vickery, J. Frazer, H. C. Burnell, S. Zollner and E. T. Beilby, some of whom also took an active interest in its day to day management. They sought technical advice from Davy Brothers of the Park Iron Works near Sheffield and appointed Joseph Hampshire (formerly of the Whittington Iron Works in Derbyshire) as manager, to replace Hughes, and Frederick Davy as engineer. The injection of additional capital, the more progressive management, and the up to date technical skill combined to bring the blast furnace into operation, for the first time, on 30 July 1864. Even prior to this the company had won a contract to supply the cast iron cylinders for the Gundagai Bridge (a 240 foot structure over the Murrumbidgee River) and this job utilised most of the metal which it was able to produce at the rate of about 25 tons a week. Further confidence in the ironworks was engendered when Ebenezer Vickery (a leading manufacturer of footwear and leather goods) gave it an order for the girders required for his new warehouse which was about to be built at a cost of £50,000.

In 1865 the Fitz Roy Iron Works Company applied for incorporation by a private Act which was assented to on 21 June, the opportunity being taken to reduce the Company's nominal capital from £102,000 to a more realistic £60,000.⁶⁹ In the meantime improvements had been made at the works including the introduction of a hot blast system which, when brought into use in May 1865, stepped up production to as much as 90 tons a week. But other problems were beginning to emerge: coal from a deposit opened up less than 3 miles away was found to be unsuitable for the hot blast process so that coke had to be brought via Sydney from Bulli (near Wollongong), and the nearest source of suitable limestone was found to be 37 miles away at Marulan (Fig. 12.10). The heavy transport costs involved in assembling materials (3 tons of coal and 1 ton of limestone being required to smelt 3 tons of ore) meant that pig iron could not be delivered to Sydney at less than £5.17.6 per ton whereas imported iron was available at £5. Moreover, there developed a 'want of full confidence on the part of the directors in the perfect

aptitude of the managing engineer for the duty he had undertaken' and a growing carelessness on the part of the men who from time to time allowed the furnace to become partially blocked up with a fused mass of ore, coal and limestone, which meant that it had to be cooled, cleared and recharged. When output was down to a mere 25 tons a week the directors decided in April 1866 that they had no alternative but to close the works. The blast furnace by then had operated for a total of only thirty-six weeks since being blown in at the end of July 1864 and had produced a mere 2,394 tons of pig iron.⁷⁰

The directors tried to come to an arrangement with the Sydney engineering firm P. N. Russell and Company, which had been using Fitz Roy iron in preference to imported supplies, but neither this nor any other firm was prepared to invest the necessary capital. On 19 June 1866 the chairman of the company, Ebenezer Vickery, wrote to the Secretary for Public Works:

The Directors, realizing the absence of the required skill to carry out the various departments of an extensive iron works, and the indisposition in this Colony to embark sufficient capital in such an undertaking, have been for some time in correspondence with some influential gentlemen in London, with a view of inducing them to join in the undertaking and supply both the skill and capital necessary to develop the Fitzroy Iron Works. The negotiations are assuming a very favourable and practical shape. . . . In order to assist the Directors in completing arrangements, they are desirous of obtaining the guarantee of an order from the Government for 10,000 tons of iron rails at £14 per ton, delivered at the nearest station to the works.⁷¹

Three days later the company was informed that the government was indeed prepared to purchase 10,000 tons but at 30/- per ton less than it sought. Even so, this gave the directors an incentive to hire a new manager, Thomas Levick, who journeyed from Wales to take up his appointment in August 1867, and to raise additional capital. Paid-up shareholders' funds, amounting to £55,135⁷² at the end of 1866, were augmented during the next six months by 'emergency calls' of £16,540 and by additional borrowings (which raised the total external indebtedness to £22,065). Since this was still not enough the company decided to issue £50,000 worth of debentures, repayable after twenty-one years, and on 30 May 1867 asked the government to act as guarantor for the proposed 6 per cent interest. The Premier (Martin) described the request, somewhat mildly, as 'rather a novel one', but according to the *Sydney Morning Herald* the Colonial Secretary (Parkes) told a deputation from the company six days later that

it seemed to him objectionable for the Government to give any assistance to a purely commercial undertaking of this kind, and he thought it would rather clash with the principles of free trade which the gentlemen of the deputation professed. He could not free himself from the impression that it would be a measure of protection in its effect.

The free-trade lobby called a public meeting which petitioned the government not to accede to this 'audacious and impolitic request' since it would create a 'most

unjust, pernicious, and damaging monopoly, and at the same time form a most dangerous precedent for others'. The *Sydney Morning Herald* on 11 June 1867 preferred to see a system of bonuses instituted rather than 'the thin end of the wedge' of protectionist ideas. The weight of opinion was clearly against the company and the government decided therefore that the venture would have to stand on its own feet.

Under Levick's guidance the company made further adjustments to its blast furnace, and opened up a mine 10 miles away at Berrima to provide proper coking coal. Meanwhile the adjacent rolling mill (which included four puddling furnaces for decarbonising pig iron into more malleable bar iron) had been leased out to first one and then another contractor but neither appears to have had much success. On 29 November 1869, when it had become obvious that there would have to be further expenditure on the blast furnace before it could be brought into operation, the shareholders decided it was time to wind up the venture and liquidate what remained of their assets. The land, improvements and tools were sold at auction on 10 January 1870 for £10,000.

Nothing was done at the Fitz Roy works itself for the next couple of years although negotiations were in fact going on behind the scenes. Then on 1 February 1873 the Fitzroy Bessemer Steel Hematite Iron and Coal Company Ltd was incorporated in England with a nominal capital of £200,000 and bought the Fitz Roy works for £60,000 (£45,000 in cash and £15,000 in fully paid-up shares in the new concern) from J. Frazer, J. Keep, E. Vickery and S. Zollner of Sydney.⁷³ The company appointed a Sydney board of directors, and set to work during 1874 and 1875 to bring the plant into operation under the supervision of an engineer, David Smith, who had been sent out from England. Smith busied himself seeking long-term markets—though his efforts hardly inspired confidence. On 13 July 1875 he wrote to the Secretary for Public Works explaining that the company wanted to make a contract to supply the government with 20,000 tons of Bessemer steel rails at £12 per ton delivered to Mittagong station within two years. A fortnight later he wrote again explaining that he had just received advice that a Bessemer plant would cost perhaps £180,000 to erect in the colony and therefore wanted to change his previous request to a six-month optional contract for 50,000 tons of Bessemer steel rails to be delivered over five years at £12 per ton ex-works. The Railways Department was less than enthusiastic; the Engineer-in-Chief minuted on 29 July:

as I thoroughly believe in free trade, I cannot advise that any assistance from public funds be given in support of what is called native industry . . . Probably this Company would be two or three years before starting to roll, and would thus have a monopoly for seven or eight years.

Eventually on 9 August Smith was told that the government was not prepared to go any further than a previous administration which nine years earlier had indicated its willingness to purchase (from the Fitz Roy Iron Works Company) 10,000 tons of rails at £12.10.0 per ton. Late that year Smith was replaced by David Lawson, and it was under his management, therefore, that smelting operations began on 5

February 1876. Originally it had been intended to use coke made from coal mined on the spot and to a limited extent this was done, but in the main the company relied on Lithgow coke railed 145 miles and on Bulli coke shipped up the coast and then railed 77 miles to be landed at the works for 20/6d per ton. Limestone, railed 37 miles from Marulan, cost 10/- per ton. Even though the iron ore was being quarried only a stone's throw away from the works and Mittagong had been linked by rail to Sydney in March 1867 and Marulan in August 1868, the cost of assembling the materials made the resulting pig iron too expensive to compete with imported supplies: much of it in fact got no further than the stockpile—one at the works and the other at a Sydney depot. Finally, on 16 March 1877, after producing 3,273 tons in thirteen months, the blast furnace was shut down and never used again.⁷⁴ Lessees disposed of the accumulated stock of iron by rolling it into rails for the short spur line from Mittagong to Joadja but even this activity had ceased by the end of 1878. The property was then bought by the Mittagong Land Company.

One more episode, however, was still to come.⁷⁵ In 1883 William Sandford was sent out to New South Wales as a representative for John Lysaght Ltd of Bristol and helped the Lysaght brothers to establish the St John Lysaght Galvanised Iron and Wire Netting Works at Parramatta—apparently a quite separate venture. During 1885 Sandford wrote home to Lysaght suggesting that the firm should acquire the Eskbank Iron Works at Lithgow (discussed later) because 'the Government often wanted gauges and sizes and lengths of galvanised iron which could not be obtained here, and consequently the orders for that iron went elsewhere'. When Lysaght turned down the proposal because the company's resources were already fully extended, Sandford submitted his resignation so that he himself could take over the Eskbank Works. Then, in January 1886 the government sought tenders from firms interested in re-rolling worn out iron rails, and Sandford, still waiting for his successor to arrive from England, saw this as an opportunity not to be missed. He therefore took a lease on the Fitz Roy Works which were standing idle and put in a joint bid with the co-operative operating the Eskbank Works. A tripartite arrangement was made in March whereby the government agreed to supply each company with 2,500 tons of old rails annually for five years and to purchase the re-rolled products. It seems unlikely that any of this work was actually done at the Fitz Roy plant because after only six months Sandford moved to Lithgow as manager of the Eskbank Works. The rail rolling contract was then renegotiated, it being agreed in May 1887 that the Eskbank plant would handle 5,000 tons a year. The Mittagong Land Company thereupon attempted to form The Great South Iron and Coal Mines Company Ltd but, when this scheme came to nothing, wrote to Sandford on 12 June 1888 offering him the Mittagong property for £50,000.⁷⁶ Sandford was not interested and thus, once and for all, the end came to the forty-year-old vision of a 'New Sheffield' at Mittagong.

Lithgow. The Eskbank Iron Works Company was formed in 1874 by an influential group among whom were James Rutherford (a prominent Bathurst businessman and manager of Cobb and Co. in New South Wales), Dan Williams (a railway construction engineer), and John Sutherland (the Secretary for Public Works). The

company leased 100 acres from Thomas Brown, owner of the nearby Eskbank colliery, and appointed Enoch Hughes (who had been associated some years previously with the Fitz Roy works) as manager. Construction was pushed ahead vigorously and on 16 December 1875 the blast furnace was ready for operation on an experimental scale. On 9 February 1876 the *Sydney Morning Herald* reported that some 400 tons of pig iron had been smelted and the blast furnace had been blown out so that further adjustments could be made. About this time Sutherland (now out of office) became managing director and ordered rolling plant, puddling, ball and mill furnaces, and other equipment including a steam hammer, hence racking up debts of £130,000 by mid-1876 including an unauthorised bank overdraft of £75,000.⁷⁷ The blast furnace eventually came into commercial production in 1878 using clay-band ore mined on the lease, supplemented by brown hematite from Back Creek near Blayney (77 miles to the west) and red siliceous hematite from Mount Wilson (12 miles away); coal from the Eskbank colliery; and limestone brought 14 miles from Pipers Creek.

Meanwhile Rutherford had taken charge of the company's affairs and was beginning to whittle down its debts, using income from the sales of pig iron, rails and rolled iron.⁷⁸ It seems that when Sutherland again became Secretary for Public Works (a portfolio that included the Railways Department) during 1878, he approved a specially low freight rate on bulk lots of iron consigned the 96 miles from Eskbank to Sydney. This reduction, modified only in detail during the next forty years, meant that the Eskbank Company paid 9/5d instead of 40/9d per ton.⁷⁹ But, despite this concession and Rutherford's efforts to lower production costs, the company was unable to establish a dependable market. Rutherford later explained that this was largely due to antagonism in the trade for when the firm was

ready to supply the Sydney wholesale requirements we deputed our late managing director [Sutherland] . . . to interview the importers and to offer to supply bar iron at £10 per ton, the retail price being then £14 per ton. He interviewed Mr. John Keep, who was the Chairman of the Hardware Association, when Mr. Keep seemed favourable . . . and promised to bring the matter before the Association the following Monday. This no doubt was done and the answer given . . . was 'We will have nothing to do with your iron, and will oppose you by all means in our power, but will buy your plant'.⁸⁰

The circumstances behind this hostility are not clear but it may be relevant that Keep had been one of the shareholders in the Fitz Roy Iron Works Company. Whatever the reason, this agreement between the iron merchants and the lack of any prospect of substantial government contracts for iron rails⁸¹ led Rutherford to the decision to end smelting operations once and for all by demolishing the furnace with explosives so as 'not to be tempted in the future'.⁸²

The *Sydney Morning Herald* of 23 August 1882 reported that the 200 or so former employees had decided to lease the rolling mill from Rutherford and run it as a co-operative, using accumulated stocks of pig iron and scrap bought from the Railways Department. During the four years 1883 through 1886 it turned out

Plate 17: The Eskbank ironworks at Lithgow in New South Wales was operated intermittently by a series of owners between 1875 and 1928 when it was dismantled by the then owners, G. and C. Hoskins, when they transferred their operations to Port Kembla. It was at Eskbank on 24 April 1900 that the first steel was made in Australia. (J. B. Jaquet, *The Iron Ore Deposits of New South Wales* . . . , Sydney, 1901.)

£96,000 worth of finished products such as rails and permanent way spikes. Then in November 1886 William Sandford came to an arrangement with the co-operative to take over as manager, and the following year signed a lease agreement with James Rutherford.⁸³ The five-year government contract for re-rolling rails, initially for 2,500 tons a year and then doubled in May 1887, gave Sandford confidence to extend the foundry and rolling plant and to make alterations so as to achieve greater efficiency. But the Railways Department fell behind on its deliveries of worn out rails and in any case wanted steel rather than iron replacements; eventually the contract was cancelled in May 1889, with the department paying £7,500 as compensation and guaranteeing to supply the company with 10,000 tons of old rails within three years at a delivered price of 50/- per ton. The output of finished products, which had averaged 2,900 tons valued at £18,600 each year from 1887 through 1889, increased to 3,400 tons (£40,000) in 1890 and 4,100 tons (£36,000) in 1891.

Now that business was improving, Sandford decided to purchase the works and the following year acquired the whole undertaking, including the land, foundry, rolling mills and colliery, for £68,260 aided by an overdraft from the Commercial Banking Company of Sydney. Although the order book was being affected by the depression—output during the three years 1893–5 averaged only 2,300 tons valued at £15,900—Sandford decided to spend £15,000 on a mill for rolling sheets and a galvanising and corrugating plant. When these, the first such installations in Australia, were ceremonially opened on 15 January 1894, Sandford was able to claim that in the seven years he had been at Lithgow, £93,000 had been paid out in wages alone and the range of products had increased from 66 sections and sizes to 245. But no sooner had this new plant got into its stride than the free-trade Reid Ministry came into office on 3 August 1894, and the following year introduced customs legislation (59 Vic. no. 18) which removed the duty from a wide range of items including, after 30 June 1896, the impost of 40/- per ton on galvanised and corrugated sheets that had been effective since 9 March 1871. Whereas beforehand there had been 'just a margin of profit' from this new investment, after the duty was abandoned 'the business was of an unsatisfactory and non-paying character'.⁸⁴ Yet Sandford was caught out again a few years later as Thornley, the Eskbank Works Manager, explained:

When the Colonies were Federated, and seeing that all the other States had protective duties, Mr. Sandford felt sure that at least a £2 per ton duty would be imposed through the Federal Tariff. He, therefore, wishing to be ready for the business, erected another sheet mill, as, if they could be fully employed, they would be worked considerably cheaper than the one. After considerable delay the Federal Parliament imposed a duty of 15s. per ton, which is not sufficient to allow the industry being carried on profitably; consequently, one sheet mill has been idle for several years, and the other has only work at intermittent periods.⁸⁵

It is convenient to pursue this episode a little further here for, although they

occurred outside the period covered by this book, Sandford's efforts to make first steel and then iron at Lithgow really belong to the 'colonial' phase of the development of this industry. To provide the necessary background, a brief digression is required to consider proposals that emerged in 1900 for the large-scale production of steel in New South Wales.

None of the attempts that had been made by that time to stimulate the local manufacture of steel rails through the guarantee of long-term contracts⁸⁶ had had any tangible results despite widespread publicity overseas. On 23 May 1900 the Premier received a proposal from W. Jamieson and H. F. G. Keats, representing Blythe River Iron-mines Ltd,⁸⁷ that this company would be willing to erect iron-smelters and rolling mills in New South Wales if the government would guarantee to purchase 100,000 tons of steel rails in four years—the prices to be those ruling in Britain plus insurance and freight. The company expected to commence production within two years of receiving the contract, mainly using ore from its hematite deposits near the Blythe River in northern Tasmania. Even though several such unsolicited proposals had been rejected since 1888, the Cabinet approved this one with curious alacrity and informed Jamieson and Keats of its decision on 3 August.⁸⁸ Two months later the company paid a deposit of £10,000 as an indication of good faith, noting an understanding that it was to receive half the public service contracts for a further four years after the expiry of its first agreement: the government quickly made it clear that this was merely a figment of the company's imagination. Six weeks later, on 17 November, the secretary of the Blythe River Company wrote enthusiastically to the Premier explaining that John H. Darby, managing director of a large English works, had visited and reported favourably on the iron ore deposits giving an estimate that the whole undertaking would require an investment of £750,000 and recommending Sydney as the location for the works. News of these negotiations brought a deputation from Lithgow asking that Sandford be given a chance to submit a tender, but on 27 November the Secretary for Public Works moved that

this House approves of the Government entering into a contract for the supply of at least 100,000 tons of steel rails, to be manufactured in New South Wales at a price not exceeding the cost in Great Britain or America, with the usual freight and charges added.⁸⁹

After a bitter debate the motion was passed three days later. The exact sequence of events from then on is not clear. Jamieson later stated that the negotiations had failed through no fault of theirs but because of the change of Ministry (27-28 March 1901), and that the company had subsequently come to another arrangement with the New South Wales government, this time for the supply of 200,000 tons of steel rails, which was to be subject to the approval of the State Parliament and also to the provision by the Commonwealth of both a tariff and a bonus.⁹⁰ In fact the company had supposed that 'when the Commonwealth was established . . . it would follow the lines adopted by other countries and initiate a protective policy so as to induce the creation of big industries of this character', and had lost interest

in the project when it learned that this was not to be so. Under the Customs Tariff Act, 1902, duties on iron and steel products (apart from galvanised iron) were to be proclaimed only 'so soon as it is certified by the Minister that the Manufacture . . . has been sufficiently established in the Commonwealth'. At the same time, a Bonus for Manufactures Bill was introduced providing for the payment of subsidies on various metal products including pig iron made from native ores, but eventually at the third attempt in 1905 the Bill lapsed for want of support in the Senate.

During the 1890s the mainstay of the Eskbank Works remained the re-rolling of scrap that was being collected from Queensland and South Australia as well as from within the colony itself. The output of finished products rose from 4,720 tons (valued at £33,300 in 1896) to 6,500 tons (£55,500) in 1899. But it was becoming increasingly clear to Sandford that the future lay in steel-making, and spurred on by the belief that federation would bring a 'more enlightened attitude' towards manufacturing industry, he bought a 4½ ton capacity Siemens-Martin open-hearth steel furnace in 1899 and in it produced the first steel in Australia on 24 April 1900. Although of some significance in its own right, this event did not solve Sandford's financial difficulties. Nor did the formation of a company known as William Sandford Ltd, registered on 5 June 1901 with a nominal capital of £60,000 to acquire 'as a going concern, the undertaking known as Eskbank Iron and Steel Rolling Mills', make much difference because 55,000 of the shares were issued as fully paid-up to Sandford himself.⁹¹

Sandford was faced with seemingly intractable problems: without additional resources he could not move into large-scale iron and steel making and yet, as it stood, the Eskbank Works was clearly not viable. He came to a tentative agreement on 24 August 1901 with a group of English investors but the London business world lost interest when it learned of the kind of protection proposed by the Commonwealth government for the iron industry. On 10 January 1902 Sandford's son wrote to him from London reporting that some people holding a concession from the New Zealand government to set up an ironworks were interested in 'the formation of a trust to combine with the proposed Lithgow Company' but nothing seems to have come of this.⁹² Sandford, who had made up his mind to 'get rid of the works by some means', tried to interest the See Ministry in taking it over leaving him as manager, but See replied tersely on 16 July 1902 that he had 'come to the conclusion that it would be far better to leave such works to be undertaken by private enterprise'. The possibility of further negotiations along these lines was effectively ruled out on 28 August 1902 when the Legislative Assembly overwhelmingly defeated a motion that the 'Government of New South Wales should, as early as possible, establish a state ironworks'.

In the meantime Sandford had brought out an English iron expert, Enoch James, to provide him with independent advice about the feasibility of smelting operations at Lithgow. Something of his anxieties at about this time can be seen from a note he wrote for his own use on 29 December 1901. He saw the future mainly in terms of government work for which

we must be able to supply a uniform quality of material. This will be impossible unless we are making our own Pig Iron. What to do next. I have been thinking about this matter for *Years*—I have decided on erecting the Furnace if Mr. James's report is favourable. Then why let it bother me again. If Mr. James's report not favourable, I go on and erect a Siemens Basic Furnace, import certain quantities of Pig Iron, and continue the present Works. With this mode of doing business, there is money in Eskbank Iron works if *properly handled*. It will be impossible for me to develop these Works without the Blast Furnace. Impossible. I am going to risk the Iron Works and the Estate in this Venture. Be cautious in spending money on present works during the next year. I would prefer developing the New Works and keep present works for wire, wire netting, nails, tin plates and other like products. Don't bother and worry about the matter . . . Take James as *General Manager*. Act with caution: but hold to my opinion.

In the event James's report turned out to be highly favourable both as to the capital required and the costs of production, suggesting that pig iron could be made at Eskbank for 35/- per ton (or less than the imported price). On 2 February 1902 Sandford noted that he had had several discussions with James who had explained that the furnace could be operated 'at 400 tons per week as well as 700 tons'. The thing to do, Sandford thought, would be to start at 400 tons and build up output as the market demanded it.

But Sandford was living in a dream world for he could find no one to support his vision of the 'Commonwealth Iron and Steel Company' centred on Lithgow. In reality the existing works only just kept going during the next few years with much of the potential profit that might have been ploughed back in improvements being absorbed by the interest payments on a bank overdraft which averaged £22,000. The main work continued to be rolled iron and steel products and some orders were also executed for railway points and crossings and for steel castings. Over much of this period, however, the works operated below capacity: indeed trade was so slack in 1903 that employees were asked to choose between accepting a reduction in wages or being made redundant by the closure of sections of the rolling plant. The men came to an arrangement whereby wages were initially lowered and then could fluctuate according to variations in the selling price of the company's products,⁹³ a practice not uncommon in the iron trades in Britain.

By notice of 1 July 1904 the government called tenders for the supply of all the iron and steel required by the Railway and Tramway Departments for five years, imposing the condition that it must be made in New South Wales. About this time, possibly as a result of that advertisement, Sandford began negotiations with the government as to the possibility of a long-term contract to supply *all* its requirements of iron and steel.

From these discussions emerged another advertisement on 16 February 1905 seeking tenders along those lines and closing on 1 September. The proposed terms were that

The Contractor shall establish within the State of New South Wales blast furnace or furnaces, and erect all machinery and plant necessary for the conversion of iron ore into pig-iron, and rolled steel and iron, and capable of supplying all the materials included in this Contract. The whole of the pig-iron supplied to the Government, or to the Railway Commissioners of New South Wales, or the Sydney Harbour Trust Commissioners under this Contract, and not less than 90% of the pig-iron used in the manufacture of the materials to be supplied under this Contract is to be produced from ore raised in the Commonwealth of Australia . . . Should any legislation be passed by the Federal Parliament of Australia providing a bonus for the production or manufacture within the Commonwealth of the materials to be supplied under this Contract, the amount of such bonus accruing on material supplied shall be deducted from any moneys due or becoming due to the Contractor under this Contract. All rails and such other materials required for the Service of the State as are included in this Contract . . . shall, during the continuance of this Contract, be ordered from the Contractor . . . This Contract is for a period of seven years. . . .

The specification was tailor-made to fit the negotiations that had been going on between Sandford and the government and his was the only firm to submit a tender.⁹⁴ It was calculated that if the 50,000 tons of iron and steel used by the government and its agencies during the previous five years had been bought at Sandford's proposed prices the cost would have been £46,000, or 11.5 per cent more than was actually paid. Moreover, in the view of the Railway Commissioners the tender fell

far short of meeting the intention of the specification . . . and will be of no real advantage as far as the supplies of the Railways are concerned; but if the manufacture of large quantities of iron from the native ores is accomplished, an important industry will be established, settlement promoted, and the railway traffic increased, and as a matter of policy, is worthy of consideration.

This summarises the spirit in which the government on 21 October 1905 signed a seven-year contract with William Sandford Ltd which was to take effect on 1 January 1907. Sandford immediately ordered a 1,200 ton capacity blast furnace from Britain: while waiting for this to arrive he tried to make even more sure of his long-term position by writing to H. R. Lysaght on 6 April 1906 suggesting that

If we follow the American methods of a 'Trust' and unite John Lysaght Limited with their brands and advantages, and W. Sandford Ltd with our contracts and advantages, we could control the black and galvanised sheet iron trade of Australia and New Zealand. As I have told you before, I am ready at any time to form an alliance for our mutual advantage.⁹⁵

Construction of the blast furnace went ahead and it was commissioned on 8 May 1907. But the cost turned out to be close to £100,000 instead of the estimated £70,000, and by August the company had almost reached the overdraft limit of £135,000 set by the Commercial Banking Company of Sydney. In desperation

Sandford issued a prospectus on 22 September inviting the public to take up the remaining 118,000 £1 shares but the response was poor, and there was no alternative but to approach the government for backing to the tune of £70,000 in order to complete the blast furnace, to erect open-hearth steel furnaces, and to provide short-term working capital. The resulting scrutiny of the company's affairs showed that it had 'arrived at a point where . . . in the ordinary course of events it would mean liquidation' but, despite such advice, the government started negotiations with the Commercial Banking Company about the priority to be accorded any loan from public funds, finally agreeing that the government's mortgage charges and debentures would have precedence up to £25,000. At its meeting on 22 November, the Cabinet agreed to advance £70,000 to William Sandford Ltd, repayment to be made at the rate of £5,000 during each of the first five years and £9,000 during each of the succeeding five years. The Legislative Assembly approved the loan early in December but insisted that the government debentures were to take priority over those of the bank; within a matter of hours the bank foreclosed, shut down the rolling mills on 8 December, and merely kept the furnace operating at minimum output to prevent structural damage. The Secretary for Public Works then approached G. and C. Hoskins Ltd to see if it would be interested in taking over the ownership and operation of the plant from the Commercial Banking Company, and on 20 December it was announced that Hoskins had agreed to do so and would formally take possession on 1 January.

By any standards this must rate as one of the most extraordinary episodes in Australia's industrial history, especially as Sandford himself knew nothing of what was going on. The evidence for this is an unfinished, draft reply by Sandford to a letter of sympathy, sent to him on 20 December 1907 by the Secretary for Public Works:

Communications were being carried on for over ten days, and a scheme completed for taking over the Works and not even a hint of what was going on conveyed to me whilst at the same time the Premier was telling us and our friends to wait; to wait. We quietly waited until the evening of the 19th. when Mr. Chas. Hoskins told me of the proposals at his House.

Hoskins paid £138,000 to the bank to settle the overdraft (of which £93,000 was on account of the new blast furnace), £14,000 to shareholders in the form of 4 per cent interminable bonds, and £50,000 to Sandford himself 'in recognition of the work he had done in pioneering the iron and steel industry at Lithgow'.⁹⁶ The new owners continued operations at the Eskbank plant (which was considerably expanded, a second blast furnace being brought into production in November 1913) until the activities were gradually transferred to a new works on the seaboard at Port Kembla between 1928 and 1931 and the Lithgow works dismantled. Perhaps Sandford's shock and disbelief at what happened in 1907 was slightly mollified by a letter from Andrew Fisher, Prime Minister of Australia, on 6 February 1913:

your views have always been national and the great pity of it all is that you were somewhat before your day like a great many more before you who had to do the heavy pioneering work, get all the blows, and reap few of the rewards.

The acquisition of the Lithgow plant by G. and C. Hoskins marked the end of the 'colonial' period of iron-making in New South Wales by which time 33,142 tons of pig iron had been produced.⁹⁷ The various attempts to establish the industry at Mittagong and Lithgow had all failed for basically similar reasons. With the benefit of hindsight it is easy to assert that if the ventures had been conceived on a larger scale the inadequacies of the resources would probably have come to light during the exploratory stages. In fact, however, the speculators concerned rushed into actual construction and then tried to save their investment by solving problems in a piecemeal way: this generally meant the use of more distant sources of materials, thus further affecting the over-optimistic costings on which the schemes had been based. It is difficult now to be sure of the role played by the various 'experts' who became involved; some appear to have tried their best in what must have seemed hopeless situations while others offered advice that was plainly misleading. But it would be wrong to imagine that the experts were badly chosen or incompetent. It says something for Sandford that he was able to interest Enoch James, 'at that time, without doubt, the greatest expert that Great Britain had', in coming to Australia to report on the prospects of Lithgow, and was willing to pay him no less than £5,775 in associated fees and expenses.⁹⁸ Yet advice of this kind was not without its dangers: Charles Hoskins later explained

that a great expert from Great Britain or any other place, coming to Australia (where the labour conditions and everything are so much at variance with anything that they have been used to in the country from whence they come), is placed at such a disadvantage, that his estimates, examinations, and conclusions that he comes to, are . . . generally speaking, so utterly unreliable that they are worse than useless.

This criticism was largely directed at James's advice to Sandford in 1902 that pig iron could be made at Lithgow for 35/- or less per ton. Only a few months before an estimate of 47/7d per ton had been published by the Geological Survey of New South Wales and the author, J. B. Jaquet, stood by this figure, admittedly as 'an outside estimate', when examined shortly afterwards before the Royal Commission on the Bonus for Manufactures Bill.⁹⁹ Sandford not only accepted James's figure but used it as the basis of pricing the long-term contract made with the government in 1905. The harsh reality became apparent during the latter part of 1907 when the prime cost of producing pig iron in the newly commissioned blast furnace was found to be about 55/- per ton.¹⁰⁰ The difference between this and the Sydney price of imported pig iron, about 69/3d, was not enough to cover freight on pig iron to Sydney, plant overheads and loan repayments, let alone provide a margin for ploughing back into the business or for paying dividends. Be this as it may, however, it was largely James's influence that led to the ill-conceived decision

to establish Australia's first large-scale blast furnace away from the seaboard and away from its main market.

Other Industries

Most industrial activities in non-metropolitan New South Wales fell into the categories already discussed. Other kinds of manufacturing failed to develop largely because, in the absence of more than a feeble stimulus from gold-mining, there was no basis for major structural readjustments similar to those in Victoria. The relatively slight and scattered investment in mining and crushing plant meant that hardly any metal-working establishments equipped to handle orders for heavy machinery came into existence in country districts. The few foundries and engineering shops that did emerge at places like Bathurst and Orange were small by comparison with those in Victorian towns such as Ballarat and Bendigo, and relied on a variety of work from miscellaneous sources. The *Australian Town and Country Journal* reported on 24 June 1876, for example, that the Denison Foundry at Bathurst (probably at this time the largest establishment of its kind outside Sydney and Newcastle) was employing fifty men and boys making railway wagons, patent wool-presses, a 40 foot water-wheel for a gold-mining company, a 66 inch cylinder for the Eskbank Iron Works Company, and the firm's own brand of chaff-cutting machines.

Many of the settlements which grew up in response to gold-mining activities tended to be impermanent and to decay relatively painlessly after only a few years. Since the disinvestment costs were small, the institutions ephemeral, and the vested interests weak, little attempt was made to keep the fabric of these small towns intact by searching out alternative forms of employment. No instances have been found, comparable to those in Victoria, of groups of prominent citizens trying to sponsor manufacturing activities with 'welfare' motives at least partly in mind.

Woollen-milling

Woollen-milling was the only kind of manufacturing that grew up outside the metropolitan area which was not closely related to local markets, resources or raw materials. It never became very important but is worth considering briefly because of the light it throws on the nature and organisation of industrial development in the colony.

In 1852 the four mills in operation, two at Sydney and one each at Parramatta and Penrith, produced between them 230,000 yards of cloth.¹⁰¹ The two largest, namely the Australian Mill (Byrnes and Company) in Parramatta and Barker's Tweed Factory in Sydney, were opened in 1847 and 1852, respectively, as adjuncts to existing flour-mills with which they shared the same source of motive power. Neither Byrnes, who had served his apprenticeship as a carpenter, nor Barker, who was trained as an engineer, appear to have had any practical experience of woollen-milling, and it is hardly surprising therefore that they erected unsuitable

buildings and bought outmoded machinery. Both depended to a considerable extent on skilled workers recruited overseas to handle the day to day technical problems.

Coghlan's assertion, frequently repeated, that the woollen cloth industry was 'in a strong position' prior to the gold-rushes, received 'a great impetus' immediately they began, and was subsequently 'extinguished' by the scarcity and high cost of labour¹⁰² is a misleading generalisation. On the one hand, construction work on Barker and Company's mill began in 1848 and its opening in 1852 was unrelated to the gold discoveries that had taken place in the meantime; on the other, the two main manufacturers were newly established marginal producers that would have been susceptible to any minor changes in local conditions. Understandably, then, the industry was in no position to hold its own against the large quantities of British textile goods being dumped on the colonial market in the mid-1850s. The Australian Mill closed down altogether from 1855 to 1860, and Barker's Mill appears to have ceased operations for two or three years before being re-opened by a lessee. As a result the output of cloth in the colony fell to a mere 36,000 yards in 1855 and 27,000 yards in 1856 before rising to an average of 84,000 yards each year for the rest of the decade.

During the 1860s it seemed as though some life might be coming back into the industry as existing mills were re-equipped and several small firms came into being: in every case the capital originated from individuals or family partnerships. But progress was slow. Of the five mills that operated throughout the decade the largest, Barker's Tweed Factory, was leased to M. M. Campbell who in October 1862 told the Select Committee on the State of Manufactures and Agriculture in the Colony that the machinery was not the best available. Shortly afterwards the premises were bought by O. B. Ebsworth who kept the mill in operation and gradually modernised the equipment during the next seven years with special emphasis being given to labour-saving machinery.¹⁰³ No sooner had this task been completed in 1870 than Ebsworth died, and the mill was again briefly operated by Barker until destroyed by fire in May 1872. It was rebuilt with machinery capable of producing 120,000 yards of tweed a year, and re-opened in 1873 by John Vicars and Company (which relocated in 1894 at Marrickville where the company is still in operation).

Different again were the problems at the Australian Mill at Parramatta. In 1860 Byrnes decided that the time was ripe to bring this establishment back into operation; learning a lesson from the long period of idleness, he decided to increase the efficiency of the mill by installing twenty power looms. Then the snags emerged. Since no skilled operatives could be recruited, Byrnes 'procured raw hands, and, after an infinity of trouble, broke them in to the work'. But once trained, they

struck for higher wages, would only work when they pleased, and, in fact, so far imperilled the business of the factory, that it was determined [in 1864] to make a clean sweep of them, and to revert to the old hand-looms.

Moreover the looms had been designed for weaving 'unions' (cotton and wool mixtures) rather than all-wool cloths and thus 'the friction to which the warp was

so constantly exposed caused such frequent breakages that the constant stoppages for repairs lost more time than was gained by the speed of the machines'. By 1868 the power looms had been dismantled and the whole of the annual output of about 60,000 yards was thenceforward made on hand-operated machines.

During the thirty years through to the end of 1890 these two mills, Barker's and Byrnes's, under various managements produced about two-thirds of the 8,345,000 yards of cloth made in the colony: the remainder came from six other establishments, several of which were simply converted flour-mills.¹⁰⁴ Although the quantities produced fluctuated considerably between years, the industry was relatively prosperous during the period from 1874 through 1883 when the eight mills turned out an annual average of about 345,000 yards.¹⁰⁵ But then the number of mills, production, and employment all began to dwindle, largely as a result of the increased volume of low priced wool and 'union' cloths being imported, a process that seems to have been little affected by the 5 per cent ad valorem duty imposed on clothing and textiles, along with a wide range of other goods, between 7 April 1886 and 30 September 1887. By this latter date the workforce in the industry had been halved in less than four years and, in desperation, the remaining 175 employees sent a deputation to the Premier to seek 'some slight encouragement' through a specific import duty of 6d per yard (roughly equivalent to an ad valorem impost ranging from 50 per cent on cheap cloth to 15 per cent on better quality ones).¹⁰⁶ Predictably, Parkes said he 'could hold out no hope of this import duty being placed upon imported tweeds' but thought that 'perhaps something might be done in the way of Government contracts, which would considerably relieve them'.

The four mills in operation were surveyed under the Census and Industrial Returns Act in 1891.¹⁰⁷ Between them during the previous year they had produced 310,000 yards which meant that, after a dull patch, they were again working at almost full capacity. Even so the Government Statistician's Office wrote scathingly about the industry's premises, plant and prospects. It noted that most of the buildings were simply converted flour-mills and thus 'neither so convenient nor so well adapted for their present use as might be desired' since considerable time and expense were incurred in shifting materials between floors. The machinery was a mixture of types and makes 'and, generally speaking, obsolete' with some of the looms working at little more than half the speed of more modern kinds available and 'utterly incapable of turning out high class cloth'. Operations like carding, weaving, warping, dyeing and finishing could not be satisfactorily performed with such antiquated equipment so that, at best, the mills could turn out only an inferior, cheap type of cloth. The report observed that the total annual capacity (335,000 yards) was 'not equal to that of one fifth class English mill' and even the largest establishment did not produce enough to return the profit commensurate with the capital invested. The main inducement that kept the mills going was the fact that they were worked in conjunction with clothing factories, thus giving the proprietors 'a second and perhaps more satisfactory return from the cloth'.

As indicated already, all the mills were privately owned and no financial details appear to have survived. As far as is known only two attempts were made to float

public woollen-mill companies. The first, at Singleton in the Hunter Valley during 1877, came to nothing;¹⁰⁸ the second resulted in the Queanbeyan Wool and Manufacturing Company Ltd being registered on 2 August 1888 but this venture collapsed in 1896 before it had had time to extend its range of operations from wool-scouring and dumping to spinning and weaving as had been intended.

The woollen industry in New South Wales thus differed from that in Victoria in several important respects although in neither colony did it achieve more than limited success. Whereas in Victoria most of the establishments were operated by public companies in provincial centres, in New South Wales most of the cloth was produced in Sydney or in nearby Parramatta; the one main exception, the Cooerwull Woollen Mill near Bowenfels 90 miles inland from the metropolis, came into being at a remote location (almost literally in the 'bush' since a village had to be built for the employees) as the result of an anomalous whim by an individual landholder.¹⁰⁹ During the discussion in Chapter 9 considerable stress was laid on the problems created for the Victorian woollen-milling industry by low-priced imports, the flow of which was little affected by increasingly onerous customs imposts. It may seem strange in such circumstances that the New South Wales industry, which to all intents and purposes was not protected by import duties on piece goods or apparel, should have survived and possibly even made some small progress during the 1870s and early 1880s. Much of the explanation lies in the fact that the Victorian companies were unable to find satisfactory outlets for their products because of the control exercised over the clothing trade by the wholesalers-importers; in New South Wales, however, most of the woollen-mills were part of, and sold their output to, many-sided businesses which included the importing of softgoods and the manufacture of clothes.

The Spatial Influences Reviewed

Perhaps the main characteristic of non-metropolitan manufacturing and processing activities was the lack of spatially related linkages at the local level. In all but a few of the cases where the detail is known, the equipment used in flour-mills, sugar-mills, breweries, tanneries, smelting-works and so on was made in Sydney or obtained outside the colony. A particular example illustrating this point was the much-publicised coach-building works established by Cobb and Co. at Bathurst soon after setting up its New South Wales headquarters there in 1862. Although this factory supplied most of the passenger coaches and freight vans used on the Company's own network in southeastern Australia, and the extensive range of buggies, sociables and other vehicles made for sale, it only employed forty to fifty hands and sub-contracted little work to local suppliers. Most of the materials were imported in semi-finished form: the elm and hickory was already cut to size, the wheels prefabricated, and the ironwork wrought into shape, so that, in effect, it was one of the first vehicle assembly works in Australia. Forward linkages were equally weak: the growth of sugar-milling did not lead to an upsurge in distillation nor the spread of flour-milling to the dispersal of biscuit making. These circumstances were

largely a reflection of, and partly help to explain, the dispersed and small-scale nature of urbanisation in New South Wales.

The only exception, apart from the metropolis itself, was the City of Newcastle and its associated cohort of mining settlements where industry inter-relationships were beginning to emerge. The coal-mining and shipping companies placed enough work locally to keep several foundries in operation and this, in turn, meant that the equipment was available in the area to meet demands from other sources. Thus, the partnership of Morrison & Bearby (which came into being when three employees of Mort's Dock and Engineering Works acquired an iron and brass foundry on Bullock Island near Newcastle in 1873) derived most of its business from the construction and repair of marine engines, boilers and colliery winding gear, but was also able to supply engines, boilers and equipment to firms making cordials, salt, acid, leather and bread. This, the Soho Foundry, employed 30 hands in 1878, 70 in 1882 and 120 in 1884 and in less than a decade became the colony's largest engineering works outside Sydney. Not far behind was the family firm founded in 1854 that traded variously as A. Rodgers and Company, J. S. Rodgers and Sons, and Rodgers Brothers, which gained something of a reputation as an innovator by building the first locomotive (for a coal-mining company), the first marine engine and the first iron pier bridge in the Hunter River district. It had the equipment therefore to handle orders from local manufacturers such as for a set of flour-mill machinery in 1865, biscuit ovens in 1879 and soap-boiling vats in 1885.¹¹⁰

There were also other groups of related activities in the Newcastle area. One was based on animal products and included meat preserving, tanning and the making of soap and candles. The most important of these firms was the Sydney Soap and Candle Company Ltd, formed in 1885 when, as mentioned in the previous chapter, the Newcastle and Sydney interests of Upfold & Gilles were amalgamated with those of J. Kitchen and Sons and Apollo Company Ltd. Another group was inter-related through its use of agricultural produce, an outstanding example being the processing of flour and other grains at William Arnott's biscuit factory. Arnott, who was born and served an apprenticeship in Scotland, arrived in Australia in 1848 and established a bakery at West Maitland in 1856: a series of floods forced him into debt and he was compelled to sell the business in 1865 when one of the creditors demanded repayment. That same year Arnott re-established himself at Newcastle and was able to take advantage of the port trade to build up a confectionery and baking business specialising in plain, sweet and ship's biscuits using mainly locally grown grain. Early in the 1880s, when there were about forty employees, the business was expanded by sending biscuits coastwise for sale on the Sydney market, and about this time the firm entered into long-term contracts with Adelaide roller flour-millers to allow it to concentrate on fancy lines which required finer, whiter flour. Following the completion of the Hawkesbury River railway bridge in 1889, Arnott opened a depot in Sydney to which manufacturing facilities were added in 1894.¹¹¹

Towards the end of the 1880s the structural weaknesses of a good deal of the

industrial development that had taken place outside the metropolitan area were becoming apparent. The case studies discussed earlier in the chapter show how various technological, entrepreneurial, governmental and other factors were helping to remould the basically simple spatial relationships which formerly existed. It had begun to dawn on country towns that there were no ready alternative activities in the offing to replace the dwindling numbers of long-established enterprises like breweries, flour-mills and tanneries. Moreover, the settlements that had grown up in association with inland copper-smelting or tin-smelting and coastal sugar-milling, as well as some of those which had initially taken up the factory production of butter with considerable enthusiasm, had begun to appreciate how fickle international commodity markets could influence prices within the colony.

Significantly, the 1880s saw increasingly suspicious (and, no doubt, jealous) attitudes developing in country areas about the role being played by influential businessmen and politicians in Sydney. There were murmurings about the activities of brewing and flour-milling companies and, more specifically, about those of The Colonial Sugar Refining Company Ltd and the New South Wales Fresh Food and Ice Company Ltd as well as other ventures like the South Coast and West Camden Co-operative Company which had their headquarters in the capital. Over the years provincial newspapers had ceaselessly reminded their readers of the 'unfair' treatment meted out by Sydney to the remainder of the colony. The *Newcastle Morning Herald* lost no opportunity to expose the tactics that were frustrating efforts to ship Hunter Valley goods direct to Europe instead of via Sydney, the inadequacies of the government contract system in general and the way it prejudiced the chances of small country firms in particular and, of course, the biased nature of electoral arrangements. There was always plenty of grist for these mills, much of it unimportant item by item but forming a convincing saga when pieced together by skilled journalists to show the way Sydney was running the colony to suit its own malevolent ends. Little imagination is needed, for example, to appreciate the reaction of the country press in April 1879 when it was told that it was not allowed to have representatives in the reporters' gallery of Parliament.

It was not until 1888, however, that popular feeling became sufficiently strong to lead to the formation of 'decentralisation leagues'. Not surprisingly, the first was set up in Newcastle and was triggered by an announcement early in the year that trains running between Sydney and the Queensland border would bypass that city. Whereas it had previously been expected that Newcastle passengers would have had to have changed trains at Hamilton (2 miles from the City station), suddenly Waratah (4 miles distant) was designated as the changing place. For five years Newcastle people had known of plans to erect a station and workshops on 38 acres resumed at Hamilton, and had accepted the inconvenience which even this arrangement would have involved because of the existing congestion in and near the central business district. Not only was the switch to Waratah seen as another arbitrary decision made in hugger-mugger in Sydney but it was one which would divert the export produce of the northern districts to the metropolis instead of to

its 'legitimate, proper, and natural stopping place' on the wharves at Newcastle. The protest began quietly enough: 200 people met on 12 January and appointed a deputation to represent the view to the Secretary for Public Works (Sutherland) that the changing station should remain at Hamilton but, if any alteration had to be made, it should be to Newcastle rather than to Waratah. During the next few days Sutherland also received deputations from Hamilton and Waratah, and perhaps considered this to be no more than a parochial brawl.¹¹²

By brushing aside these initial approaches Sutherland drove mildly antagonist groups together. On 19 January a crowd of 'between 1,800 and 2,000 persons' met at Newcastle and appointed a deputation to represent its view to the Minister that 'Newcastle be the changing station for all trains between Sydney and Brisbane, and *vice versa*'. To make matters worse, Sutherland authorised a curt announcement in the Sydney press on 31 January that Hamilton was to be the changing station, and three days later told the representatives of the Newcastle meeting that he was 'not here to take orders from any deputation'. This haughty and evasive attitude was duly reported on 16 February to a throng of 3,000 people—claimed to be the largest public meeting held in Newcastle—which resolved:

1. That the reply of the Hon. the Minister for Works to the deputation on the subject of the changing station is unsatisfactory, and discloses an evident intention to disregard the interests of Newcastle and the North for the purpose of centralising the trade and commerce of the whole colony at Sydney.
2. That, in order to protect the interests of the Northern and North-western Districts against centralisation, it is necessary that an association be at once formed to be called the Northern and North-western Decentralisation League.

In their exuberance, some speakers mentioned the possibility of 'separation' at a future date: 'what Victoria and Moreton Bay felt forty years ago they were experiencing now', said one, 'and it was for them to decide how long they would tolerate such experience'. But wiser counsels prevailed, pointing out that to mix up the question of separation with the question of getting common justice for this city 'is to place a great barrier in the way of our receiving it, for it will certainly alienate the goodwill and assistance of the people of the rest of the colony'. The *Newcastle Morning Herald* of 18 February saw a well-framed Local Government Bill as one solution:

At present there is nothing between the Parliament of the country and the Municipal Councils, and our opinion is that . . . a sensible and comprehensive measure creating bodies possessed of powers neither so extensive nor contracted would help check centralization. . . .

By this time the mood was such that every setback was seen as part of the machinations of the metropolis. When Hudson Brothers Ltd dismissed 200 men from its rolling stock works at Wickham it was put about that this had resulted from the government trying to centralise all railway contracts in Sydney: conveniently

it was overlooked that Hudson Brothers had also been forced to close its Redfern factory and to run down operations at Granville because of the shortage of orders.

The council of what by now was being called the 'North and North-western Decentralization League' formulated a constitution which was formally adopted on 27 February. The objects sought by the League were:

- (a) The discontinuance of the present system of centralization, which is injurious to the interests of the colony at large, and cause a heavy loss to the revenue.
- (b) A fair and impartial railway tariff for passengers and goods on the Great Northern and North-western lines, including the Homebush-Newcastle branch.
- (c) The granting to all Northern ports in the colony the same advantages that Sydney may enjoy as an import and export port.
- (d) The issue of through railway tickets to the neighbouring colonies at all large towns at rates proportionate to those charged in respect to tickets issued in Sydney, and on similar conditions.
- (e) A just and equitable expenditure of the revenue of the colony.
- (f) The establishment from time to time, in all places where the public convenience so requires, of branch stamp offices, and of local offices for the granting of probates of wills, and for the registration of deeds.
- (g) The granting to all the large centres of population the same railway and other privileges that are granted to Sydney.

The League proposed to achieve these aims by ensuring that country electorates were represented in the Parliament by local residents if possible, or, failing that, by men 'whose interests are not absolutely centred in Sydney, and who are opposed to centralization', and by continuous agitation, deputations, petitions and any other constitutional means. Ironically, two days later in Parliament, the Minister for Works announced that Newcastle, after all, was to be the changing station for the railway between Sydney and Brisbane.

Far from dampening enthusiasm, this decision gave the League's supporters further encouragement: 'what they have lately accomplished' said the *Newcastle Morning Herald* on 5 March, 'should act as an incentive and as a proof of what can be done where the people themselves are alive to their interests and act as one man'. Spurred on in this way, no fewer than twelve branches of the League were set up during the next couple of months—eight being in the suburbs of Newcastle itself, three others at East Maitland, West Maitland, and Morpeth, and one calling itself 'The Industrial, Mechanical, and Working Class branch'. By 1 May the League was ready for its first conference, diplomatically held at East Maitland to avoid any suggestion that Newcastle might be fostering the movement to serve its own ends, and this set up several sub-committees to prepare reports for a second conference held on 11 September. Much the most useful was an analysis of the proposed Local Government Bill; rather than any extension of the system of municipal government, the League wanted the colony to be divided into ten provincial districts each of which would be entitled to a share of the national revenue and authorised to disburse this according to its own set of priorities. But it was given no opportunity

to parade these views because the government decided not to proceed with this Bill (and, in fact, only minor amendments were made to the organisation of local government during the remainder of the century). This, and the more acute, local problems created by a general strike of miners that had commenced on 24 August, appears to have taken the wind out of the sails of the League and little further publicity was given to its activities.

In other parts of the colony, too, anti-Sydney feelings became more evident and more focused at about the same time. Possibly the early success of the North and North-western Decentralization League over the changing station episode had an encouraging effect: certainly the provincial press gave space to the activities of these organisations. Thus a Decentralisation League was formed in March at Bathurst, a town that had suffered in 1886 when Cobb and Co. shifted its coach-making plant to Charleville in Queensland and in 1887 when the Railways Department reduced the number of staff at its permanent way and locomotive repair workshops from 300 to 100. The circumstances of this are far from clear: one explanation was that the government was deliberately transferring as much work as possible to the newly constructed Eveleigh Railway Workshops in Sydney, another was that the Bathurst Workshops had been inefficient. The real reasons were hardly important: the redundancy at the workshops simply gave a focus to the long-standing suspicions of Sydney centralisation. Nor were these feelings disabused by the Minister for Works when he passed through the town on 17 March during the course of a grand tour of the colony: 'surely', wondered the *Australian Town and Country Journal* a week later, 'he will not be compelled to support the miserable policy of centralising in Sydney everything which is payable, and courting a cheap popularity in the metropolis at the expense of the country'. The Bathurst organisation also displayed its doubts a few weeks later by translating itself into the Western Decentralisation League and widening the scope of its activities to include the reorganisation of the local government system, greater uniformity in railway rates for passengers and freight, and a more equitable distribution of the revenue. Influenced by these developments 100 miles away, the Mayor of Goulburn called a public meeting on 20 March to form a Decentralisation League in that town. There was no novelty in the arguments put forward: among other complaints reported in the *Goulburn Herald* on 22 March there was

the unfair and iniquitous system of differential [railway freight] rates, through which they were debarred from starting any manufactories or encouraging industries that would give employment to large numbers in this city. This unfair and enormous freight debarred them not only from manufacturing goods for their own consumption, but from supplying other and smaller towns further in the interior . . . We want manufacturers with their wives and families in our town to make it prosperous.

Everyone, of course, was convinced 'that the system of centralisation practised by successive Governments is a great injury to country towns and districts'.

But even some of the most outspoken critics of the centralising tendencies were

beginning to recognise that they were part of what appeared to be an inexorable process. The *Newcastle Morning Herald* came to this conclusion in an editorial on 19 March 1890:

The largeness of our coast towns, and the smallness of those upcountry, when the colony is over a century old, shows that men will persist in gravitating to the coast belt; and if this peculiarity of Australians continues and intensifies, it will undoubtedly have to be provided for by the establishment of industries for the manufacture of goods and articles which at present are imported.

That, in a nutshell, summarises the geography of manufacturing in New South Wales during both the nineteenth and twentieth centuries.

PART E

Manufacturing in the Other Colonies 1851 to 1890

Prologue to Part E

The two chapters in this part of the book trace the development and spatial organisation of manufacturing in South Australia (Chapter 13), and in Tasmania, Queensland and Western Australia (Chapter 14). Together, these four colonies had considerably fewer factory workers, even in 1890, than Victoria or New South Wales which clearly held the centre of the stage during the whole of this period. In several ways the industrial circumstances of the four colonies mirrored on a smaller scale many of the processes taking place in the southeastern corner of the mainland, and thus a more generalised account of what occurred is appropriate. In terms of the spatial themes developed so far, South Australia is the most interesting of the four since, of all the Australian colonies, this was the only one in which country mills and factories were largely controlled from the outset by metropolitan interests.

Originally, the borders of South Australia lay between meridians 132° and 141° E and between latitude 26° S and the Southern Ocean. But on 10 October 1861 an area of 70,200 square miles was added in the west when the boundary was shifted to 129° E, thus bringing the total to 380,070 square miles. Then on 6 July 1863 the Northern Territory (523,620 square miles) was brought under the jurisdiction of South Australia, an arrangement that continued until 1 June 1911 when it was formally transferred to the Commonwealth Government. Throughout this period, the Territory was industrially insignificant and the discussion in this book can be confined to circumstances in South Australia itself. Under 13 and 14 Vic. c. 59 (5 August 1850) the existing South Australian Legislative Council was authorised to set up a two-thirds elective council which was formally constituted on 21 July 1851. Two years later it exercised the power, under 13 and 14 Vic. c. 59, to establish a bi-cameral Parliament, and this led—after no little controversy—to an election in March 1857 for the two Houses which met for the first time the following month.

In Tasmania, similarly, the partly nominated Legislative Council gave way to an elected bi-cameral Parliament which had its inaugural meeting on 2 December 1856. Meanwhile in 1853, the year in which the transportation of convicts to Tasmania was discontinued, the name 'Tasmania' was widely adopted in place of 'Van Diemen's Land', the approval of the Colonial Office being gazetted on 3 May. However, it was not until 19 Vic. no. 17 became effective on 1 January 1856 that the change was legalised.

Queensland, as explained in the prologue to Part D, was erected into a separate colony on 10 December 1859, and the first Parliament (with a nominated Council and an elected Assembly) was summoned on 29 May 1860. The new colony covered

an area of 554,000 square miles, but by letters patent dated 13 March 1861 the area was increased to 670,000 square miles by the annexation of that part of New South Wales lying north of latitude 26°S and between meridians 141° and 138°E .

Western Australia was administered by a nominated Legislative Council until 1870 when it was felt that the colony had reached the stage at which it would be able to defray all costs of government out of revenue—a condition set out in Section 9 of 13 and 14 Vic. c. 59. Although two-thirds of the new Council were elected, the names of the successful candidates after the first hustings in October 1870 read, in Crowley's words, 'like a certified list of the colony's leading gentry'. The Governor, through his powers to convene and close the sessions of the Council and to propose and approve Bills, remained firmly in control of the colony's affairs subject to the interference of the British government which, among other things, retained the right to disallow Bills within two years. Soon afterwards a movement began which sought Responsible Government along the lines of that in the other Australian colonies, but it was not until 30 December 1890 that the first Parliament, consisting of a nominated Council (made fully elective three years later) and an elected Assembly, was summoned for the first time. Of great significance in many respects, as is made clear in Chapter 14, was the fact that the transportation of convicts to the colony began in 1850 and continued until 1868, by which time nearly 9,700 men (but no women) had been sent to do their period of purgatory in this western one-third of mainland Australia.

13 Manufacturing in South Australia 1851 to 1890

The population of South Australia increased five-fold—from 63,700 to 315,200—during the forty years to 1891. Women and children made up 70 per cent of this increment and thus the age and sex imbalance evident at mid-century was largely eliminated (Table 13.1). Possibly 10,000 people left the colony during the 1850s—a few permanently, many only temporarily—to try to make their fortunes on the gold-fields of neighbouring Victoria, a development that had a considerable impact on the local economy. On the one hand, only about a third as much copper ore was won during 1853–4 compared with previous years; on the other, South Australian farmers and millers were not slow to take advantage of the enlarged breadstuffs market which became even more accessible when the Murray River route was opened up in 1853. During the 1860s and 1870s a natural increase of 91,000 was boosted by a net inward flow of 60,000 settlers, but the story between the censuses of 1881 and 1891 was different, for over two-fifths of the natural increase of 69,000 was eroded by a net outward movement of 29,700 migrants. This latter process can be ascribed both to repelling forces, such as the depressed

Table 13.1 Population in Adelaide and rest of South Australia, 1851–91^a

Area	Age and sex	1851	1861	1871	1881	1891
Adelaide ^b	Children under 15 ^c	8,550	14,831	21,080	27,518	45,022
	Adult males	7,527	9,354	13,389	28,481	33,284
	Adult females	6,450	11,592	15,910	35,812	38,878
	Total	22,527	35,777	50,379	91,811	117,184
Rest of colony	Children under 15 ^c	15,452	40,553	62,576	81,120	80,939
	Adult males	15,612	27,848	39,666	62,033	64,750
	Adult females	10,109	22,652	32,804	40,380	52,339
	Total	41,173	91,053	135,046	183,533	198,028
Total South Australia	Children under 15 ^c	24,002	55,384	83,656	108,638	125,961
	Adult males	23,139	37,202	53,055	90,514	98,034
	Adult females	16,559	34,244	48,714	76,192	91,217
	Total	63,700	126,830	185,425	275,344	315,212

^a Excludes Aborigines and all persons in Northern Territory.

^b See discussion in text.

^c Partly estimated.

Source: South Australian census reports 1851–91.

conditions in the rural areas and the paucity of worthwhile alternative opportunities in Adelaide, and to attracting ones, like the real or imagined possibilities opening up in marvellous Melbourne and booming Broken Hill.

During the 1850s the proportion of the colony's population in Adelaide diminished, thus continuing the trend evident through much of the previous decade. There is room for argument about the definition of 'Adelaide' and therefore the precise numbers involved, but this tendency towards deconcentration is clear enough.¹ The details of the processes involved have been considered by Williams:² it is sufficient to note here that the cultivated area rose from 81,000 acres (67 per cent under wheat) in 1851-2 to 401,000 acres (78 per cent under wheat) ten years later, much of this being concentrated on the drier, flatter coastal plains from Gawler in the north to Willunga and its nearby port in the south, and along the eastern slopes of the central uplands near Tanunda and between Gumeracha and Strathalbyn (Fig. 13.1). Meanwhile, pastoralists were accommodating some of the increasing numbers of sheep (1,250,000 in 1851-2 and 3,038,000 in 1861-2) by squatting on land extending far beyond the areas reserved for permanent settlement, including the coastal fringe of Eyre Peninsula, Yorke Peninsula, and the South Eastern districts, and a continuous stretch of country running as much as 350 miles north of Adelaide.

These developments helped to compensate for the falling off in activity during 1852 and 1853 at the colony's two main copper mines, Kapunda and Burra Burra. In the latter case the number of employees dwindled from 1,040 in March 1851 to 360 in March 1852 and then to less than 100 nine months later:³ as an economy measure, pumping of the lower levels was discontinued so that the few remaining miners who had decided not to join the rush to the Victorian gold-fields could do little more than fossick for ore in the shallower workings. During 1854 the difficulties facing the mining companies began to be resolved with the arrival of experienced hands recruited in England and the drifting back of former employees who had become disillusioned diggers. At the Burra Burra mine, for example, the output of ore (which had totalled 19,400 tons in 1849-50 and 23,300 tons in 1850-1) rose from a mere 2,200 tons in 1852-3 to 5,000 tons in 1853-4 and to 14,000 tons in 1860-1, and the number of employees reached a peak of 1,200 towards the end of the decade.

Apart from Adelaide and its suburbs four kinds of urban settlements came into being. First, there were the mining centres dominated by Burra (about 4,900 in 1861), Kapunda (3,000) and the newly emerging township at Kadina. Second, there were the leading service centres of Gawler (1,000) and Mount Barker (600), the former benefiting from its strategic position on the routes to the northern wheat, pastoral and mining areas. Third, since many of the settled districts were near the coast, a series of outports developed to handle export commodities (especially wool, wheat, flour, copper and copper ore), including Port Robe and Port MacDonnell in the southeast; Port Elliot (the deep-water port for the Murray River trade); Port Willunga at the southern end of the coastal wheat-growing area; Port Wakefield and Port Augusta in the north of Gulf St Vincent and Spencer Gulf,

Fig. 13.1: South Australia, location map of main places and features mentioned in the text.

respectively; and Port Lincoln at the southern tip of Eyre Peninsula.⁴ Fourth, there were numerous small villages serving local needs.

Two of the principles of the Wakefield theorists were that the colony should be a community of agriculturalists and that land should be sold not given away. Legislation in South Australia, unlike much of that in the eastern colonies, tended to favour the farmer and penalise the squatter. Under an Order in Council proclaimed in the colony on 7 November 1850, a squatter was permitted to lease for grazing purposes land that lay beyond the areas sold or surveyed for sale. This carried no rights of pre-emption or renewal, and it was subject to resumption after six months notice if required for agricultural settlement. By the early 1860s much of the central part of the colony stretching from the shores of Gulf St Vincent east to Murray River and from Encounter Bay north to Clare had been, or was being, surveyed and sold. But squatters, speculators and agents were beginning to dominate the auctions, thus restricting the amount of additional land becoming available for cultivation and preventing farmers taking advantage of the demand for breadstuffs in external markets. A series of poor seasons, and evidence in 1867 and 1868 that frustrated farmers were emigrating to Victoria because of its more liberal systems of land purchase, forced the government to amend the colony's land legislation. Under 32 Vic. no. 14 assented to early in 1869 (and usually known as Strangways' Act), the principle was introduced whereby country land was still to be offered at auction but the purchaser might declare that he would buy on credit. In addition some of the best land was set aside as 'agricultural' areas within which blocks of up to 640 acres could be selected by credit purchasers at the upset price. Then in 1872 legislation was enacted that declared all land south of 'Goyder's Line'⁵ to be an agricultural area open for credit selection after survey. The selector or his agent was required to reside on the block, a certain proportion of which had to be cultivated, as a way of encouraging farming and reducing the incidence of 'dummying' (the practice by which land was selected by an agent who subsequently transferred it to his employer). The area of land in cultivation increased from 604,000 acres in 1866-7 to 1,229,000 acres (83 per cent under wheat) in 1871-2, a considerable achievement considering the amount of country land bought at an open auction by, or on behalf of, squatters.

The 1861-71 intercensal period thus saw a further dispersion of population: the small increment in several of the older established counties suggests that these were contributing to the flow of people moving to the periphery of the settled districts and to the pastoral areas beyond. Adelaide and its environs, for instance, grew by an annual average of only 3.5 per cent compared with the 4.0 per cent increase in the remainder of the colony.

Particularly significant was the feeble nature of urban development. By 1871 there were only eight country towns with 1,000 or more inhabitants and, even taken together, these accommodated less than 11 per cent of the colony's population (Table 13.2) and barely 15 per cent even of the non-metropolitan population.⁶ Five were copper mining or processing centres, for no sooner had operations at Burrā and Kapunda revived during the latter part of the 1850s than copper was discovered

Table 13.2 Percentage of South Australian population in Adelaide and other towns, 1861-91^a

Area	1861	1871	1881	1891
Adelaide and environs ^b	28.2	27.2	33.3	37.2
Other towns with 1,000 or more inhabitants	5.8	10.8	10.2	9.4
Towns with 500 to 999 inhabitants	1.5	3.0	3.5	3.9
Other persons	64.5	59.0	53.0	49.5
Total	100.0	100.0	100.0	100.0

^a Excludes Aborigines and all persons in Northern Territory. Population of towns with 1,000 or more inhabitants based on estimates prepared by Hirst, *Adelaide and the Country*, p. 229; population of other towns estimated from census reports, directories and yearbooks, and must be regarded as an order of magnitude only.

^b Derived from Table 13.1.

in 1860 at Kadina and the following year 10 miles away at Moonta on the western edge of Yorke Peninsula. The rich potential of the field was quickly recognised and in 1861 construction began of a smelting-works nearby on the coast at Wallaroo which was thought by Austin in 1863 to be 'the most extensive in the colony—perhaps outside Swansea'.⁷ By 1871 this trio of towns could boast a combined population of about 10,000: men had been attracted there mainly from the copper mines of Cornwall, the smelting-works of South Wales and the gold-fields of Victoria, but a number, accompanied by their wives, families and household goods, moved across from Burra and Kapunda.⁸ Although some of the cost penalties associated with the inland locations of these latter mines were mitigated when the railway reached Kapunda in 1860 and Burra in 1870 (Fig. 13.2), mining operations nonetheless contracted in both places and their combined population declined from 8,200 in 1861 to 5,400 ten years later. The only other settlements with more than 1,000 inhabitants were Gawler which continued to prosper as the service and milling centre of a rich wheat-growing area; Clare which marked the northern limits of wheat-growing during the 1860s and gained some advantage from its position on the main road north from Gawler and Kapunda to the pastoral district near the head of Spencer Gulf and on the route from the Burra Burra mining area to the Wallaroo-Moonta field; and Mount Gambier which was boosted by the agricultural development on the rich volcanic soils nearby and the spread of sheep farming activities.

The 1870s saw the rapid extension of agricultural settlement following the changes to land legislation already mentioned. Disregarding Goyder's advice, the government was persuaded in 1874 to amend The Waste Lands Alienation Act, 1872 and (by 37 and 38 Vic. no. 22) to throw open for agricultural settlement, after survey, all land 'situated south of the twenty-sixth parallel of south latitude' or, in other words, anywhere in the colony. Tempted by good seasons and profitable returns, farmers moved north and continued to do so though poor crops in some

Fig. 13.2: Sections of railway opened in South Australia during the intercensal periods 1851–61 and 1861–71.

districts during 1876–8 gave the warning that wheat cultivation was being pushed into areas with inadequate and unreliable rainfall. From 530,000 acres in 1869–70 the area under wheat rose to 1,734,000 acres in 1880–1, one-third of which were beyond Goyder's Line:

	Acreage	Produce (bu)	Yield (bu per ac.)
Inside	1,165,000	6,687,000	5.74
Outside	569,000	1,919,000	3.37

Three-quarters of the 'outside' acreage was in an area stretching 140 miles north from Clare which only ten years previously had been on the periphery of agricultural development.

As part of the survey procedure, land was set aside for townships. Forty-four such sites were surveyed from 1853 through 1868, forty from 1869 through 1874, and a further sixty during the following decade.⁹ Over and above these were private settlements sometimes complete with schools and churches. In areas where much of the land was acquired for pastoral purposes, the 'townships' remained nothing more than survey pegs in the midst of huge freehold estates.¹⁰ Generally, one township was marked out in each Hundred (roughly rectangular subdivisions of Counties measuring perhaps 30–40 square miles) so that the sites were only 10 or 12 miles apart. But since the agricultural holdings ranged from 250 to 640 acres the hinterland populations were too small to sustain more than rudimentary villages clustered round a general store, a post office and a pub. A few developed into railway junctions or shipping points and thus became attractive to flour-millers and implement-makers which further enhanced their importance. As will be explained

later, many of the flour-mills in the newly settled areas were owned and operated by Adelaide-based firms and as often as not it was the competitive strategies adopted by these rivals that decided the fate of country towns. Communities that failed to attract an existing milling firm (in 1883, for example, the residents of Wilson made an unsuccessful attempt to persuade John Dunn and Company to erect a mill there rather than at Hawker 10 miles to the north) sometimes tried to seize the initiative. Local companies were formed at Mallala (1878), Yongala (1880), Caltowie (1880) and Terowie (1881) with varying degrees of success; at Caltowie local farmers and townsfolk quickly subscribed £1,840 and the resulting mill remained in operation until the 1890s, but barely two years elapsed between the Mallala company's registration and the final report of its liquidator.¹¹

The 1881 census revealed that, outside the metropolitan area, the only place with more than 5,000 inhabitants was the mining town of Moonta, but losses in 1878 and 1879 (due partly to the high costs of production and partly to the low price for copper) had led the Moonta Mining Company to review its organisation and methods and gradually reduce the number of miners on its payroll: the retrenchment of existing employees and the poor prospects for their children caused 1,200 people to desert the town by 1881 (which then had a population of 6,225) and 900 more followed suit during the next ten years. Of the other nine places with 1,000 or more inhabitants, four (Kadina, Wallaroo, Burra and Kapunda) were also losing population as a result of changing circumstances in the copper mining industry. At the Burra Burra mine, for instance, operations during the 1870s were largely confined to winning ore from existing workings, but the South Australian Mining Association found itself having to spend £17 to obtain £15 worth of ore and decided to pay off the last of its employees in September 1877. Elsewhere, Gawler, Mount Gambier and Clare continued to make unspectacular progress especially when compared with Port Augusta, whose population increased from 550 to 2,160 during the 1871-81 intercensal period, and to Port Pirie which was surveyed only in 1872 but accommodated 1,430 inhabitants nine years later. To some extent these five towns were developing as regional centres but the spatial organisation of the colony—in particular the narrowness of the main agricultural belt, the focusing of trade on numerous local ports, and the layout of the railway network (Fig. 13.3)—restricted the size of the hinterland which any one place could come to dominate. The 1881 census also listed fifteen settlements with between 500 and 999 inhabitants (Fig. 13.4), several of which, like Jamestown, Quorn and Laura, were milling and farm implement-making centres serving the new northern wheat-growing areas.

The early 1880s saw a further spread of farming into the more remote areas despite droughty conditions in 1880-1. Nonetheless people were beginning to reappraise the situation since wheat production and yields beyond Goyder's Line were both falling, and a succession of poor seasons led to a drift of population from the Upper North (that is, from beyond places like Laura and Jamestown). The five copper mining centres of Moonta, Kadina, Wallaroo, Burra and Kapunda continued their decline and by 1891 accommodated only 14,800 people as compared with

Fig. 13.3: Sections of railway opened in South Australia during the intercessal periods 1871–81 and 1881–91.

19,900 in 1876 and 17,400 in 1881. Alternative employment opportunities in country areas were not developing quickly enough to absorb the displaced miners and farm workers or the children of those who remained. There were only a few exceptions.

The opening up of the Broken Hill mining field led to the expansion of Peterborough which was the transshipment point between bullock dray and railway wagon until the 145 mile line from it to Cockburn was opened in June 1887, and Peterborough then became the junction for the 154 mile link to Adelaide and the 73 mile line to Port Pirie. The population of this latter place almost trebled during the decade, reaching 4,000 in 1891, and hence it became the third largest country town in the colony after Moonta (5,300) and Gawler (4,100). Port Pirie's expansion

Fig. 13.4: Towns in South Australia with more than 500 inhabitants in 1881. (Sources: Hirst, *Adelaide and the Country*, p. 229; and data obtained from the census of 3 April 1881 supplemented by town descriptions in yearbooks and directories.)

came about because of the growth of wheat, flour and lead-zinc ore trade through the port and the establishment there of coke furnaces and lead-smelting plant by the British Broken Hill Proprietary Company Ltd, the first blast furnace of which was blown in on 27 June 1889.¹² Elsewhere some new employment opportunities arose in the Bordertown area where land near the Adelaide-Melbourne railway line

was being subdivided for fruit, vegetable and vine growing, and at Renmark on the Murray River where a pioneer irrigation project was launched in 1887.

Developments of this kind, however, did little to check the exodus from the country areas: Hirst has estimated that the loss by migration during the decade was equivalent to 17 per cent of the 1881 non-metropolitan population.¹³ Some went to Adelaide (approximately compensating for the number of local residents who left the metropolis) but the majority, as indicated at the beginning of the chapter, migrated to Victoria or New South Wales.

At no stage during the forty years to 1890 was there any serious challenge to the dominant role played by Adelaide. The main mining settlements were virtually company towns in which the managements also built their own foundries, smithies and sawmills as an integral part of their operations. Pryor's claim that 'in the early days, the Moonta mines had the best equipped engineering shops in South Australia' is probably correct: among other things these fabricated seventy-four large capacity boilers for the Moonta and Kadina mines and the nearby smelting-works at Wallaroo. When mines closed down altogether (as at Burra in 1877) or reduced output (as at Moonta and Kadina from 1877 through 1880) these associated foundries and heavy engineering shops were dismantled or operated below capacity. There was no comparison, therefore, with the situation in Ballarat or Bendigo, for example, where the various firms engaged in heavy engineering attempted to diversify their activities when mining slackened, and sought government contracts in competition with their metropolitan counterparts.

One of the distinctive features of the economic geography of South Australia during this period was the growing importance of the export trade through outports, a process influenced by the spread of wheat-growing and the organisation and scheduling of railway construction. Apart from lines in the Encounter Bay area linking Goolwa, Victor Harbor and Strathalbyn (Fig. 13.2), the rest of the embryo railway system until 1869 focused on Adelaide and its nearby port which also formed the hub of the coastal services. During that year shipments from Port Adelaide accounted for 63 per cent by volume of the wool exported, 81 per cent of the wheat, and 87 per cent of the flour. Then on 1 January 1870 a line was opened linking Hoyleton with Port Wakefield, and this was followed by others linking Gladstone and Jamestown with Port Pirie (1875-8), Mundoorra with Port Broughton (1876), Snowtown with Port Wallaroo (1878-9) and Quorn with Port Augusta (1879). While these developments made little difference to the proportion of the wool clip passing through Port Adelaide, they considerably modified the trade in breadstuffs. Of the 90,450 tons of wheat exported in 1879 (compared with 41,800 tons in 1869), only 33.1 per cent was consigned from Port Adelaide: virtually all the rest was shipped out of Port Pirie (50.5 per cent), Port Wakefield (4.9), Port Broughton (4.7) and Port Augusta (3.4). As against this, however, Port Adelaide still dominated the export trade in flour, handling 57,350 short tons or 81.3 per cent of the total, with Port Pirie, 10,700 short tons or 15.1 per cent, accounting for much of the remainder. The role played by Port Adelaide had weakened still further by 1884—the last year for which the detailed information is available—since it handled

only 19.5 per cent of the 224,200 tons of wheat exported and 74.1 per cent of the 84,950 short tons of flour. At first sight these details seem to belie the earlier assertion that the supremacy of the metropolis was never seriously challenged, but the important point—to be taken up again later—is that much of the grain and flour trade was in the hands of a few firms based in Adelaide or, in one case, in Gawler nearby.

A further illustration of the kind of control exercised by Adelaide over the industrial and commercial affairs of the colony is provided by the brewing industry.¹⁴ The South Australian Brewing, Malting and Wine and Spirit Company Ltd was incorporated on 15 March 1888 to acquire and merge three Adelaide firms, the Kent Town Brewery, the West End Brewery, and Rounsevell & Simm's wine and spirit business. Among the documents prepared were schedules of the properties belonging to the participants which show that the two breweries between them had forty freehold and fifty-seven leasehold hotels: half of these were outside the metropolitan area, some being as far away as Port Lincoln, Yorketown, Mount Gambier and Jamestown. Similarly, the Lion Brewing and Malting Company Ltd, formed a few months later to take over the Adelaide business of Beaglehole & Johnston, acquired not only a brewery and malthouse but also the freehold or leasehold of twenty-four pubs, a third of which were in distant towns. In no other Australian colony at this time had metropolitan breweries forged such spatially extensive chains of tied houses.

The Demand for Manufactured Products

As in the case of Victoria and New South Wales the demands for manufactured goods arising from the private and public sectors and from external markets can each be considered separately although, in reality, the entrepreneurial decision-making processes were less compartmentalised than this may imply.

Private sector demand

The number of adult male equivalents in South Australia increased nearly five-fold during the forty years to 1891 and the rise in demand for everyday consumer goods was probably not dissimilar since effective wage rates remained fairly steady (except in 1865-6 and 1874 when they fell briefly). A good deal of the industrial investment during the first part of this period was devoted to the provision of foodstuffs and beverages. Indeed the first three manufacturing firms to be incorporated under The Companies Act, 1864 (27 and 28 Vic. no. 13) were The Adelaide Ice Company Ltd (7 April 1865), The Aerated Bread Company Ltd (14 August 1865) and The Adelaide Salt Company Ltd (9 October 1866), although most of the business remained in the hands of families or small partnerships. By 1868, for example, there were forty-three breweries (the seven in Adelaide having an annual output of 1,738,000 gallons); fifty-three cordial, soda water and ginger beer factories; twelve biscuit works; and others making jams, jellies, confectionery and so on.¹⁵ There was considerable overlap between these activities. Thus, Jones

Table 13.3 Estimates of new capital formation and replacement outlays from the public sector in South Australia, 1861-90^a
(£000)

Period	New or replacement	Railways	Telegraph	Water and sewerage	Bridges and harbours	Defence construction	Public buildings	Other miscellaneous	Total
1861-65	new replacement	100 155	33 8	94 6	26 14	5 —	83 6	15 63	356 252
1866-70	new replacement	671 191	80 8	111 11	112 44	5 1	278 27	9 10	1,266 292
1871-75	new replacement	559 332	367 30	314 14	281 24	11 —	78 5	30 —	1,640 405
1876-80	new replacement	2,924 447	201 30	572 41	655 36	161 —	574 18	13 —	5,100 572
1881-85	new replacement	3,731 745	149 37	1,033 103	655 38	108 1	428 35	11 —	6,115 959
1886-90	new replacement	2,469 939	122 36	985 73	198 9	23 2	202 19	496 —	4,495 1,078
Total		13,263	1,101	3,357	2,092	317	1,753	647	22,530

^a Excludes local government expenditures except in the case of water and sewerage. The original source should be consulted for an explanation of the derivation of these estimates and related qualifications. Expenditure on roads is excluded from this tabulation.

Source: Butlin, *Australian Domestic Product*, *passim*.

Table 13.4 Estimates of new capital formation and replacement outlays from the private sector in South Australia, 1861-90^a
(£000)

Period	New or replacement	Residential ^b	Shops and offices	Churches	Industrial	Agricultural and pastoral ^c	Shipping	Total
1861-65	new replacement	1,896 91	160 101	95 6	— —	145 156	— —	2,296 354
1866-70	new replacement	1,748 111	125 119	89 5	— —	483 231	4 —	2,449 466
1871-75	new replacement	1,894 150	406 154	36 5	— —	1,505 390	107 —	3,948 699
1876-80	new replacement	4,456 186	575 190	68 5	500 120	3,412 917	115 —	9,126 1,418
1881-85	new replacement	2,139 239	114 237	126 10	153 164	1,658 1,517	27 —	4,217 2,167
1886-90	new replacement	1,671 252	718 240	73 10	165 176	—675 1,548	3 —	1,955 2,226
Total		14,833	3,139	528	1,278	11,287	256	31,321

^a The original source should be consulted for an explanation of the derivation of these estimates and related qualifications. Data for mining not available.

^b Includes hospitals, asylums, hotels, guest houses and other inhabited premises.

^c Includes tools, machinery, and equipment and physical improvements such as dams, tanks, fences and farm buildings but excludes livestock, the clearing of land and land itself.

Source: Butlin, *Australian Domestic Product*, *passim*.

Brothers, which late in 1867 acquired the assets of The Aerated Bread Company, extended the usefulness of the carbonic acid gas producing plant by diversifying into the manufacture of aerated confectionery, biscuits, lemonade and soda water. Or again, J. E. Seppelt selected a site near Freeling (in the Barossa Valley 20 miles northeast of Gawler) for a tobacco plantation and associated cigar factory but turned instead to farming; then in 1849 he began wine-making and two years later added the manufacture of cordials, liqueurs and bitters. In the mid-1870s his son extended the works so that he could 'turn bad wine into good vinegar'.¹⁶

Clothing and footwear manufacturing on a formal factory basis started during the latter part of the 1860s. Possibly the first mechanised bootmaking establishment was Saunders's which commenced operations in Adelaide early in 1867, but only four years later it was claimed that local producers were supplying half the 800,000 pairs of boots and shoes sold each year in the colony. Since output averaged about thirty pairs per hand per week, it suggests that 250 to 300 people were employed altogether. The next five years saw the workforce expand to nearly 600 which, it was said, was turning out £200,000 worth of footwear a year compared with imports valued at £60,000. In less than a decade, therefore, the process of import substitution had gone about as far as could be expected because the goods still entering the colony were the lighter and more fashionable lines which required greater skills and special leathers. Although machinery was first applied to the commercial manufacture of clothing (in a retail tailor's workroom) during 1866, it was not until 1870 that two Adelaide softgoods wholesalers each opened extensive factories which early the following year were between them employing 200 women and girls.¹⁷

As in the other colonies, residential investment in South Australia was a powerful engine for economic development. Butlin has estimated that during the thirty years through 1890 about 187,000 *rooms* were built in the colony and that the residential sector accounted for just over a quarter of the new and replacement capital outlays from both public and private sources (Tables 13.3 and 13.4).¹⁸ Yet two circumstances reduced the stimulus given to manufacturing. First, the outer walls of much of the residential accommodation were built of stone, and hence there was a greater emphasis on quarrying and less on brickmaking than in New South Wales or Victoria. Furthermore, the scarcity of suitable indigenous building timbers placed a restraint on the development of the sawmilling industry which had to rely almost entirely on supplies drawn from North America and the other Australian colonies, especially Tasmania. As a natural extension of their timber importing businesses, most of the larger sawmilling firms also brought in other building materials like galvanised iron, decorative railings, cement, and machine-made doors and window frames. It is to some extent ironic in these circumstances that the first attempt in Australia to produce Portland cement was made by William Lewis at the Brighton Cement Works near Adelaide which was brought into operation in December 1882;¹⁹ Lewis was foiled by lack of knowledge and ill-health, and in 1890 joined forces with W. Shearing and R. D. Langley who successfully floated the business as Shearing's Portland Cement Company Ltd, incorporated on 7 April 1892.²⁰

Second, much of the demand for residential accommodation was in the sparsely populated agricultural areas where there was little incentive for anyone to invest in formal sawmills or brickyards. Moreover, most of the faster growing country towns were on or near the coast and builders there could rely on supplies of imported materials such as direct shipments of boards from Tasmania and galvanised iron from Europe. The colony's building boom from 1876 through 1880 (Table 13.4), during which twice the usual amount of accommodation was completed, largely stemmed from the rise of these northern wheat-growing and shipping towns, and probably benefited the importers more than the manufacturers.

The rapid spread of wheat farming in South Australia would barely have been possible if local inventors and manufacturers had not been able to meet the demand for a growing range of agricultural implements. Several firms of this kind were already operating early in the 1840s and it was one of these, J. S. Bagshaw and Company, that in 1843-4 helped Ridley and Bull translate their ideas for a stripper mechanism into a practical machine. Only a handful of these were built during the remainder of the decade, and it is unlikely that this development had much immediate impact on farmers' decisions. Its real importance came a few years later when the Victorian gold-rushes not only increased the demand there for breadstuffs but also exacerbated the shortage of agricultural labour in South Australia. Moreover, several other firms had had time to develop 'new' or 'improved' mechanisms and the resulting competitive field trials, especially those held towards the end of 1855, received considerable publicity. A significant increase in the area under wheat followed soon afterwards; from 89,000 acres in the 1855-6 season it grew to 162,000 acres in 1856-7, about half of which was reaped by machine. By 1864-5 nearly 90 per cent of the crop was mechanically harvested. As the 1864 *Statistical Register* noted,

One, if not the most important, advantage our farmers possess over those of the sister Colonies is the expedition and economy with which their crops can be secured, owing to the successful working of the reaping machines now universally used on all but hilly land, permitting of the grain being reaped, winnowed, cleaned, and bagged on the harvest field, and removed into store ere the day is closed.

In a matter of years South Australian agricultural technology went ahead of that employed in the other colonies. This was largely because the strippers embodied a 'comb and beaters' mechanism which suited the relatively dry harvesting conditions in South Australia but was less satisfactory in damper climates. Machinery of this kind was therefore not widely adopted in Victoria until wheat-growing began to shift into the drier districts north of the Great Divide. The judges at the Sydney International Exhibition in 1879 noted that strippers and reapers 'make a great saving of labour at harvesting, but can only be used [in New South Wales] in the drier parts, and where the straw is of no marketable value'.²¹

At first the demand for a widening range of equipment—ploughs, iron harrows, rakes, scarifiers, reapers, winnowers, rollers, wagons, drays and chaff-cutters—

was met by Adelaide firms like Adamson Brothers, Mellor and Sons,²² and J. S. Bagshaw and Son, but during the latter part of the 1850s an increasing number of works began to appear in country towns. Places like Gawler, Auburn, Mount Barker, Strathalbyn and Mount Gambier each had two or three such establishments, while no fewer than five began operations at Kapunda between 1857 and 1863. Most undertook a variety of work, combining the roles of wheelwright, blacksmith and engineer, but the mainstay of these businesses was the manufacture, repair and hire of farm equipment.²³ Several were branches of metropolitan firms: Adamson Brothers, for instance, established a subsidiary at Kapunda in 1859 and at Auburn in 1865, and J. Mellor and Sons opened a branch at Kapunda in 1863. The implement-makers were among the first to suffer as a result of the temporary decline in the acreage under wheat during the 1868–9 and 1869–70 seasons, and had to turn their hands to the fabrication of anything from railway-crossing gates to decorative ironwork for graves. Then during the 1870s the industry received a further boost as wheat farming spread into new areas. In particular, the problem of clearing the dense mallee scrub country bordering Gulf St Vincent and on Yorke Peninsula led to the development of the stump-jump plough (the initial idea of which is usually attributed to R. B. Smith in 1876) and the establishment of works making this implement at nearly all the main towns on the peninsula and at places like Alma, Port Wakefield, Balaklava and Snowtown. Most of these were relatively small, independent concerns employing no more than fifteen to twenty hands during the busy season and perhaps half as many in the slacker part of the year. But some of the longer-established firms also kept abreast of these developments by setting up additional branch works—Adamson Brothers at Laura and Quorn; Mellor Brothers (the style adopted in 1868 when Joseph Mellor passed the business to his three sons) at Jamestown and Quorn; and James Martin and Company of Gawler at Gladstone and Quorn. The choice of this latter town by all three firms emphasises the importance of the area north of Goyder's Line (Fig. 13.1).

A good deal of effort, probably more than in any other comparable industry, went into developmental work. Additional incentives were provided in the form of prizes: on 28 November 1877, for instance, the Legislative Assembly recommended a bonus of £4,000 (twice as much as any of the other premiums offered and which are discussed later) 'to the inventor of the best machine combining within itself the various operations at the same time of reaping and cleaning, fit for bagging on the field, the various cereal crops of South Australia'.²⁴ Yet there was often a considerable time lag between the birth of an idea and its successful commercial application, a point well illustrated by the results of the trials to determine the winner of the government bonus which were held at Gawler in stifling temperatures late in 1879:

Out of twenty-nine entries only fourteen harvesting machines appeared on the ground, and of these several hardly did any work at all. Several broke down altogether through some unfortunate accident, which did not prove anything against the principles upon which they were constructed; others were evidently a failure, being fundamentally a mis-

take. One or two did fair work for a few yards, or even once up and down the field, but were so complicated that they would require an engineer or a very clever artisan to keep them in order, and even under his care would be liable to frequent disarrangements. Some wasted the corn abominably, scattering good wheat as well as fowl's corn and drake over the ground; others broke a large proportion of the grain. One or two excellent samples of well-winnowed grain were delivered, but the question was hardly decided whether out of them all one combined reaper, thresher, and winnower gathered the harvest with as little waste as does the plain stripper and thresher in common use.²⁵

Considerable cross-fertilisation of ideas occurred as a result of contests of this kind and the movement of personnel between firms. Take as an example the careers of John and David Shearer. David Shearer began work in 1868 at the Clare branch factory of J. G. Ramsay and Company (a Mount Barker firm), and a few years later moved to the Auburn works of Adamson Brothers. Meanwhile his brother John had set up as a blacksmith at Mount Torrens where David joined him for eighteen months; they then sold up and went their separate ways to work for other firms (John going to J. G. Ramsay's at Mount Barker). In 1877 they went into partnership as J. & D. Shearer establishing a works at Mannum to make grubbing machines, ploughs, scarifiers and harrows, adding in 1883 their own 'improved' version of the stump-jump plough. Five years later they started manufacturing a one-piece wrought steel ploughshare that was more durable than the cast iron and cheaper than the forged versions.

Ideas also flowed between the colonies as firms exhibited and promoted their products, and tried to learn from experience. At the Sydney International Exhibition of 1879, South Australian companies like Mellor Brothers, J. G. Ramsay and Company, and James W. Stott displayed their ploughs, scarifiers, mowing machines and reaper-strippers, but James Martin and Company of Gawler received the greatest acclaim because it had taken the trouble to design a stripper and reaper with easily adjustable bearings for use in cool and damp weather. Other firms were thereby encouraged to follow suit by widening the range they made of each type of machine, although sometimes with disastrous results. For instance, in 1891 Mellor Brothers tried to consolidate the local sales of its patent stump-jump plough by forming itself into a farmers' co-operative, and to widen the scope of its business by setting up branch factories in Sydney (the Meadowbank Manufacturing Company, at Ryde) and Melbourne (the Braybrook Implement Company, at what is now known as Sunshine).²⁶ It had timed these moves badly because they not only coincided with adverse seasons but also with the beginning of the depression; by the beginning of 1895 the shareholders in Mellor Bros Co-operative Company Ltd were left with no alternative but to resolve to wind up its affairs.

It is doubtful whether at any stage the mining industry in South Australia gave much direct stimulus to manufacturing. The leading mines, as already mentioned, had their own foundries and workshops, and imported most of the machinery (like powerful pumping engines) that they were unable to make for themselves. Judging from the contemporary descriptions of the work being undertaken in the general

run of foundries and engineering establishments, the manufacture and repair of mining equipment formed only a minor part of their business. There was one important exception. In 1874 James Martin invited Frederick May to join him as a partner in his Gawler engineering concern, a significant step because May had previously been Chief Engineer of The Moonta Mining Company and thus brought to the firm fifteen years experience of designing and operating some of the most advanced mining equipment in the colony. With May's assistance, Martin was able to further expand both the heavy engineering and the agricultural implement-making sides of the business, building up his workforce from 95 hands in 1874 to 250 in 1880.²⁷ Then, in July 1885, Frederick May and his brother Alfred decided to set up a rival engineering business in Gawler. Timing, reputation and luck enabled this new firm to obtain almost instant orders from the companies that were just beginning to open up the silver-lead deposits at Broken Hill—an external source of business for equipment like engines and boilers which soon breathed new life into other engineering works, especially those at Port Adelaide.²⁸

Despite the importance of coastal shipping services in South Australian waters, local yards—such as Fletcher's, McKendrick's, Jenkin's, and Playfair's at Port Adelaide—seem to have spent most of their time on maintenance, repair and conversion jobs rather than on new ship construction. Indeed the first steamship with a locally built hull and engine was not launched at Port Adelaide until 1865 (and even then was only a small Murray River paddle-boat).²⁹ The Murray trade, however, became a significant source of work for shipbuilders and foundries: details drawn from a variety of sources suggest that about sixty river boats, averaging 100 gross tons apiece, and nearly as many barges were built in the colony between 1855 and 1890. Several of the early steamers (like the *Leichhardt* and the *Sturt* in 1855–6) were simply put together using imported iron sections and engines, but experience showed that wooden-hulled, shallow-draught vessels were a better investment. It was not long before Goolwa, at the mouth of the Murray River, became the base for the 'bottom end' fleet since it was here that cargoes were transferred to the 7 mile tramway running to the ocean harbour at Port Elliot. Hand in hand with maintenance work (owners found, for instance, that it paid them to have a hardwood skin placed over iron-hulled vessels), went the construction of new boats. At least twenty-five paddle-steamers and twenty large barges were built at this river port, many of them by the Goolwa Foundry and Ironworks originally set up in 1864 but taken over by Graham and Company four years later. This firm also supplied equipment, including engines, to the small boatbuilding yards operating upstream at places like Milang, Murray Bridge and Mannum.

Public sector demand

Until 1873 there seems to have been no considered policy relating to the allocation of tenders for manufactured goods locally or overseas. Departments had been accustomed to ordering supplies through the Agent-General in London, and the continuation of this practice effectively prevented colonial importers or manu-

facturers knowing about, and therefore being able to bid for, business. On 15 October that year, however, the Legislative Assembly resolved

That . . . the Government should in all cases where practicable invite tenders in the Province of South Australia for the supply of all goods, merchandise, and machinery required for our railways, telegraph, or other Government works, before sending to England or elsewhere for them.

The Committee of the Chamber of Manufactures was 'much pleased' by the principle evinced in this resolution but expressed fears that unless the contracts offered were large and repetitive the high unit costs of production would prevent local firms being competitive. It also hoped that prior to actually calling tenders the Government would give three to six months notice of the types and quantities of goods required 'which would induce local manufacturers to go to a considerable outlay to prepare themselves'.³⁰

It was some time before government departments and agencies could be jolted out of their old ways. In 1877, for example, the Public Works Department called tenders for 200 railway wagons, giving only six days notice and specifying brands of iron and varieties of timber that were not generally available in the colony. A report in the *South Australian Register* that, as a result, no local firms had been able to tender stirred up sufficient fuss in May and June for the specifications and closing date to be amended. Or again, the Marine Board in 1882 at first decided to accept an English firm's tender to supply a ship's engine because the colonial quotations were at least 13 per cent higher, but, according to the *South Australian Register* on 1 December, was persuaded to change its mind a few days later on the grounds that financial and practical advantages could accrue because a local manufacturer could be more closely supervised. Figures that would give a clear view of the absolute or relative significance of government orders are not available but it is known that during the three years ending 30 June 1890, official purchases of goods (excluding railway equipment) manufactured in the colony for which tenders had been called amounted to £95,000.³¹

As in the other colonies, the manufacture of railway rolling stock excited continuing interest.³² Until the early 1880s all the coaching stock and most of the goods wagons were either imported or made in the railway workshops beside Adelaide railway station: only spasmodic contracts for the simpler types of freight trucks were given to local firms, a total of twenty-four being thus ordered in 1862, twenty in 1865, and so on. Then in March 1882 a contract for three composite bogey carriages was let to Duncan & Fraser and this marked the beginning of a change in policy whereby most rolling stock was built in the colony. Thus in 1883 and 1884 orders for only £8,050 worth of stock were placed overseas whereas the railway workshops and private contractors, respectively, built vehicles costing £75,060 and £46,990. James Martin and Company Ltd at Gawler obtained the lion's share of the wagon contracts, supplying 610 (£57,930) in the seven years to January 1890. During the 1880s, however, the Railways Department used its own workshop

facilities to meet more of the demand for new rolling stock, spending £49,800 in wages and £60,400 on materials for this purpose alone during the three years to 30 June 1890. As against this, local firms were given contracts for wagons, carriages and other equipment worth £126,000 (which would have included, of course, allowances for depreciation and a margin for profit).

One step more remained: the manufacture of railway locomotives, a long dreamed of symbol of industrial maturity. By 1887, however, it was being seen from another and more practical viewpoint, for in August that year 2,390 people signed a petition seeking protection for local industries on the grounds that

at the present time there is a considerable dearth of employment, and many skilled workmen have for lack of work been driven out of the country, and many others will have to follow without some remedy is provided.

They went on to suggest that among things which could be made locally 'if continuous orders for a considerable quantity were given to local makers with a moderate bonus' were the wheels of carriages and, inevitably, railway locomotives.

Tenders were called in September for the supply of fifty-two locomotives to be built in the colony; not surprisingly the contract was awarded to the only local firm to bid for the job, James Martin and Company Ltd, for £162,425. Significantly, this decision was reached in the knowledge that Beyer Peacock and Company of Manchester had offered to supply the locomotives f.o.b. Port Adelaide for £114,500, although this quotation may have been for 'similar' rather than identical vehicles and, even more importantly, it was lower than Beyer Peacock's usual prices for comparable engines at this time. It is perhaps more realistic, therefore, to think of Martin's tender as being at least 12 per cent above that of a highly competitive overseas rival.³³ Martin's immediately set about extending its facilities and recruiting staff, like Robert Shepherd, from overseas. Shepherd had worked as a draftsman for several leading English locomotive builders and was sadly disappointed when he arrived at Gawler. He wrote later to the Royal Commission on Stores (5 September 1893):

Imagine me . . . finding on my arrival the most ill arranged, badly lighted, worst equipped shop it was ever my lot to enter, and to be told—'This is where we are going to build locomotives' . . .; but here was scarcely a tool fit to be used for the work to which I had been so long accustomed—not a true standard gauge, not a standard rule over 3 ft. long.

This was perhaps the exaggerated view of a disgruntled former employee but, nonetheless, it helps to balance the uncritical and glowing accounts penned by journalists. Yet even if Shepherd were correct in asserting that a great deal of the work had to be done by hammer and chisel instead of by machine, the first locomotive was delivered, with appropriate ceremony, on 11 April 1890. Having proved that it could handle work like this, Martin's was given a second contract

in August 1891 for forty broad and fifty-two narrow gauge locomotives valued altogether at £309,266. Although the contract should have been completed by the end of 1896, Martin's sought an extension to 31 December 1897 and then, at a penalty of £25 per engine per week, to 31 October 1898. By this time, however, the staff of the railway workshops had also learned how to build locomotives and the government's dependence on private enterprise diminished. Martin's managed to obtain one more contract, for forty engines, but in August 1907 decided that its future prospects were poor and its realistic course was to go into voluntary liquidation.

Only one more example need be given of the way in which public works contracts influenced the process of import substitution. On 15 October 1883 G. E. Fulton and Company wrote to the government drawing attention to the large quantities of pipes and castings being imported for waterworks schemes; it expressed confidence that it could compete if (a) protected by a duty of 30/- per ton (which would have been equivalent to about 20 per cent); (b) an allowance were made for the cost of exchange on drafts and the interest payable on raw materials during transit; and (c) a percentage were allowed on the imported price.³⁴ This latter point was a reference to the procedures that had been developed in the Public Works Department for comparing overseas and local prices:

The official estimate shows the cost of the imported article delivered into store, at Adelaide, including all charges and *customs duties*. The Hon. Commissioner then allows the local tenderer 10 per cent. margin on the official estimate.

The Public Works Department reported that, during the five years to October 1883, 19,475 tons of plain and special cast iron pipes had been imported at a cost of £147,700, and that on this basis Fulton's proposal would mean an additional outlay of £9,770, or 33 per cent, each year.

Nonetheless, early in 1884 the government, 'being desirous of encouraging the development of local manufactures', called tenders for cast iron water-pipes to be manufactured in the colony over a period of four years. For making 12,750 tons, Fulton's quoted £120,636 and Martin's £125,430, as compared with calculated costs of imported pipe ranging from £77,166 to £93,500. The firms were given a chance to recalculate their prices and submit new tenders: Fulton's dropped its bid to £118,986 and Martin's to £119,055. The Public Works Department did its arithmetic and discovered that Fulton's figure (plus £1,000 allowance to cover inspection charges) would necessitate a 16.14 per cent margin rather than the 10 per cent normally allowed. An even less enthusiastic report was made by the Commissioners for Audit who argued that since customs duty was not charged it should not affect the comparison otherwise the loss of customs revenue would also have to be taken into consideration. They noted that the difference between the lowest tender (£118,986) and the estimated in-store cost of imported pipes (£86,850) was £32,136. They then calculated that a local contractor could land the raw metal needed for £68,372 (including an allowance for 30 per cent wastage) and that this

Table 13.5 External trade, South Australia, 1851-90
(£000)

Year	Exports originating in South Australia						Entrepôt trade	Retained imports
	Wool	Wheat	Ores	Other	Processed and manufactured ^a	Total		
1851	148	6	104	9	274	541	61	738
1852	116	20	200	41	360	737	1,051	-252
1853	236	29	63	94	310	732	1,510	826
1854	182	29	58	165	260	694	628	1,519
1855	283	6	84	44	270	687	301	1,070
1856	412	32	157	44	753	1,398	267	1,099
1857	505	64	165	82	928	1,744	214	1,409
1858	421	94	119	79	642	1,355	157	1,612
1859	485	108	110	80	719	1,502	154	1,354
1860	573	87	92	73	751	1,576	207	1,432
1861	623	196	134	63	823	1,839	194	1,782
1862	635	165	127	105	888	1,920	225	1,595
1863	716	220	92	107	960	2,095	263	1,765
1864	776	564	51	112	1,513	3,016	290	2,123
1865	821	412	186	89	1,247	2,755	375	2,552
1866	990	127	237	76	1,110	2,540	319	2,516
1867	920	522	118	63	1,153	2,776	389	2,118
1868	1,305	149	210	103	837	2,604	215	2,023
1869	1,009	371	251	177	914	2,722	271	2,484
1870	903	100	175	146	799	2,123	296	1,734

1871	1,292	639	131	63	1,165	3,290	293	1,868
1872	1,647	334	126	153	1,264	3,524	215	2,587
1873	1,618	966	135	127	1,439	4,285	303	3,527
1874	1,763	429	137	134	1,405	3,868	535	3,439
1875	1,834	831	175	166	1,436	4,442	363	3,841
1876	1,547	1,172	165	197	1,258	4,339	477	4,099
1877	2,011	291	166	135	1,320	3,923	704	3,922
1878	1,834	844	155	249	1,116	4,198	1,157	4,563
1879	1,695	819	135	222	1,087	3,958	805	4,209
1880	1,716	1,621	113	252	1,128	4,830	745	4,837
1881	1,606	543	156	233	1,105	3,643	764	4,460
1882	1,819	635	198	283	1,253	4,188	1,172	5,536
1883	1,682	266	157	283	1,100	3,488	1,396	4,914
1884	1,865	1,676	188	355	1,208	5,292	1,331	4,418
1885	1,417	1,577	131	339	922	4,386	1,032	4,257
1886	1,448	82	70	355	867	2,822	1,667	3,186
1887	1,358	360	61	496	1,074	3,349	1,982	3,114
1888	1,354	1,492	79	552	1,194	4,671	2,313	3,100
1889	1,542	237	90	632	1,194	3,695	3,565	3,240
1890	1,354	1,382	87	515	1,072	4,410	4,417	3,845

^a Of the total 'processed and manufactured' exports from 1851 through 1890 (£39,118,000), 58.8 per cent (£22,991,000) was flour and 34.3 per cent (£13,399,000) was refined copper and regulus.

Source: SASR.

was £18,478 less than the imported pipes. In their view, therefore, the real figure to be considered by the government when making a policy decision was £50,614 (£32,136 plus £18,478) since this was the amount which would be spent in the colony in wages or absorbed in profits by the contractor. They also noted that pipe-making was a skilled job for which artisans would have to be recruited overseas, and the whole proposal therefore was likely to be of little assistance to those out of work.

Rumours that even the second tender might be rejected caused 967 ironmoulders, labourers and others to petition for the contract to be placed locally. The Public Works Department was again asked to check its calculations and decided that the in-store cost of 12,750 tons of imported pipes might really be as much as £90,583 so that the margin (including £1,000 allowance for inspection) need only be 11.36 per cent. This was sufficiently close to the usual allowance to enable the government to give instructions for a contract to be signed with Fulton's on 20 October 1884 which laid down that deliveries were to commence no later than 1 January 1886. By the end of 1890 Fulton's had delivered all but 430 of the 29,700 tons of cast iron pipes subsequently needed for public works: import substitution was well-nigh complete.

Export demand

Apart from flour and copper, most of the goods manufactured or processed in South Australia were absorbed by the home market. Over the whole forty-year period through 1890 only £2,728,000 worth of other factory products, a mere 2.4 per cent of total exports, were sent beyond its borders (Table 13.5). Much of this consisted of commodities like leather, harness-ware and wine but, as indicated already, the 1880s saw a growing trade in mining machinery (mainly with the Broken Hill companies) and in agricultural implements and machinery (largely with western Victoria where several firms, like J. & D. Shearer, established agencies). It seems strange at first sight that South Australia farm machinery makers managed to retain their markets in the neighbouring colony in the face of increased customs duties: however, in James Martin's view expressed to the Royal Commission on Intercolonial Free Trade on 1 August 1890,

The reason that Victoria has not been able to keep us out of their market altogether, notwithstanding their high duty, is that people who have been here and have used our implements, and have now gone to Victoria to settle there, prefer our implements to Victorian-manufactured machines, and would rather pay extra prices for them.

As in New South Wales and Victoria, the preservation of meat for export was taken up with some enthusiasm during the late 1860s. The first venture, The Guichen Bay Boiling Down and Meat Curing Company Ltd, was already in operation when it was registered on 3 February 1869 but less than two years later it was wound up by court order. Meanwhile, the Adelaide Meat Preserving Company had been formed as a result of meetings in May and July 1868 and incorporated on 9 February the following year.³⁵ From then on its brief career

paralleled those of similar businesses in the eastern colonies. When slaughtering began in October 1869 sheep could be bought for 3/6d to 5/- a head but even by July 1871 they were costing 11/-; shipping rates rose; prices on the London market eased; and shares remained unsold and calls unpaid. Towards the end of 1872 the works was put on a care and maintenance basis and closed down completely the following March. A loss of £3,796 during the six months to 30 June 1873, followed by another of £9,474 for the remainder of the year, led to the familiar accusations and recriminations, and, inevitably, a decision to liquidate the company in order to meet its liabilities. A similar fate sooner or later befell the other companies which entered this field³⁸ so that the export of canned meat never became important in South Australia.

Much of the interest must focus, therefore, on the exports of flour and copper worth £22,991,000 and £13,399,000, respectively, during the forty years through 1890, or 31.4 per cent of all South Australian produce sent outside the colony.

Table 13.6 Consumption of South Australian wheat, 1851-90
(000 bushels)

Period	Production minus estimated seed wheat	Available for home consumption ^a	Exported as wheat	Exported as flour and biscuit
1851-60	17,161	9,117	1,305	6,739
1861-70	39,673	12,090	10,039	17,544
1871-80	78,179	14,042	33,486	30,651
1881-90	87,166 ^b	10,980	43,131	33,055
Total	222,179	46,229	87,961	87,989

^a Net production minus recorded wheat and flour exports.

^b From 1885 through 1888 only official estimates available.

Sources: *SABB*; *SASR*; *SA Customs Returns* (1852-8).

Flour-milling. An account was given earlier in the chapter of circumstances in which wheat-growing spread into the Lower North and Upper North Divisions of the colony during the 1870s and led to a doubling of the quantity of wheat available for consumption on the internal and external markets (Table 13.6). Just over 20 per cent of the crop (net of estimated seed wheat) was consumed locally, half the remainder being exported as grain and the other half as flour. No attempt appears to have been made to collect production figures from the flour-millers themselves, but it can be roughly estimated that to supply local and external demand they must have turned out an annual average of 36,000 short tons during the 1850s, 67,000 short tons during the 1860s, 100,000 short tons during the 1870s and 99,000 short tons during the 1880s. This latter figure can be compared with the annual outputs of 165,000 and 103,000 short tons, respectively, in Victoria and New South Wales.

The changing spatial distribution of flour-milling is clearly shown in Fig. 13.5. There is an obvious contrast between the compact grouping of the 76 mills in 1864 and the very much more dispersed pattern, with a greater emphasis on coastal

Fig. 13.5: Flour-mills in South Australia in 1864, 1878, 1890 and 1900. Roller-milling was introduced in 1879 but the first complete listing was not made until 1890. (Sources: SASR supplemented by directories.)

locations, of the 113 operating fourteen years later. Then there was a thinning out stage when, from 1879, roller machinery started to supplement, and in some cases replace, stone grinding equipment. By 1890 (the first year for which data are available) this process was all but complete with a mere handful of the 81 remaining establishments still using only traditional methods.

In contrast to the eastern colonies, many of the country mills and much of the grain trade in South Australia were controlled from the outset by a few powerful metropolitan firms. One was John Dunn and Company which kept up with the advancing wheat frontier by building or acquiring additional mills so that by the 1880s it not only had fifty or more wheat purchasing agencies but operated a chain of mills at Mount Barker (built 1844), Bridgewater (1860), Nairne (1864), Port Adelaide (1866), Port Pirie (1877), Wilmington (1878), Quorn (1879), Port Augusta (1880), Hawker (1883) and Wolseley (1883).³⁷ But the most significant development was the formation of the Adelaide Milling and Mercantile Company Ltd which was incorporated on 28 July 1882 with a nominal capital of £750,000 divided into 150,000 £5 shares. This brought together the extensive grain and milling businesses of John Hart and Company (which was allocated 11,600 fully paid-up shares as compensation), Walter Duffield and Company (12,100 shares), and James Cowan and Company (14,000 shares), as well as the whole of the grain business of Morgan, Connor, and Glyde (4,000 shares). As part of the agreement each of these firms took a further 13,825 shares on which £1 was immediately called. The new organisation thus acquired widespread assets: apart from wharves, agencies and miscellaneous properties, Cowan's, for example, had been operating mills at Two Wells, Mallala, Quorn, Gladstone and Allendale, and Duffield's at Gawler (2), Wallaroo, Snowtown and Port Pirie. In 1889 the firm was reconstructed as the Adelaide Milling Company Ltd with a nominal (and paid-up) capital of £200,000, all but a handful of the shares being held in London until G. S. Fowler, an Adelaide wholesale grocer, acquired a 41 per cent interest in 1893.

With large firms of this kind established and active in the field, it is hardly surprising that local ventures were given little chance to establish themselves. But two other influences were also important. First, the leading milling companies were very progressive technically. The *Adelaide Observer* reported on 21 February 1880 that Walter Duffield and Company had been using two sets of Wegmann's patent porcelain rollers 'for nearly a year' at one of its Gawler mills and in the meantime a further ten sets had been installed in its other mills at Gawler and Wallaroo. If this account is true, these would have been the earliest roller systems installed in Australia, predating even the first demonstration in New South Wales or Victoria at the Sydney International Exhibition in September 1879. This same newspaper, when reporting the opening of Duffield's Port Pirie mill in January 1881, noted that it, too, was equipped with Wegmann rollers. Other firms quickly followed suit, although it is unclear whether they installed porcelain rollers (which simply crushed the grain more expeditiously than previously), corrugated rollers (which, as described in Chapter 9, scraped the endosperm from the bran), or perhaps both kinds in successive stages of processing. Thus, John Dunn and Company displayed

samples of its 'Snowflake' flour in London during November 1881, and in August 1883 the directors of the Adelaide Milling and Mercantile Company assured the shareholders that the 'improved' milling techniques were being progressively introduced into all its establishments. A second reason, suggested by Hirst,³⁸ for the dominant role played by the leading millers was that the spread of wheat-growing into the northern areas occurred at a time when the main markets for the colony's breadstuffs were shifting from Australasia to the Pacific, Asia, southern Africa and Europe. Whereas Great Britain and other overseas destinations took only 16 per cent of South Australia's wheat in 1869 they absorbed 97 per cent in 1884, the comparable figures for flour being 12 and 40 per cent. The leading established firms alone had the necessary experience and financial backing to cope with the growing complexity of the international trade.

Copper-smelting. During the forty years through 1890 165,700 tons of fine copper valued at £13,283,000 and 3,100 tons of regulus (ingots containing 60 to 70 per cent impurities) worth £116,000 were exported from South Australia. All but a very small proportion of this metal was produced in four smelting-works located at Kapunda, Koorunga, Port Adelaide and Wallaroo. The Kapunda works, established by the mine's proprietors in 1849, holds little interest for present purposes. Apart from the three years to March 1855 (when it was shut down because the men disappeared to the Victorian gold-fields), this plant operated until about 1864 processing all the output of the mine before shipment: during its peak years in 1861 and 1862 it produced 595 and 486 tons of fine copper.³⁹ Technical problems at the mine, such as flooding, and a sharp fall in London copper prices (Fig. 13.6) caused the proprietors to dispose of their interest to the Kapunda Copper Company, and the new owners decided to close the smelting-works and to sell most of their ore to the English and Australian Copper Company.

The latter firm, it may be recalled from Chapter 5, had acquired the assets of the Patent Copper Company. In April 1849 this had entered into an agreement with the South Australian Mining Association (the proprietors of the adjacent Burra Burra and Karkulto mines) to smelt only the Association's ore and on its property. The English and Australian Copper Company (like its predecessor) seems to have displayed little business acumen because, as Brown points out, 'the effect of the agreement [was] to relieve the Association of the greater part of the cost of cartage and freight [so that] the Association's profits were safeguarded, and even guaranteed, by the Company's assumption of that responsibility'.⁴⁰ The difficulties of shifting large quantities of ore and ingot copper to the coast at Port Wakefield and of coal inland were exacerbated during the Victorian gold-rushes, and, in desperation, the company tried briefly to substitute imported mule trains for local bullock teams. The shortage of fuel at the Koorunga works meant that it could only be worked intermittently and therefore inefficiently (a mere 900 tons of copper being produced during the three years to mid-1855), and the company found its capital being tied up in growing stockpiles of ore at the mine and of coal at the coast. Then the company started to solve some of its difficulties—for example by using Hunter

Fig. 13.6: Tonnages of fine copper and regulus and of copper ore exported from South Australia from 1851 through 1890, together with their average values on the London market. (Source: calculated from SASR returns.)

Valley coal and local wood as fuel instead of English coal—and output rose to about 2,000 tons a year with a peak of 3,100 tons in 1860-1.

No sooner had the company got into its stride, however, than the Association

began to run into difficulties partly as a result of falling copper prices (Fig. 13.6) and partly because its miners were attracted away to the newly discovered Wallaroo and Moonta deposits on Yorke Peninsula. The company was thus forced to reassess its operations. On the one hand, it appeared unlikely that the Burra Burra and Karkulto mines would remain a reliable source of ore; on the other, the extension in 1860 of the railway from the wharves at Port Adelaide as far as Kapunda meant that it had become feasible to concentrate all the company's shipping facilities in one place instead of dividing them between Port Adelaide and Port Wakefield. It was decided, therefore, to erect a new refinery at Port Adelaide and this commenced operations towards the end of 1861. Not long afterwards the company renegotiated its agreement with the Association and eliminated the undertaking to smelt the ore at the mine, thus enabling the Koorunga smelter to be run down and virtually put out of commission in mid-1864 (by which time it had produced a total of 19,700 tons of fine copper). In turn this added to the problems of the South Australian Mining Association because it now had to deliver the ore to the company's Port Adelaide works and thus shoulder the transport burden so long avoided. During 1865-6 the Association operated at a loss and, in the absence of any signs of improvement in world copper markets, it decided in March 1867 to cease work at the Burra Burra mine. A fresh start was made in 1872 since, in the meantime, the town had become linked to Port Adelaide by rail, the Association's finances had been reorganised, and an expert had advised that operations could be resumed profitably if open-cut instead of deep mining methods were used. In fact, however, costs of mining rose and returns diminished. After producing only a further 14,000 tons of ore, most of which was smelted at the Port Adelaide works, the Burra Burra mine was closed permanently in September 1877.

The English and Australian Copper Company had taken something of a gamble by locating a new smelter at Port Adelaide for it had hoped to draw on ore shipped from other parts of the colony, especially the newly discovered deposits in the Wallaroo-Moonta area. Some accounts suggest that the company's decision was made as the result of a *prior* agreement with the proprietors of the Moonta mine but this is most unlikely—in fact virtually impossible—in view of the detailed timetabling: more feasible is the possibility that the company agreed to process some of the first ore won at Moonta but that this arrangement proved unsatisfactory. The Moonta Company decided instead to sell its ore to the Wallaroo Company, leaving the English and Australian Copper Company to rest content with diminishing and erratic supplies from the Kapunda and Burra Burra mines and even smaller and more intermittent parcels from the dozens of tiny mining ventures which continued to mushroom.⁴¹ Nonetheless, during the twelve years to the middle of 1873, this smelter turned out 20,100 tons of fine copper, worth at current world prices about £1,700,000 and making up over this period nearly 29 per cent of the colony's exports of this metal. In 1870 the company took yet another gamble when it decided to erect a smelter near Newcastle in New South Wales (see Chapter 12). The reasoning behind this decision is unclear, but it may have been both an attempt to minimise its South Australian fuel costs and to attract additional and

alternative supplies of ore not only from New South Wales mines but also from more distant sources in Queensland and New Caledonia.

Much more important was the smelting-works set up near its mine on the eastern coast of Spencer Gulf by The Wallaroo Mining and Smelting Company in 1861. At first only a small proportion of the company's own ore was processed, but within a couple of years most of it was being smelted on the spot (using wood fuel) along with much of the output from the nearby Moonta mine. Early in 1866 it was decided to erect the Hunter River Copper Works near Newcastle and this came into full-scale production in 1868. By this means the company minimised its fuel costs since lower grade ore (ranging from 7.25 to 8.13 per cent copper content) could be shipped to the coal, and as back-loading coal could be brought to the higher grade ores (11.13 to 12.63 per cent).⁴² Up to the end of 1889, the Wallaroo and Hunter River establishments received 969,000 gross tons (each of 21 hundredweight) of ore, of which almost exactly half came from the company's own mining operations and most of the remainder from those at Moonta. The Wallaroo works put through 640,000 gross tons and turned out 103,000 tons of fine copper, as against 329,000 gross tons and an output of 39,000 tons at the Hunter River plant. Both these works were affected by the long-run fall in copper prices especially during the 1870s and the latter part of the 1880s when production was curtailed (Fig. 13.7). Nonetheless they were highly profitable operations: the net earnings of the Wallaroo establishment amounted to £472,000 by the end of 1889, representing a profit of 18 per cent on turnover, while the Hunter River works earned £277,000 or 24 per cent profit on turnover. The Wallaroo and Moonta Companies merged in 1890 and decided soon afterwards to close the Newcastle works and dispose of the site.⁴³

From these details it can be appreciated that even though ingot copper was the colony's fourth main export commodity (after wool £44,460,000, flour £22,990,000 and wheat £19,500,000), the copper-smelting and refining industry in South Australia did not provide much direct stimulus to manufacturing in general. Most of the smelting plant was imported and the maintenance carried out in the companies' own workshops, leaving only minor jobs, such as the repair of ships and the supply of bullock drays, to local firms. The main effect was an indirect one through the flow of wages and dividends. The amount paid in wages is not known but some perspective can be gained from the fact that the Wallaroo Smelting Works, which from 1860 through 1889 made 71 per cent of the ingot copper exported from South Australia, employed an average of only 177 men and boys and never more than 276 even at its peak in 1872. Nor can the dividends derived from smelting operations be calculated although an order of magnitude can be derived by again using the results of the Wallaroo Company's operations. Since its mining activities produced a net operating profit over the whole period of only £91,000 it is clear that the major part of the £418,000 paid to shareholders must have been derived from the £749,000 earned in net operating profits by the two smelting-works. In short, as in New South Wales, the processing of copper made a contribution to the industrial development of South Australia without greatly affecting its structure.

Plate 18: In 1861 The Wallaroo Mining and Smelting Company established this smelting works near its mine on the eastern coast of Spencer Gulf in South Australia. This establishment, photographed here in 1870, produced 103,000 tons of fine copper by the end of 1889. (South Australian Archives.)

Fig. 13.7: Copper ore processed, and metal produced, at the Wallaroo Smelting Works in South Australia and the Hunter River Copper Works in New South Wales from 1864 through 1889. (Source: SAAO, 'Walleroo Statistics 1860-89', BRG 40/A748 shelf 203.)

Tariffs and Bonuses

During the first half of this period manufacturers gained little advantage from customs legislation in South Australia. Tariff policy in the 1850s was directed towards simplifying arrangements so as to encourage the development of inter-colonial trade via the Murray River: in 1851 specific duties were being charged on no fewer than 140 different items but on only 38 two years later. At the same time the 10 per cent ad valorem category was abandoned and the few commodities concerned transferred to the 5 per cent group so that even the slight measure of protection enjoyed, for instance, by local carriage-builders and furniture-makers was removed. Another attempt to assist the Murray River trade was made in 1859 when the duties on corn sacks, flour, wheat, manures and seeds were removed, the revenue lost being made up by an increased charge on manufactured tobacco.

During the latter part of this decade South Australia had found itself increasingly caught up in discussions with New South Wales and Victoria about the differences in their customs schedules and policies. In 1860 the government decided to pave the way for an assimilation of the tariffs of the three neighbours by abandoning all ad valorem duties as from 23 May, thus leaving imposts only on beer, coffee, hops, spirits, sugar, tea, tobacco and wine. South Australia was quite forthright about its motives in a letter to each of the other Australian colonies on 18 March 1862:

So long as [the customs schedules] remain essentially different it will be impossible for the Colony with the higher tariff to prevent the introduction of goods that have paid duty under a lower one, unless a large and costly revenue service be maintained . . . It was this consideration that, two years ago, mainly induced the Parliament of this Province to repeal the then existing *ad valorem* duties.⁴⁴

South Australia (which until 1860 had had much the most elaborate schedule of any of the colonies) now recognised that 'the systematic treatment of each Colony by its neighbor as though it were a foreign state, is gradually creating, and must continue to excite, feelings between the inhabitants of the several Colonies scarcely in accordance with the unity of their origin . . .', and went on to suggest that representatives of the colonies should meet in Melbourne to discuss the issues involved. It set the ball rolling by declaring that

this Government intend seeking legislative authority to receive free of duty all articles *bonâ fide* the produce of any other Australian Colony which is willing, on the same terms, to receive the produce of this. . . .

This gesture turned out to be a fairly expensive even if calculated risk. The removal of the 5 per cent ad valorem charges from 23 May 1860 meant that the South Australian Treasury lost £5,250 by 30 June, £50,250 during the next twelve months, and a further £57,290 by 30 June 1862. Even though the Melbourne Intercolonial Conference, eventually held in March-April 1863, managed to agree on a uniform tariff, it soon became obvious that this did not have the support of the legislatures concerned.⁴⁵ The South Australian government realised that its efforts had been

in vain, and decided—as urgently needed revenue measures—to restore the 5 per cent ad valorem duty from 3 June 1863 (26 and 27 Vic. no. 6) and institute rather trivial imposts on imported timber and wooden goods. The ad valorem charge provided about a third of the customs revenue and was derived mainly from imports of drapery, manufactured iron and footwear. The low specific and rated duties on other than luxury items gave little protection to local manufacturers while at the same time the brevity of the list of exempted commodities meant that the cost of most basic raw materials, like pig iron, was made even higher.

Manufacturers possibly gained a little from the next revision of the schedule in 1870 which was undertaken largely to meet a growing deficit. The Treasurer, John Hart, himself a flour-miller, tried to steer between the factions by suggesting in Parliament on 7 September that his tariff was 'not what I should call protective, but it is to a certain extent discriminating'. Nonetheless, he had been

very considerably struck when in Melbourne with the advances that were being made in some branches of manufacture, as the effect of certain discriminating duties. I do not consider duties protective unless they are intended as prohibitory, or sufficiently large to prevent goods from being introduced.

The new schedule, which came into effect on 8 September (33 and 34 Vic. no. 10), increased some of the existing specific duties (such as beer in the wood from 6d to 9d per gallon); placed fixed duties on additional items (like soap, candles and preserves); made the impost on manufactured much higher than that on raw tobacco; put all goods not otherwise listed (including sulphuric acid, biscuits, iron and brass castings, chaff-cutters and iron pipes, as well as luxury items) into a new 10 per cent category; and greatly lengthened the free list. It was this latter step that probably benefited manufacturers the most, for a wide range of materials—tanning bark, canvas, caustic soda, iron bar and pig, boot elastics, kid skins, patent leather, printing paper and so on—were now exempted from duty.

There appears to have been no real change of philosophy underlying the next revision of the schedules in 1876: rather, the intention was to simplify and clarify them and in some instances to bring the nature and level of the imposts into line with those of New South Wales with the possibility of assimilation again in view. Few of the alterations, which all became operative on 26 July (under 39 and 40 Vic. no. 34), seem to have been made as a further encouragement to those industries which had been singled out for government bonuses: wine, beer and soda water bottles were, for instance, deliberately excluded when 'bottles' were shifted from the free to the 10 per cent category. Many of the changes, however, were arbitrary and obfuscated the logic of the schedules introduced in 1870. Whereas the impost on iron castings was reduced from 10 to 5 per cent, that on cast iron pipes was changed from 10 per cent to 30/- per ton (equivalent to nearly 16 per cent in ad valorem terms).⁴⁶

During the election campaign early in 1881, the Chief Secretary, William Morgan, announced, as part of his platform, an intention to abandon the 10 per cent

duties and to assimilate the tariff of South Australia to that of New South Wales and thus leave, in the words of the *Age* on 14 April, 'poor Victoria quite out in the cold'. Morgan's manifesto stirred the manufacturers into forming the Colonial Industries Defence Association which, on 8 March 1881, sent out a circular soliciting support:

The Policy of the Government, as announced by the Chief Secretary, is to reduce the Duties on articles now being Manufactured in the Colony; Duties which have largely conduced to the establishment of Manufactories in South Australia. As we believe this reduction would be DETRIMENTAL to the interest of the Colony, and in some cases RUINOUS to manufacturers, we have combined to influence by every legitimate means, the return to Parliament of members who will RESIST this proposed alteration of the Tariff, and would EARNESTLY REQUEST YOU to assist in carrying out this object, by enrolling your name on the Committee and contributing to the funds.⁴⁷

Morgan had misjudged the extent to which support for protection had grown and he was able to form a coalition Ministry only after agreeing that the 10 per cent duties would be retained. Nor, it seems, had he appreciated the significance of the moves and counter-moves being made by the Railways Departments of Victoria and New South Wales to capture the trade of the Riverina which were beginning to downgrade the importance of the Murray River traffic via South Australia.

By 1885 a series of circumstances, among which were the ending of the preoccupation with the Murray trade, a more persistent and vocal support for protection, and an ever-increasing budgetary deficit, combined both to necessitate and to make feasible a major revision of tariff policy. There is no doubt that the government was under increasing pressure to restructure the customs schedule. On 23 September 1884 it was put to the Treasurer (W. B. Rounsevell) that there were 'numerous inconsistencies . . . in the present Customs Tariff which hinder the extension of local productions and manufactures' and that many imported articles could be made locally if the tariff were revised 'in the direction of fostering colonial industries'. Rounsevell told the group concerned that the government did 'not intend to interfere with the tariff at present, but [would] take the matter into consideration during recess', a response considered by a public meeting held on 13 October to be not 'sufficiently definite'. The outcome was a petition, signed by 2,315 electors and residents of Adelaide and suburbs, asking the Legislative Assembly to review the customs tariffs so as 'to encourage local productions and manufactures'.⁴⁸ But the Colton government (of which Rounsevell was Treasurer) was replaced by the Downer Ministry which immediately had to face up to the problem of an ever-increasing budgetary deficit. This had begun in 1882-3 and had risen to £436,000 by 30 June 1884. By the time Newland, the new Treasurer, made his budget speech on 18 August 1885 the colony was facing a cash deficit of £709,000:

Never . . . in the history of South Australia, has the same necessity arisen for a tariff that, while giving the country a considerable revenue

most urgently required at the present moment, secures to the trading community a tariff that is simplicity itself as regards its working. In framing it, while giving encouragement to our native industries, the Government have also been guided by the necessity for obtaining additional revenue. There can be no doubt that up to the present time we have given but little encouragement to our local industries. Our disposition has been to encourage the importing rather than the manufacture of raw materials. . . .

The new schedules, which came into effect on 19 August (48 and 49 Vic. no. 348), introduced for the first time a 15 per cent *ad valorem* category containing 116 items of which 77 (such as apparel, men's boots and shoes, carriages, furniture, grates, stoves and tinware) had been paying 10 per cent; 9 (cloths, tweeds and serges) had been paying 5 per cent; 6 had been subject to specific rates; and 24 had been free. In this new category, then, were a mixture of luxury items like silks and furs as well as others that the government 'earnestly hoped' might be made locally: 'we believe', said Newland of the 15 per cent duty, 'it will have the desired effect in giving a stimulus to the establishment of manufactories for the purpose of working up our raw products without laying [us] open to the censure of following too closely the perhaps too excessive protective policy of a neighboring colony'. Newland also scrapped the 5 per cent category, increased over a third of the specific duties, and placed 376 items on the free list (compared with only 35 previously) on the grounds that they 'cannot be produced locally'. Much of the debate in the Legislative Assembly was taken up with the classification of particular items rather than with the principles involved, although a few members were concerned lest some firms—like those making up slop clothing—might be put out of business because of the additional duties being imposed to boost other activities such as woollen-milling. The 1885 customs revision represented 'the first deliberate advance' of the colony towards a policy of protection and brought with it the problems, familiar by this time to Victorians, of inter-industry conflict.

At the hustings during the 1887 election campaign, protection was made a major issue, with the Trades and Labour Council, for instance, endorsing nine candidates in the metropolitan area of whom six were successful. By the time the Playford Ministry took office in June that year the accumulated cash deficit of the colony had risen to £1,109,000 because the depressed conditions in the intervening period had reduced the revenue anticipated from the 1885 tariff changes as well as from other sources. Again the need for revenue as well as the demand for adequate encouragement to local industry went hand in hand, but the mood of the colony had changed. Playford (who was also Treasurer) had less need to compromise: 'the country will not rest satisfied', he said during his budget speech on 18 August, 'until a protection tariff has received a fair trial'. He made no bones as to the purpose of his proposals for by 'adopting a somewhat similar tariff to [that of Victoria] we are hopeful of achieving the same result as she has achieved'. The guiding principles, Playford claimed, were to stimulate local manufactures by raising duties still further (under 50 and 51 Vic. no. 405, effective 19 August, most of the items

previously in the 15 per cent category were raised to 25 per cent); to admit raw materials and necessities of life free; and to tax luxuries.

It is not easy to isolate the effects of the tariff on secondary industry in South Australia because they are obscured by other circumstances such as the rise in demand for agricultural machinery in western Victoria and for mining equipment in Broken Hill, and the award of government contracts for items like water-pipes and railway locomotives. The Royal Commission appointed in 1890 to enquire into the probable result of free trade between the colonies noted (p. v) that there was

no question but that increased manufacturing industry has resulted from the adoption of protection in South Australia. Industries have been so strengthened that they are now in a position to successfully cope with any competition within or without the colony.

In response to a questionnaire sent out by the Commission, eighty-four manufacturers (employing 3,646 hands) indicated that they were in favour of free trade between the colonies 'at once'; twenty-five (387 hands) wanted it 'deferred'; and forty-eight (1,207 hands) were 'opposed altogether'. Significantly, it was the agricultural implement-makers and metal-working firms that declared themselves to be 'equal to any competition' and saw unrestricted inter-colonial trade as 'opening up wider fields for enterprise and providing extended markets', whereas it was generally firms making commodities like clothing, footwear, leather, furniture, carriages and tinware, which had been given the greatest nominal protection by the 1885 and 1887 schedules, that expressed the greatest fear of being swept out of business by the products of Victoria and New South Wales.

One other aspect of customs policy affected manufacturers during this period. Until 1867 drawbacks could be claimed only on unbroken packages of 'goods, wares, or merchandise, other than spirits, wines, tobacco, and beer' upon which import duty had been paid. But by 30 Vic. no. 10 (11 January 1867) the executive was empowered to gazette regulations to allow drawback on products grown and processed in South Australia that incorporated imported sugar and which were subsequently sent out of the colony. For some years the only commodity treated in this way was jam and was thus of trivial importance. The principle adopted in this instance, however, guided drawback arrangements for many years. In the case of jam it was supposed that half the weight consisted of sugar and this then was the quantity on which drawback was allowed; similarly, regulations permitting drawback on apparel and slops made up in the colony from imported materials assumed that one-third of the value was the cost of making and hence the claim could only be made at the rate of 40 per cent of two-thirds the value. This was a system devised by the Collector of Customs as being operationally convenient, and there can be no doubt that in scores of ways like this the public service left its own imprint on the industrial development of the colony. It was the Collector of Customs again, for instance, who recommended that boots and shoes should no longer be eligible for drawback:

These articles are now manufactured very largely in the Colony, and for the river trade the colonial make is undoubtedly preferable to the imported; and, as most of the materials used are either in the free list, or are of home manufacture, the amount of duty paid thereon is very small indeed; besides which, even were it desirable to encourage the export of foreign or British goods of this description, our own are now so well got up that it would be difficult to distinguish between them, so as to prevent drawbacks being allowed upon goods which have never paid duty.⁴⁹

The tenor of this comment and the ending of drawback privileges on boots and shoes from 31 May 1871 also indicates that, although the preoccupation with the Murray River trade was very real, not all decisions in respect of it were made at the expense of local manufacturers.

Bonuses

None of the other Australian colonies attached anything like the same importance to bonuses as South Australia, particularly during the 1870s. The basic philosophy, frequently argued by free-traders, was that a bonus, being a single payment for an agreed and recognisable result, was a far more satisfactory way of encouraging manufacturers than protective imposts which could involve the community in a continuing commitment to uncertain and imprecise objectives.

The bonuses offered were of several kinds.⁵⁰ Some were designed to stimulate mineral exploration, such as the rewards of £250 and £1,000 for discovering and developing reserves of petroleum oil and kerosene, £500 for finding a gold-field, and £10,000 for proving a payable coalfield. Others attempted, without success, to encourage the growth and manufacture of sugar (£1,000 for the first 100 tons) and the production of paper (£2,000 for the first 250 tons). The best that can be said of some of them is that they led to experiments which brought home to enthusiastic pressure groups, like the Chamber of Manufactures, some of the realities of industrial financing and technology.

This was particularly true of the bonus of £2,000 offered in 1871 for 500 tons of marketable pig iron smelted in the colony from South Australian ore, which was changed two years later into a reward for 500 tons of pig iron, or 300 tons of blooms, or 250 tons of marketable bar or rod iron.⁵¹ In the meantime a group of Adelaide businessmen had acquired a mineral lease near Victor Harbor and floated The South Australian Iron and Steel Company Ltd which was incorporated on 7 January 1874 with a nominal capital of £3,000 in 10/- shares. The Mount Jagger Iron Mine was opened up and a small experimental furnace erected that was blown in during August. The ore was a brown hematite containing 52 per cent iron and was being landed at the works for 12/- per ton. Since there was abundant limestone, a good water supply, and ample timber for charcoal, the success of the venture seemed assured and 118 shareholders had subscribed the whole of the £3,000 before the end of November. At about this time, however, things started to go wrong. The men, lacking experience at operating a small charcoal furnace, could not keep it in blast for more than a few days at a time before it became blocked by a fused mass

of ore, charcoal and limestone which had to be cleared out when cold with crowbars and hammers. After four or five episodes of this kind, the furnace cracked and became unsafe: the company thereupon discharged all its employees and closed the works after it had produced a mere 30 tons. The following year the company decided to issue further shares in order to rebuild the furnace, but before anything had been done the directors became alarmed at the low price of pig iron in England and recommended instead that the company be wound up voluntarily. By this time £3,440 had been spent for a return of barely £150. No claim seems to have been made for the bonus which lapsed on 30 November 1877.

Only three of the bonuses offered for manufactured products produced any worthwhile results and only one of these initiated a new form of industrial activity. In December 1873 the Legislative Assembly resolved that £250 should be awarded to the first firm to turn out 5,000 dozen glass bottles, the scarcity of which was frustrating the wine industry. Within two months The South Australian Bottle Factory Ltd had been floated and was incorporated on 2 February with a nominal capital of £2,000 in £1 shares.⁵² A complete plant was ordered from England and put into operation late in January 1875 even before the building itself was finished because the company had already spent the £1,932 subscribed by shareholders and was running up a substantial overdraft with the Bank of Adelaide. The bottles produced were, however, substandard, and by May it had become clear that the longer the company remained in existence, the greater its indebtedness would become. One of its main problems was that it had recruited many of its staff in Europe on a three-year contract and the payment of wages, whether or not the plant was working, could only be avoided by a formal resolution to wind up. When this was done on 14 May 1875, £2,250 had been invested in land, buildings, plant and materials and the company had an external indebtedness of £2,027, about half of which was owed to the bank. The plant was sold to a consortium of firms, most of which were engaged in wine or cordial making, and re-opened as the Brompton Glass Works; it was under this name that the bonus was claimed and paid a few months later.

Little need be said about the bonus of £100 for the first 50 tons of rope and cordage since this merely encouraged Tamlin & Coombe to enlarge its Adelaide Rope Factory. Of longer-run importance was the decision of 8 June 1870 to place £2,000 on the estimates for 1871 as an incentive for the manufacture of 10,000 yards of tweed in the colony. For about two years prior to this Edward Kram had been making small quantities of cloth at Hahndorf, a small village 20 miles southeast of Adelaide. In November 1872 it was proposed in the Legislative Assembly that the bonus should be made available in instalments of £200 per 1,000 yards because it was clearly beyond the resources of a firm like that at Hahndorf to accumulate 10,000 yards before claiming the award. But the sample of tweed displayed was 'full of grass-seeds and not properly finished' and the majority of members thought it absurd that they should be asked to give a bonus of 4/- per yard 'for trash that no one would wear'. At about this time Kram re-established his equipment in a disused brewery at Lobethal and obtained financial backing from F. W. Kleinschmidt, but

by the end of 1873 it had become obvious that a much larger investment, including the use of power looms, would be necessary before there was any prospect of earning the bonus. Accordingly, The Lobethal Wool and Tweed Company Ltd was organised and incorporated on 13 February 1874.⁵³ The nominal capital of £5,000 was divided into £5 shares, of which 150 were issued to Kleinschmidt and 25 to Kram and taken to be fully paid-up. By July 1875 the company was able to claim the £2,000 bonus but, as was noted later, the government managed to fund £600 of this out of the customs duty that the company had paid on its imported machinery. Nonetheless the directors were thus encouraged to issue 2,000 new shares in the expectation that output could be raised to 1,000 yards a week, but for reasons which are not now clear, this gamble failed to come off for in 1878 the factory was closed and soon afterwards it was decided to wind up the business.

Meetings were held in 1880 and 1881 to try to stir interest in a new enterprise to take over the idle plant, but it was not until August 1882 that the South Australian Woollen Factory Company Ltd was successfully floated with a nominal capital of £25,000. The Lobethal land and buildings were acquired for £3,000, work put in hand on extensions at a cost of £2,115, and new machinery worth £3,560 ordered from England. It was these decisions that began to 'fix' Lobethal as a long-term location for woollen-milling since disinvestment costs now started to increase sharply. In November 1883 manufacturing operations began on a small scale: as machinery and weavers recruited in Scotland arrived the mill was gradually brought into full production, reaching a total of 38,800 yards during the six months to 31 October 1885 by which time 23,500 shares had been taken up and called to 15/-. At this point the company's fortunes started to change. During the next six months sales dropped by 13,300 yards largely due to reduced military orders, and things became worse during the latter part of 1886 because of the depressed conditions in the colony as a whole: the mill was worked only half-time thus pushing up the bank overdraft to £6,900. In an effort to salvage matters the directors decided to diversify into blankets and flannels but this compounded rather than solved the problems, and after struggling on for another couple of years the shareholders decided to liquidate the company in October 1889 so that it could be reconstructed.

In the books of its successor, the South Australian Woollen Company Ltd, the land, buildings, machinery, plant, stock and stores that had formerly been valued at £21,519 were now entered as worth a mere £4,000: in this way, £11,373 was wiped off the value of plant and machinery alone. Only two aspects of the new company's affairs are of interest here because both illustrate the reluctance of firms to make locational adjustments even in the face of adverse circumstances. Although the directors managed to keep the reconstructed company afloat during the difficult years of the 1890s, they were acute enough to recognise their managerial and technical inability to cope with the interstate competition that seemed likely to follow federation. They therefore began negotiations with the New South Wales woollen-milling firm, John Vicars and Company, which led on 4 March 1901 to an agreement, perhaps unprecedented in the history of Australian manufacturing, to the effect that Vicars would 'manage the business of the South Australian Woollen

Company Ltd for a period of five years' for which service it would be issued with 2,000 shares considered fully paid-up as well as one-third of the profits each half-year. The success or otherwise of this arrangement is not known, but towards the end of 1909 the shareholders agreed to accept 1,990 £1 preference and 9,014 £1 ordinary shares in a reconstructed firm, South Australian Woollen Company Ltd, which was incorporated on 11 November that year with a nominal capital of £40,000. In a curiously haphazard way the locational problems, such as the lack of fresh water and the difficulties of waste disposal, were thus passed on from one company to another.⁵⁴

Fig. 13.8: Estimated total employment in South Australian factories 1860–99 (derived from Appendix Table A1.8).

The Course of Industrial Development

A rough indication of the trends in South Australian factory employment is given by Fig. 13.8 although, as detailed in Appendix 1, interpolated data had to be used for several periods of three or four years duration. The total number of factory hands probably rose from about 3,100 in 1860 to 7,000 in 1875 and 12,500 in 1890. The rate of increase appears to have been fairly steady except for minor pauses in 1864 and 1870 and more significant ones during the first half of the 1880s (sinking to a nadir in 1884–5) and in the early 1890s. But the basic data are too poor to allow a more detailed analysis: in fact the Chamber of Manufactures had such scant regard for the accuracy and completeness of the *Statistical Register* returns that early in 1881 it attempted to hold its own industrial census, an exercise thwarted by the fact that only half the 700-odd manufacturers approached bothered to send back their questionnaires; the returns were destroyed without being analysed. An attempt has been made in Appendix Table A1.9 to re-sort the available data into industry classes. The manufacture of metal goods, foodstuffs and clothing—employing, respectively, about 30, 20 and 18 per cent of the total throughout the period—clearly dominated the industrial structure. Agricultural implement-making

led the metal goods category until the latter part of the 1880s when founding and general engineering came to the fore. As might be expected, flour-milling was the largest single activity in the food group, reaching a peak of 875 hands in 1879-80: from then on the number of mill workers steadily declined to 620 in 1890-1, a process that was partly related to the reduction in the number of mills and partly to the substitution of machinery which raised the average horse-power available per hand from 2.6 to 4.0 over this eleven-year period. The complete absence of any details relating to output or investment makes further analysis impossible.

Company formation and financing

By the end of 1890 a total of 781 organisations had been incorporated under The Companies Act, 1864. The great majority were speculative mining ventures, but 57 indicated their intention to undertake some form of manufacturing or processing activity, including flour-milling (7), butter and cheese making (10), other food producing (13), metal-working (6) and brewing (5). These fell into two basic groups. On the one hand, a series of small, local companies was formed to make butter and cheese, grind flour or preserve fruit, generally with a nominal capital of £5,000 or less that was locally subscribed. On the other, most of the larger companies were organised to take over and expand existing businesses. A case in point was the formation of G. E. Fulton and Company Ltd in 1888 to acquire the engineering and foundry business which, it will be recalled, had won the government contract for making cast iron water-pipes. The purchase price was £40,000 paid partly in cash (£20,000) and partly by issuing the partners and their nominees with 40,000 shares in the new company paid to 10/-; the other 40,000 were allotted to five Adelaide men (such as James Cowan, the flour-miller) and called as required.⁵⁵ Most of these large companies drew funds from outside the colony. For instance, of the 200,000 £2 shares into which the nominal capital of The South Australian Brewing, Malting, and Wine and Spirit Company Ltd was divided, 50,000 taken to be fully paid were issued to the owners of the three Adelaide businesses brought together by this merger. All the remaining 150,000 shares had been taken up by 282 people and paid to £1 by October 1888: of these, 87,090 were held in Melbourne (and 2,585 elsewhere in Victoria); 37,987 in Adelaide (and 663 in the remainder of South Australia); 7,000 in Newcastle, 3,600 in Sydney, and 100 in Wollongong; 10,700 in Queensland; 250 in England, and 25 in New Zealand.⁵⁶

On occasion, more than just finance was imported. In October 1881 the directors of the Apollo Stearine Candle Company Ltd of Victoria came to an agreement with G. Wilcox of Adelaide to purchase the tallow business operated by Mofflin and Company at Hindmarsh: from this sprang The Adelaide Apollo Soap and Stearine Candle Company Ltd which was incorporated on 9 January 1882 with a nominal capital of £10,000 in twenty shares of £500. It was arranged that, on the one hand, Wilcox would sell to the company all the assets of the tallow business for £3,500 as well as its contracts with forty-seven butchers for the supply of fat, and place ten of the shares on the Adelaide market; on the other hand, the directors of the Melbourne company undertook to purchase eight shares and to supply stearine,

but insisted that for the first two years the management of the Adelaide venture should be in the hands of their nominee subject only to the advice of a local board of directors.⁵⁷

South Australia's leading manufacturing establishment was almost entirely financed from within the colony and mainly by the family concerned. James Martin, who had built up his iron-founding and engineering business at Gawler since its beginning in the late 1840s, decided to incorporate the concern as James Martin and Company in July 1885. (This same month his partner Frederick May left the firm to set up on his own account, strongly suggesting that the two events were related.) The new company was registered on 2 September 1885 with a nominal capital of £100,000 in 4,000 shares of £25: 1,529 shares were allotted to Martin himself, 492 to his nephew (and works' manager) John F. Martin, and 94 to various members of the Martin dynasty, all 2,115 being deemed paid to £20.⁵⁸ At this stage, then, there was no outside involvement in the company's affairs, but by the same token the manoeuvre brought no new capital to the business. When Martin's was awarded the locomotive contract in 1888 the additional capital needed to carry out this work led to a reconstruction of the company which was wound up and re-incorporated in the same name as a new legal entity on 4 December 1889. The nominal capital now was £150,000 in 30,000 shares of £5: 9,670 were issued as 'A' shares to James and John F. Martin and 1,932 to the liquidator (probably in settlement of corporate debts), each of these being taken as paid to £4. In addition, a 'B' series was issued and called to £2, thus producing a cash flow of £2,290 from seventeen subscribers, mainly living in Adelaide, Gawler, and other South Australian towns like Goolwa. During 1893 and 1894 Martin's started to run into the difficulties that eventually led to a decision in 1907 to liquidate the company: the firm encouraged its own employees to take up 'B' shares and by March 1894 no fewer than 178 people, mostly Gawler residents, had done so. Yet this provided only a small injection of new capital from outside the family and simply acted as a short-term palliative: nothing could change the fact that the markets for Martin's products were being eroded by circumstances outside its control.

Occasionally, towards the end of this period, South Australian capital was used to develop manufacturing outside the colony, an example being the Broken Hill Brewing Company Ltd formed in 1888 and financed mainly from Adelaide sources. But more important were the branch factories established by some firms in other colonies. Duncan & Fraser, for instance, tried to retain the Victorian market for its carriages and wagons in the face of rising customs duties by doing 'half' the work in Adelaide and then putting it together in Melbourne,⁵⁹ and the Mellor Bros Co-operative Company Ltd opened a branch factory there and another in Sydney to make stump-jump ploughs.

Employees and Employers

South Australia on 27 October 1876 became the first Australian colony to pass a Trade Union Act (39 and 40 Vic. no. 41) which, among other things, gave protection

to their funds, made provision for the prosecution of defalcating officials, and provided that no member of a trade union should be liable for prosecution for conspiracy. This was significant in that employee organisations were emerging in South Australia at an early stage in the colony's industrial development and playing an active role in pressing for improvements in wages and conditions. Hardly surprisingly, in view of the growth of agricultural implement-making works, the time was ripe in 1864 for the formation of a branch in Adelaide of the Amalgamated Society of Engineers. In 1873 this decided to seek recognition of the eight-hour day by appointing deputations to wait on individual employers. On 29 May Mellor Brothers acceded to the men's demand—though not without first giving them, as the *South Australian Register* reported on 17 June, 'a few words of advice as to how their leisure time should be spent'—and other firms quickly followed suit: by October it had become a general rule in the trade. But this victory, won without the need for industrial action, had to be defended repeatedly in subsequent years as employers tried to meet short-term problems by asking their men to work longer hours or accept lower wages.⁶⁰ In other trades, too, groups were formed to help employees take a united stand: the Tailors' Co-operative Society, for instance, was organised in May 1875 to help rally support for a strike caused when the employers refused to adopt the Melbourne methods and rates of pay.

Much more detailed scrutiny of the evidence is required before definite conclusions can be reached about the impact of organised labour on industrial development. But, rightly or wrongly, by the end of the 1890s employers were beginning to blame the hard line being taken by some unions as a major cause of the relatively high manufacturing costs of some South Australian products. An example was the log of claims made by the tanners and curriers while on strike in 1890: the employers offered to pay beamsmen the same amount for forty-eight hours as previously given for fifty-four which, even as a gesture of conciliation, raised the Adelaide rate considerably above that in Melbourne.⁶¹ Apart from its effect on the price of leather and hence on external sales, this also affected the local boot and shoe trade which was already having difficulty in defending itself against the cheaper imports from Victoria and, more especially, from New South Wales. One footwear manufacturer explained to the Royal Commission on Intercolonial Free Trade on 5 September 1890 that

The unions there [New South Wales] do not seem to have troubled themselves about the question of machinery as they do in Adelaide and Melbourne. They can introduce any kind of labor-saving machinery they like in Sydney without agreeing with the unions to do so.

Whether or not there were grounds for such a feeling, which was clearly shared by other manufacturers, is less important than the fact that this was a prevalent attitude affecting the investment decisions of existing and potential entrepreneurs.

Yet despite union pressure for improved hours and wages, surprisingly little concern was displayed about general working conditions. Some gentlemen of the cloth, concerned with the welfare of their parishioners, tried to establish evidence

of 'sweating' in Adelaide's clothing factories in 1889, but the results were inconclusive as were the efforts of the various unions involved a few months later.. Nonetheless, sufficient concern was beginning to emerge to warrant a full-scale investigation of conditions in shops and factories in 1892. The Shops and Factories Commission found an 'entire absence in South Australia of any legislative provisions for the protection of women and children' and 'no law . . . regulating factories'. It also concluded that

Sweating exists to some extent, particularly in connection with shirt-making. By sweating we mean working for rates of remuneration so low that very hard work is necessitated to secure the barest existence. This is generally the result of sub-letting. Women are chiefly the victims of sweating. Factory work, with its greater liberty, attracts many, and is generally preferred to domestic service.

Something of the attitude towards this inquiry can be gleaned from the petition to Parliament that emerged from a 'largely attended meeting of manufacturers of South Australia' on 24 July 1891: 'at the present time, when a number of new industries are being started or are only in their infancy, it would be unwise to harass them by the imposition of fines at every turn'. The first Factories Act (57 and 58 Vic. no. 603) was not passed until 21 December 1894 and applied only to premises within the municipalities, 'manufacturing districts' (see later), and other proclaimed areas.

There is no evidence that the early emergence of employee organisations had any bearing on the formation of a Chamber of Manufactures in Adelaide during 1869 (eight years before a similar body appeared in Victoria, and fifteen years ahead of that in New South Wales). The *South Australian Register* report on 27 May of a public meeting held the previous day explained that within the previous two or three years many colonists 'instead of being able to depend upon their three great staple industries [wool, copper and breadstuffs] . . . had been obliged to look out for something else to turn to'. Among the possibilities that would assist both primary and secondary producers were the cultivation of flax and the manufacture of rope, the production of cloth from wool and of dairy products from milk, and the fashioning of ingot copper into finished goods. The objects were, in brief, to promote and encourage South Australian manufacturing by providing information, holding exhibitions, giving practical advice, and investigating the feasibility of possible new industries. The Chamber also expected to act as a forum to help arbitrate between members or between employers and employees, and to 'afford a medium of communication with public authorities'. There is no doubt that the South Australian Chamber of Manufactures became an extremely influential organisation whose wide-ranging activities, from the advocacy of steel-making to the destruction of sparrows in orchards, received wide and continuing publicity. It was rough justice that, at the very moment when its constant representations about the need for South Australia to protect and develop secondary industry were beginning to bear fruit, its government subsidy was reduced in 1885 from £500 to £100 a year.⁶²

The Spatial Distribution of Manufacturing

It is not possible from the information available to obtain a clear idea of the relative size of the metropolitan and non-metropolitan factory workforce during this period. Taking all the available evidence into account, however, there seems little doubt that there was during the 1880s an increasing concentration of factory employment in and around the metropolis. In particular, the 'traditional' country town activities, like flour-milling and agricultural implement-making, were re-focusing themselves structurally and spatially to meet the demands of new markets. What marks South Australia out from all the other colonies was the extent to which manufacturing activities of this kind were controlled by metropolitan interests, a situation which was even further promoted in the 1880s when breweries, among others, started to combine and lengthen their chains of country outlets.

There was another spatial influence in South Australia which merits brief mention, not so much because of its absolute importance but because it was unusual, and may even have been unique in the English-speaking world. During the mid-1870s there was a growing conflict between manufacturers and citizens living nearby. At stake, on the one hand, was the protection of public health and public amenity; on the other, was the problem faced by tanners, fellmongers and the operators of other noxious premises who established themselves in sparsely populated areas but later found themselves being prosecuted as a result of proceedings initiated by newly arrived residents. This, of course, was no new problem, but South Australia attempted to handle it in a different way.

The episode began in 1874 when settlers along the River Torrens below the industrial suburb of Hindmarsh obtained a perpetual injunction against two of the leading fellmongers restraining them from polluting the stream. The Chamber of Manufactures made representations that Hindmarsh had 'for many years been looked upon as the *locale* of South Australian manufactories, and if persons take up their residence there they must do so at the risk of suffering the discomforts arising from the unfragrant operations. . . .' Further point was given to its views the following year when householders took proceedings against the owners of flax-mills at Gawler and Willunga to restrain them from creating a nuisance. The Chamber's concern was that under The Public Health Act, 1873 a nuisance complaint could be made, not only by a medical officer or two medical practitioners as was provided similarly in the Victorian Public Health Amendment Act, 1867, but also by any six householders. With such examples before them of the way that long-standing industrial ventures could be put out of business overnight by a few new residents in an area, investors were likely to be deterred, argued the Chamber, from investing in large-scale manufacturing activities. The result was the appointment of the commission to enquire into the whole question of sanitation (interpreted in fact as pollution) in the colony which took evidence in 1875-6; among their other findings, the majority of the members thought that the creation

of special 'Manufacturing Districts' would be 'very expensive to the State, and their success problematical'.⁶³

Nonetheless, on 3 September 1879 a Manufacturing Districts Bill was introduced into the Legislative Assembly that provided for the gazettal of districts in which sections of some Acts would not apply. The proposition was well-meaning but woolly and thus raised questions in the minds of members as to how the districts were to be chosen and what would happen to the amenity of contiguous residential areas. The Attorney-General (Bundey) said in debate in October that he 'was not aware that there was any such Act in existence anywhere else in the world' and it behove them 'to be extremely cautious in sanctioning manufactures in a climate like that of South Australia'. The Bill was obviously unsatisfactory and, sensibly, it was quickly withdrawn.

Two years later the Bray Ministry reintroduced a more carefully prepared Bill as a government measure. The Attorney-General (Downer) pointed out on 22 September 1881 that

It would be very hard if any person who had spent his money in the colony with the view of establishing manufactures should suddenly find his trade stopped, his business put an end to, and his capital wasted, and everyone would therefore agree with him that it was best to settle the rights of these manufacturers on a satisfactory basis.

The Bill proposed that a district might be proclaimed on the strength of a petition signed by three-quarters of the ratepayers of a corporate city, town or area formed under the District Councils Act, 1876, and a similar proportion of the householders elsewhere; that the proclamation would specify the provisions of the Public Health Act and the Municipal Corporations Act from which the district was exempted; and that no compensation would be payable in respect of land bought by a claimant after the establishment of the Manufacturing District. Damage could, however, be recovered for nuisance but not when the operations concerned were demonstrably being carried on in 'the most efficient and most approved manner'.⁶⁴

Even before this second Bill had been introduced into the Legislative Assembly, the inhabitants of Mannum had staked their claim:

at present . . . no place in this province [has been] proclaimed as manufacturing district . . . your memorialists beg to draw the attention . . . to the fact that Mannum, having a beautiful frontage to the River Murray, and being the nearest point to Adelaide, would be a most desirable place for a proclaimed manufacturing district.⁶⁵

It is not known how many referenda were organised on this question since only those that received the assent of the required proportion of the ratepayers or householders became the subject of formal petitions or memorials. There is, however, a touch of irony in the fact that a debate which had been sparked off by the closure of works along the River Torrens should end with the premeditated encouragement of noxious industry by the eligible voters of various country towns, including Gawler (proclaimed a Manufacturing District in December 1883), Man-

num (May 1884), Port Pirie (December 1888), Davenport (August 1891) and Port Augusta (October 1891). But perhaps the attitude of mind involved was summed up by the memorable observation of a member of the Legislative Assembly on 22 September 1881: 'some men seemed to be unable to smell, and for the prosperity of South Australia it would be well that those should go and live in the manufacturing districts'.

Attention has been drawn in this analysis to several significant aspects of industrial development in South Australia. One was the close relationship between farming and manufacturing both because of the demand for processing facilities and for a wide range of equipment. Moreover the presence of one or two enterprises of this kind provided the basic *raison d'être* for several dozen towns which, in turn, supported service industries like brewing, printing and cabinet-making. A second feature was that much of the dispersion of these activities occurred, not because of local initiative—as was usually the case in Victoria and New South Wales—but as a result of investment decisions made by Adelaide and a few Gawler firms as part of their overall competitive strategies.

Conventionally, South Australia is seen as a free-trade colony that became a convert to protection in the latter part of the 1880s: it would be simplistic, however, to regard the legislative and executive attitude towards manufacturing as following a similar schedule. The change of heart really dates from the early 1870s, as indicated by the 'discriminating' tariff announced by Hart in September 1870 with its greatly lengthened free list of raw and semi-finished materials; the offer of bonuses during that decade for the manufacture of woollens, iron, paper, rope, bottles and refined sugar; and the resolution of the Legislative Assembly on 15 October 1873 that tenders should 'where practicable' be called in South Australia for government stores. A good deal of the credit for this more sympathetic approach must go to the newly formed Chamber of Manufactures whose wide-ranging activities could be seen as aiding farmers, horticulturalists, orchardists and vignerons, as well as processors and manufacturers; its views, being moderate and well informed, received regular, extensive and generally approving publicity.

Yet, in the longer-run, this emphasis on processing and the production of farm equipment led to fundamental weaknesses in the structure of South Australia's secondary industry, and these were becoming evident by the late 1880s and early 1890s. Moreover, simultaneously with the adoption of protection in the last decade of this period came the extension of the government's own direct involvement in manufacturing, especially of railway equipment. No sooner had private firms been 'enticed', as one entrepreneur later claimed, into extending their facilities to make rolling stock than the Railways Department started to handle more jobs of this kind at its Islington Workshops; similarly, and of much greater significance, it also turned its hand to making locomotives. The resulting collapse of James Martin and Company Ltd in 1907, by far the largest and one of the oldest firms in South Australia, must have given food for thought to those who seventeen years earlier

had celebrated the completion of the first locally built railway locomotive by drinking so heartily to 'the future progress of colonial industry'.

14 Manufacturing in the Other Colonies 1851 to 1890

The three remaining colonies—Tasmania, Queensland and Western Australia—are of interest to the industrial geographer during this period even though in 1880 their combined factory workforce totalled only about 14,000 (see Appendix 1), or several hundred fewer than were similarly occupied in the city of Melbourne. Even ten years later, by which time 27,600 hands were employed in the three colonies, they were far short of the 41,700 who earned a livelihood at factory workbenches in the Melbourne and Metropolitan Board of Works area.

Tasmania

This was a period of mixed fortunes for Tasmania, and it is important therefore to sketch in some of the general background before considering the course of industrial development. During the forty years between the censuses of 1 March 1851 and 5 April 1891 the island's population rose by 76,537 to reach 146,667. Prior to the cessation of transportation in 1853 the main sources of population increase had been the convicts themselves and free immigrants, many of whom had been assisted by the government. Of the 81,492 people counted at the census in March 1857, only 37 per cent had been born on the island: the remainder consisted almost equally of people who had come to the colony willingly and those who had been brought under duress. Despite the exodus of young men to the Victorian gold-fields, there was a surplus of about 8,800 arrivals over departures during the 1850s, and this, along with a natural increase of 12,100, resulted in an average annual growth rate of 2.7 per cent.

Yet even before the end of the decade there were signs that the island's economy was beginning to stagnate: it was in fact entering a depression that was to last through the 1860s and into the early 1870s. The statistical evidence is overwhelming. Between the censuses of April 1861 and February 1870, the total population grew by only 9,400, or by about 1.1 per cent per annum: in round figures, the 14,400 increment from natural increase was partly offset by a net outward migration of 5,000 people, many of whom were adult males in their twenties and thirties. One result was that the marriage rate per 1,000 persons, which had been 18.85 during the quinquennium 1856 to 1860, fell in successive periods to 9.40, 7.24 and 6.30 (1871 to 1875).¹ Accordingly this led to a reduction in the demand for residential accommodation which, in turn, caused redundancy in the building and related trades. The fall in the level of activity becomes clear from a comparison of the average number of dwellings built each year:

Table 14.1 External trade, Tasmania, 1857-90^a
(£000)

Year	Exports originating in Tasmania										Entrepôt trade	Retained imports
	Wool	Livestock	Grain	Vegetables and fruit ^b	Timber	Oil ^c	Gold	Other	Processed and manufactured ^d	Total		
1857	394	84	225	109	123	44	1	59	154	1,193	162	1,109
1858	398	46	7	123	104	44	1	43	96	862	290	1,039
1859	468	61	183	91	77	63	2	35	130	1,110	84	1,080
1860	368	44	163	85	71	57	—	69	25	882	80	988
1861	326	49	165	83	53	60	—	38	64	838	67	887
1862	366	59	110	88	65	59	—	45	80	872	48	810
1863	408	76	75	120	65	29	—	50	137	960	40	863
1864	416	24	56	107	71	20	—	46	178	918	58	851
1865	382	38	97	114	51	24	—	40	92	838	43	719
1866	385	25	77	99	40	36	1	50	94	807	27	915
1867	379	24	58	86	49	26	1	57	97	777	13	843
1868	399	18	123	89	43	50	—	58	129	909	12	834
1869	303	17	95	117	37	61	—	61	106	797	30	946 ^e
1870	246	15	63	97	33	33	7	58	74	626	23	770
1871	298	17	98	74	42	46	14	57	85	731	10	768
1872	434	28	91	90	40	48	16	74	68	889	21	786
1873	314	37	135	95	56	48	15	70	101	871	23	1,084
1874	351	46	116	104	67	24	18	48	129	903	22	1,235
1875	434	46	110	125	78	30	14	63	176	1,076	10	1,176

1876	440	36	46	113	59	46	42	113	223	1,118	13	1,120
1877	523	23	85	115	67	34	27	213	317	1,404	13	1,295
1878	479	20	37	99	66	18	59	128	382	1,288	28	1,297
1879	407	39	22	118	57	14	146	61	425	1,289	12	1,256
1880	542	24	34	97	48	23	202	60	451	1,481	31	1,339
1881	498	43	21	118	51	19	211	84	503	1,548	7	1,424
1882	433	48	92	164	48	13	161	118	502	1,579	9	1,662
1883	450	75	28	258	42	20	174	137	514	1,698	33	1,799
1884	454	83	18	155	39	15	132	136	417	1,449	27	1,629
1885	260	76	6	183	42	7	141	126	458	1,299	15	1,743
1886	311	43	32	215	35	10	104	119	443	1,312	19	1,737
1887	415	59	10	194	34	7	141	98	467	1,425	24	1,573
1888	307	64	2	135	68	3	128	119	478	1,304	30	1,581
1889	283	69	37	307	61	5	123	181	377	1,443	17	1,594
1890	419	94	16	257	36	8	87	184	330	1,431	56	1,841

^a Prior to 1857 no distinction was made between exports of colonial origin and re-exports.

^b Mainly potatoes, berry fruits and hops.

^c Includes whale and mutton bird oil.

^d Of the total value of processed and manufactured exports (£8,302,000), £4,741,000 consisted of ingot tin (commencing in 1875) and £1,488,000 of jam (commencing in 1864).

^e Includes railway plant valued at £88,000.

Source: *Tas.SR*.

Intercensal period	Brick and stone	Wood, iron, etc.
1857-61	164	730
1861-70	47	138
1870-81	-16	147

During the 1870s the construction of brick and stone dwellings failed to keep pace with demolitions. Butlin's estimates suggest that the net additions to the housing stock in 1862, 1863, 1867 through 1870, and 1875 were so small that they almost have to be measured in terms of rooms.² A further indication of the slackening in activity is given by the external trade statistics set out in Table 14.1: the average annual value of imports and exports per head, for instance, declined from £44 in the 1856-60 period to £20 during the latter part of the 1860s and £17 during the early 1870s. In a word, as Blainey suggests, the outlook for Tasmania was 'gloomy'³ because it had almost reached the limits of rural expansion. The growth of the area under cultivation on the mainland after the mid-1850s, the erection of protective tariffs by some of the other colonies, and the small, barely expanding home market all retarded agriculture and industry. Farmers turned away from wheat, which was becoming a hazardous crop both because of fluctuating prices on external markets and because it was more prone to rust disease in the newer and generally wetter agricultural areas, and tried to develop markets in New South Wales and Queensland for alternative commodities like potatoes.

At the same time there was a shift in the geographical distribution of the population. In 1857 the census enumerators counted only 40 per cent of the population north of an imaginary line roughly bisecting the island between Cape Sorell in the west and Cape Forestier in the east (Fig. 14.1): by 1861 the proportion there had risen to 46 and by 1870 to about 50 per cent. This occurred for three main reasons: more land was opened up in the north; immigration societies were especially active in Launceston and, in any case, many migrants from the mainland entered the colony through this northern port;⁴ and convicts showed a natural desire to remove themselves as far as possible from their former places of detention.⁵ Hence, while farming in the south was under 'the shadow of arrested growth', agriculture in the north was more prosperous. This was particularly true of a stretch of country, 10 miles wide, running 40 miles from Evandale in the east to Chudleigh in the west. It was this area that attracted the first railway investment in the colony, when in February 1871 The Launceston Western Railway Company opened a 45 mile line linking Launceston with Deloraine via the two wheat handling and processing centres of Longford and Westbury (Fig. 14.2). The 1860s also saw land being opened up along the northern coastal fringe between Devonport and Smithton. Small farmers there ring-barked forest country to clear the ground for wheat, oats and potatoes which were mainly sold on mainland markets; when wheat-growing began to be less profitable, they turned their hands to timber-cutting as an additional source of income.

The depressed conditions in the southern part of the island halted the growth of Hobart which, along with the suburbs of Queenborough and Glenorchy, had a population of about 25,000 in both 1861 and 1870.⁶ The reduction in the external

Fig. 14.1: Tasmania, location map of places and features mentioned in the text.

trade of the colony affected this southern port more than Launceston and its cohort of minor shipping points in the north, but nonetheless it remained the main place of entry for retained imports and in most years dominated the export trade as well (Table 14.2). Hobart's lucrative entrepôt trade dwindled, however, to only a few thousand pounds in value. Launceston added no more than 300 to its population

during the 1860s to bring it up to nearly 10,700 early in 1870. One indication of the more prosperous farming conditions within the hinterland of this port was the trade in breadstuffs: from 1857 through 1870, 54,100 tons of wheat and 48,800 short tons of flour went out over its wharves compared with just 1,200 and 7,710 tons, respectively, over those at Hobart.

Fig. 14.2: Sections of railway opened in Tasmania during the intercensal periods 1870–81 and 1881–91. The Burnie-Waratah line was originally opened as a horse tramway in 1878.

The plight of Tasmania did not, of course, escape the notice of the mainland colonies, and especially of Victoria. On 3 April 1865 the *Argus* painted a 'lamentable picture of the state of a fallen sister':

For fifty years, to suit the selfish purposes of the Home government, Van Diemen's Land was the dung-heap of England, and the pandemonium of Christendom. The curse has been stayed, but the effect remains . . . It glares out most forcibly in the marked distinction between district and district. In the north, where settlement has been of later days, and in a great measure composed of free men, the neat villages, cheerful faces, and comparative prosperity of the people, remind us considerably of England. In the south, and along the main road, where few indeed, if not of the present [but] of the past generation, have been unacquainted with the lash, the hopeless stagnation of life depresses the mind like an evil dream. The men lounge through their work, whenever they assume the semblance of it; the women, slatternly and ruffianly, permeate the police courts with their brawls . . . At

Hobart Town . . . a couple of ships, a brig or two, and a few coasters, represent the trade of a haven which could contain the navies of the world. Rather over a thousand houses stand tenantless: of the once flourishing merchants, scarcely half a dozen remain in a state of solvency.

The picture may have been overdrawn but descriptions like this were hardly calculated to encourage new investment to flow into the colony. The same newspaper on 22 August 1866 regretted that Tasmania was 'an impoverished tributary' instead of 'a vigorous rival', and suggested that this had partly been brought about by the annual expenditure of £100,000 on 'a Governor, two Houses of Parliament, and one thousand Government officials' to manage the affairs of only 95,000 people:

The honour and dignity of a separate Legislature no doubt count for much; but for all practical purposes, would not the inclusion of the same representatives in the larger Parliament of a contiguous colony, and the incorporation of Tasmania with a wealthy and progressive neighbour, conserve the interests of the former, while alleviating its burdens and advancing its prosperity?

A week later a notice of motion (later withdrawn) was given in the Tasmanian House of Assembly which advocated

That the annexation of Tasmania to Victoria, having a liberal representation in the Parliament of that country, would cement the interests of both, open to Tasmania a permanent market for all its products, and relieve her from a major part of the taxation she has now to bear.

Annexation remained an issue well into the 1870s and contributed to the 'political estrangement and misunderstanding that in these years marked the relations between the North and the South'.⁷ In short, the economic and political climate was not conducive to industrial development, a point that will be considered again in a moment.

From 1872 conditions began to improve following the winning of gold, at first in small quantities, at places like Mangana in 1870, Waterhouse in 1871, and Hellyer, Denison and Brandy Creek in 1872, and the discovery of tin at Mt Bischoff (Waratah) late in 1871 (Fig. 14.1). The tangible results were not immediate: the main significance of these mineral discoveries at first was the way they helped restore some confidence in the colony's future. It took time for the Mount Bischoff Tin Mining Company (formed in 1873 to purchase the property from its discoverer) to get into its stride. Not only was it faced with the problem of opening up a mine in an isolated corner of the island, but it also had to develop a track for pack-horses to the coast at Wynyard; start building a 48 mile horse-drawn tramway to a shipping point at Burnie; arrange for ore and reduced tin to be lightered coastwise to Launceston; and organise a smelting works there to prepare the tin for shipment. In the circumstances it was not surprising that only 4 tons of ore were exported in 1873 and 142 tons in 1874, or that no supplies of refined tin were ready to be sent overseas until 1875. Similarly, gold exports only started to increase significantly

Table 14.2 External trade through Hobart and Launceston, 1857-78^a
(£000)

Year	Hobart			Launceston ^b		
	Retained imports	Colonial exports	Entrepôt trade	Retained imports	Colonial exports	Entrepôt trade
1857	680	529	132	429	664	30
1858	723	446	88	316	416	202
1859	589	481	74	492	630	10
1860	576	429	49	413	453	31
1861	561	409	40	327	429	27
1862	514	431	33	295	441	14
1863	529	498	26	334	462	14
1864	526	484	23	325	434	35
1865	400	425	38	320	413	5
1866	451	443	18	464	365	9
1867	485	456	10	358	321	3
1868	431	411	8	402	498	4
1869	429	392	15	516	405	15
1870	388	330	16	381	295	7
1871	443	382	6	325	349	4
1872	466	484	10	320	405	11
1873	599	489	17	486	382	6
1874	698	475	6	537	428	16
1875	665	583	7	511	493	3
1876	606	588	7	513	529	7
1877	660	715	5	636	688	9
1878	695	587	23	602	701	4

^a Because of rounding some figures do not tally with the totals shown in Table 14.1.^b Includes trade through out-ports in the north: Circular Head, Port Frederick, Leith and Wynyard.Source: *Tas.SR*.

in 1878, and the 23,542 fine ounces sent out that year overshadowed the quantities exported during the four previous years put together.

It was some time, too, before adequate job opportunities became available to support the natural increase in population, and it was not until the discovery of the Beaconsfield gold-field in 1877 that miners in any number were attracted from the mainland. During each of the five years to the end of 1875 more folk left the island than came to it, and the resulting net loss of 4,400 people was not wholly offset by the net gain of 2,900 when the flow was reversed from 1876 through 1880. Between the censuses of February 1870 and April 1881, the population of the colony increased by 16,400 to a total of 115,700, of whom 6,400 were living in the new mining areas.⁸

Hobart managed to add a mere 1,800 to its population during this intercensal period and thus contained only 23 per cent of the colony's inhabitants compared with 25 per cent previously—a reversal of fortune rare among Australian capital cities. In contrast, Launceston grew by 2,100 people, or by about a fifth, and had become a relatively prosperous town benefiting from the Beaconsfield gold-field

only 26 miles away by road, from the operation of smelters processing the Mt Bischoff tin, and from the revival in trade through the port (Table 14.2). Moreover, it soon became the railway 'centre' of the colony: workshops here erected imported locomotives and other rolling stock for the line to Deloraine (which, after barely covering working expenses during the first eighteen months of operation, was transferred to the government in August 1872), and for the 122 mile link to Hobart, built by the Tasmanian Main Line Railway Company and opened in November 1876. The depot set up at the southern terminus of this 3'6" gauge, single track line was only equipped to undertake minor running repairs: thus it became the practice for most private and all government locomotives to be landed, built and made ready for operation at Launceston.⁹ It is not hard to imagine the indignation felt from time to time in Hobart when engine components off-loaded there were simply railed away for erection in its northern rival.

Fig. 14.3: Towns in Tasmania with more than 500 inhabitants at the census of 3 April 1881.

Prior to 1881 no official attempt was made to enumerate the population living in the smaller towns, but in April that year it was found that only three—Longford (1,286), Westbury (1,156) and New Norfolk (1,036)—had more than 1,000 inhabitants, and only six others exceeded 500. Most were located in the north (Fig. 14.3) and, with the exception of the mining town of Waratah, all were farming and agricultural processing centres that were being affected by changes in the inter-colonial breadstuffs trade, and especially the appearance of Victoria as a regular net exporter in 1877. The loss of markets in New South Wales and Queensland, and of course in Victoria itself, particularly affected the wheat-growing areas to the south and southwest of Launceston: whereas 1,480 short tons of flour and 195,000 bushels of wheat (98 per cent of the colony's breadstuffs exports) were sent out

through this port in 1875, no flour and a mere 6,500 bushels of wheat passed over the wharves in 1878. Districts like Morven, Campbell Town, Longford and Westbury (identified in Fig. 5.1) were losing population, and the chances are that when the census was taken in 1881 the towns in these areas were already stagnating and possibly even beginning the decline which became more clearly apparent during the following decade.

In the 1881-91 intercensal period the population of the colony increased by nearly 31,000 (or at an annual average rate of 2.4 per cent) to bring the total to 146,667. Economic activity continued at a high level until towards the end of the 1880s, largely as a result of the stimulus provided by mining:

	1871-75	1876-80	1881-85	1886-90
Exports of gold				
Fine ounces (000)	20	122	236	165
£(000)	77	475	896	583
Exports of ingot tin				
Tons (000)	1	16	20	18
£(000)	39	1,358	1,772	1,841

During the ten years to the end of 1889, no less than £586,000 was paid out in dividends by the gold-mining companies and £1,015,000 by those working tin.¹⁰ As Blainey points out, ever since 1871 when seventeen of the twenty mining companies registered in the colony had their offices in, and were directed from, Launceston, this northern city led the way in mining speculation.¹¹ In 1889 twenty-six gold-mining companies (with a total nominal capital of £353,000) had their offices there as against sixteen (£114,000) in Hobart; similarly, fifty-three tin mining ventures (£691,000) were registered in this northern town compared with twenty-two (£182,000) in the south.¹²

It was Launceston, then, that gained the greater boost from mining: whereas the population of Hobart increased by barely 1 per cent a year to reach 30,000 in 1891, its northern rival forged ahead at well over three times this pace to 18,100. This is to some extent, however, an over-simplified comparison because in the vicinity of Hobart were several resort towns as well as orchard and market garden areas that had developed to supply the jam and fruit preserving industry (the significance of which will be considered later). In contrast, Launceston lacked nearby complementary activities of this kind and, moreover, had to contend with some attrition of its trade when inter-colonial steamship services linked other northern ports direct with the mainland. For example, the extension of the Launceston-Deloraine railway 37 miles to West Devonport (then known as Formby) on the Mersey River in 1885 led William Howard Smith & Sons Ltd to lay on a weekly service by the 800 ton S.S. *Balmain* from Formby to Melbourne via Burnie, Wynyard and Stanley. Even so Launceston's hold on the commerce of the northern part of the island was not seriously weakened, as the following figures (£000) for imports indicate:

	1883	1884	1887	1888
Launceston	919	757	742	737
Burnie	48	9	15	23
Devonport	23	30	68	60
Stanley	5	6	9	9
Ulverstone	3	4	8	8

Yet, despite the boom in Launceston and the rekindling of commercial activity in Hobart, the proportion of the island's population in these two places slipped back one percentile point to 33 per cent. Much of the drama of the 1880s lay in the country towns: in 1881, as mentioned already, there were only nine places with more than 500 inhabitants—ten years later there were twenty-six (Fig. 14.4). All but a handful were already in existence as small villages so that together they actually absorbed about 12,550 people during the intercensal period, giving them a combined population in 1891 of 25,030. In effect there were four categories. The first included many of the older agricultural settlements (such as Campbell Town, Evandale, Longford and Westbury) which either lost population or (like New Norfolk, Oatlands, Perth and Richmond) barely made any progress. In contrast, a second group—all located along the north coast west of the River Tamar—expanded vigorously in response to the development of farming (especially grain and potatoes), dairying and sawmilling, and the opportunities provided by improved transport facilities. Three were close together: Devonport grew from 530 to 1,805 inhabitants largely because it was both a rail and shipping terminus; Latrobe from 710 to 1,560 as an agricultural centre (resourceful enough in 1887 to establish the only gas-works outside Hobart and Launceston); and Ulverstone from

Fig. 14.4: Towns in Tasmania with more than 500 inhabitants at the census of 5 April 1891.

100 to 1,130 as a farming, commercial, sawmilling and tourist town, which was given another boost in 1890 when it became the new terminus of the railway to Launceston (Fig. 14.2). Further west, Burnie was transformed from a village of 305 to a town of 980 inhabitants largely because it was the transshipment point for the produce of, and supplies for, the Mt Bischoff tin mining companies,¹³ and the headquarters of the Van Diemen's Land Company. Both Burnie and nearby Wynyard, which had become a well-known sawmilling and timber exporting port, were also functioning as administrative and market centres serving the increasing number of farms being carved out of the bush.

In the northeast a third group of settlements was enhanced by the development of farming and mining, and the improvement of transport facilities. In 1886 a 47 mile railway was opened between Conara Junction on the Hobart-Launceston line to St Marys which enabled the coal deposits in that area to be fully exploited: within four years output had risen from 3,800 to 44,950 tons. Meanwhile in 1889 another line, also 47 miles long, was brought into operation between Launceston and Scottsdale (then known as Ellesmere), the only place in the whole of this part of the island to have more than 500 population in 1891. Most of the tin being produced in the Ringarooma and Bobbyalla areas came from scattered alluvial deposits which did not form a basis for permanent settlements: in 1882, for instance, 2,660 tons of ore were produced by 1,700 men working no fewer than 184 claims.¹⁴

Finally, a number of towns emerged that were based on mining. Between the censuses of 1881 and 1891 Beaconsfield grew from a raw community of 455 to a vigorous town of 1,580 inhabitants (the fifth largest place on the island) serving the richest gold-field in the colony, the main section of which measured barely 600 acres. No fewer than 330,500 fine ounces—56 per cent of the island's recorded output—had been produced in this area, nine-tenths being obtained from quartz. Most was put through the powerful batteries of The Tasmania Gold Mining and Quartz Crushing Company, by far the largest venture in the area: not content with this, it obtained a near monopoly of the field in June 1888 when three of the nearby claims were incorporated in a reconstructed company having a nominal capital of £225,000, about 400 employees, and crushing plants with eighty-five head of stampers.¹⁵ In the northwest, Waratah clearly established itself as the focus of tin mining and processing, and increased its population during the decade by 550 to reach 1,420 early in 1891. Apart from the Mount Bischoff Tin Mining Company, which alone produced about half the Tasmanian output of this metal, at least eight other companies were operating in this area. Between 2,500 and 3,000 tons of ore were crushed and concentrated each year at the Mount Bischoff Company's plant before being railed to Burnie and thence 100 miles coastwise to Launceston for smelting. Unlike most establishments of its kind the entire Waratah works—sixty head of stampers, jiggers, rotating tables, Chilean mills, and so on—was driven by water-power: moreover in 1883 it became the first industrial plant to be lit by hydro-electricity. Further south, following the discovery of many mineral deposits—including tin at Mt Heemskirk in 1876, alluvial gold at Pieman River in 1879, silver-lead at Mt Zeehan in 1882, nuggets of gold at Rocky River in 1883, and

gold-copper at Mt Lyell in 1886—several mining camps were established. But the promising auriferous country took time to develop because of the 'total absence of any pack track or means of transport of supplies through the extremely broken, densely timbered, and boggy country'. Moreover, the shareholders of fifty or more companies lost their money in the futile attempts to open up the stanniferous area between the Heemskirk Range and the coast where it was soon found that very rich patches of ore alternated with equally poor spaces: in addition

a very great expenditure was incurred in road-making, and the erection of buildings and machinery, the transport alone of material entailing an almost ruinous expense, in the excessive charges for freight. The consequent exhaustion of the available funds of these companies in premature work, and their inability, therefore, to explore the lodes at any sufficient depth to test their value has caused the entire collapse of the undertakings.¹⁶

According to Blainey, at least ten companies tried to assure their shareholders that dividends were on the way by setting up batteries of stampers but these merely added to costs and not to profits.¹⁷ The resulting forfeiture of most of these mineral leases, and legislation in 1885 that enabled tin 'diggers' to work alluvial ground on a similar system to that for gold, encouraged co-operative parties of miners to take up 20 acres apiece for alluvial working. The point for present purposes is that the rise by 1891 of places like Zeehan, Dundas and Strahan on the west coast of the island represented potential development for the future rather than the results of past achievements.

Although the 1880s were relatively prosperous years for Tasmania, some of the fundamental structural weaknesses of the economy began to emerge towards the end of the decade. They would, indeed, have become apparent earlier but for the very considerable increase in government expenditure on railways, roads, bridges and other public works, largely financed by loans totalling £2,300,000 raised in London during 1883-5: as a result the public debt increased from £2,050,000 in 1882 to £4,500,000 in 1888. The failure of the attempts to open up the Heemskirk tin deposits and the declining productivity of some of the existing gold-fields made people more conscious of the exaggerated hopes that had been entertained for the mineral industry and the consequent long-run neglect of agricultural and forest resources.

Recognising that the growth in internal demand would be small and unlikely to offer much scope for expansion, and that Tasmanian produce was being shut out of mainland markets by increasingly high customs duties, the Treasurer had discussions with members of the Victorian government during a visit to Melbourne in 1883 about the possibility of a reciprocal interchange of products and manufactured goods.¹⁸ This overture was followed up by a meeting in Hobart in January 1885 at which the representatives of the two colonies agreed to recommend to their respective governments that a three-year agreement be made under which natural products, articles manufactured from colonial materials, and all mixed manufactures of which the foreign portion made up less than 5 per cent of the total value

'should be admitted into the ports of either Colony free of Customs Duties'. But, possibly because an election was due in Victoria, the matter was not pursued there any further.

Meanwhile in Tasmania the proposal received a mixed reaction although there was a large measure of agreement that some arrangement of this kind was necessary. Along the north coast, in particular, there was strong support: residents of Wellington electorate petitioned in August 1885 for more active steps to be taken towards a treaty on the grounds that for many years they had 'suffered through the inimical tariff of Victoria, which has prevented them getting the full benefit of the Melbourne market for oats, timber, bacon, and farm produce generally, and has entirely closed that market against potatoes, which are the principal product of the North-West Coast'. However, little was done until a delegation, led by the chairman of the Hobart Chamber of Commerce, approached the Treasurer on 2 November 1886 to urge that negotiations with the other colonies be pursued, and that there was no need to wait until all the colonies had joined a reciprocity scheme. A month later the Premier wrote to New South Wales and Queensland inviting them, separately, to consider entering a trade agreement with Tasmania. No interest was shown in Sydney, and it was six months before the Queensland government even bothered to write back and ask for more particulars. The essence of Tasmania's problem was shown by its response on 10 August 1887: while it wanted to supply the northern colony with a wide range of agricultural produce, timber and coal, as well as flour, candles, soda, leather, malt liquors, boots and woollen goods, the only firm suggestion it could offer in return was a differential duty of £4 per ton (instead of the usual £6) on Queensland sugar. The correspondence promptly came to an end.¹⁹

The hard truth was that Tasmania no longer had any natural or manufactured 'speciality' to give it bargaining power with the other Australian colonies. The best it could do was to develop the fruit trade with London and in this respect, at least, it achieved some measure of success. Whereas, previously, Tasmanian fruit had had to be sent to Melbourne aboard inter-colonial steamers for transshipment into vessels with refrigerated holds operating at the colder temperatures necessary for cargoes of frozen meat, on 25 March 1889 the Orient Company's R.M.S. *Iberia* called at Hobart on its homeward run to pick up the 7,000 cases that made up the first consignment of fruit shipped direct to London.

Manufacturing in Tasmania

In these circumstances it is hardly surprising that secondary industry in Tasmania made relatively little progress during this period (Fig. 14.5). The employment estimates prepared for this book (detailed in Table A1.10) suggest that the number of hands in formal processing and manufacturing establishments increased from 3,225 in 1860 to 6,020 in 1889. If anything these are optimistic figures: neither the literary nor the, admittedly poor, statistical evidence would seem to support Butlin's view that as many as 7,680 people were working in Tasmanian factories by 1889.²⁰

Table 14.3 Estimates of new capital formation and replacement outlays from the public sector in Tasmania, 1861-90^a
(£000)

Period	New or replacement	Railways	Telegraph	Water and sewerage	Bridges and harbours	Defence construction	Public buildings	Other miscellaneous	Total
1861-65	new replacement	2 —	4 2	— 12	3 —	10 1	63 12	24 —	106 27
1866-70	new replacement	372 —	12 3	1 5	8 —	14 —	20 11	20 —	447 19
1871-75	new replacement	74 24	38 2	— 6	7 —	1 —	11 13	9 —	140 45
1876-80	new replacement	8 37	14 8	— 9	49 —	8 —	21 27	6 —	106 81
1881-85	new replacement	539 54	22 16	56 11	134 1	53 1	143 37	15 —	962 120
1886-90	new replacement	1,448 152	27 24	137 11	250 5	23 2	162 33	8 —	2,055 227
Total		2,710	172	248	457	113	553	82	4,335

^a Excludes local government expenditures except in the case of water and sewerage. The original source should be consulted for an explanation of the derivation of these estimates and related qualifications. Expenditure on roads is excluded from this tabulation.

Source: Butlin, *Australian Domestic Product, passim*.

Table 14.4 Estimates of new capital formation and replacement outlays from the private sector in Tasmania, 1861-90^a (£000)

Period	New or replacement	Residential ^b	Shops and offices	Industrial	Mining	Agricultural and pastoral ^c	Shipping ^d	Total
1861-65	new replacement	244 61	95 3	-211 267	^e —	122 32	— —	250 363
1866-70	new replacement	148 62	95 2	255 265	^e —	-88 25	2 —	412 354
1871-75	new replacement	244 78	91 2	415 355	^e 4	328 39	75 —	1,153 478
1876-80	new replacement	627 81	57 1	18 328	63 13	897 120	70 —	1,732 543
1881-85	new replacement	762 97	88 2	-140 321	54 31	933 167	27 —	1,724 618
1886-90	new replacement	940 110	153 3	659 346	73 39	1,085 181	5 —	2,915 679
Total		3,454	592	2,878	277	3,841	179	11,221

^a The original source should be consulted for an explanation of the derivation of these estimates and related qualifications. Data for churches are not available.

^b Includes hospitals, asylums, hotels, guest houses and other inhabited premises.

^c Includes tools, machinery, and equipment and physical improvements such as dams, tanks, fences and farm buildings but excludes livestock, the clearing of land, and land itself.

^d See Table 14.6 for estimates of the value of ships built 1851-70.

^e No data.

Source: Butlin, *Australian Domestic Product*, *passim*.

Fig. 14.5: Estimated total factory employment in Tasmania, Queensland and Western Australia, 1860-99 (derived from Appendix Tables A1.10, A1.12 and A1.14).

Internal demand remained dull during the period from 1861 through 1875 and there is evidence of a good deal of unemployment, short-time working and destitution, especially in the south of the island. New and replacement outlays on dwellings, shops, offices, churches and public buildings remained small (Tables 14.3 and 14.4). In fact the total expenditure of this kind in Tasmania during the whole of this fifteen-year period was less than that in Victoria in any one year during the 1860s. As suggested earlier, the net additions to the housing stock almost have to be counted in terms of rooms since fewer than 200 dwellings were completed each year on average during the 1860s and barely 300 during the 1870s. Even this gives an exaggerated view of formal building activity because in the tin mining areas in the northwest and northeast, many of the so-called dwellings were crude affairs put together from materials available on the spot.

Nor did investment in agriculture and mining provide much stimulus for Tasmanian manufacturers. Much of the newer farmland, especially along the north coast, was roughly cleared timber country in which the use of machinery was inhibited by rotting, half-buried stumps. Moreover, when equipment like stump extractors and stump-jump ploughs was developed it was cheaper to buy it from

Victorian makers who, from 1875, supplied Tasmanian farmers with between £2,000 and £3,000 worth each year. Melbourne firms established agencies on the island: by 1876 at Launceston, for instance, Ferguson & Barclay was handling Hugh Lennon's implements and Alexander Webster those of J. Henderson and Co. Similarly, much of the heavy mining machinery was imported from the mainland: during the 1870s and 1880s Victorian foundries alone met orders amounting to £75,000, a third of which was sent in 1882-4 when the abortive attempts were being made to develop tin deposits at Heemskirk. Although the indirect impact of mining was significant in the sense that it stirred the colony back into life, the direct impact on local manufacturing appears to have been small. Only one firm, Salisbury's Foundry & Engineering Works at Launceston, made a name for itself in this field. Salisbury, who had been making mining machinery at Castlemaine in Victoria, migrated to Launceston in 1876 and re-established himself as a general founder having mining equipment as a particular speciality. The firm's lucky break came soon afterwards when it was asked by the Mount Bischoff Tin Mining Company to make up some tin-dressing machines to the patented design of its manager, H. W. F. Kayser: when these proved their worth, Salisbury's began supplying 'Kayser's Tin-dressing Appliances' to other mining companies in Tasmania and in Queensland.

Mineral processing (as distinct from the crushing and concentrating of tin and the extraction of gold from quartz) was limited during this period to tin-smelting on a commercial scale and iron-smelting on an experimental basis. By the end of 1890 about 79,000 tons of tin concentrate (approximately 70 per cent tin content) had been produced in Tasmania, all but 6,500 tons of which was smelted into high-grade ingot before being consigned overseas. The Mount Bischoff Company opened a smelter at Launceston in 1874 and operated another at its mine from 1875 to 1879. Two other establishments, the Tasmanian Tin Smelting Works at Launceston and the Hobart Tin Smelting Works, operated intermittently for about ten years. The main significance of these plants was not the number of employees they absorbed—probably at no stage more than 200—but the fact that only 5 per cent (2,700 tons) of the ingot tin was produced in, and shipped from, Hobart. When the Waratah smelter was shut down in 1879, virtually all the colony's metallurgical capacity was concentrated beside the wharves at Launceston.

Three companies, two private and one public, were formed in Melbourne in 1872 to mine and smelt iron ore on the western side of the River Tamar in the vicinity of Beaconsfield. One, the Ilfracombe Iron Company, spent £10,000 and succeeded in producing a small quantity of pig iron the following year. Soon afterwards it ran out of money and disappeared from the scene. Nearby, the Tamar Hematite Iron Company erected a furnace with a capacity of about 5 tons per day, which produced between 500 and 600 tons during the first six months of 1875. It was found that the iron varied considerably in quality and that experimental castings tended to be brittle; to play safe, the company decided to suspend operations and send an experimental shipment of 200 tons to Britain. Later it was claimed that this had realised £6. 7. 6 per ton, considerably more than Scottish pig iron, but the death

of the managing partner early in 1876 and the falling quotations given by British firms for iron delivered to Australian mainland ports were seen as warning omens, and yet another venture was abandoned. The third attempt was on an altogether different scale and was ultimately defeated not so much by lack of funds but because it ran into technical problems that even the experts in England were unable to solve.²¹ In 1872 James Scott (Member of the Legislative Assembly for George Town) and T. C. Just (a Launceston businessman) persuaded several leading Melbourne investors to join them in floating The Tasmanian Charcoal Iron Company Ltd, which was registered in Victoria on 18 September that year with a nominal capital of £80,000. Within a few weeks the foundation stone of the first furnace had been laid but further development was delayed while the company tried to persuade the government to grant it the freehold of the 400 acre site on the grounds that this would make it easier to raise additional capital in England. After spending £10,000 to £12,000 on preliminary works and opening up the mine, the venture was reconstructed on 23 May 1874 as The British and Tasmanian Charcoal Iron Company Ltd with a nominal capital of £250,000 in 50/- shares. Plant was ordered from Scotland and eventually erected at Port Lempriere about 5 miles from the open-cut mine. By the time the works was formally opened on 17 June 1876 by the Governor of Tasmania, the company had invested £52,000 in the furnace (which had a capacity of 50 tons per day), a 4' 8½" gauge railway to the mine, another 2 mile line to a deep-water jetty for colliers, and a battery of forty coke ovens. The whole undertaking was on a much more ambitious scale than any previous attempt to smelt iron in Australia: not content with producing pig, the company also planned to manufacture fencing wire and gas and water-pipes. Towards the end of 1876 the plant was brought into full operation, turning out 250 to 300 tons of iron per week some of which was sold in Melbourne and some sent to London for testing. But, despite numerous experiments and countless appeals for assistance and advice, the company could not overcome the problems caused by the relatively high chromite content in the ores: the tappings lacked uniformity of quality and the iron could not be made sufficiently grey and soft. After producing about 5,000 tons, the directors decided 'reluctantly and with bitter disappointment' that they had 'to declare themselves beaten', and the plant was dismantled and sold.

Outlays in the public sector²² increased substantially during the 1880s as is clear from Table 14.3, but it is unlikely that this provided more than a small direct stimulus to secondary industry since a good deal of it was paid to navvies laying the permanent way for railways, building roads and improving harbour accommodation. The private railway companies appear to have bought much of their equipment, including rolling stock, from overseas firms: the government placed some orders locally for wagons to be used on its new lines but these did not amount to more than a few thousand pounds.²³ All forty-two locomotives in service throughout the island in 1890 had been imported and their erection and subsequent maintenance in the workshops at Launceston provided work for only a handful of men.

Circumstances on external markets did not favour two of Tasmania's traditional

Plate 19: The works of the British and Tasmanian Charcoal Iron Company Ltd on the western arm of the Tamar River about 35 miles from Launceston was in 1876 the most ambitious attempt to smelt iron in Australia. The blast furnace, 70 feet high and 24 feet in circumference (left), was able to produce 50 tons daily. The project failed because of problems caused by the high chromite content of the ore. (*Illustrated Australian News*, 29 December 1875.)

Table 14.5 Wheat and flour produced and traded, Tasmania, 1861-90
(000)

	1861-65	1866-70	1871-75	1876-80	1881-85	1886-90
Wheat (bushels)						
Grown in Tasmania minus seed grain	4,910	4,683	4,252	3,753	3,452	3,174
Net exports (-) or imports (+) of wheat	-515	-645	-1,033	-129	+156	+1,122
Total wheat apparently available for milling in colony	4,395	4,038	3,219	3,624	3,608	4,296
Flour (short tons)						
Net exports of flour	19	14	6	1	—	—
Apparent quantity milled in Tasmania ^a	99	91	72	82	81	97
Millers' returns of flour made	n.a.	n.a.	n.a.	n.a.	n.a.	81 ^b

^a Assuming an output of 45 lb of flour per bushel.^b Six of the fifty flour-mills did not supply returns of output.Source: Calculated from *Tas.SR*. See also Tables 9.6 and 12.3 for similar data for Victoria and New South Wales.

industries, flour-milling and shipbuilding, to which some attention was paid in Chapter 5 and which can now briefly be considered in turn.

Flour-milling. The summary of breadstuffs production and trade set out in Table 14.5 indicates what occurred. Wheat output fell throughout the three decades as a result, in the main, of the dwindling acreage sown to this grain. The external demand for wheat collapsed after 1875 just at the time when Tasmanian millers were fighting a losing battle to retain what little remained of their external markets. The domestic market stabilised at about 15,000 to 16,000 short tons a year during the 1860s but fell away temporarily during the first half of the following decade, probably as a result of the high level of net emigration, to 13,000 short tons. Then, during the second half of the 1880s, the internal demand for breadstuffs rose to about 19,500 short tons a year because of the increase in population and the dispersal of miners into parts of the island unsuitable even for subsistence-type cropping. It is also probable that farmers along the north coast, who were taking up dairying as a substitute for wheat and potato growing, were themselves beginning to buy flour from the trade instead of gristing their own domestic supplies.

It is difficult to trace in any detail how the industry adjusted itself structurally and spatially to these changing circumstances because the annual return of 'trades and manufactories' included establishments whether or not they were in operation and sometimes long after they had been permanently closed. Thus the formal record reveals the rapidity with which mills were erected in newer farming areas (for instance, the Port Sorell Police District had two steam-mills and seven water-mills in 1868 compared with only one water-mill ten years previously), but does not fully reflect the rate at which some long-established wheat-growing districts declined. Whereas the number of steam-mills hardly changed over this period, one water-driven mill disappeared from the scene almost every year:

Flour-mills	1861	1871	1881	1891
Steam-driven	20	22	21	20
Water-driven	50	40	33	24

Even so, the significance of water-power in this and some other industries (such as woollen-milling) in Tasmania should not be lightly dismissed: the more detailed returns published for the first time in 1886 show that water-mills averaged 24 horse-power apiece, or nearly double that of those powered by steam. Two points flow from this. Perhaps because of the adherence to, and possibly greater affinity for, traditional methods, Tasmanian millers were slower to introduce roller-milling equipment than their mainland competitors. It has not been possible to establish beyond doubt when the first roller installation came into operation on the island, although advertisements for the 'new white flour' were in evidence in 1888 (by which time Thomas Affleck, for instance, had converted both his main mill at Launceston and a smaller one at Longford). But even by 1890 the average value of 'buildings and equipment' was only £1,400, suggesting that the number of complete roller plants (the smallest of which cost £2,000 to £3,000) was not very great. In the second place, flour-milling in Tasmania provided little work for

Table 14.6 Shipbuilding in Tasmania, 1851-70^a

Period	Southern districts ^b			Northern districts ^c		
	Number of vessels	Registered tonnage	Estimated value (£)	Number of vessels	Registered tonnage	Estimated value (£)
1851-55	52	2,934	60,050	24	992	14,880
1856-60	22	1,052	20,300	4	78	1,885
1861-65	37	1,909	35,860	23	801	12,015
1866-70	31	1,231	22,160	23	801	12,965
Total	142	7,126	138,370	74	2,672	41,745

^a The estimated values shown must be regarded as orders of magnitude only. They are based on data given in *Tas.SR* from 1874 to 1884 about the value of Tasmanian vessels sold out of the colony (£18 and £15 per ton for sailing-ships out of Hobart and Launceston, respectively, and £65 per ton for steamships). All but six of the vessels (238 tons) were sailing-ships.

^b The 'southern district' includes the whole coastline south of latitude 42°S (the area of jurisdiction of the Hobart Marine Board).

^c The 'northern district' includes the coastline north of latitude 42°S (controlled by the Launceston Marine Board).

Source: Numbers of vessels and tonnages compiled from 'Ships Built in the Ports of Tasmania', *THAJ*, 1872, no. 58.

engineering firms: throughout the whole colony in 1886 there were no more than twenty-seven steam engines in establishments of this kind.

Shipbuilding. During the 1840s Tasmanian shipbuilders launched a greater tonnage than those in all the other Australian colonies put together (see Table 5.5), and had demonstrated their ability to construct vessels of up to nearly 600 tons register. The rise of this industry depended in part, as was suggested in Chapter 5, on the entrepreneurial and technical abilities of a handful of men who took advantage of the abundance of suitable timbers (especially *Eucalyptus globulus*, or blue gum) and cheap labour to turn out vessels for only £8 per ton. No sooner had the industry established itself, however, than the mainland gold-rushes brought about its collapse. Whereas in 1850 forty-two vessels totalling 4,050 tons were built, there were only six launchings aggregating 280 tons in 1855 and four amounting to 180 tons in 1856. Some of the explanation lies in the shortage and higher cost of skilled tradesmen, but it was mainly due to the very large numbers of overseas vessels that began trading on the Australian coast. In Victoria and New South Wales during the four years 1851-4 no fewer than 1,300 vessels aggregating 156,000 tons were registered, although not all remained long in Australian waters and many were lost each year as a result of mishaps of one sort or another. Simultaneously, the larger mainland shipping companies were turning to steam-driven vessels, a type of construction in which Tasmanian yards had little expertise. To make matters worse, the whaling industry based on Hobart was beginning its long decline.

The summary given in Table 14.6 shows that during the 1850s and 1860s a total of only 9,800 tons was launched, or barely as much as in 1849 and 1850. Most of the 216 vessels were small and designed simply for use in Australian coastal waters, but a few ketches with especially shallow draughts were built for the intra-colonial grain trade in South Australia. The essays of the late 1840s into the construction of large vessels were not repeated, none being registered at more than 350 tons. For coastal work steamboats were more reliable and manoeuvrable, and the owners of Tasmanian-built ships ran into insurance problems when they tried to enter international commerce. Before the British Board of Trade would classify the Hobart-built *Harriet M'Gregor* (332 tons launched in 1871) on her first arrival in London, it insisted that the copper be stripped off the hull to facilitate a thorough examination: then, to add insult to injury, she was only classed for eight years instead of the usual twenty-one years for a ship of this kind. From 1874 through 1884 the Government Statistician published annual figures relating to Tasmanian-built vessels sold out of the colony which show that during these eleven years only fifty vessels, measuring 3,330 tons and valued at £56,900, were exported, the majority prior to 1877.

Shipbuilding thus failed to live up to the high promise of the 1840s and did not become a force leading to further industrial development. Moreover, any slight stimulus it might have given during this period was dissipated because of the way the industry was organised. The formal yards in Hobart and Launceston built only about half the tonnage and one-third of the ships launched from 1851 through 1870: the rest were put together usually under ad hoc conditions at more than a score of

spots among the capes and coves in the southeastern corner of the island (Fig. 14.1), as often as not in association with sawmilling operations.

Neither the local shipbuilding industry nor Tasmania's dependence on the sea links with the mainland led to any significant development of marine engineering, one reason being that only a handful of steamships were built in the colony during the second half of the nineteenth century. Another was that until 1884 the inter-colonial steamers on the Hobart and Launceston registers had to go to Sydney or Melbourne for their annual survey and refit. However, late that year the Tasmanian legislature passed The Inspection of Machinery Act which made locally issued overhaul certificates acceptable in the other colonies: as a direct result, it was claimed, the Derwent Iron Works and Engineering Company extended its premises to attract maintenance work of this kind to Hobart.²⁴

The role of government

As in the other colonies, the course of industrial development in Tasmania was considerably affected by government action and, in some cases, inaction. Over much of this period public expenditure was in excess of revenue and, not surprisingly for an island less than one-third the size of Victoria and heavily dependent on imported supplies, customs duties played a significant role in the colony's finances. Until 17 January 1862 most commodities, except spirits, wine, beer, tobacco, tea, coffee and sugar—the usual staple items—came in free of duty, but on that day (by 25 Vic. no. 15) specific duties were imposed on various grocery and other household goods, and a general 10 per cent ad valorem charge made on all other imports apart from a free list consisting mainly of raw or producers' materials. Significantly, in the light of the previous discussion, most shipbuilding materials were exempted from duty, including anchors, chains, cables, copper and yellow metal sheathing; felt for sheathing; sail, canvas, rope and twine; pitch and tar; ships' blocks, binnacle and signal lamps, shackles, sheaves, dead-eyes and dead lights; and whaling gear of all kinds. When, eighteen months later, package duties replaced ad valorem imposts (by 27 Vic. no. 1) the free list was not greatly changed except that 'empty tin cases for jam' were specifically included. The rest of the decade saw several other alterations, some of which were clearly intended to encourage local industry: indeed, as 29 Vic. no. 16 (29 September 1865) stated,

Whereas it is expedient, in order to encourage the progress of manufactures in Iron, to exempt from duty certain articles of Machinery whether imported in the whole or in parts into this Colony . . . No duties of Customs shall be raised, levied, collected or paid upon the importation into this Colony of any Machine or portion of any Machine to be worked by steam, wind, or water: Provided that the Importer of any such articles shall satisfy the Collector of Customs . . . that such articles are *bonâ fide* Machines or portions of Machines which cannot be ordinarily worked otherwise than by steam, wind, or water.

Early in 1867 muriatic and sulphuric acid were exempted from duty on the grounds that this would assist the manufacture of farm manures.

It is doubtful whether much genuine element of protection had yet been introduced into the customs schedules; most of the package duties, for example, were equivalent to less than 10 per cent in ad valorem terms. But, at the same time, the kind of items placed on, and added to, the free list during the 1860s suggests that some discrimination was being shown towards existing, and perhaps even potential, local industries. In the southern part of the island, where the depression was most evident by the middle of this decade, support was growing for a more ostensibly protectionist customs schedule. Early in 1867 no fewer than 914 citizens of Hobart (which, if all were genuine, meant 6 per cent of the town's population) signed a petition explaining that considerable distress existed among the 'Laboring and Artisan Classes, who notwithstanding a great diminution in their number during the last 12 years, are not employed on average above 6 months in the year'. The root cause they thought was the 'large importations of Manufactured Goods', adding—with what could be seen as unconscious humour or deliberate irony—'in many cases the produce of Prison labour'.²⁵ Their plea was for a revision of the existing customs duties and for serious consideration to be given to the desirability of promoting 'fresh industries'. The latter suggestion was placed in the hands of a Select Committee (whose findings will be considered in a moment) but the former was all but ignored. It is true that on 20 August 1868 the package duties on brushware, hardware, software, wallpaper, toys, and similar items were doubled, but these were clearly not categories in which import replacement was likely to progress very far in the immediate future. Nor did the changes made by 34 Vic. no. 1 in 1870 (when, among other things, specific duties were imposed for the first time on flour; rope, cordage and twine; galvanised iron sheet and piping; and agricultural and horticultural implements) or by 37 Vic. no. 1 in 1873 (when a 10 per cent ad valorem duty was again introduced on all items not subject to specific or package charges or on the free list) represent genuine moves towards protection. They were, if anything, somewhat desperate measures by hard-pressed Treasurers who, like their colleagues on the mainland, paid lip service to supporting local industry thereby hoping to make additional taxation seem more purposeful and hence more palatable.

This comment applies also to the revised schedules effective on 14 January 1880. Close examination shows that the changes were more apparent than real: the additional duty imposed on beer, for instance, simply maintained the differential enjoyed by local brewers who, on 1 March, were due to pay an excise duty of 3d per gallon. It is true that a new 20 per cent ad valorem category was created, but the only items included were architraves, doors, mouldings, sashes and skirtings made of wood: the great majority of commodities paid imposts of no more than 10 per cent and, in many cases, a good deal less. The following year a Select Committee recommended that 'all raw materials used in local industries giving employment to labour should be admitted free of duty',²⁶ and this suggestion was implemented by 47 Vic. no. 12 (29 October 1883) when items like engine fittings, grindery, boot elastic and hatters' materials were added to the free list. Towards the end of 1884 yet another amending Act (48 Vic. no. 12) made railway rolling stock

(but not springs, wheels and axles) subject to duty, a device clearly intended to encourage the private companies to place wagon and carriage contracts with local firms. The last major alteration to the schedules relevant here occurred when 52 Vic. no. 18 was passed in October 1888: in brief, the general 10 per cent *ad valorem* impost was raised to 12½ per cent; the specific duty on a few manufactured items was increased; and some more producers' materials were exempted. By now, however, the Tasmanian tariff was running into the same sorts of inconsistencies which, sooner or later, faced each of the colonies, and in August 1889 a Select Committee was set up to inquire into the customs schedule 'with the object of placing it upon a more equitable basis'. It sought no evidence from manufacturers, and simply recommended that the government should choose between a 12½ and a 20 per cent *ad valorem* duty: the former, it thought, 'will effect a reversal of the policy which has recently been adopted or continued, whereby many articles of local production have been protected by duties equal to *ad valorem* rates of 20 to 35 per cent', while the second alternative might help towards intercolonial free trade.²⁷

By and large, then, the customs schedules offered manufacturing only a limited amount of protection, although the readiness with which producers' materials and major items of equipment were added to the free list suggests that politicians had some understanding of, and sympathy for, manufacturers' problems. This is indicated, too, by the way drawback legislation was used to encourage the export of some manufactured goods. The system was introduced in September 1863 specifically to allow jam makers to claim a refund of the import duty (£6 per ton) paid on sugar: the rate allowed, £2. 8. 0 per ton of jam, assumed that two-fifths by weight consisted of sugar.²⁸ By the end of the decade a score of jam factories had come into being, mostly in Hobart and along the Huon River, usually as part of general fruit and produce marketing businesses. Exports of this product were by then worth about £15,000 a year, and increased to £77,000 annually during the 1870s and £57,000 during the 1880s. When the first detailed figures for the industry were collected in 1884 the eight factories involved employed nearly 300 hands. By this time actual manufacturing was almost entirely confined to Hobart, although several firms operated subsidiary fruit pulping and boiling depots in the main growing areas along the Huon River and in the New Norfolk district. One of the largest was Geo. Peacock & Sons which made a name for itself by winning prizes for its jam, pickles, sauces and canned fruit at mainland exhibitions in the latter part of the 1880s. This business was taken over in 1891 by H. Jones, E. A. Peacock, and A. W. Palfreyman and continued trading as H. Jones and Co. which subsequently developed into one of the leading fruit and vegetable processors in Australia.

The special position of the jam industry was apparent also from another piece of legislation. On 1 December 1884, under The Women and Children Employment Act (48 Vic. no. 20), it became illegal for anyone below the age of twelve to be given work in a factory, which was defined as 'any manufactory, workshop, workroom, or other establishment . . . where any woman, young person, or child shall be

employed'. Nor could a factory proprietor employ women for more than ten hours or children (meaning someone over the age of twelve but under fourteen) for more than eight hours a day: however, 'nothing in this Act shall be deemed or taken to prevent' the employment of children in jam factories for up to nine hours a day from December through March. Young Tasmanians had perhaps learned or been taught that, in season, it paid to be seen but not heard.

As mentioned earlier, the agitation in Hobart during the 1860s for the more positive promotion of local industries as a way of reducing unemployment led to the establishment on 14 August 1868 of a Select Committee 'to enquire into the desirability or otherwise of encouraging Colonial Manufactures'. Its members became 'imbued with the conviction that many latent resources may be developed which would tend to encourage a spirit of enterprise' but all it did (without taking very much evidence) was to suggest that a separate inquiry should be made into the desirability of again permitting the distillation of spirits (prohibited, it will be recalled from Chapter 5, at the beginning of 1839), and to recommend that bonuses should be offered for the production of beet sugar, cloth and iron smelted with charcoal. Legislation passed on 22 October the following year in fact offered an award of £2,000 for the first 200 tons of sugar made from Tasmanian produce; and £100 for the first 300 tons of salt, £1,000 for the first 40,000 yards of sacking, and £1,000 for the first £1,000 worth of 'woollen stuff' made in a year.

Only the latter bonus had any practical result. Even before the Act received formal consent, the Tasmanian Wool Manufacturing Company Ltd had been floated in Hobart with a nominal capital of £10,000. Not long afterwards a Launceston man, P. Bulman, visited Scotland, entered into a partnership there, returned with machinery, and brought the Waverley Woollen Mills—famous for many years because of its use of water-power—into operation on 13 May 1874. Later that year the firm, trading as Bulman, Johnstone and Co., was awarded the bonus. The Hobart mill came into production not long afterwards but was destroyed by fire in May 1877, thus leaving the Waverley Mills as the only establishment of its kind in the colony until 1886 when James Aiken and Sons set up the Tasmanian Woollen Factory in Hobart. Between them that year they turned out no more than £12,000 worth of woollen goods and employed only eighty hands.

Yet, while it was trying to protect some industries and to promote others, the government stood idly by and watched the sawmillers ruthlessly destroying one of the colony's most important natural assets and placing their own prosperity at risk. Prior to 1896 the only regulations that had been in force for the control of the timber industry in Tasmania were the annual licences required by wood-cutters and splitters. There was no provision by which a sawmiller could obtain the exclusive right to work a particular block of Crown land other than by purchase. As a result it became the practice for millers to apply to purchase under the long-deferred payment system, deposit the cost of the survey, pay one or two instalments at long intervals, denude the land of useful timber and then throw the devastated block back on the Crown.²⁹

No information is available about the quantity or value of timber processed in

Tasmanian mills until 1884, although a rough guide to the level of activity in previous years is given by the export trade (Table 14.1), much of which consisted of stringy bark (*Eucalyptus obliqua*) sawn into beams, planks, palings, laths and shingles, sent to Victoria, South Australia and New Zealand. During the early 1870s about half the total output was sold on external markets where by the middle of the decade, however, it was getting such a poor reputation that advice was sought from a Select Committee. This considered that

to maintain the credit of our Timber cut from the *Eucalypti*, it should, when exported, be classified and marked as is done with Deals in Europe. And, that a most objectionable practice prevails in supplying Shingles for the Export Trade . . . of packing them in bundles containing 80 to 90, instead of 100. . . .³⁰

The main areas cut over by the sawmillers were the western side of D'Entrecasteaux Channel (between Huon Point and South East Cape) and along the north coast especially in the Port Sorell and Wynyard districts. Only for 1884 are data available by districts:³¹

District	Mills	Employees	Capital invested (£)	Value of timber sawn (£)
Burnie-Wynyard	5	75	14,900	10,960
Port Sorell	14	95	12,250	15,430
D'Entrecasteaux Channel	11	277	31,600	28,690
Hobart	3	66	14,500	29,500
Launceston	3	60	12,000	16,000
Other areas	15	135	20,200	15,300
Total	51	708	105,450	115,880

Sawmillers here had two great assets. In the first place they had no need to work forest more than 12 to 14 miles from the seaboard,³² and were able to avoid costly investment in tramways. A second advantage was that good trees on the western bank of the Huon River would each yield 8,000 super feet of sawn timber worth, at 50/- per 1,000 super feet, about £20. It was reckoned that £340 worth of timber could be extracted from an acre of virgin forest so that the usual 50 acre block might return as much as £17,000. While some blocks contained a good deal of scrub and poor timber, others had trees which yielded as much as 27,000 super feet of timber: millers at Southport, for instance, had been known to cut no fewer than 750 first class sleepers from one blue gum and 150,000 shingles from one swamp gum.

Over the years these advantages had enabled Tasmanian sawmillers to tender competitively for mainland contracts but at the same time this dependence on external markets made the industry particularly susceptible to changes in circumstances outside its control. The 1880s, for instance, saw not only the raising of customs duties in traditional markets like Victoria and South Australia, but also the slackening of business in the middle years of the decade. A report by Perrin, the Conservator of Forests, dated 2 June 1887 described how the island's saw-milling industry had suffered in 1886 as South Australia 'passed through a terrible time of depression' causing capitalists and speculators there

to altogether lock up their money chests, and building operations as a necessary sequence almost entirely ceased throughout the Colony; and this added to the immense exodus of the population during the depression, whereby hundreds of houses suddenly became tenantless, not only in the city but in all the towns of the Colony as well, and property of all description depreciated in value to such an extent that rents were lowered with lightning rapidity to nearly half their former rates; contractors and builders collapsed, and the large timber merchants, with their ever-accumulating stocks, now found their occupation, if not quite gone, brought to an abrupt standstill, and probably ruin and bankruptcy staring them in the face. . . .

But while the D'Entrecasteaux Channel sawmillers could reasonably claim that the South Australian depression was no fault of theirs, they were at least partly to blame for the longer-run erosion of their external markets: they continued to make the fatal mistake of exporting inferior timber and, in consequence, their customers turned instead to their local sawmillers and to supplies of jarrah from Western Australia. The government chose to ignore both the warnings and the warning signs, so that ten years later Perrin felt compelled to observe:

The condition of Tasmanian forests is infinitely worse today than it was at date of my Report in 1886-7. Another decade of waste, of private monopoly, of fierce bush fires, of neglect by the Government to check the damage to public property, must ultimately result in disaster to the industries and thousands of people dependent upon the timber resources of the Colony.³³

Perrin's prediction proved to be wrong, but only because changes in paper-making technology during the twentieth century altered the use that could be made of the island's forest resources.

Tasmania's industrial development during this forty-year period provides both comparisons and contrasts with events in the other colonies. It was the only colony by mid-century that could boast of having two long-established—in the Australian time-scale, almost traditional—secondary industries, and it was among the first to learn that undue dependence on external markets did not provide a firm basis for long-term development. The small and, for much of this period, stagnant home market made it difficult to find dynamic alternatives. Although mineral discoveries gave the economy a new lease of life, in which manufacturing shared, they did not directly stimulate secondary industry to anything like the extent expected; the main benefits flowed instead to the mining machinery makers of Victoria and the tin-plate works in Britain. But Tasmania enjoyed a peculiar distinction among the Australian colonies: no other capital city had to face the real threat of an industrial rival in the same way that Launceston challenged Hobart. It is impossible to calculate with any degree of accuracy the actual numbers of factory workers employed in either of these places, and in any case a precise statistical result may be less important than the fact that Launceston was popularly regarded as the industrial centre of

Tasmania, a view further reinforced in July 1887 when the island's first Chamber of Manufactures was formed in this town.

Queensland

The story in Queensland was quite different from that in Tasmania. As can be seen from Table 14.7, the population grew in three decades by 364,000—four times more quickly than any of the other Australian colonies. This was largely because of the high rate of immigration:

Quinquennium	Natural increase	Net immigration
1861-65	6,040	52,855
1866-70	13,310	15,041
1871-75	16,410	37,423
1876-80	20,224	21,684
1881-85	23,248	82,393
1886-90	42,110	33,325
Total 1861-90	121,342	242,721

Little need be said about the period prior to the formal separation of Queensland from New South Wales on 10 December 1859. By mid-century, apart from Brisbane (2,543) and Ipswich (932), only four other villages (all with fewer than 300 inhabitants) had come into existence at Drayton, Gayndah, Maryborough and Warwick; the other 4,250 settlers were mainly squatters on the Darling Downs or along the Mary and Burnett Rivers (Fig. 14.6). This picture changed little during the remainder of the decade. Concern that Brisbane, in the event of separation, might be given a reasonable amount of territory to the south and that therefore the border could be fixed at latitude 30°S, led to an attempt in 1853-4 to lay out a new capital at Gladstone, 270 miles to the north, but even two years after the land sales held in February 1854, barely 200 people had taken up residence there. Some of the first decisions reached by the new independent government, such as the allocation of £10,000 each for the erection of a Government House and a Parliament House, £10,000 for the construction of an electric telegraph to the border near Warwick, and £10,000 for the purchase of a steam dredge to operate in the Brisbane River, all helped to confirm Brisbane as the administrative centre of the colony. The eccentric position of the capital in the extreme southeastern corner of the colony (which extends 1,300 miles from north to south and 900 miles east to west) had, and continues to exert, a not unimportant influence on the development and location of secondary industry.

It soon became manifestly clear that the new colony could not undertake public works on the necessary scale simply by using cash revenue receipts (£175,000 in 1860 and £223,000 in 1861) and thus loans totalling £831,000 were raised locally and in Britain during 1862 and 1863. One particular problem was the absence of 'safe commodious harbours for sea-going ships of large tonnage', although it was noted in 1860 that, if New South Wales had had a more liberal policy of improving harbours, separation might have been delayed and that in one sense, therefore, this

Table 14.7 Population in Queensland, censuses 1861-91

Area	1861	1864	1868	1871	1876	1881	1886	1891
Brisbane ^a	5,900	11,920	15,240	18,180	28,369	37,127	68,240	88,083
Towns with 500 or more population	6,989	15,980	21,725	28,800	42,380	55,923	85,324	110,302
Towns with 200-499 population ^b	2,459	3,054	3,341	4,491	7,341	10,326	16,963	24,641
Gold-fields	14,711	30,513	59,595	{	12,366	20,288	25,727	49,702
Other areas					56,267	74,905	126,599	120,990
Total	30,059	61,467	99,901	120,104	173,283	213,525	322,853	393,718

^a Brisbane Metropolitan area as defined in study (mimeographed, 1969) prepared in the Queensland office of the Commonwealth Bureau of Census and Statistics. This attempts in very great detail to apply the boundary concepts (adopted on an Australian-wide basis in 1966 by the Bureau) to the previous population censuses.

^b Many of these small towns were on the gold-fields.

Sources: Queensland censuses 1861-91, and Bureau of Census and Statistics, *Development within the Brisbane Statistical Division 1856-1966* (S.R. 83/69), Brisbane, 1969.

Fig. 14.6: Queensland, location map of places and features mentioned in the text.

parsimony need not be regretted. The construction and location of the dredges required to clear the colony's river ports became a constant source of intra-colonial friction. Even at this early stage, Brisbane (with £937,000 worth of imports and exports during 1860), Maryborough (£179,000), Rockhampton (£129,000) and Gladstone (£21,000) had established themselves as the leading ports of entry and clearance. Although others, notably Bowen and Mackay, emerged later in the decade, these four remained dominant (Table 14.8). Poor harbour facilities were not the sole reason why only a relatively small proportion of Queensland's produce was shipped overseas direct. Political separation did not, of course, bring an end to existing commercial arrangements and, in particular, to the mortgages held by Sydney merchants on a large portion of the flocks and herds in the colony. It was estimated in 1860 that most of the exports and nine-tenths of the imports passing through Queensland's ports were transhipped in the southern capital.

Table 14.8 Tonnage of shipping entering Queensland ports, 1859–73
(000)

Port	Inter-colonial		Foreign	
	Steamers	Sailing	Steamers	Sailing
Brisbane	611	181	6	261
Maryborough	85	19	—	19
Rockhampton	230	54	—	31
Gladstone	80	28	1	5
Bowen	70	14	3	5
Townsville	62	16	—	3
Others	6	14	2	3
Total	1,144	326	12	327

Source: 'Shipping at each port of the colony', *QV&P(LA)*, 1874, vol. 2, p. 983.

Land regulations were a very important influence not only on the spread and nature of settlement but also on the immigration program. The acquisition of tracts of new country for pastoral occupation was made simple and easy for people willing to push beyond the areas already settled while, at the same time, existing owners who failed to stock their runs were liable to have them forfeited. Early in 1860 settlement had scarcely advanced beyond the Darling Downs in the west and Rockhampton in the north: four years later pastoral stations had been established 400 miles further west beyond the Paroo River and 800 miles northwest of Rockhampton on the banks of the Flinders, Albert and Nicholson Rivers. Along the coastal areas there was a similar acceleration in activity. People who travelled from Europe to Queensland at no expense to the government (or through sponsors who defrayed the cost of an immigrant's passage) were entitled on arrival, under The Alienation of Crown Lands Act, 1860, to a 'land order' worth £18 for the purchase of Crown land; after two years in the colony they could claim an additional order worth £12. These orders, being transferable, were bought by

squatters from newcomers who tended to stay longer, or even permanently, in the coastal areas spending their newly acquired wealth. The same Act also provided the incentive for people to take up cotton growing by offering an export subsidy of a £10 land grant for each 300 lb bale of 'good cleaned Sea Island cotton' exported to Great Britain for the first three years and £5 per bale for a further two years after that. The timing was opportune because America was about to be torn apart by the Civil War (1861-5) and the price of cotton began to rise sharply. Plantations were established along the rivers south and southwest of Brisbane, and near Ipswich and Maryborough. The first exports, equivalent to 48 bales, were sent out in 1862 and this trade rose to a peak of 8,700 bales in 1871 before gradually declining until by 1886 the industry was all but extinct. At its height there were between thirty and forty cotton gins at work, which all told produced 44,500 bales for export, but these were generally small affairs that made no lasting impression on the course of industrial development.³⁴

Much more important in this respect were the 'sugar and coffee regulations' that became valid on 1 October 1864. These enabled a person or company to obtain a single block of land, not less than 320 and not more than 1,280 acres in extent, for a three-year non-renewable lease at an annual rental of 1/- per acre. Provided that the lessee spent at least 20/- per acre on the bona fide production of sugar and coffee, and that at least 5 per cent of the land was planted to either of these crops, he had the right to acquire the fee simple of his holding at an upset price of 20/- per acre. A further significant point was that only land within 10 miles of the seaboard or of any navigable river was brought within the scope of these arrangements. The effect was immediate. Omitting applications refused or still pending, 5,050 acres were granted under these regulations by the end of 1864 and a further 25,000 acres during the next twelve months.³⁵ Prior to this sugar had been grown in Queensland only on an experimental, domestic scale³⁶ so that enthusiasm had yet to be daunted by experience. By the end of 1867 there were nearly 2,000 acres of cane under cultivation and between them the six mills in existence extracted 168 tons of raw sugar. At this stage most of the mills were located on the plantations themselves and, powered by cattle or horses, turned out on average no more than 50 tons of raw sugar a year. During the 1870s the industry established itself on a firmer footing (despite setbacks in the middle of that decade due to bad seasons), and, as can be seen from Tables 14.9 and 14.10, raw and refined sugar by the middle of the 1880s made up nearly 10 per cent of the colony's exports. The introduction of refining in 1873 and the central mill system in the 1880s will be discussed later in the chapter.

The loan money raised in 1862 and 1863 was used partly to pay for the immigration program (which was boosted also by reductions in rates brought about by the enforced sales during the American Civil War of fleets of clipper ships from American to British owners), and partly to finance public works, including a railway from Ipswich—the head of navigation on the Brisbane River—to the Darling Downs, the first 20 miles of which was opened on 31 July 1865 (Fig. 14.7); the initial works on a railway westwards from Rockhampton; dredging along the Brisbane River; and a telegraph line from Brisbane to Maryborough, Gladstone and

Table 14.9 External trade, Queensland, 1861-90
(£000)

Year	Exports originating in Queensland										Total	Entrepôt trade	Retained imports
	Wool	Livestock ^a	Tallow	Hides and skins	Raw sugar	Gold	Tin ore	Copper ore	Other ^b	Processed and manufactured ^c			
1861	613	2	48	20	—	4	—	1	21	—	709	1	967
1862	627	1	51	18	—	1	—	10	62	—	770	23	1,301
1863	777	1	31	19	—	15	—	—	19	—	862	26	1,687
1864	1,038	1	33	18	—	83	—	—	44	—	1,217	30	2,238
1865	885	6	57	31	—	93	—	18	27	—	1,117	36	2,470
1866	988	39	54	35	—	86	—	34	54	3	1,293	73	2,395
1867	1,462	13	90	49	—	189	—	45	268	45	2,161	37	1,711
1868	1,057	2	123	61	—	594	—	70	120	43	2,070	37	1,862
1869	1,098	66	166	59	—	523	—	72	95	56	2,135	32	1,773
1870	1,026	531	167	61	—	490	—	1	111	132	2,519	15	1,562
1871	1,159	326	139	76	16	617	—	8	126	266	2,733	27	1,536
1872	1,170	366	100	93	37	660	108	23	109	312	2,978	21	2,198
1873	1,375	392	51	93	40	718	371	8	106	292	3,446	97	2,788
1874	1,421	366	43	89	101	1,356	253	4	87	333	4,053	53	2,909
1875	1,366	262	43	80	57	1,498	191	6	60	238	3,801	57	3,271
1876	1,500	157	67	80	12	1,428	166	2	75	321	3,808	68	3,059
1877	1,500	267	73	102	133	1,307	123	2	437	334	4,278	83	3,986
1878	1,186	347	24	67	93	1,052	75	2	150	87	3,083	107	3,329
1879	1,239	317	72	71	207	1,023	96	1	160	162	3,348	86	2,995
1880	1,388	233	162	87	206	821	107	1	140	236	3,381	67	3,020
1881	1,332	255	173	105	176	925	148	—	178	186	3,478	62	4,002
1882	1,329	280	130	100	143	830	209	—	223	215	3,459	75	6,243
1883	2,278	626	180	136	486	698	238	2	229	284	5,157	120	6,114
1884	1,890	572	76	109	354	923	204	1	222	203	4,554	120	6,262
1885	1,780	674	98	126	541	1,119	139	1	242	396	5,116	127	6,295
1886	1,414	716	33	102	622	1,232	85	5	226	378	4,813	121	5,982
1887	2,369	952	99	101	604	1,432	187	—	279	315	6,338	116	5,706
1888	2,258	902	75	113	217	1,662	194	—	288	303	6,012	114	6,533
1889	2,680	828	61	128	336	2,754	158	1	298	267	7,511	225	5,828
1890	2,525	1,956	114	117	543	2,256	146	2	374	377	8,410	142	4,925

^a Livestock exported overland to New South Wales excluded prior to 1869.^b Of the total (£4,830,000), timber exports accounted for £98,000, and cotton (mainly from 1865 through 1874) for £527,000.^c Details are given in Table 14.10.

Source: QSR.

Table 14.10 Export of goods manufactured and processed in Queensland, 1866-90
(£000)

Year	Preserved meat	Frozen meat	Meat extract	Refined sugar	Rum	Copper ingot	Tin ingot	Other	Total
1866	—	—	3	—	—	—	—	—	3
1867	24	—	—	—	—	21	—	—	45
1868	31	—	—	—	—	7	—	5	43
1869	34	—	—	—	5	16	—	1	56
1870	15	—	47	—	5	63	—	2	132
1871	36	—	43	—	7	175	—	5	266
1872	62	—	5	—	8	235	—	2	312
1873	62	—	2	—	9	189	26	4	292
1874	58	—	—	7	11	146	105	6	333
1875	50	—	2	13	18	106	47	2	238
1876	88	—	7	10	12	171	21	12	321
1877	87	—	2	47	11	166	11	10	334
1878	4	—	2	26	6	33	13	3	87
1879	21	—	1	68	10	33	24	5	162
1880	77	1	2	87	8	19	36	6	236
1881	40	—	13	31	13	20	46	23	186
1882	119	—	—	9	7	1	61	18	215
1883	151	2	2	53	2	1	60	13	284
1884	57	13	—	100	6	2	24	1	203
1885	172	5	6	180	5	—	17	11	396
1886	2	12	—	234	5	16	108	1	378
1887	100	—	4	154	2	7	36	12	315
1888	78	—	—	168	1	4	37	15	303
1889	17	62	12	107	1	14	40	14	267
1890	44	76	25	156	3	1	53	19	377

Source: QSR.

Fig. 14.7: Sections of railway opened in Queensland by decennial periods from 1861 to 1891.

Rockhampton. Some of the cash derived from land sales was also spent on the immigration program, thus reducing the amount available for road construction and maintenance. One result was to emphasise the importance of coastal services, with freight being shifted along a series of east-west roads each focusing on a port.³⁷

The commitment to railway building led the government in 1864 to float another loan of £1,019,000 in London using the Union Bank of Australia as agents. During the first seven months of 1865 debentures worth £300,000 were sold but the Union Bank was unable to dispose of any more at or above par. Even so it continued to advance funds to the government until early in 1866 when it became concerned about the size of the debt it was accumulating. The bank was therefore authorised by the government to dispose of £250,000 worth of debentures at £97.15.0 per cent and continued to advance funds with the remaining unsold debentures as security. But the scale of the public works program was so great that by May 1866 most of the money thus borrowed had been spent. The government chose not to curtail the works in hand but rather to authorise the issue of further debentures worth £200,000 to be spent on immigration, £891,000 on railways, and £79,950 on other schemes. The bank refused to make further cash available on the strength of unsold debentures, and the government instead accepted an offer, made through Sydney agents, of the London-based Agra and Masterman's Bank to place a loan for £500,000 and grant accommodation in the meantime for the whole amount. At this stage news had not reached Australia of the turmoil on the London money market as a result of the collapse on 10 May of one of the leading bill-dealing firms, Overend and Gurney, which in turn brought down other businesses including the Agra and Masterman's Bank and the main railway contractor (Peto, Brassey, and Betts) operating in Queensland. The first inkling of these failures reached Brisbane on 10 July and precipitated a financial (and political) crisis in the colony which spread rapidly following the failure of the Bank of Queensland later that month. Money circulation almost came to a standstill, and the colony was left in a wretched condition in 1866-7 with 'business languid, poverty universal, and penury not uncommon'.

At this time mineral working was of small account. Copper had been worked at Peak Downs (180 miles northwest of Rockhampton) by a Sydney company since 1861, and small quantities of alluvial gold had been produced as early as 1856. Then, in September 1867, a 'genuine gold-field' was discovered at Gympie Creek, only 80 miles north of Brisbane and barely 50 from Maryborough. In the circumstances a gold-rush was inevitable, and within a matter of months an estimated 15,000 to 16,000 people had swarmed into the area, and the 140,000 fine ounces of gold they panned in 1868 far exceeded the 114,000 fine ounces that had been produced in the colony up to this time. Just as the auriferous alluvium was beginning to run out, quartz reefs were found and machinery introduced. Unsuccessful diggers had the opportunity in 1869 to try their luck again at the newly discovered Ravenswood field, 60 miles south of Townsville. Three years later a very extensive tract of stream tin was discovered at Stanthorpe near the border with New South Wales, 38 miles south of Warwick by this time linked with Ipswich by rail. Since legislation

at this stage allowed any person or company to secure a 640 acre block of mineral land with the right to acquire the fee simple it is not surprising that 7,000 to 8,000 people assembled in the district within a matter of months. The ore had a tin content of nearly 70 per cent and could bear the costs of transport to overseas markets without being processed. But on 13 July 1872 the Queensland Smelting and Assaying Company Ltd was registered with a capital of £2,500 in £50 shares and set up a tin-smelting works—the first in Australia—at Bulimba in Brisbane which came into commercial operation on 5 December that same year. By the end of May 1874 it had processed 2,000 tons of ore into 1,380 tons of tin and a few months later had installed sufficient capacity to handle half the yield of the Stanthorpe field.³⁸

Although rich lodes of copper had been found on the Cloncurry, a branch of the Flinders River, these were in a remote, inaccessible district where fuel was scarce, and the deposit was therefore left untouched. No such problems were associated with the discovery of this metal at Mount Perry near Bundaberg in 1872. As in the case of the Peak Downs deposit, the finance needed to open up this new area and erect the smelting works largely came from Sydney investors. But after only 4,800 tons of copper concentrate had been produced, the low price of this metal on world markets brought an end to mining at Mount Perry in 1884, just as it had done the previous year at the field further north which by then had turned out 47,000 tons of concentrate.

Meanwhile the Ravenswood gold-bearing reefs had been followed to 200 feet but the sulphide ores were too stubborn for ordinary battery treatment which failed to separate the constituents. Many of the mines and plant were abandoned during the rushes (1873–6) to new fields at Charters Towers, Palmer River west of Cooktown, and the Hodgkinson district behind Cairns. In turn, this meant a renewed demand for machinery, especially on the quartz field at Charters Towers as can be seen from the following details of the gold-mining plant operating in the colony during 1884:

Gold-field	Number of		Companies	
	Engines	Stamp heads	Number	Paid-up capital (£)
Charters Towers district	81	226	41	489,000
Etheridge	15	88	—	—
Hodgkinson	15	101	4	40,000
Palmer River	9	50	2	14,000
Ravenswood district	32	95	4	137,000
Rockhampton	11	90	1	1,500
Gympie	52	147	163	611,000
All others	12	105	—	—
Total	227	902	215	1,292,500

In 1879 stream and lode tin were found a few miles inland from Cairns on the Atherton Tableland, and within five years eight plants were turning out about 200 tons of concentrate a month. Moffat and Company, which had acquired most of the mines near Irvinebank, erected a tin-smelting plant there in 1884 thus helping to ensure the long-term development of the area. By this time the Mount Morgan mine had come quietly into production; according to Blainey, its stamp battery had been operating for nearly a year before an enterprising journalist discovered what

was going on and broke the news in March 1884 to an astonished Rockhampton only 25 miles away to the northeast.³⁹ The whole of the gold deposit was held by one syndicate (incorporated as the Mount Morgan Gold Mining Company in 1886) and all attempts to jump the company's ground were unsuccessful. From a mere 3,200 fine ounces in 1883, output rose to its all-time peak of 314,000 fine ounces six years later.

One of the more significant features to emerge from this brief discussion of the development of Queensland up to 1890 is the way that pastoral, agricultural and mineral activity spread very rapidly and yet remained focused on a series of port towns—Maryborough, Bundaberg, Gladstone, Rockhampton, Mackay, Townsville, Cairns and Cooktown—spaced out along almost the entire length of the eastern coastline, as well as Normanton in the Gulf of Carpentaria (Fig. 14.8). Aside from the electric telegraph and Cobb and Co.'s indefatigable coaches, almost all overland communication ran east and west between coast and hinterland. Apart from Gladstone, all the ports just mentioned had their own separate railways: even the longer ones, like the Central Railway through Rockhampton, had poorly developed lateral spurs. It was not until 1892, for instance, that the Southern Railway was linked to the Maryborough-Bundaberg system further up the coast (Fig. 14.7). One result was that Brisbane did not have such a firm grip on the external trade of the colony as Sydney did in New South Wales or Melbourne in Victoria, a point that can be illustrated by quoting the value and percentage of the colony's seaward trade passing through the main ports during the five years to the end of 1890:

	Imports		Exports	
	£(000)	per cent	£(000)	per cent
Brisbane-Ipswich	18,561	65.9	6,024	22.0
Maryborough	1,347	4.8	2,179	8.0
Bundaberg	381	1.4	807	3.0
Rockhampton	2,226	7.9	8,024	29.4
Mackay	469	1.7	1,052	3.9
Townsville	3,117	11.0	5,033	18.4
Cairns	382	1.4	434	1.6
Cooktown	558	2.0	643	2.3
Normanton	504	1.7	864	3.2
All others	638	2.2	2,254	8.2
Total (1886-90)	28,183	100.0	27,314	100.0

These circumstances help to explain the relatively small proportion of the population in the Brisbane metropolitan area throughout this period—19.6 per cent in 1861, 15.1 per cent in 1871, 17.4 per cent in 1881 and 22.3 per cent in 1891—and the more significant role played by secondary industry located elsewhere in the colony.

Manufacturing in Queensland

When Queensland was separated from New South Wales there was only a handful of formal manufacturing establishments—a steam flour-mill, four steam sawmills, two tanneries, two works making soap and candles, and a pottery. As the

Fig. 14.8: Urban population in Queensland at the censuses held on 1 September 1871, 1 May 1881 and 5 April 1891. Towns with 500 or more population are depicted and those with 2,000 or more are named.

Registrar-General commented when reporting to the Colonial Secretary in June 1861,

Both capital and labour are far too valuable to be employed with advantage or profit in manufactories or other undertakings exposed to the active and infallibly destructive competition of older communities possessed of both in superabundance.⁴⁰

At the end of 1865 there were probably no more than 500 or so people engaged in processing or manufacturing activities of all kinds, but during the next six years, despite the monetary confusion in 1866 and 1867, the number employed increased eightfold to reach nearly 4,400 in 1871 (see Fig. 14.5). There were three basic reasons for this remarkable episode: the need for more day to day consumer goods because of the doubling of the population between the censuses of 1861 and 1864 and its doubling again by the census of 1871; the appearance, almost overnight, of activities like sugar-milling and meat preserving (discussed more fully in a moment); and the upsurge in demand for machinery and metal goods, not only by these industries, but also by the sawmillers, cotton processors and miners.

It would be wrong to give the impression, however, that this was an easy market for local firms making producers' materials. Since the first iron casting in Queensland had only been made in July 1862, it was felt, understandably enough, that colonial foundries were too inexperienced to make heavy machinery of the kind, for instance, required in sugar-mills. Farmers and plantation owners had two other obvious sources. On the one hand, there were long-established Sydney metal-working firms that were quick to recognise, and promote their products in, this new market. On the other, many of the settlers had just arrived from Britain which still appeared to be the unchallenged producer of engineering products of all kinds. It is all too easy, therefore, to overlook the early struggles of firms, like Walkers of Maryborough, which were ultimately successful. This firm, it may be recalled from Chapter 9, grew up on the Ballarat gold-field in Victoria but was attracted in 1868 to set up a branch foundry at Maryborough in Queensland because of the potential demand there both for sugar-milling and gold-mining equipment following the discovery of the nearby Gympie field a few months previously. A decade or so later, when the firm had 150 employees, John Walker reflected that

in the early days of the place we found it a very hard struggle, as there was a great prejudice against anything made in the colony, regardless of price. It was thought impossible to make sugar machinery in the colony at all. We were put to the test, and at considerable expense to ourselves we overcame that prejudice . . . We offered to make the first two or three machines at the same price they could be imported at . . . and since then we have been able to get a fair price.⁴¹

It is impossible to say with any certainty what proportion of this machinery market was secured by local firms. If it is assumed that the average cost of the equipment installed in the thirty-nine mills crushing sugar during the 1870-1 season was £2,500 and that reported figures for sugar machinery imports (which were classified

Table 14.11 Estimates of new capital formation and replacement outlays from the public sector in Queensland, 1861-90^a
(£000)

Period	New or replacement	Railways	Telegraph	Water and sewerage	Bridges and harbours	Defence construction	Public buildings	Other miscellaneous	Total
1861-65	new replacement	190 —	59 1	47 —	177 68	8 —	111 47	2 —	594 116
1866-70	new replacement	1,065 87	62 8	3 —	94 21	1 1	143 25	2 1	1,370 143
1871-75	new replacement	825 163	127 15	16 —	133 32	1 —	129 58	11 —	1,242 268
1876-80	new replacement	2,403 296	144 26	29 —	342 31	23 1	399 72	17 —	3,357 426
1881-85	new replacement	4,773 639	201 31	192 —	593 53	117 7	505 87	21 —	6,402 817
1886-90	new replacement	5,967 1,206	190 44	175 —	748 297	103 5	671 125	91 —	7,945 1,677
Total		17,614	908	462	2,589	267	2,372	145	24,357

^a Excludes local government expenditures except in the case of water and sewerage. The original source should be consulted for an explanation of the derivation of these estimates and related qualifications. Expenditure on roads is excluded from this tabulation.

Source: Butlin, *Australian Domestic Product*, *passim*.

Table 14.12 Estimates of new capital formation and replacement outlays from the private sector in Queensland, 1861-90^a
(£000)

Period	New or replacement	Residential ^b	Shops and offices	Industrial	Mining	Agricultural and pastoral ^c	Total
1861-65	new replacement	2,027 40	198 24	77 6	— —	1,331 178	3,633 248
1866-70	new replacement	1,079 71	208 43	685 40	4 3	213 260	2,189 417
1871-75	new replacement	3,065 120	255 67	212 130	82 26	1,934 355	5,548 698
1876-80	new replacement	1,803 152	164 84	121 128	152 63	1,717 573	3,957 1,000
1881-85	new replacement	5,135 225	388 119	863 184	372 107	2,352 819	9,110 1,454
1886-90	new replacement	5,328 319	874 164	967 297	489 245	98 808	7,756 1,833
Total		19,364	2,588	3,710	1,543	10,638	37,843

^a The original source should be consulted for an explanation of the derivation of these estimates and related qualifications. Data for churches and shipping are not available.

^b Includes hospitals, asylums, hotels, guest houses and other inhabited premises.

^c Includes tools, machinery, and equipment and physical improvements such as dams, tanks, fences and farm buildings but excludes livestock, the clearing of land and land itself.

Source: Butlin, *Australian Domestic Product*, *passim*.

separately) can broadly be relied upon, it is possible that Queensland foundries supplied about half, worth nearly £50,000.

During the 1870s the rate of growth of the manufacturing workforce slackened considerably (Fig. 14.5). One reason was that fewer new firms were setting up in business: much of the expanding demand for consumer goods was met by existing factories without a proportionate increase in the number of employees. The same was also true of several of the processing industries, including meat preservation, sugar-milling and distilling, where the yield of establishments was raised by extending the period of operations rather than as a result of major new investment. For a number of activities the decade was one of long- or short-term changes in fortune. Exports of smelted copper (probably the most reliable guide to actual output) fell off considerably after reaching a peak in 1872; raw sugar production was halved in the 1875-6 season when the cane became diseased as a result of wet weather; and in 1877 an estimated 1,750,000 sheep were lost as a result of drought and other causes so that the meat preserving works scarcely did any business (Fig. 14.9).

Public investment, which had begun to ease off in 1869, remained at a lower level on a per capita basis until the second half of the 1870s. Much of the increase then, as can be seen from Table 14.11, was devoted to railway construction, although at this stage local manufacturers were given few opportunities to tender for rolling stock or other equipment so that, as will be detailed later, much of this expenditure leaked overseas. In contrast, private investment during the early 1870s was high, particularly in the case of residential building when an attempt was made to overcome the shortage of accommodation resulting from the financial crisis; Butlin has estimated that there was a net addition of only 1,700 residential rooms to the housing stock of the colony from 1868 through 1870 whereas 32,200 were added during the following three years (Table 14.12).⁴² The second half of the decade saw somewhat smaller outlays on most types of private investment: during the three years to the end of 1879, for instance, only 15,700 rooms were added to the total stock. In any case building was less important in Queensland than in other parts of Australia as a stimulus to manufacturing because most permanent dwellings—nearly 94 per cent in 1876—were constructed of wood. The 1,800 brick and stone houses in the colony were nearly all located in Brisbane and Ipswich: the Registrar-General, in his report on the 1881 census (p.xiv), noted that in the country districts

a great portion of the dwellings have walls of strong slabs of hardwood standing vertically on squared beams, or slipped horizontally into the upright timbers, and are generally covered with shingles or bark.

There was little incentive, therefore, for investment in limeworks or in brick and tile yards: indeed when more detailed figures for brickworks were published for the first time in 1876 they indicated that the fifty-eight yards, employing fewer than four hands apiece, were grossly inefficient since the same workforce in Sydney

Fig. 14.9: Queensland exports of smelted copper and tin, and output of raw sugar and preserved and frozen meat. (Source: QSR.)

without the aid of machinery could have turned out Queensland's annual production in less than six weeks.

Sawmills were established along the southern coast, especially in the Maryborough area, in the 1860s but barely a decade later the millers claimed that they were running short of good quality logs. The stretch just north of the New South Wales border had already been picked over by the cedar cutters before Queensland became a separate colony, and the more accessible forests in the Wide Bay district had been ruthlessly ravaged in a similar way not long afterwards.⁴³ Particularly wasteful was the practice of 'freshing' whereby logs were rolled into a stream to await the next flood which, hopefully, would wash them down to the mills on the coast. Large numbers simply floated out to sea and then, according to some

accounts, lay rotting in piles along mile upon mile of the shoreline. Apart from building, timber was becoming widely used for fencing on pastoral stations, formed the main domestic and industrial fuel, and was an essential construction material for all deep-mining operations. Considerable quantities were also exported—the equivalent of about 80,000,000 super feet was reported to have been shipped from the colony during the twenty years through 1880 and a great deal more was no doubt sent away without being noted. Yet despite all this evidence about the use being made of timber, no more than fifty 'Moulding, Framing, Turning, and Saw-Mills (Steam)' establishments were recorded as operating in the colony at any one time during the 1870s, thus suggesting that a good deal of the timber, especially for dwellings in rural areas, was felled and pit-sawn on the spot. The informal living conditions of the two-fifths of the population who were neither in settlements of more than 100 people nor on the gold-fields is well illustrated by a comment of the Registrar-General on page ix of his report on the 1876 census:

It is contended . . . by many residents in the Australian 'bush' that the 'open-house' style, with an inch or two between the rough slabs forming the wall, and with window places innocent of glass, are the most healthy of all habitations in the country. . . .

Prior to 1879, as mentioned already, few contracts to supply equipment for railways, bridges and harbours had been awarded to local firms. Pressure was beginning to build up, however, for a change in attitude. Among the incidents that led to this was the allocation of the contract for 300 tons of cast iron cylinders for railway bridges over the Mary River to an English firm rather than to Walker's foundry only a few miles away at Maryborough. The Chief Engineer had recommended this to the Commissioner for Railways on 19 March 1878 on the grounds that

at the prices now ruling in the English market, the Government might rely upon getting the cylinders landed at Maryborough at from 50s. to £3 a ton under Messrs. Walker and Co.'s quotation.⁴⁴

When informed that the contract had gone overseas, Walker's wrote to the Minister for Public Works on 15 April:

Even assuming that it may be possible for the Department to deliver on the local wharf bridge cylinders of English manufacture on slightly better terms than those mentioned in our tender, we think that we, or any other colonial firms, are not unreasonable in expecting a slight preference to be extended to the results of our industries. As an individual firm, we have never yet received any such preference whatever, our various tenders and offers for contracts having been accepted only when they happened to be lowest. But as large taxpayers and employers of hundreds of men and boys in various capacities, we are bound at such a juncture to express a belief that industrial undertakings like ours are entitled to consideration . . . when we point out in evidence of the reasonableness of our request, that the colony will . . . benefit by an internal expenditure of £4,508, over £3,000 of which will be paid in wages. . . .

Early in 1879 the National Protectionist Association was formed to press for legislation that would 'secure employment to the people by establishing industries among the centres of population' and 'make it compulsory on the part of the Administration of the day that all moneys voted by the legislature either for the requirements of Government or for the construction of public works shall be expended in the purchase of local labor in preference to that of foreign'. In Melbourne, the *Age* was delighted with this turn of events, assuring its readers on 25 February that

No violation of this principle is to be permitted until it has first been ascertained by public advertisement that the Queensland labor market is unable to produce the articles required. In addition to this, the imposition of duties on all imported manufactured articles which can be made in the colony, and the imposition of duties sufficient to encourage the production of agricultural produce is advocated, while it is proposed that all raw material (coal excepted) be admitted duty free in order to induce capitalists to invest in the various branches of the manufacturing industries in Queensland.

It must have been difficult, in the circumstances, for the government to know how best to handle the next major issue which concerned the award of the contract for the construction of two dredges. When the tender box was opened in April 1879 it was found that Walker and Co. of Maryborough had quoted £59,000 (one dredge to be delivered in three years and the other six months later) while its main rival in Brisbane, Smellie and Co., had set its price at £58,000 (undertaking to supply both dredges in three years or, as an alternative, one only in thirty months for £29,500). Revealingly, no bid was received from New South Wales, while from Melbourne came tenders, both promising delivery in two years, from D. Forman and Co. for £47,600 and from McColl, Anderson and Co. for £83,000. It was decided that, after all, there were only sufficient funds available for one dredge and that a tender of £22,000 from one of the ten British firms which had shown an interest should be accepted. This was approved on 7 May. Sixteen days later Smellie and Co. wrote to the Treasurer explaining that in the meantime there had been a falling off in the demand for labour and that it was prepared to deliver a dredge in twenty-four months for £29,000. Within a matter of hours the Executive Council had rescinded its previous decision and given the job to this Brisbane firm even though its price was 32 per cent greater.⁴⁵

Simultaneously, questions were being raised about the supply of railway rolling stock: over 500 route-miles had been opened and plans were in hand for the construction within four years of a similar distance again. Until this time most locomotives, carriages and wagons had been imported and assembled at the railway workshops in Ipswich and Rockhampton. The former establishment, set up in 1864, was much the larger and, along with a small branch shop at Toowoomba, employed 320 hands on working and repairing locomotives and carriages, undertaking jobs for other government departments, and building and erecting new rolling stock. During 1878, for instance, the Ipswich shops turned out eight carriages and fifty-six

vans and wagons, while the Rockhampton works put together one carriage and thirty-six other items. In addition to these modest endeavours the Ipswich shops had assembled a 24 ton locomotive from spare parts in 1877 and two rather larger ones the following year. Encouraged by good reports when these entered normal service, and somewhat daunted by the very considerable increase in rolling stock required during the next four or five years, the Commissioner for Railways suggested on 19 April 1879 that 'we should find it to our advantage to enter into the manufacture of engines to a certain extent'.

The Legislative Assembly was far from sure about the wisdom of such a move and on 12 June set up a Select Committee to look into the whole question.⁴⁶ It heard evidence from representatives of several leading iron-founders and engineering firms who explained that, while they were technically competent and adequately equipped to build locomotives, the steam-up cost would be 25 per cent above that for comparable imported versions and even this assumed a spreading of overheads by being given 'a considerable order'. Figures tabled by the Locomotive Superintendent showed that the cost of building the two 37 ton engines in the Ipswich shops had been about £4,536 (a quarter of which had been spent on imported parts) compared with only £3,690 for similar vehicles imported from Glasgow. Even this was an unreal comparison, of course, because the Ipswich price made no allowance for interest on capital, depreciation or profit. The Committee sought the advice of Dr E. H. Williams from the Baldwin Locomotive Works at Philadelphia—the world leader in this field, turning out no fewer than 384 engines in 1873 alone. The answer he gave to one question is worth recording:

- Q. Would there be any chance of your firm, or any of the firms in existence, starting here and showing us the way to make locomotives—I mean in Australia?
- A. No, because there is too much rivalry between the colonies. They have talked the thing over extensively. The New South Wales people would desire the workshops in their colony, and so would the Victorians, and possibly the Queenslanders, and New Zealanders, and South Australians, and would not care about dealing with the others very much.

In the circumstances the conclusions reached by the Committee when it reported on 18 September 1879 were as inescapable as they were sensible:

While willing to admit that there are some manifest advantages in giving work of this kind to local shops at prices somewhat in advance of those at which locomotives could be obtained from England or America, your Committee do not think that the time has yet arrived when an order could be advantageously executed in the colony.

It did recommend, however, that carriages and trucks should be supplied either from the workshops or from local contractors, a view which may have been coloured by the downturn in the level of economic activity in the colony in 1878 and 1879.

The manufacture of rolling stock at the Ipswich works was then all but

abandoned and imports were restricted to locomotives and special vehicles like refrigerated vans. Contracts were let for a few wagons at a time to a score of local firms, including Babbage and Co., Sutton and Co., and Hood & Binnie at Brisbane; Shillito and Son, Harlow and Co., and Springall & Frost at Ipswich; Griffith Brothers, and W. Porritt and Co. at Toowoomba; Walker's Union Foundry and Tooth's Vulcan Foundry at Maryborough; and Burns & Twigg at Rockhampton. Most of these works, which had grown up to meet the demand for milling and mining equipment, had been going through a dull patch and this new source of business at first provided a welcome relief. But both public and private expenditure increased very considerably during the early 1880s and manufacturers were soon hard pressed to cope with the amount of work becoming available. From the point of view of the Commissioner for Railways, who had 167 additional miles to operate in 1881, 67 more in 1882 and 171 more in 1883, the situation was far from satisfactory.

The allocation of relatively small contracts to so many firms (in part a reflection of the disjointed nature of the railways and the economies which could be achieved by having equipment for each line made on the spot) meant that no contractor was prepared to specialise in this field or to risk alienating private customers by giving government contracts, which were not regarded as very profitable, any sort of priority. The dilemma was summed up by the Commissioner on 24 October 1883:

If we were to invite tenders for a large quantity of rolling-stock, including carriages, waggons, etc. (but not engines), in one contract, extending over a period of years, inducements might thus be held out to contractors to enter fully into this class of work, import machinery, etc. On the other hand . . . a practical monopoly for years would not ultimately tend towards our advantage, and would not be fair . . . towards the many enterprising contractors who have been manufacturing stock for us.⁴⁷

The dangers of relying too much on one establishment had in any case become apparent since all seven railway carriage contracts offered between May 1880 and July 1883, for a total of thirty vehicles valued at £24,350, had been awarded to G. E. Negus and Company of Maryborough. When that firm said it was too busy to undertake any more work, the Railways Department was forced in 1883-4 to give contracts for eleven vehicles to the newly formed Queensland Carriage Manufacturing Company, which was still only in the process of erecting a factory at Nundah (Brisbane), and in dribs and drabs to Springall & Frost at Ipswich and W. Porritt and Co. at Toowoomba. It was also forced to resume carriage building at the Ipswich workshops.

By the end of 1882 an estimated £426,000 had been spent on locomotives and other rolling stock for the Queensland railways of which £238,600 was used to pay for imported equipment and the remaining £187,400 for work done in the railway workshops and by private contractors. The expenditures during each of the next five years are known in more detail from the Annual Reports:

Year	Overseas outlays on		Local work by		Total
	Locomotives	Other	Contractors	Workshops	
	£	£	£	£	£
1883	52,120	18,393	37,302	11,995	119,810
1884	64,083	27,521	76,434	19,969	188,007
1885	36,191	1,262	62,735	17,876	118,064
1886	101,334	25,224	38,788	17,618	182,964
1887	19,337	15,263	27,598	17,797	79,995

By the end of 1887, then, nearly 46 per cent of all outlays on rolling stock for Queensland's railways had been spent within the colony.

The boom of the early 1880s proved to be short-lived and there was a noticeable slowing down in the rate of industrial growth towards the end of 1884. The metal trades were affected, for instance, by changing circumstances in the sugar industry: whereas the number of sugar-mills doubled between the seasons of 1880-1 and 1884-5 (when it reached a nineteenth century peak of 166 establishments) no new ones were added during the following year and then it started to dwindle. On 2 July 1885 a deputation of boiler-makers and iron shipbuilders waited on the Treasurer to urge that contracts for bridge ironwork should be placed in the colony: having seen the order for a bridge at Mackay go to a Belgian firm, it wanted to make sure the same thing did not happen to those for the Annan and Endeavour bridges. Thirteen months later another deputation from the ironworkers, this time representing both masters and men, presented the Premier (Griffith) with a resolution (passed at a meeting held to discuss the depression in the trade)

That, in the opinion of this meeting, all constructive ironwork, such as bridges, railway locomotives, and rolling stock, tugs, dredges, punts, waterworks plant, sugar-mills, etc., required by the Government, ought to be made within the colony.⁴⁸

Griffith agreed that it was desirable to have such work done locally unless there was 'a great disparity in the prices'. The reason that the Mackay bridge iron had been bought overseas was that the lowest colonial tender (£18,200) was 43 per cent higher; similarly, the lowest local bid for the Annan bridge had been 24 per cent more than overseas quotations. The nub of the problem was exposed by one of the employers:

The reason so few tenders were sent in by local firms for the bridges referred to, was that they all had a lot of work in hand at the time; at present the work could be done 50 or 60 per cent cheaper than it could then.

The following week, on 12 August, a motion was put before the Legislative Assembly

That . . . the time had arrived when, from the number of skilled mechanics in the colony, an effort should be made by the Government [due regard at the same time being paid to the rights of the general taxpayer] to encourage the manufacture within the colony of loco-

tives and all rolling-stock in future required for our railways, and all ironwork required for our bridges. . . .

The ensuing debate was a poor one, much of it being taken up with the discussion of an amendment proposing an additional phrase, shown in brackets in the foregoing quotation; with these words added the resolution was agreed to on 10 September. Those who had seen locomotive building as an instant source of work for the unemployed were due for a disappointment since tenders for seventy-five locomotives were not even called until 18 August 1887. It is not known how many firms submitted quotations, but in December it was announced that Evans, Anderson, Phelan and Company of Brisbane had been given contracts for twenty-five passenger and twenty-five mixed traffic locomotives, and Springall & Frost (which soon afterwards changed its name to the Phoenix Engineering and Rolling Stock Company) of Ipswich for another twenty-five mixed traffic engines. The basic contract prices for the passenger and mixed traffic types were, respectively, £2,250 and £2,220 (both firms) on rail in Brisbane with an allowance of an extra £100 for delivery in Maryborough, £150 in Rockhampton and £170 in Townsville. The Commissioner for Railways in his report for 1887 anticipated that the steam-up cost of the passenger locomotives would be 12 per cent, and of the mixed traffic engines between 6 and 7 per cent in advance of similar imported ones but it is unclear whether this turned out to be the case. During 1889-90 the first eight engines from the Brisbane builders and the first three from the Ipswich firm entered service.

The latter part of the 1880s formed a turning point for Queensland's industrial development in several other ways. On the one hand, Brisbane, which in terms of population had barely kept pace with the remainder of the colony, now began to move ahead—albeit temporarily—with a new vigour. Between the censuses of 1881 and 1891 the metropolitan area's population increased at an average annual rate of 8.8 per cent, compared with 5.7 per cent in the remainder of Queensland, and its share of the colonial total thus grew from 17.4 to 22.4 per cent (Table 14.7). It is difficult to document the effect of this with any precision but, as one example, company reports make it clear that Brisbane breweries were beginning to benefit from economies in scale and improvements in shipping services and were thus breaking into provincial markets. This was borne out when output figures for individual breweries during the year ending 31 March 1885 were published in the annual *Statistics of Queensland*: by then the three leading Brisbane establishments were making over half the colonial brew. On the other hand, manufacturers in the main centres along the eastern seaboard, despite the increased flow of government contracts, were suffering from the dearth of constant local jobs, the spasmodic and unreliable nature of the demand from mining operations, and, towards the end of the decade, the growing competition for work in almost any part of the colony. One example was Walker's Union Foundry and shipbuilding yard at Maryborough which in 1882 was employing 200 men and boys building barges, tugs, bridges, lighthouses and rolling stock for the government as well as equipment for

sugar-mills, sawmills, gas-works, and coal and gold-mining companies.⁴⁹ Two years later the business was floated as a public company, John Walker and Company Ltd, which was reorganised as Walker's Ltd in November 1888. During 1887-8 and 1888-9 the profits on current operations were, respectively, £8,080 and £4,120 and 12 per cent dividends were paid. But the following year produced a loss on current operations of £1,090 and no dividend for shareholders. The report of the directors neatly summarises the situation at the end of this period:

In common with almost every individual or company interested in 'industrial undertakings' in the colony, your directors have had the experience of passing through a year of unparalleled depression; the conduct of the company's business has, therefore, been an arduous work, rendered unusually difficult by reason of the unprecedented scarcity of orders, and the excessive competition for any business that was offering. . . .⁵⁰

Manufacturers were again being reminded, as they were in the 1870s, that their prosperity very largely depended, directly or indirectly, on the processing of primary produce. The two brief studies which follow indicate that in the late 1880s, however, meat preserving and freezing had not yet emerged as a powerful stimulus and the sugar industry was temporarily in the doldrums.

Meat preserving and freezing. In Queensland, as in Victoria and New South Wales, the demand for meat in Britain during the 1860s and the surplus of livestock in eastern Australia led to the establishment of a number of works to can meat and prepare extract. Until the 1880s all were located near Maryborough, Toowoomba, Ipswich and Rockhampton, and it is convenient to consider them here in that order.

On their property 'Yengarie', a few miles west of Maryborough, Robert Tooth and Robert Cran established a boiling down works which they converted towards the end of 1865 into a meat extract business. Critchell and Raymond claim that the first consignment of extract from this establishment (and, indeed, from any part of Australia) reached London in July 1866.⁵¹ Until 1871 about 25 tons of this product was made each year, but then the spread of pleuropneumonia disease in cattle (which raised livestock prices) and a rumour in Britain that diseased meat was being converted into extract (which led to an abrupt falling off in demand) caused Tooth and Cran to revert to boiling down and then soon afterwards to take up sugar refining.

Two meat preserving works were set up on the Darling Downs. The first was conducted as an integral part of the operations on 'Clifton', a run of 90,000 acres south of Toowoomba carrying 100,000 sheep. Here, W. B. Tooth (a nephew of the Sydney brewer) erected a works at which, according to the *Sydney Morning Herald* on 4 July 1870, slaughtering had commenced a couple of months earlier. During the first year alone, 32,000 sheep were processed, a throughput that compared favourably with several of the works being set up by public companies in Victoria at about this time. But when prices fell on the London market in 1873 the canning of mutton was discontinued and surplus stock were sold or boiled down for tallow. The other concern, the Hogarth Australian Meat Preserving Company Ltd, was

formed in England and registered in London on 5 September 1870 with a nominal capital of £18,000.⁵² Hogarth already operated a preserving works in Aberdeen and, it was claimed, gained support for this new venture mainly from 'old colonists resident in England'. The plant was established at Oakey Creek on 'Westbrook' station, about 10 miles west of Toowoomba, and began slaughtering towards the end of April 1871. In the first couple of months 300 cattle and 12,000 sheep were preserved, the first consignment of the company's products being dispatched via Sydney on 3 June. The new company even toyed with the idea of selling 'an extract of wallaby' in England labelled 'Australian Game', but if the notion was ever pursued it failed to tickle the English palate. Yet despite the contemporary and later publicity given to other establishments, it is clear that the Hogarth works had a much more sustained importance than is generally realised. During the three years 1871-3, for instance, the Chief Inspector of Stock noted that 88,000 of the 306,000 sheep slaughtered in preserving works had been processed at Oakey Creek, and then during a similar period ten years later, it was responsible for almost four-fifths of the mutton and one-eighth of the beef canned in the colony.

Near Ipswich the 'Redbank' and 'Town Marie' works were operating in the early 1870s but both seem to have fallen victim to the collapse of the English market for canned meat in 1872-3.⁵³ More important were the developments near Rockhampton. Nine miles up the Fitzroy River Berkelman and Lambert converted their 'Laurel Bank' boiling down establishment into a preserving works which began processing 500 sheep a day at the end of May 1871.⁵⁴ A dozen miles downstream at Lakes Creek, just below Rockhampton, the works of the Central Queensland Meat Preserving Company Ltd, a firm registered in London on 12 April 1870 with a nominal capital of £45,000,⁵⁵ followed suit about three weeks later. This latter plant soon dwarfed all others in the colony, handling in 1872 no fewer than 143,000 of the 191,000 sheep slaughtered by all the canneries. An immediate consequence of purchasing and processing on this scale—almost twice that of any other establishment operating in Australia at the time—was to enhance the value of stock throughout the Rockhampton district: this, and the much reduced prices being paid in London for Australian tinned meat, forced the company to discontinue operations the following year. As far as is known the Lakes Creek plant remained idle until 1877 when both it and the Laurel Bank establishment were acquired by Whitehead and Company which simply used them for boiling down livestock.

In 1879, however, Whitehead's sold the premises to a group of Rockhampton businessmen who formed the Central Queensland Meat Export Company Ltd with the intention of installing Bell-Coleman refrigerating equipment and entering the frozen meat trade.⁵⁶ On 12 September 1883, even while S.S. *Fiado* was tied up at the wharf preparing to load the first shipment, the works was severely damaged by fire. The loss was put at £32,000 of which only half was covered by insurance; although the company called up the remaining capital and rebuilt the works it never fully recovered from this mishap. Eventually, at an acrimonious meeting of shareholders on 28 and 29 April 1886 it was decided that there was no alternative but to wind up its affairs. A Melbourne syndicate then purchased the premises

which were developed during the 1890s into one of the leading meat export plants in Australia. The second attempt to ship frozen meat also ended in disaster. The Australian Company Ltd, registered in London on 29 April 1881, was formed to establish a freezing works in northern Queensland where the cattle industry was being retarded because of the lack of payable markets. The company obtained the lease of Poole Island near Bowen and erected the second works in Queensland to be equipped with refrigerated facilities. No sooner had the first cargo been stowed aboard than the area was struck by a cyclone on 30 January 1884 and the vessel driven ashore: unbelievably it was again S.S. *Fiado*. The Australian Company, crippled financially, sold the works to the British India Steam Navigation Company which shipped a few consignments on the joint account of growers and ship owners before abandoning the project in 1886. As a result of these mishaps it was left to the Queensland Freezing and Food Export Company, which had been formed in 1880 to erect preserving and freezing works at Queensport on the Brisbane River, to make the first shipment of refrigerated meat from the colony on 20 May 1884. Although this particular consignment was not successful financially, it gave the company sufficient encouragement to persist with its endeavours during the next couple of years.

It will be clear from this brief review that meat processing for export had by no means become firmly established in the colony prior to 1890. At least eleven ventures—four financed in Britain, one in Victoria, and the remainder in Queensland and New South Wales—operated at various times during this period. Fluctuations in livestock prices, the weakening market for canned meat in Britain, droughts, fire and cyclone damage, and technical difficulties associated with handling and stowing frozen meat, all contributed to the violent year to year fluctuations in production shown in Fig. 14.9. Up to the end of 1888, 26,500 tons of canned and 1,250 tons of frozen meat had been exported. Then the two main works in the colony, at Lakes Creek and Queensport, entered the frozen meat trade in earnest, shipping out 1,200 tons in 1889 and 2,700 tons in 1890. Even at this stage preparations were in hand to set up works on a much larger scale: the Queensland Meat Export and Agency Company Ltd, for instance, was promoted in June 1890, registered six months later with a nominal capital of £250,000, and soon afterwards began erecting plants at Townsville and Brisbane (with a capacity between them to process 60,000 head of cattle or 720,000 sheep a year) which came into operation in 1892.⁵⁷ The industry was about to be established on an international scale.

Sugar-milling and refining. Sugar-cane cultivation, at first concentrated along the Albert and Logan Rivers in the Moreton Bay area and near the Mary River in Wide Bay, spread northwards during this period to Bundaberg, Mackay, and the Burdekin, Herbert and Johnstone Rivers. Prior to the 1880s cane was processed in two kinds of mills. A few smallholders set up their own simple horse-powered affairs with a capacity to make no more than 1,200 to 1,800 gallons of juice in a day; most relied on the larger, usually steam-driven, works established on the majority of plantations. In 1878, for instance, there were sixty-eight mills in Queensland which processed the owners' own crops and those of 355 small settlers.⁵⁸ The

Plate 20: The sugar-mill on the Kirkcubbin plantation in Queensland began crushing on 1 August 1871. Forty workmen (including 31 Polynesians) produced 10 tons of sugar using machinery made by Walkers which had established its foundry at nearby Maryborough three years previously. (*Illustrated Australian News*, 29 February 1872.)

investment involved varied considerably, as did the quality of the sugar produced. On one plantation 25 acres out of 1,110 were under sugar and £2,000 worth of machinery had been bought from Walker's of Maryborough; on another 330 out of 1,070 acres had been planted and £10,000 spent on machinery in Glasgow, Brisbane and Mackay; and on yet a third, where virtually all the 1,200 acres were under cane, £17,500 had been invested in machinery mostly from overseas. Such differences depended not only on the size, capacity and efficiency of the crushing plant itself but also on the type of equipment used for processing the juice. By 1880, for instance, only a quarter of the mills had replaced their 'open batteries' for concentrating the liquor by the much more efficient vacuum pan system;⁵⁹ on the other hand, virtually all had installed centrifuges for separating the molasses from the sugar crystals.

Until 1873 there was no refinery in the colony and the sugar was largely sold in grades normally used for manufacturing purposes. About a dozen plantation owners attempted to use molasses by erecting stills, a form of integration encouraged late in 1866 by An Act to Authorise Distillation by the Owners of Sugar Mills or Manufactories which made the excise duty on colonial spirits one-third less than the customs duty on imported supplies. When their meat extract business at Yengarie became unprofitable in the early 1870s, Tooth and Cran decided to investigate the possibility of opening a sugar refinery, an investment that they considered worthwhile only if an adequate supply of raw sugar could be assured. On 3 April 1872 Tooth wrote to the Premier (Palmer) seeking an arrangement whereby raw sugar could be imported, refined and then re-exported under bond, and explaining that such a facility would be needed until such time as local producers could supply enough raw material to keep the projected refinery operating at full capacity.⁶⁰ In August The Bonded Distilleries and Sugar Houses Act, 1872, was passed with the intention 'of giving Messrs. Tooth and Cran every facility to commence their refining', but Tooth continued to complain that the conditions imposed were unrealistic since imported sugars could not, under the Act, be processed at the same time as local supplies. Nonetheless, work went ahead on the refinery which started operations in July or August 1873. The partners also developed a method of liming the cane juice so that it could be pumped without deterioration along a series of pipes directly linking the refinery with fifteen or sixteen farm mills each consisting only of a set of rollers and juice tanks, and an engine and boiler. This system proved so successful that Tooth set up two similar ones in the Philippines and Malaya later the same decade, and R. Cran and Co. also used it when establishing the Millaquin Refinery (Bundaberg), the second such establishment in Queensland, which came into operation in August 1882.⁶¹ In 1889 it was noted that £100,000 had been invested in the Yengarie refinery, which had a capacity of 4,000 to 5,000 tons during the season, and £150,000 in the Millaquin establishment.⁶²

During the latter part of the 1870s four or five mills were built by people who intended to purchase all their cane from small farmers or planters and sell the sugar on their own account. Most ran into the problem that to keep a £20,000 mill

adequately supplied with cane required 2,000 acres to be cultivated in the immediate vicinity and enough small farmers able to spend from £10 to £20 per acre each year. Two of these establishments had failed by 1880 and two more were in the hands of banks. A few years later the small settlers, even those with mills, were beginning to feel the effects of falling sugar prices on world markets. On 15 July 1885 a meeting of 250 farmers and selectors in the Mackay area decided to petition the government for assistance in financing central mills in the district. They pointed out that all the mills were owned by plantation owners who would only process other people's cane at a time and price that suited them, and in order to escape from this situation sought a loan for which they offered the government their land, worth about £2 an acre, as security. In addition they made a powerful plea that, with help of this kind, sugar-cane growing could be made a white man's industry.

Labour from the Pacific islands had been introduced into Queensland cotton plantations as early as August 1863 and large numbers were subsequently employed on sugar plantations and in sugar-mills. It is impossible here to enlarge upon this question which had a continuing influence on Queensland politics throughout this period. In the present context it is sufficient to note that the Griffith Ministry, which viewed black labour with little favour, saw the Mackay settlers' petition as a practical means of helping to implement its policy of prohibiting Kanaka immigration after 31 December 1890. The government sought advice about the capital and operating costs and won approval for a vote of £50,000 to distribute in the form of advances for central mills.⁶³ The chief condition under which the loans were granted was that the shareholders 'will employ labourers of European extraction, and no others, in and about the cultivation, cutting, and carting of the cane'. Two companies were formed in the Mackay area. A number of small farmers agreed to take shares in (that is, mortgage their land to) the North Eton Central Mill Company to the value of £20,375. By August 1888 the double rolling equipment was ready for operation but the shareholders only had 472 acres under cane whereas, with a capacity of 3,000 tons, the mill needed the cane from about 3,000 acres (since the yield was expected to be one-third lower than usual because of flood damage earlier in the year). As a result the mill was run during this season on an experimental basis, crushing 1,430 tons, extracting 175,000 gallons of juice, and producing a mere 100 tons of sugar. The second mill, built by the Racecourse Central Mill Company, commenced operations in July 1889 even though its shareholders had planted only 175 acres to cane. While individual shareholders had each signed an agreement pledging that coloured labour would not be used on their farms, neither the memorandum nor articles of association of the companies included any such provision: the directors went ahead, therefore, and bought cane from plantations where island labour was being used. The companies also took advantage of the government in another way. Instead of paying fixed and relatively low prices to shareholders for their cane, they paid rates only slightly less than those given to non-shareholders (although even this differential was regarded as unfair), with the result that interest payments due to the government were taken out of capital. The central mill system, therefore, got off to a bad start and, having learned its lesson,

it was some years before the government again came to the financial assistance of the industry.

The problems of the central mills were part and parcel of those of the industry as a whole. From a peak of 166 mills crushing the cane from nearly 41,000 acres during the 1885-6 season, the number fell to 106 mills processing only 31,000 acres in 1888-9. The Royal Commission set up to investigate the depressed conditions thought that there were several explanations: the unnecessarily large areas held by planters who only cultivated a small portion but paid interest on the whole; the financial embarrassment of many planters and farmers who were operating on borrowed capital bearing a high rate of interest; the effects of a prolonged drought; the falling world markets because of competition from beet sugar; and the general want of confidence in the industry as a result of all these circumstances. But there is no doubt, too, that The Pacific Island Labourers Act of 1880 Amendment Act, 1885 made plantation owners reluctant to risk further investment until the Kanaka labour question had been sorted out: the Royal Commission found that the cultivation of sugar-cane in areas north of Townsville by European labour was impractical and concluded that 'if all coloured labour is withdrawn, extinction of the industry must speedily follow'. Largely as a result of this the cessation provision of the 1885 Act was repealed in 1892.

But, in any case, the structure of the industry was changing during the 1880s. On the one hand, small farm mills had practically disappeared, as is made clear by the following summary of information relating to the 1888-9 season prepared for the Royal Commission:

District	Farms		Plantations	
	With mills	Without	With mills	Without
Brisbane	1	2	7	—
Logan	1	26	17	—
Maryborough	2	5	22	7
Bundaberg	—	45	34	6
Mackay	—	106	17	5
Further north	—	13	18	6
Total	4	197	115	24

On the other, most of the sugar grown north of Mackay was produced on plantations, the only exception being the thirteen farms in the Herbert River area supplying The Colonial Sugar Refining Company's Victoria Mill established there in 1883. A good deal of New South Wales and Victorian money was being invested in the industry. As a nice example of backward integration, Swallow and Derham, a leading Melbourne biscuit-making firm, opened up the Hambledon plantation and mill near Cairns in August 1883.⁶⁴ Seven years later Swallow told the Royal Commission that £180,000 had been invested in the 6,000 acre estate of which 900 acres were under sugar: the mill alone was valued at £33,000 with about a quarter of the machinery having been made at Maryborough and Townsville. As an equally nice example of opportunism the Queensland government took advantage of The Colonial Sugar Refining Company's desire to acquire land and commence opera-

tions in the colony by passing The Colonial Sugar Refining Company's Act, 1881, the only one of its kind, under which the company undertook

within the space of five years . . . [to] expend . . . two hundred thousand pounds, at the least, in the preparation and cultivation of the lands . . . within the districts of Mackay and Cardwell . . . or in the erection of plant and machinery for the manufacture of sugar, on lands of the company, within the said districts.

In 1883 the company opened the Homebush Mill at Mackay and the Victoria Mill on the Herbert River near Ingham, and in 1885 the Goondi Mill (incorporating the machinery that had previously been used in its Southgate Mill on the Clarence River in New South Wales) was opened on the Johnstone River at Innisfail. On 13 March 1889 Edward Knox, the General Manager, told the Royal Commission that the company had 38,000 acres in Queensland of which 6,800 acres had been planted to cane. During the season just ended, he said, the Homebush, Victoria and Goondi Mills had crushed cane from 5,000 acres belonging to the company and from 1,000 acres belonging to others; over £220,000 had been spent on machinery imported from Britain and, besides this, 50 miles of permanent lines and 24 miles of portable lines, serviced by 1,500 wagons and nine locomotives, had been built to link the canefields with the mills. Yet, despite this, the government proposed to apply a discriminatory taxation scheme against the company: not surprisingly Knox told shareholders in 1890 that, 'when the history of the Company's experience comes to be written', these circumstances would 'furnish an instructive lesson for those who would venture upon the establishment of any manufacturing enterprise in that Colony'.⁶⁵

The role of government

It has already been made clear that government played a considerable, if largely indirect, role in the industrial development of the colony. Over much of this period, however, customs legislation gave local manufacturers little assistance. Prior to 19 September 1866 all goods, except spirits, wine, beer and tobacco, entered the colony duty free but on that day a general 7½ per cent ad valorem levy was imposed (by 30 Vic. no. 9) except for a few items on a very short free list. Amending legislation on 18 October reduced the free list even more: whereas machinery for manufacturing, agricultural and pastoral purposes was to be admitted free, this was amended to allow only a *refund* of duty on machinery imported 'for use in the manufacture of sugar and actually erected or in use for that purpose', a change necessitated, it was claimed in the Assembly on 11 October, because of the practical difficulties of interpreting what was meant by 'agricultural machinery'. Although this legislation was intended as a temporary measure to help the government through its financial difficulties, its operation was extended in September 1869 for another year. Since most raw materials and producers' goods were taxed, it is doubtful whether manufacturers gained much, if any, advantage.

During the 1860s (apart from 1865) current expenditure exceeded current

revenue and it was obvious by 1870 that the avowed intention of reducing customs duties could not, responsibly, be attained. In fact it was necessary towards the end of that year to increase the ad valorem duties to 10 per cent although, at the same time, materials like iron ore, plain sheet iron, boiler plates, and tin plates and sheets were placed on the free list. These changes and a considerable increase in the volume of retained imports (from £1,536,000 in 1871 to £2,788,000 in 1873) helped to create a surplus on current account in 1873-4 of £164,000. The treasurer thus took the opportunity in 37 Vic. no. 8 to reduce ad valorem duties to 7½ per cent between 1 July and 30 September 1874 and to 5 per cent thereafter. Some new specific duties were, however, imposed such as 40/- per ton on galvanised and corrugated iron; 80/- per ton on acids, cordage and rope; 2/6d on doors; and even 2/6d per linear foot on boats. The free list was short but did include 'machinery for manufacturing, sawing, and sewing, agricultural, mining and pastoral purposes, steam engines and boilers'. Iron-foundries and engineering shops, in particular, were left without any protection save that of being available on the spot. John Sinclair (a partner in the engineering and shipbuilding firm of Smellie and Co.) told the Select Committee inquiring into the Railway Workshops in 1879 that

Generally, when we received any orders, it is for work required in a hurry. I do not think we could compete in anything against English engineers; if we did so, it would be at a sacrifice of polish and finish; the working parts would be as good, but the finishing part would be abandoned.⁶⁶

Some people saw this reduction of the ad valorem duties as a root cause of the depressed conditions towards the end of the 1870s, and there was some popular demand for a protective tariff.⁶⁷ But, in the event, the Treasurer made few adjustments to the tariff schedules until 1885.

Nonetheless two legislative changes in November 1880 did affect distillers and sawmillers. In the one case, the excise duty on locally made spirits was raised to bring it into line with the duty on imported supplies: within a couple of years the output of rum had been cut by a quarter. In the other, an export duty of 20/- per 1,000 super feet was placed on sawn and unsawn cedar. The Premier explained to the Assembly on 25 October that the bulk of this trade was carried on by companies based in the other colonies so that little advantage accrued to Queensland. Moreover, there was a growing recognition of the need to preserve this tree. But his most telling argument was that New South Wales and Victoria had put an import duty on sawn timber while allowing logs in free, so that the actual milling and manufacturing of timber had been encouraged to move out of the colony.

By 1884-5 the colony was again running into budgetary difficulties but the Treasurer made only a few alterations: from 19 August 1885 a 5 per cent levy was placed on machinery, the impost on spirits was raised, and logs and timber were made subject to a specific duty. As another revenue raising device, from 1 October a 3d per gallon excise duty was charged on colonial beer, and for this purpose breweries had to be registered. A year later a general 7½ per cent ad valorem impost

was levied in an effort to avoid a repetition of the £222,000 deficit that had occurred during the twelve months to 30 June 1886, but this was seen as a temporary measure due to expire at the end of 1888. In the event, the deficit in 1886-7 was £456,000 and in 1887-8 £191,000 so that there could be no question of allowing the ad valorem duties to come to an end. On 11 September 1888 the Treasurer (McIlwraith) told the Legislative Assembly that 'only after very mature consideration' he proposed to increase the duty on machinery from 5 to 15 per cent except for items that could not be made in the colony:

There is no lesson that has been better taught to us by Victoria than the one, that encouragement to the manufacture of machinery in a colony immensely lowers the cost of its production.

This must have drawn a few wry smiles in Victorian foundries that were tendering low in order to survive, and in Queensland foundries which had never been given much consideration in the past. On a broad range of other goods the ad valorem duty was doubled to 15 per cent. Piece goods were, however, left at 10 per cent, while various categories of boots and shoes were charged at specific amounts per dozen pairs (reminiscent of the Victorian imposts during the 1870s). As compensation, the free list was lengthened to include industrial machinery (e.g. roller-mills, carding, weaving and knitting equipment), producers' materials (e.g. leather), and printing papers, inks and presses because, the Treasurer explained, work of this kind was being diverted from Queensland. This, the last amendment to the customs schedules during the period, introduced a measure of protection, but it solved neither the problems faced by the government nor those of the manufacturers.

The government also gave some rather lukewarm assistance to manufacturers in other ways. During 1869 two measures were passed which attempted to stimulate 'native' and 'manufacturing' industries. The Encouragement to Native Industries Act of 14 September 1869 empowered the Governor in Council to issue land orders 'for the purpose of encouraging any industrial pursuit within the Colony of Queensland'. It is unclear how much use was made of this legislation. Apart from one man who was granted a small coastal strip as a reward for having made 100 tons or so of solar salt, the only other documented case appears to be a petition from the Queensland Smelting and Assaying Company Ltd in 1874 for a grant of land on the grounds that it had, despite considerable financial and technical difficulties, built the first tin-smelting plant in Australia. As reported, the company's case appears to have been strong but the Select Committee decided that its activities did not come within the scope of the Act and therefore the company was not entitled to a grant of land. In the light of this affair, in which personalities rather than performance loomed large, it was perhaps just as well that the Act was rescinded the following year.

The Encouragement to Manufacturing Industries Act of 14 September 1869 was more specific since £1,000 was promised for the first £2,000 worth of woollen goods woven from wool grown in the colony, and £1,500 was to be paid for the first £1,500 worth of cotton goods made from colonial produce. As a further inducement

When each or either of the woollen or cloth manufactories shall have been established and shall have been in full working order for the period of two years certain and shall have been awarded the gratuities provided in the two preceding sections of this Act it shall be lawful for the Governor in Council to authorise the owners of the manufactories to select at the cost of their own survey in not more than three selections one thousand acres of agricultural first or second class pastoral land in any part of the colony. . . .

The apparent perversity that surrounds so much of the detailed industrial history of Queensland during these and later years is well illustrated by the fact that a fortnight after the land selection component of the bonus had been rescinded on 20 July 1875 a group of businessmen met at Ipswich to form the Queensland Woollen Milling Company Ltd. Even before the Governor formally opened the mill on 16 October 1877, 600 to 800 yards of cloth had been made and the proprietors were planning to claim the bonus two weeks later.⁶⁸ For some years the company was short of capital. Moreover, it received a miserable share of public contracts: during the eight years to the end of 1885, in fact, the government bought only 5,160 of the 27,270 yards it required from the company—the only one of its kind in the colony.

At various times other specific bonuses were proposed but failed to gain support. On 12 June 1879, for instance, it was suggested that an award should be made for the manufacture of pig iron, but when it was pointed out that similar inducements in the other colonies had simply been a waste of investors' money, the motion was withdrawn. Of more interest was a Bill, discussed in the Legislative Assembly in August 1879, which provided a bonus for meat curing companies by an assessment on stock. The bonus proposed was £5 per ton on all meat exported up to 5,000 tons to be paid for by a levy of £1 per 100 on all cattle and 4/- per 100 on sheep. The majority of members thought the idea ludicrous because it could pave the way for levies and bonuses on all kinds of products—on maize to support maizena makers, for instance, or on oranges to assist marmalade factories. Fourteen years later, however, attitudes had changed and legislation (57 Vic. no. 11) was passed on 26 September 1893 which levied 15/- per 100 on all cattle and 1/6d per 100 on all sheep in Queensland to finance advances to meat-works and dairy factories. Within a couple of years close to £100,000 had been paid or promised under The Meat and Dairy Produce Encouragement Act, 1893, to ten meat-works located along the coast from Brisbane in the south to Mareeba in the north.⁶⁹ Similarly, under The Sugar Works Guarantee Act, 1893 the government came to the rescue of the sugar industry by making it lawful for any company to apply to the Treasurer for permission to issue debentures to defray the cost of building and equipping sugar-works. By the middle of 1895 £72,000 had been guaranteed to three companies and it was anticipated that £197,000 more would be required during the next twelve months.⁷⁰ Support on this scale, unheard of in Australia up to this time, helps to explain the rapid expansion of employment opportunities during the 1890s (Fig. 14.5).

In a mere twenty-five years, Queensland moved from a situation in which the first iron casting was seen as a significant step forward to one in which the ability to build railway locomotives was almost taken for granted. Much of the explanation lies in the nature of the demand. If Queensland had had good natural harbours, for instance, there would have been less need for dredges, barges, tugs and navigational aids, and in the absence of sugar-milling and quartz crushing there would have been little call for heavy machinery. But activities like the milling of sugar and timber, gold-mining, and the smelting of tin and copper were subject to short- and long-run fluctuations as a result of changing circumstances within and beyond the colony. Thus the agitation, beginning in the late 1870s, for more government contracts to be placed with local firms and the introduction in the 1880s of an explicit element of protection in the customs schedules can both be seen as attempts to reduce the amplitude and frequency of the fluctuations by broadening the industrial base.

Spatially, the most important feature of Queensland's manufacturing was its dispersal along the coast especially in and around the main provincial centres like Maryborough, Rockhampton and Townsville. Unfortunately, the available data are unsuitable for any form of geographical analysis and it is impossible to do other than suggest that in 1890 more than two-thirds of the 16,000 factory hands (which includes people employed in meat-works and sugar-mills) were outside the Brisbane metropolitan area. One result of the assistance given to the meat, sugar and dairy industries during the 1890s was to give a renewed vigour to non-metropolitan manufacturing and enable provincial firms, such as the iron-foundries, to stave off the threat of Brisbane dominance which had begun to emerge during the 1880s. Few inland towns developed more than a narrow range of minor service industries, small sawmills, joinery shops, printeries, and the ubiquitous smithy and saddlery. At Toowoomba and Warwick on the Darling Downs, however, the activities also included flour-milling, malting and brewing. Indeed as a nice reversal of the usual process, Patrick and Thomas Perkins, who had opened the Downs Brewery at Toowoomba in 1869, floated a public company which by 1889 had a paid-up capital from Queensland and Victorian shareholders of £163,000, and developed their small Brisbane subsidiary into the third largest brewery in the colony. Occasionally, too, firms saw advantages in moving out of Brisbane, a classic example of precise locational decision-making being the shift of Cobb and Co.'s coach-building factory inland:

As our coach routes extended out West we commenced to notice that our vehicles built with the coastal seasoned timbers would not stand the dry inland climate, they would crack and gape at all joints. This became so serious at last that we decided to move our Factory to a suitable inland locality, and after considerable thought Charleville, nearly 500 miles inland, was chosen, and our whole plant and equipment moved to there [from Brisbane] in 1886. We had another Factory in Bathurst, N.S.W., and the machinery and plant from there were also removed to Charleville at the same time, making jointly a substantial and up-to-date plant, and a greatly increased staff of expert workmen. The effect of this move

was immediately apparent, for we purchased large stocks of timber and seasoned it in the same hot dry climate in which traps when built were used. . . .⁷¹

Most factory employees, however, earned their livelihood within a few miles of the coast: 'decentralisation' in the Queensland context meant something rather different from the situation in Victoria and New South Wales.

Western Australia

It would be difficult to imagine any contrast greater than that between the progress of Queensland and that of Western Australia where even by the census of 1891 the population still numbered less than 50,000 or barely 1.6 per cent of the Australian total. Manufacturing was on such a small, almost domestic, scale that it possesses largely antiquarian interest and could all but be ignored in the present context except for the growth of a relatively important hardwood timber industry. Only a brief background statement is thus required.

During the years from 1850 to 1868, when 9,668 convicts were transported to Western Australia, the population grew from 5,900 to 22,700. Part of this increase was accounted for, too, by the arrival of 5,500 assisted migrants; as against this, the numbers added by natural increase were small. Newly arrived convicts were generally employed on public works so that during the 1850s and 1860s considerable improvements were made to facilities in the leading settlements and, by the building of jetties, bridges and roads—such as that between Perth and Albany (Fig. 14.10)—to the communications between them. In due course a convict was granted a ticket of leave which enabled him to work for private employers in country areas. This provided the workforce needed to open up farmland (the cultivated area, about half under wheat and potatoes, expanded nearly sevenfold to 49,000 acres in 1869); to develop the pastoral industry which provided wool for export and meat for local consumption; and to expand the export trade in sandalwood to China, horses to India, and hardwood to the eastern colonies.

The funds spent by Britain on transportation, the rise in export income from a mere £22,000 in 1850 to £206,000 in 1869 (Table 14.13), and the growth in internal demand for food, building materials and small coastal craft, all helped to breathe some life into the embryo economy. But, as Crowley points out, fundamentally it had not altered: 'it was as much dependent in 1869 on growing food for itself and exporting wool to British manufacturers as it had been in 1850'.⁷² Despite the almost total dependence on imported supplies of all but the most simple kinds of manufactured goods, imports per head of population only rose from £8.17. 0 in 1850 to £9. 6. 0 in 1869.

The cessation of transportation in 1868 had a considerable impact on the colony because it meant both the ending of British expenditure and a much reduced rate of population increase. During the 1870s, in fact, departures exceeded arrivals:

Table 14.13 External trade, Western Australia, 1861-90 (£000)

Year	Exports							Imports	
	Wool	Timber	Sandalwood	Pearl shell	Lead ore	Gold	Other ^a	Total	
1861	54	2	25	—	1	—	14	96	148
1862	60	7	22	—	—	—	30	119	173
1863	84	3	25	—	2	—	29	143	157
1864	41	6	25	—	1	—	39	112	169
1865	102	16	13	—	8	—	40	179	168
1866	93	7	24	—	11	—	17	152	252
1867	87	5	18	1	3	—	60	174	205
1868	98	1	26	6	13	—	49	193	226
1869	94	14	33	6	8	—	51	206	257
1870	89	18	49	9	15	—	21	201	213
1871	111	15	27	13	5	—	28	199	198
1872	123	3	32	26	4	—	21	209	227
1873	132	5	63	28	12	—	25	265	297
1874	216	24	71	62	26	—	30	429	364
1875	182	24	66	65	28	—	26	391	350
1876	165	24	66	75	26	—	41	397	386
1877	200	37	32	12	47	—	45	373	363
1878	151	64	35	26	43	—	109	428	379
1879	175	70	35	86	33	—	96	495	407
1880	271	66	52	40	15	—	55	499	354
1881	257	79	77	39	11	—	40	503	405
1882	301	94	96	40	14	—	38	583	509
1883	225	80	56	32	7	—	47	447	517
1884	249	69	21	15	5	—	47	406	521
1885	248	68	36	43	3	—	49	447	650
1886	333	50	27	105	4	1	110	630	758
1887	334	28	35	110	5	19	74	605	832
1888	424	42	34	59	5	13	103	680	786
1889	396	63	57	89	3	59	94	761	818
1890	261	82	51	86	2	87	103	672	874

^a Of the total of £1,531,000, pearls accounted for £291,000, guano for £263,000, horses for £220,000, hides and skins for £145,000, copper ore for £100,000, wheat and flour for £62,000 and cattle and sheep for £18,000.

Source: W/ABB.

Fig. 14.10: Western Australia, location map of places and features mentioned in the text.

Quinquennium	Natural increase	Net immigration
1861-65	1,870	4,165
1866-70	2,055	1,699
1871-75	1,965	-98
1876-80	2,608	-49
1881-85	2,740	3,658
1886-90	4,364	8,179
Total 1861-90	15,602	17,554

As luck would have it, the 1868-9 and 1869-70 seasons were droughty and this, along with the appearance of wheat rust in the Victoria district north of Perth and the shortage of labour, brought about a depression in the agricultural and pastoral areas. Work also ceased at the Gwalla and Yanganooka copper mines and at the Geraldine lead mine, partly because of the shortage of miners but also because there were no teams available to take the ore to the coast for shipment.

The only bright note was the interest being taken by Victorian investors in the possibility of developing the export of hardwood timber on a commercial scale (see later), but initially even these efforts were hampered by the shortage of labourers and the difficulty of obtaining suitable vessels 'because of the great activity of the Newcastle [New South Wales] coal trade'. As the Colonial Secretary explained in 1871, Western Australia was isolated simply for want of regular steamship services even though there was ample inter-colonial trade for moderate-sized coasting vessels: however, it was 'not uncommon for a couple of months to pass by without receiving any communication from the far Northern or Eastern Settlements. . . .'⁷³ Nor can it be overlooked that the stream of male convicts had perpetuated the long-standing imbalance between the sexes but female migrants were not readily attracted to a colony where the cat-o'-nine-tails had scourged the backs and minds of men: 'our agents in England have found it difficult', wrote the Colonial Secretary, 'to procure young females'. But if they had few women to turn to for solace, the men did at least have the bottle. As Governor Weld explained to the Secretary of State for the Colonies in a dispatch dated 22 May 1871,

Many causes have been assigned for the slow progress of this Colony, but the fact has been too often overlooked, that no country can prosper when earnings are spent in drink instead of being profitably invested, which, as far as I can learn, has been more frequently the case here than in any country with which in the course of a very considerable colonial experience I have been acquainted.⁷⁴

These two themes—the absolute shortage of manpower and the fact that 'the class of people of whom the major portion of the labouring population is composed are not fit to cope with evil times'—remained dominant during the 1870s.

As a result of the political changes noted in the Prologue to Part E, the colony was empowered to raise loans for public works. During the decade to the end of 1881, £400,000 of loan money was spent on the construction of railways, telegraph lines and harbour works, and a further £939,000 by the end of 1890. In 1873 the Legislative Council approved the raising of a loan of £100,000 for the construction of the first government railway to convey lead and copper ore 34 miles from

Fig. 14.11: Railways built in Western Australia indicating dates of opening. Some sections were built as logging lines (see text).

Northampton for shipment at Geraldton (Fig. 14.11), but even before the line was opened in 1879 world lead prices were falling and thus the colony's exports of this metal dwindled in value from a peak of £47,000 in 1877 to £7,000 in 1883 and £2,000

in 1890. The second government line linking Fremantle with Guildford via Perth was opened in 1881 and gradually extended as shown in Fig. 14.11, and a 17 mile stretch was built from Geraldton to Walkaway in 1887. The important point is that the entire government railway system, in two separate areas, totalled only 188 miles in 1890. Apart from a few small tenders for wagons, virtually all the rolling stock and equipment was imported, and the Fremantle Railway Works (which even in 1893 employed only 120 permanent and 80 temporary hands) was not equipped to manufacture stock.⁷⁵ The other main railway opened during this period was the 243 mile stretch from Beverley to Albany which was built by a private company on the land-grant principle whereby 12,000 acres of adjoining Crown land were granted per mile of track. The Western Australian Land Company awarded the actual construction contract to C. & E. Millar, a Victorian company, and in turn they approached the government with a proposal to build a short spur line from Elleker to Torbay to give access to the karri forests in the area. Again, almost all the rolling stock was imported.

The recourse to the loan market and the increased responsibilities of the colony led to a series of revenue raising adjustments to the customs schedules. During 1871 and 1872 unsuccessful attempts were made to place a protective duty on flour but, against the wishes of the government, imposts were placed on wheat, grains, hay, butter, meat and other articles in which the colony was not self-sufficient. There is no need to consider in detail the amendments made to the schedules: during much of the 1870s there was, apart from specific duties on staples, a 10 per cent ad valorem duty on most goods except for items like implements, iron for bridges, and agricultural and sawmill machinery.⁷⁶ Increasing deficits on current account necessitated sterner measures on 7 October 1879 when most items previously on the short list were placed in the 10 per cent category and the remainder charged 12½ per cent. The next change in 1882 came about because the previous legislation was due to expire rather than because of immediate financial difficulties. For the first time an element of protection was explicitly introduced, even if expressed in somewhat guarded terms by the Tariff Commission concerned which believed

that the re-adjustment on the lines laid down will tend to promote trade. At the same time, [our] aim has been to foster all local industries without favouring any particular branch of the community.⁷⁷

The main step in fact was the creation of a 5 per cent class to embrace producers' materials and machinery. In 1886-7 the colony found itself in deficit to the tune of £79,000, and this provided the opportunity for a tariff of 6 January 1888 (51 Vic. no. 23) that was deliberately intended to protect items that were being made in the colony—including aerated water, doors, window sashes, worked timber and tinware—by placing them in a new 20 per cent category while, at the same time, the list of producers' materials in the 5 per cent category was considerably lengthened. Western Australia thus ended this period with a customs schedule which was designed to give its infant industries some measure of assistance.

Just as important, however, was the sharp increase in the rate of immigration

following the discovery of gold in 1885 at Halls Creek, a remote spot in the Kimberleys. This soon fizzled out but it had attracted experienced prospectors into the colony and these began to find fields elsewhere—at Yilgarn and Pilbara in 1888, Ashburton in 1890, Murchison in 1891, Coolgardie in 1892 and Kalgoorlie in 1893. During 1890 the colony produced 20,400 fine ounces of gold, most of it from the alluvial deposits in the Pilbara area. The population of the colony soared from 35,200 at the end of 1885 to 46,300 in 1890 and 101,100 in 1895, and the increase in consumer demand (after a time-lag because of the isolation and inaccessibility of the earlier gold-fields) and the orders for equipment and materials for the quartz workings were reflected in the sharp rise in factory employment in 1889 and 1890 (Fig. 14.5).

Prior to this upsurge in industrial activity, manufacturing in the colony had remained at a fairly simple level with little investment of external capital. The possibility of large-scale operations, limited already by the absolute size of the domestic market, was further reduced because of the paucity of urban centres with more than 1,000 inhabitants and the fact that these stretched from Geraldton in the north to Albany in the south (Fig. 14.12). Even if all settlements of 100 or more people are included, the whole 'urban' population amounted to only 13,800 in 1881 (46.5 per cent of the total) and 23,900 in 1891 (48.0 per cent). Some attempts were made to induce particular industries by offering bonuses—for the manufacture of castor oil in 1852, sugar in 1873, lead smelting in 1874 and canned fruit in 1889—but none of these came to anything. The most interesting, the lead smelting bonus gazetted on 24 November 1874, offered £2,500 for the erection of a works in the Northampton area within three years but no one made a bid to claim it; although a group of investors sought to have the offer renewed in 1879, the conditions laid down by the Legislative Council and the decline in world lead prices put paid to the idea.⁷⁸

The only industry which came to any prominence during this period was hardwood sawmilling which gave employment to about half the manufacturing workforce between 1871 and 1888. Beginning in 1855 a small export trade in jarrah had been developed by men like Yelverton (who established a mill at Quindalup in 1853), the total shipped by that time being recorded as 12,840,000 super feet. Experience was starting to accumulate in the eastern colonies and overseas that jarrah timber was particularly valuable for railway sleepers, wharf piles and shipbuilding because of its resistance to white ants and sea worms. Ultimately, on 6 December 1871, the secretary of Lloyd's Register of British and Foreign Shipping reported that that institution had rated jarrah timber suitable for shipbuilding, thus giving it an authoritative seal of approval.⁷⁹

During 1869 two companies, the Western Australian Timber Company Ltd and the Rockingham Jarrah Company Ltd, were formed in Victoria, with capital being subscribed in Melbourne, Ballarat and India. These sought concessions from the Governor of Western Australia: in return for undertakings to set up a mill, construct a jetty, and build a forest tramway, the Western Australian Timber Company received a grant of 200,000 acres in the Geographe Bay area, and the

Fig. 14.12: Urban population of Western Australia at the censuses held on 31 December 1859, 3 April 1881 and 5 April 1891. Towns with 100 or more population are depicted and those with 500 or more are named.

Rockingham Jarrah Company obtained 250,000 acres near Cockburn Sound. Both placed orders with Victorian foundries for equipment, including a small locomotive from the Phoenix Foundry at Ballarat. The former company opened a 12 mile line between its jetty at Lockeville and its mill at Yoganup in November 1871 (Fig. 14.11), and the latter completed its 23 mile tramway from the mill at Jarrahdale to the coast at Rockingham. The expected increase in shipments did not, however, immediately materialise. One reason was the shortage of manpower (and thus both the companies contemplated recruiting coolies) and another was the uncertainty of shipping services. But there is evidence, too, that the falling off in demand was due to some consignments of poor quality timber which temporarily brought the whole industry into disrepute.

The first real stimulus came in 1878 when the Victorian government placed an export duty on red gum (see Chapter 9) and the South Australian Railways Department turned to Western Australia for supplies of sleepers. Whereas exports during the five years to the end of 1877 had totalled 15,740,000 super feet, they were boosted during the next five years to 43,000,000 super feet, two-fifths of which came from the three companies operating in the Sussex district at Lockeville (originally established by the Western Australian Timber Company but sold in 1884 to South Australian interests); Hamelin (set up in 1882 to handle karri timber by M. C. Davies Karri & Jarrah Forests Company, an Adelaide timber firm); and Quindalup (the Yelverton concession).⁸⁰ This change in markets and company ownership from Victoria to South Australia tied the fortunes of much of the Western Australian industry to the prosperity of its eastern neighbour. The recession there in the mid-1880s thus affected Western Australian sawmillers more than it did those in Tasmania whose plight was mentioned earlier in the chapter. By 1890 the trade had not only revived but had been substantially increased by the establishment of an additional milling complex to the west of Albany by C. & E. Millar, the contractors, as indicated earlier, for the Albany-Beverley railway. According to Robertson⁸¹ the exports of 14,066,000 super feet were largely in the hands of four companies:

M. C. Davies and Company (Hamelin)	5,023,000
The Neil McNeil Company (Jarrahdale)	4,265,000
C. & E. Millar (Torbay)	3,127,000
H. J. Yelverton (Quindalup)	863,000
All other companies	788,000

Even at this stage, then, the concentration of the Western Australian timber industry in relatively few hands had begun. Railway developments during the 1890s, especially the construction of a line between Perth and Bunbury in 1893, led to the establishment of new sawmilling firms. But in 1897 C. & E. Millar floated Millars Karri and Jarrah Forest Ltd in London with a nominal capital of £350,000 which, when re-registered five years later as Millars' Karri and Jarrah Company (1902) Ltd, brought together the leading companies into a combine that virtually controlled the industry for the next fifty years.⁸²

This brief review emphasises that even by 1890 factory industry in Western Australia was still of small importance compared with that in the other colonies. Exports of processed and manufactured goods, apart from sawn timber, were negligible, and virtually the whole stimulus came from the day to day needs of a tiny domestic market (barely the size, in population terms, of Newcastle and environs in New South Wales) in which import replacement was taking place only slowly. Expenditure on public works was on such a small absolute scale that there was little incentive for private or public investment in well-equipped heavy engineering or metal-working shops. The impact of railway construction and operation was, in any case, further reduced because less than half the railway mileage was owned by the government, and the private railway and land development companies simply bought most of their equipment from established firms in southeastern Australia and overseas. Although the gold discoveries of the late 1880s and 1890s helped to set in motion a new train of developments which were quickly reflected in increased factory employment, it was not until well into the twentieth century that industrial technology in Western Australia began to catch up with that in the eastern States.

15 Manufacturing in Australia: Retrospect and Prospect

Some of the ways in which the themes discussed at the beginning of the book worked out in each colony have now been illustrated. Much detailed investigation still remains, of course, to be done: studies of particular entrepreneurs, firms, industries and towns are needed that would examine the processes of industrial development in the kind of context provided by this book rather than as isolated events in time or space. Hardly any basic research has been attempted in Australia on a wide range of related topics such as the sources of industrial capital and the role played by the banks and other institutions that sooner or later became caught up in the affairs of most of the larger public companies, the nature and influence of technological advances, the development and spread of innovations, and the effects of changes in consumer tastes and preferences. But here, however, some rather more formal comparisons are needed in order to relate the growth of factory industry in the separate colonies and set it into the broader context of Australian economic development.

Table 15.1 Factory employment in Australia, 1851 to 1890-1
(000)

Colony	1851 ^a	1860-1	1870-1	1880-1	1890-1
New South Wales	4.7	6.0	17.9	33.2	50.2
Victoria	0.6	5.3	19.1	40.3	58.6
South Australia	2.1	3.1	5.9	9.7	12.8
Queensland	0.2	0.3 ^a	3.3	5.6	16.0
Tasmania	3.0	3.2	5.1	6.6	6.5
Western Australia	0.2	0.3 ^a	0.7	1.8	5.1
Australia	10.8	18.2	52.0	97.2	149.2

^a Estimates from literary sources which should be regarded as orders of magnitude only.

Source: Estimates derived as explained in Appendix 1.

The first sixty years saw the emergence of simple kinds of manufacturing in isolated enclaves on the periphery of a continent that had been awakened from its Dreamtime and drawn into the world as a distant dumping ground for shiploads of miserable miscreants. At this stage all industrial activity was born of necessity: as each settlement was founded there was little thought other than to provide the means of survival and to supplement imported supplies by making the best use of

the materials and resources on hand. The tiny, separate markets gave little scope for industrial expansion and, apart from Tasmanian and South Australian flour and some Sydney-made consumer items, the flow of processed and manufactured goods between the colonies remained small. In any case, the land industries absorbed much of the available capital and labour, and the linkage effects of sheep and cattle raising and wool and hide exporting were, so far as manufacturing was concerned, extremely weak. It is impossible to make satisfactory statements even about the total numbers of factory workers in each colony during the first half of the nineteenth century; the figures for 1851 shown in Table 15.1 have been estimated from various sources and must be regarded as orders of magnitude only. Nonetheless, there is no doubt about the commanding lead held by New South Wales which accounted for at least two-fifths of Australian factory employment, although it must also be noted that this was proportionately no more than its share of the total population.

During the 1850s Victoria, where the metal-working industries were boosted by the demand for gold-mining equipment and service industries by the rapid growth of settlements, began to challenge this lead and early the following decade overtook its northern neighbour where activities had not fully recovered after being undermined by the massive increase in speculative imports. Victorian factory employment then continued to grow at a faster rate than that in New South Wales except during the latter part of the 1860s and the early 1880s:

	Average annual growth (per cent) by quinquennia					
	1861-65	1866-70	1871-75	1876-80	1881-85	1886-90
Victoria	17.6	11.1	10.2	5.4	5.0	2.7
New South Wales	9.5	13.6	8.2	4.6	7.5	1.1

By the end of 1890 Victoria and New South Wales had 39.3 and 33.6 per cent, respectively, of the Australian factory workforce numbering altogether about 149,000.

The view taken here is that too much stress has been laid on the effects of 'protection' in Victoria and 'free trade' in New South Wales—labels in any case that do not fully reflect the actual conditions under which industrial development took place. But it must also be admitted that it is well-nigh impossible to unscramble these effects from the mass of other influences involved. Thus, the rapid expansion of factory activity in Victoria during the 1860s and early 1870s has to be explained in terms of many factors: the attempt to catch up with the shortage and poor standards of residential accommodation; the growth of towns; the attempts by communities to create alternative employment opportunities for displaced gold-miners and their families; the determination of country engineering firms to become less dependent on mining machinery orders; the offer of bonuses by the government for new forms of industrial endeavour; the availability of speculative finance that was willing to support, among others, woollen-milling and meat canning ventures; the multiplier effects of public investment amounting to £16,926,000

(compared with £11,752,000 in New South Wales, excluding roads in both cases) from 1861 to 1875; and the award of government contracts, especially after 1870, to local manufacturers. Then during the latter part of the 1870s the rate of growth of several industries—building materials, textiles, leather and food products—fell off considerably as a result of a series of circumstances including the slackening in non-metropolitan town formation, the difficulties encountered by textile firms, and the collapse of many of the meat canning companies. This was partly compensated for by the fairly steady progress displayed by the metal and printing trades, and the doubling of employment in the footwear industry between 1874 and 1881, an episode largely related to specific changes in tariffs and drawback regulations.

Meanwhile factory employment in New South Wales made slower, but in some respects more soundly based, progress. The metal trades, for instance, developed in response to longer-term demands such as for shipbuilding and repairing, and were hardly affected by the decline in gold production since this had mainly been obtained from alluvial deposits with little use of machinery. Estimated new and replacement investment in factory buildings and equipment prior to 1880 suggests that the outlays per worker employed were greater than in Victoria, a result consistent with literary evidence indicating that New South Wales manufacturers, concerned about the higher cost of labour,¹ were more ready to introduce mechanised methods in the footwear and clothing industries as well as in the heavy engineering trades. Moreover, investment tended to be less speculative in character with no episodes comparable to the rush to form meat canning and woollen-milling companies in Victoria during the late 1860s and early 1870s. Probably, too, there was a more conservative attitude by banks and other lending institutions towards secondary industry (a point, however, still to be examined in detail) and a greater reliance on private funds including the reinvestment of profits by individuals and partnerships which continued to own and operate most enterprises. This may also help to explain the caution displayed by firms towards government work especially after the *débâcle* over locomotive contracts in 1869–71 and subsequent labour disputes. During the 1870s industrial expansion in New South Wales was sustained by the acceleration of non-metropolitan town formation, the spread of activities like brewing into country areas, the rise of the sugar industry along the North Coast, an increase in shipbuilding and repairing during the last half of the decade, and a growing propensity for Melbourne firms to set up branches in the rival metropolis.

By 1877–8 the factory workforce structures of the two colonies were not dissimilar, as can be seen by comparing the proportions engaged in the main activities:²

	1877-78		1883-84		1889-90	
	N.S.W.	Vic.	N.S.W.	Vic.	N.S.W.	Vic.
Building materials and furniture	15.5	15.4	22.3	16.8	17.0	21.2
Metal goods	19.2	18.6	22.6	20.0	22.7	23.8
Clothing	22.1	17.6	12.8	18.0	13.9	13.8
Footwear	6.3	7.3	5.3	8.3	5.0	6.4
Food, drink and tobacco	18.8	15.5	18.5	13.7	19.6	12.9
Paper and printing	3.9	7.3	5.9	8.1	9.3	9.3
Skins, tanning, etc.	9.0	7.1	7.4	5.0	5.7	4.1
Other	5.2	11.2	5.2	10.1	6.8	8.5

There were, of course, some differences of emphasis, with the food, drink and tobacco group (having large numbers employed, partly seasonally, in sugar-milling), and the clothing and tanning groups being relatively more important in New South Wales, and the footwear, paper and printing, and 'other' groups being more significant in Victoria. During the next few years the structures first diverged and then became more similar although, in the meantime, the relative importance of some industries had altered. Among other things, these changes reflect the high level of building activity during the early 1880s in New South Wales and later in Victoria, and the stimulus given to the metal trades by contracts for railway equipment and structural materials and the emergence of new branches like the manufacture of lifts, wire and domestic appliances. But the greatest fluctuations occurred in the clothing trades which in Victoria absorbed 3,400 hands between 1880 and 1882 as a result of tariff increases late in 1879 (one of the few occasions when they may have been significant); changes in drawback arrangements which allowed local manufacturers to obtain a refund of duties on materials incorporated in goods exported; low railway freights on consignments sent to southern New South Wales; and—probably most important of all—the growing concentration of a pool of female labour in Melbourne which, because more and more girls came to dislike domestic service and there were few other employment opportunities, provided a source of unorganised labour that could readily be exploited. This burst of growth came to an abrupt end after 1882 because of a reaction by employees against low wages and poor working conditions, price cutting by importers who also benefited from falling ocean freight rates, counter-measures by New South Wales manufacturers, and the decline of export markets in South Australia, Tasmania and New Zealand. Meanwhile, the New South Wales clothing industry, which had actually employed more hands than Victoria in the late 1870s (a point usually overlooked), declined absolutely as it was unable to compete against Melbourne-made goods, and only revived again towards the end of the 1880s. But by then, as in Victoria, it had lost ground in comparison with other industrial activities.

Although New South Wales had 7,000 (or 14 per cent) fewer factory hands than Victoria in 1890 this does not fully represent their respective positions. Wage rates in this latter colony tended to be somewhat lower and the large numbers of poorly paid clothing workers reduced the *average* income per hand still further. If it is assumed, following Butlin,³ that the estimated average factory income per annum

made up one-fifth of gross output, the output per employee in 1890 would have been £392 in Victoria and £437.10.0 in New South Wales. Using the estimated factory workforce figures generated in Appendix 1, the gross manufacturing output for this year can be computed at £22,986,000 for Victoria and £21,984,000 for New South Wales, results that agree tolerably well with official calculations (published in each colony on the basis of 1891 census data) after allowing for the fact that the employment figures used here are greater and imply a wider coverage of 'manufacturing' than adopted by the colonial statisticians.⁴ If, in addition, Butlin's suggestions are accepted that materials and fuel made up 60 per cent of gross output and miscellaneous expenses a further 4 per cent, the value of gross factory product can be computed. The results⁵ for three sample years (current prices) are:

	Gross output (£m)		Gross product (£m)	
	New South Wales	Victoria	New South Wales	Victoria
1870	6.9	7.4	2.5	2.7
1880	13.3	15.4	4.8	5.5
1890	22.0	23.0	7.9	8.3

The proportion of the Australian factory workforce in each of the remaining four colonies at decennial intervals indicates the long-run decline in the relative importance of Tasmania and South Australia and the rising significance of manufacturing in Queensland and, to a much lesser extent, in Western Australia:

	1860-61	1870-71	1880-81	1890-91
Tasmania	17.7	9.8	6.8	4.3
South Australia	17.2	11.4	9.9	8.6
Queensland	1.6	6.4	5.8	10.7
Western Australia	1.6	1.4	1.9	3.4
Total	38.1	29.0	24.4	27.0

Not much need be added to the detailed discussion of the circumstances in these colonies given in the two preceding chapters, but it is worth illustrating the erratic way that their industrial workforces grew (or at one stage in Tasmania even contracted):

	Average annual growth (per cent) by quinquennia					
	1861-65	1866-70	1871-75	1876-80	1881-85	1886-90
Tasmania	5.4	3.9	3.3	1.9	-1.1	0.8
South Australia	6.8	6.2	3.2	7.0	0.8	4.8
Queensland	11.6	45.1	9.4	1.3	17.5	5.0
Western Australia	10.8	8.2	14.2	5.0	12.4	9.1

The high rates displayed at first by Queensland and Western Australia are, of course, exaggerated because of the small numbers of factory hands there in 1861 but, even so, the upsurge of industrial activity in the northeastern colony during the latter part of the 1860s was among the more remarkable events of this period especially as it coincided with the financial and political turmoil of 1866-7. It reflected the quadrupling of the population from 30,000 to 120,000 between 1861 and 1871, the rise of the sugar-milling and meat preserving industries, and the demand for metal goods by these and other ventures. Queensland's manufacturing was again boosted in the early 1880s when a shortage of railway equipment led to

orders being placed locally and a new phase of expansion occurred in the sugar industry. In Western Australia the spurts of growth in the early 1870s and again ten years later were largely related to events in the hardwood sawmilling industry which dominated the colony's manufacturing workforce for much of this period.

Using the methods previously described, Butlin estimated the gross output and, by implication, the gross product in current prices of Tasmanian and Queensland factories. However, in comparison with the factory workforce estimates prepared for this book (Appendix Tables A1.10 and A1.12) Butlin appears to overstate manufacturing employment in Tasmania, and to overstate it in Queensland until 1882 and then understate it for the remainder of the decade. In turn, of course, this affects the estimates of gross output and product as can be seen from the following comparisons (in current prices):

	1870		1880		1890	
	Butlin	Linge	Butlin	Linge	Butlin	Linge
Gross output (£m)						
Tasmania	1.4	1.3	2.2	1.8	2.5	2.1
Queensland	1.2	1.2	2.0	1.9	5.2	5.7
Total	2.6	2.5	4.2	3.7	7.7	7.8
Gross product (£m)						
Tasmania	0.5	0.5	0.8	0.6	0.9	0.8
Queensland	0.4	0.4	0.7	0.7	1.9	2.1
Total	0.9	0.9	1.5	1.3	2.8	2.9

These differences may seem trivial but they attain some importance because Butlin then assumed that the gross output of these two colonies taken together was equal to that of South Australia and Western Australia (for which his data were inadequate). Here separate estimates have been prepared for these latter colonies by combining the employment figures from Appendix 1 with Butlin's wage indices,⁶ and these can be set out (in current prices) as follows:

	1870	1880	1890
Gross output (£m)			
South Australia	1.5	2.6	4.2
Western Australia	0.2	0.5	1.7
Total	1.7	3.1	5.9
Gross product (£m)			
South Australia	0.5	0.9	1.5
Western Australia	0.1	0.2	0.6
Total	0.6	1.1	2.1

Thus when Butlin's estimates for the four colonies are taken together they appear to be rather too high:

	1870		1880		1890	
	Butlin	Linge	Butlin	Linge	Butlin	Linge
Gross factory output (£m)	5.2	4.2	8.4	6.8	15.4	13.7
Gross factory product (£m)	1.8	1.5	3.0	2.4	5.6	5.0

It would seem, then, that the absolute and relative importance of manufacturing in Victoria and New South Wales must be emphasised even more.

To facilitate comparisons over time, the annual estimates of factory production

£(000)

Fig. 15.1: Estimated gross factory product of Australian colonies 1861-90 (deflated series based on 1910-1 prices).

for each colony have been deflated on the basis of Butlin's price index for manufactured goods.⁷ The results are shown in Fig. 15.1. Computed figures of this kind are, of course, subject to several possible sources of error and, taken

individually, are unlikely to be very precise; attention is better directed, therefore, to the general shape of the profiles which conforms remarkably well with the literary evidence quoted in earlier chapters. In both Butlin's and the author's series for Australia as a whole there is a distinct falling off in the average rate of growth after 1877:

	1861-3 to 1876-8	1876-8 to 1887-9
From Butlin's estimates (per cent)	11.2	5.3
From author's estimates (per cent)	10.1	5.3

This change was heavily weighted by events in Victoria and New South Wales where there was a reorientation of manufacturing from the processing of local resources to the more deliberate attempt to replace imported goods, especially those like clothing, footwear and millinery which required an intensive use of labour. This generalised interpretation does not, however, accurately reflect circumstances in the other colonies. In Queensland, for instance, the value of factory production increased at a very high rate between 1861 and 1871, slowed markedly from 1871 to 1876, and then forged ahead again until 1889, and in Tasmania industrial progress was extremely slow after 1877. Nonetheless the period from 1861 to 1889, taken as a whole, can be characterised as one in which manufacturing in most colonies displayed sustained long-run growth:

	Average annual growth (per cent) 1861 to 1889		
	Factory product (deflated series)	Factory employment	Total population
Queensland	15.6	17.0	8.9
Western Australia	11.3	11.5	4.3
Victoria	8.9	9.0	2.5
New South Wales	8.1	7.7	4.0
South Australia	6.1	4.7	3.0
Tasmania	3.4	2.1	1.6
Australia	8.3	7.6	3.4

The rapid rise of manufacturing can only be fully appreciated when related to the development of other sectors of the economy. One indication is given by the growing proportion of the total workforce earning a livelihood at factory workbenches in the four main colonies:

	Per cent of workforce employed in factories			
	1861	1871	1881	1891
New South Wales	3.9	8.6	10.4	10.6
Victoria	2.2	6.8	11.2	12.0
Queensland	2.7	6.1	6.0	8.8
South Australia	6.7	9.0	8.5	9.8

These calculations are based on the author's estimates of the factory workforce since it is impossible to reorganise satisfactorily the published data from the 1861, 1871 and 1881 censuses, which are a mixture of 'industrial' and 'occupational' classifications, even into major groupings. In each colony (but especially in Victoria and New South Wales) there was also a shadowy fringe of 'makers' cum

'dealers', mainly in the clothing, footwear and furniture trades, which means that the proportion engaged in 'manufacturing' of all kinds was somewhat greater,⁸ a point that can be illustrated by the more detailed analysis of the 1891 census results in Table 15.2. Together, formal and informal manufacturing activity in each colony absorbed a proportion of the workforce second only to the agricultural-pastoral-forestry group.

The importance of the role played by formal factory industry becomes even clearer when expressed in terms of its contribution to gross domestic product. The results of combining Butlin's deflated series for all other sectors with the deflated factory series calculated for this book are set out for Australia as a whole in Table 15.3. Whereas factory industry made only a modest contribution to gross domestic product in the early 1860s it had established itself as one of the leading sectors by the 1880s, reflecting fundamental shifts in the economy as Australia developed into a settled, wealthy society in which 60 per cent of the population lived in towns of 500 or more inhabitants. The growth of factory product at an average of 8.3 per cent a year (constant prices) from 1861 to 1889 was exceeded only by railway earnings at 13.9 per cent (which at no stage, however, made a substantial contribution to total product), and was considerably greater than that of gross domestic product as a whole (4.9 per cent), and the other leading sectors including the pastoral industries (6.7 per cent), building and construction (6.6 per cent), and distribution (5.7 per cent). By any criterion this was a notable achievement.

The first hundred or so years of European settlement in Australia can be summarised as being a period of 'industrial awakening'. This volume is, of course, not the conclusion of the story, but the years 1889 and 1890 marked the end of a period of rapid industrial growth and formed a turning point in several other respects. Public companies with multiple branches were beginning to play a more significant role; governments were taking initial steps to expand exports by organising and subsidising certain processing industries; overseas investors were becoming interested in the potential offered by meat processing, timber-milling and other activities; the community was demanding effective legislation to improve working conditions, to prevent the abuse of youngsters, apprentices and female workers, and to control pollution and other kinds of industrial nuisance; employee and employer groups were being formalised and recognising that their problems and the solutions transcended political boundaries; new technology was emerging which—like the reticulation of electricity and the extension of the telephone systems—was to have a profound effect on the organisation of industry and the society in which it operated; and the climate of opinion in New South Wales was moving towards the acceptance of protection and thus, in turn, enhancing the possibility of federation. In short, by the end of this period, the 'colonial' era of manufacturing was being replaced by some of the trappings of a modern industrial society. Spatially, too, the late 1880s saw the emergence of new forces: capital city firms were becoming more directly involved in non-metropolitan industry; 'decentralisation' had appeared as a live issue in country areas; manufacturers

Table 15.2 Classification of workforce, Australian colonies, census April 1891^a
(per cent)

Industry group	N.S.W.	Vic.	Qld	S.A.	Tas.	W.A.	Australia
Agricultural and pastoral	24.6	20.7	29.9	28.1	31.9	30.2	24.7
Mining	6.9	4.7	6.5	2.5	6.6	5.0	5.5
Manufacturing: factories	10.6	12.0	8.8	9.8	9.8	16.9 ^b	10.9
Manufacturing: other ^c	5.2	7.0	3.3	3.8	2.3	0.3	5.6
Building and construction ^d	14.1	14.5	14.0	14.3	14.0	10.5	14.1
Transport and communications	6.6	6.4	8.0	8.6	5.3	11.8	6.9
Finance and property	1.7	1.9	2.5	1.5	2.7	1.7	1.9
Other commercial	10.1	12.0	8.1	11.9	7.6	5.0	10.3
Professional services	5.1	4.6	4.0	4.3	4.7	3.5	4.7
Public service ^e	1.7	1.5	2.0	2.4	1.7	2.4	1.5
Domestic service, etc. ^f	11.8	11.5	11.4	11.3	11.7	10.5	11.6
Independent and undefined	1.6	3.2	1.5	1.5	1.7	2.2	2.3
Total ^g	100.0	100.0	100.0	100.0	100.0	100.0	100.0

^a Excludes Chinese and Aborigines.^b May include some forestry workers which are classified in the 'agricultural and pastoral' group in other colonies.^c Includes makers cum dealers, and home-workers.^d Also includes undefined 'general labourers'.^e Excludes employees in railways and other government enterprises.^f Includes workers in hotels, accommodation, etc.^g Actual workforce figures are: New South Wales, 471,887; Victoria, 493,977; Queensland, 181,102; South Australia, 123,362; Tasmania, 61,408; Western Australia, 24,805; and Australia, 1,356,541.

Source: Colonial censuses, 5 April 1891.

Table 15.3 Share of industrial subdivisions in Australian gross domestic product (deflated series) 1861-90 (per cent)

Year	Pastoral	Agricul- tural	Mining	Dairying	Factories	Construc- tion	Water transport	Railways, tramways	Public services	Finance	Distrib- tion	Other services	Rents
1861	7.8	7.3	15.1	3.9	4.9	10.3	0.9	0.2	7.8	4.9	12.1	15.7	9.1
1862	9.0	3.6	15.0	3.9	5.6	9.6	1.1	0.2	8.3	4.9	13.1	16.1	9.6
1863	7.1	4.9	13.8	4.4	6.3	11.4	0.9	0.2	8.2	5.4	11.8	16.0	9.6
1864	9.9	5.3	12.5	4.5	5.6	10.9	0.8	0.3	7.8	5.5	12.9	14.8	9.2
1865	8.5	5.7	12.5	3.8	6.7	11.5	1.0	0.5	8.0	5.6	11.0	15.6	9.6
1866	10.6	5.2	11.6	2.8	7.7	8.4	1.1	0.5	8.8	5.6	13.5	14.7	9.5
1867	12.6	8.3	9.9	2.9	7.9	8.9	1.0	0.4	7.5	5.2	13.3	13.2	8.9
1868	12.8	5.2	10.8	3.2	8.7	11.6	1.1	0.4	7.4	5.3	11.8	12.8	8.9
1869	10.6	6.1	10.2	3.0	9.5	11.2	1.0	0.4	6.6	4.8	14.6	12.9	9.1
1870	15.4	6.8	8.4	3.4	9.3	9.1	0.8	0.4	6.2	4.9	13.9	12.5	8.9
1871	11.0	6.6	10.6	4.0	10.2	9.1	1.0	0.5	6.8	5.1	11.6	13.9	9.6
1872	13.6	6.3	8.9	3.6	9.1	11.0	1.0	0.5	5.5	5.2	13.6	12.7	9.0
1873	14.9	6.4	7.4	4.4	8.3	8.9	1.0	0.5	5.1	5.5	17.3	11.7	8.6
1874	15.5	5.6	7.5	3.9	9.3	10.1	1.0	0.6	5.4	5.8	15.6	11.3	8.4
1875	16.6	5.6	6.9	3.3	9.9	12.3	1.0	0.6	5.3	5.1	14.5	10.9	8.0
1876	15.0	5.4	6.5	3.4	10.8	12.8	1.1	0.7	5.6	4.9	14.1	11.2	8.5
1877	10.8	6.7	5.5	3.6	11.5	17.2	1.0	0.9	5.9	4.9	12.6	10.9	8.5
1878	14.7	6.9	4.7	3.9	10.4	14.3	1.0	1.0	5.6	4.9	13.8	10.8	8.0
1879	15.3	7.3	4.6	3.1	10.5	12.3	1.1	1.0	5.8	4.6	15.3	10.9	8.2
1880	15.4	8.0	4.5	4.8	10.2	13.5	1.0	1.2	5.6	4.2	12.8	10.8	8.0
1881	13.6	7.0	4.5	4.7	11.2	16.2	1.0	1.3	4.6	3.8	13.4	10.8	7.9
1882	11.3	7.1	4.7	2.9	12.7	14.7	1.2	1.6	5.2	4.8	13.3	11.7	8.8
1883	14.1	6.7	4.1	3.5	11.8	14.9	1.1	1.5	5.1	5.1	12.9	11.0	8.2
1884	9.3	7.6	4.3	3.3	12.7	15.8	1.2	1.8	5.5	5.1	12.7	12.0	8.7
1885	12.1	6.6	3.8	2.9	12.3	14.9	1.1	1.8	5.3	4.9	13.8	11.8	8.7
1886	11.7	5.6	3.7	3.2	11.9	18.3	1.1	1.8	5.5	4.5	11.8	12.0	8.9
1887	14.3	6.0	3.8	3.5	11.6	16.8	1.1	1.7	4.8	4.2	12.9	10.9	8.4
1888	11.2	6.1	4.0	3.5	11.6	17.9	1.1	1.9	4.3	4.2	14.3	10.9	9.0
1889	12.5	5.2	5.0	3.4	11.5	16.2	1.0	1.9	4.3	4.5	15.0	11.0	8.5
1890	14.2	6.4	4.2	3.8	10.9	14.0	1.2	2.2	4.2	5.0	12.8	12.0	9.1

Source: Calculated from Butlin, *Australian Domestic Product*, p. 460, incorporating the author's own series for factory product. Butlin's series based on 1910-1 prices.

were beginning to seek sites in the outer suburbs of the larger centres; and companies were emerging with productive capacity in more than one colony. Although, of course, Federation was a significant event in its own right, the main effect from an industrial point of view was to reinforce or retard structural and spatial trends that were already in evidence ten to fifteen years earlier.

A good deal of emphasis has been given in these chapters to the dilemmas facing colonial manufacturers both individually and collectively, the processes of adjustment in which they were involved, and the long intervals that often occurred between ambition and achievement, or failure. But it would be wrong to construe this as a critical or supercilious commentary. The real wonder is not that problems arose and took time to resolve but that factory industry made the kind of progress it did especially as many of the difficulties faced then are no less intractable now despite the vast expansion of knowledge and accumulation of experience in the meantime. Indeed, some of the controversies reported—over tariffs, decentralisation, and even the allocation of pipe-making contracts to overseas firms—must surely give a feeling of *déjà vu* to the reader who in the 1970s can see such episodes repeating themselves with uncanny precision.

APPENDIX

A Note on Statistics of Manufacturing in Australia 1860 to 1900

Appendix 1 A Note on Statistics of Manufacturing in Australia 1860 to 1900

On 3 October 1905, during the debate on the Commonwealth Census and Statistics Bill, a member of the House of Representatives commented that 'the honourable member has only to investigate the industrial statistics of the various States to recognise the necessity of some Federal power to arrange them upon a uniform basis'. During the nineteenth century each of the Australian colonies collected statistics of various kinds¹ but their approach to industrial data left much to be desired. In 1896 New South Wales and Victoria conducted 'a considerable amount of correspondence' which led them to define an industrial establishment as 'any factory, workshop, or mill where four or more persons are employed or power is used'.² Then in 1902 Statisticians of all the States agreed to this definition and to other matters relating to methods of collection and presentation. Even so it was several years before reasonable uniformity was achieved: for example, up to and including 1905, Queensland still incorporated all establishments with two or more hands in its industrial statistics, and for several years thereafter continued to publish factory data in a different way from the other States. The Census and Statistics Act, 1905 tidied up some problems but still left State Statisticians with powers and responsibilities stemming from prior legislation, including the Census Act, 1901 in New South Wales; the Statistics Collection Act, 1902-3 in Victoria; the Statistical Returns Act, 1896 in Queensland; the Industrial Statistics Act, 1897 in Western Australia; and the Statistical Returns Act, 1877 in Tasmania.

The inadequacy of many of the industrial data for the period between 1860 and 1900 and their lack of comparability over time and between colonies has led to the preparation of the special tabulations detailed in this Appendix. This has involved two main processes. First, some activities (such as stone crushing, threshing, wool-washing and laundering) have been excluded, and estimates for others (such as baking) included in an effort to embrace, so far as possible, the same range of industries in each colony. In addition, special series have had to be devised because the Colonial Statisticians from time to time changed their definitions (such as by including all cabinet-making factories instead of only those operated by steam). Second, for all or part of the period there are no factory employment statistics for some colonies and thus data about the numbers of establishments have had to be used as the basis for deriving employment series.

An attempt has been made—though not always successfully—to disaggregate the annual estimates of factory employment for each colony into the sixteen industry classes used by the Commonwealth Bureau of Census and Statistics up to 1967-8 which were originally devised in 1930-1 and modified in 1945. It can be argued that

this relatively modern classification is not wholly appropriate to nineteenth century manufacturing because of differences in materials, processes and products. Thus 'conveyances' in the nineteenth century meant carts and carriages which required as much woodwork as metalwork whereas now it would very largely mean motor vehicles. In recognition of this problem the main components of Class IV (industrial metals, machines and conveyances) have been detailed separately. Similarly, boiling down, which varied in importance between the colonies and was subject to considerable year to year fluctuations, has been shown separately from the remaining industries in Class III.

Emphasis has been placed on employment estimates because of the lack of adequate data about other indicators such as the gross or net values of production. Most of the data have been drawn from the *Statistical Registers* or *Blue Books* of each colony since these are the only sources from which annual estimates can be compiled, but wherever possible these have been checked against information published from time to time elsewhere (such as in reports relating to forest sawmills and railway workshops). Despite the detailed account of omissions, additions and allowances given in this Appendix, the series thus produced must be treated with caution, for neither the statistical nor the literary evidence is good enough to verify that they adequately reflect changes over time or between industry groups. It is not always clear to what extent the modifications in collection methods affected comparability; it is sometimes difficult to trace whether declared changes in coverage actually represented discontinuities or simply tardy statements of previously adopted policies; and it is usually not made explicit, until the latter part of the 1890s, whether some numerically significant groups like managers, proprietors, carters, home-workers and so on were included.

Three previous attempts have been made to develop industrial employment series. H. R. Edwards, 'Employment in the New South Wales Manufacturing Industries, 1877 to 1938-39', sets out details for sixteen major classes and some sub-classes for New South Wales as a whole. Edwards's series have much in common with those calculated *ab initio* for this book, although it is clear that different judgments have been reached about omissions and additions and about the allocation of industries to classes. N. G. Butlin has also calculated series for four of the colonies (*Australian Domestic Product*, pp. 159-63 and *Investment in Australian Economic Development*, pp. 203 and 207-8) but no explanations are given for the differences in some of the series published in these two sources. In an unpublished seminar paper, dated 27 May 1965, A. R. Hall (The Australian National University) also presented an analysis of 'Victorian Manufacturing Employment 1860-1900'. Butlin's 1962 and 1964 and Hall's 1965 figures for total employment in Victorian manufacturing are set out in Table A1.4: it is only fair however, to point out that Hall gives many warnings about the discontinuities in his series.

New South Wales

Statistical Register

Prior to the 1877-8 statistical year no industrial employment data were published in the *Statistical Register* for New South Wales. For the period from 1861-2 to 1876-7, therefore, estimates have been made for this colony based on (i) the number of establishments, (ii) the average employment per establishment in the same range of industries during the three years ending 31 March 1880, and (iii) allowances for railway workshops, and for tailoring, dressmaking and bread baking. Necessarily these estimates are somewhat speculative.

From 1877-8 employment data for individual industries were published annually (except for the period from 1 April to 31 December 1891), and these have been re-sorted into the sixteen industry classes. The size of the omissions and additions made, and the overall effect of these, have been shown in Table A1.1 which also points up how the lack of consistency in the *Statistical Register* coverage affected the apparent industrial progress of the colony. The main changes made here can be briefly summarised.

Omissions

- (i) Waterworks, the mint, and air engines omitted when shown in the *Statistical Register*.
- (ii) Wool pressing omitted in 1886-7 and 1887-8.
- (iii) Laundries omitted from 1877-8 to 1887-8 inclusive.
- (iv) Stone crushing and quarrying omitted throughout.
- (v) Chaff-cutting omitted from 1886-7 to 1900 inclusive.
- (vi) Employment in gas distribution omitted from 1877-8 to 1895 (after which it was officially omitted). For official estimates back to 1887-8 see Table 14 in *Statistical Register*, 1897, p. 526; prior to that employment in gas-works has been reduced by one-quarter.
- (vii) Several adjustments have been made in the light of footnotes in the *Statistical Register* correcting previous errors. For example, the *Statistical Register*, 1879, p. 183 notes that employment in printing was overstated in 1878.

Additions

- (i) An estimate for bakeries added from 1877-8 to 1890-1 and from 1893 to 1900. The series was based on the figure given in 1892, which includes bakeries, and the fluctuations of four staple cereal industries in Class IX.
- (ii) An estimate for dressmaking, millinery and tailoring added from 1877-8 to 1895 inclusive. A series was prepared on the basis of the figures given in the *Statistical Registers* from 1896 (when these industries were officially included). Information about dressmaking (obtained from the 1892 survey under the Census and Industrial Returns Act, 1891) published in the *Statistical Register* in 1892 helps to guide the estimate.
- (iii) In 1886 data relating to butter and cheese making, coke, and asphalt were included in the *Statistical Register* for the first time; the definition of 'jewellery' was widened; and all cabinet-making and printing works were included and not simply those operated by steam. To avoid major discontinuities in the series (amounting to an increase of about 1,850 workers in 1886-7 over 1885-6 as a result of these definitional changes) allowances have been added to previous years.

The resulting series set out in Table A1.2 have to be treated cautiously. Contemporary sources give little indication of what was, or was not, regarded as 'manufacturing'. In the 1887-8 edition of *The Wealth and Progress of New South Wales* (p. 389), Coghlan indicates that 'no works which are simply retail establishments have been included' and, of the works which did not use power, 'only such have been enumerated as were in a fairly large way of business, or were of a special character. . . .' He also made it clear that clothing factories with fewer than ten, and boot factories with fewer than six, hands were excluded.

In the 1889-90 edition of *Wealth and Progress of New South Wales* (p. 500) it is stipulated—apparently in relation to the 1889 figures—that no 'establishments of any kind having less than three hands' were included. A complication is introduced by figures in the *Statistical Register* for 1888 (p. 167) and for 1889 (p. 415) which indicate that 1,040 employees in 'minor' works were omitted from the published 1888-9 total of 45,564, and 2,620 from the published 1889-90 total of 44,989. Further confusion arises from a note which explains that the figure of 2,620 was greater than that for the previous year 'because a number of small establishments formerly included [in the published statistics] have [now] been omitted'. Since the number of establishments to which these figures relate is not given in either year it is impossible to say how 'minor' was defined: moreover there is no evidence that these small establishments were included in the published totals for previous years or subsequently. The only safe inference is that the 1889-90 figure may be understated by up to 1,580 employees compared with 1888-9 or 1,557 if marble works and chaff-cutting establishments are excluded. This latter number has been allocated to the various industry classes set out in Table A1.2 on the basis of the information given in the two *Statistical Registers* cited although this inflates Class XV from 220 to 714 because the data are incomplete.

It will be noted in Table A1.2 that the figure of 4,146 for the employment in railways workshops in 1890-1 seems high compared with the remainder of the series. This may simply be an arithmetical slip (although the same figure was repeated in subsequent editions of the *Statistical Register*) or it may genuinely reflect an increase in employment resulting from the failure of two private companies to fulfil their contracts for fifty locomotives (see Chapter 11), some of which were subsequently erected in the Eveleigh Workshops from components that the government had imported on their behalf. Attempts to check this figure, which is of particular importance in the light of debate about the timing of the downturn into the depression of the 1890s, have so far proved unrewarding.

Three points are made in the 1894 edition of *Wealth and Progress of New South Wales*: first, that only factories operating all the year round were included (except for sugar-mills which had to operate for at least six months to be considered); second, that no dressmakers or milliners were counted in and that slop clothing factories were included only if they had at least ten hands; and, third, that establishments which did not use mechanical power (and there is some evidence that this may have been interpreted as steam power) were discounted unless they employed at least five hands, but that all works in which machinery was used were

included. Coghlan recognised that these definitions omitted some workers who might be regarded as engaged in 'manufacturing': indeed on p. 554 he estimated that 6,560 males (tailors, shoemakers, wheelwrights, blacksmiths, saddlers and so on) and 13,500 females (seamstresses, milliners and dressmakers) were thus excluded.

In 1896 New South Wales and Victoria reached agreement about the definition of industrial statistics and, as a result, New South Wales reduced its minimum factory size from five to four hands, included dressmakers and milliners, and excluded jobbing blacksmiths. These alterations alone brought about an 'increase' over 1895 of 1,231 males and 3,387 females in the 1896 New South Wales *Statistical Register* returns. Unfortunately these definitional changes are neither precise nor wholly consistent and do not form a satisfactory basis on which to make corrections to the basic data. Thus, from 1892 to 1895, people employed 'outside the factory' were included, but it would seem that this was somewhat literally interpreted to embrace, for instance, forest workers employed by sawmills. Although it is probable that 'home workers' were included from 1892 to 1895, it was not until 1896 that this was explicitly stated in the *Statistical Registers*.

Until the Census Act, 1901 the collection of statistics in New South Wales had no legal backing. The only exception was the data obtained under the Census and Industrial Return Act, 1891 relating to 1892. As a footnote in the *Statistical Register*, 1894 (p. 541) makes clear, this resulted in the 1892 industrial employment figure being inflated to 48,632 whereas, on the basis of the definitions then current, it would otherwise have been only 44,268. The 4,364 difference was partly accounted for by the inclusion of bread baking, millinery and dressmaking (for which allowances for other years have been made in this book), and partly by a number of other changes in coverage or definition which are not explained and which cannot be satisfactorily disentangled. Nonetheless, to try to ensure some comparability with 1890-1 and 1893, the employment figure (49,728) calculated in the original series for this book for 1892 has been reduced by 1,800 in Table A1.2, thus avoiding the possibility of employment in millinery and dressmaking (see *Wealth and Progress of New South Wales*, 1893, p. 450) being double-counted.

It must also be noted that until 1892 industrial statistics were obtained by police as part of their many duties; in that year a new policy was adopted by which a schedule was delivered to every establishment with a request that the completed form be sent direct to the Statistician. Nonetheless, in *Wealth and Progress of New South Wales*, 1892 (p. 887) Coghlan reported that 'the results of the present industrial census show the substantial accuracy of the returns collected in past years by agency of the police'. This new collecting arrangement continued for the remainder of the 1890s.

Prior to 1877 details were given annually in the *Statistical Register* of the number of industrial establishments in individual industries in each police or pastoral district. Then, from 1877-8 to 1885-6 inclusive, details were given of male and female employment in each industry by the 'metropolitan district' and 'country districts', the former being expressly defined as the Metropolitan Police District

(that is, the electoral districts of East Sydney, West Sydney, South Sydney, Paddington, Redfern, the Glebe, Balmain, Newtown, Canterbury and St Leonards).

In 1886–7 the geographical basis of publication changed: the total numbers of males and females employed in industrial establishments were given separately for each electorate, but geographical details of the workforce in individual industries were omitted. At first sight it appears that the series for 'metropolitan' and 'country' can be continued without a break but there are two substantial problems. One is that the basis of the coverage changed, as can be seen by comparing the *Statistical Register* for 1885 (p. 195) with that for 1886 (p. 184). The other is that in the absence of details about individual industries it is more difficult to allocate geographically the necessary omissions and additions to bring the New South Wales series into line with those of the other colonies.

For the four years from 1892 through 1895 there was yet another change. Data on the number of establishments and the hands employed in the metropolitan and country districts were published industry by industry so that a fairly reasonable attempt can be made to allocate employment on the bases adopted in this book. But then, from 1896 through 1900, the twofold geographical division was used by the statistician only for the eleven major industry groups into which he divided all manufacturing: these groups are different from, and cannot be converted to, the sixteen industry classes used here.

The *Statistical Register* data thus give only a bare outline of the location of industrial activity in New South Wales and in this respect are less useful than those published in Victoria. All that can be derived are reasonably satisfactory employment figures for each of the sixteen classes separately for the metropolitan area and the remainder of the colony for the periods from 1877–8 through 1885–6 and again from 1892 through 1895.

Factories and Shops Act

The Factories and Shops Act, 1896, effective on 1 January 1897, required the registration of factories with four or more persons in the Sydney metropolitan area only. Other places in New South Wales were subsequently brought within the scope of the Act by proclamation: on 6 February 1899 it was extended to include Newcastle and some of its suburbs and to East and West Maitland. The statistical tables appended to the first few annual reports of the Clerk-in-charge, Department of Labour and Industry, are so incomplete that there is no point in considering them further in this volume

Victoria

Statistical Register

Prior to 1868 only some fairly rough total employment data are available for Victoria (except in the case of flour-mills, breweries, and brickyards and potteries). From 1868 details are set out by individual industries and a dissection into the

sixteen industry classes adopted here becomes possible. The Victorian *Statistical Register* data have to be treated with considerable caution. A. G. Thompson, in 'Statistical Measurement of Manufacturing Activity in Victoria 1861-1901' (M. Com. thesis, University of Melbourne, 1964), gives a useful account (pp. 59-82) of the weakness of the early collection and compilation procedures and of the gradual improvements that took place during the 1880s and 1890s. Nonetheless, industrial statistics were long regarded as the poor relation of agricultural returns; definitions were hazy and collectors and compilers alike must have made some fairly arbitrary decisions about inclusions and exclusions. It is worth quoting in full the 'note to proprietors' and the relevant section of the 'directions to collectors' which were distributed early in 1891: attention was drawn in Chapter 8 to the fact that the 'note' defines the 'past year' as that ending on 31 December 1890 while the data were in fact published as though for the year ending 1 March 1891.³

Note to proprietor or person in charge

The present being the Census year, the manufactory and Quarry Schedule contains a larger number of inquiries than it does in ordinary years, and it is hoped that these will be responded to as fully and correctly as possible; approximate particulars, however, may be entered if exact information is not available. The words 'past year', when used, are intended to imply the year ended 31st December, 1890; but, if more convenient, the information may be given for any other recent period of twelve months.

It is provided by the Local Government Act that any Collector divulging or making extracts from the information supplied, is liable to a penalty not exceeding Ten pounds; but if, notwithstanding this provision, the Proprietor should object to trust the document to the Collector, he may fold it up the reverse way and drop it into the post, informing the Collector that he has done so. It will travel free of postage if the word 'Statistics' be kept visible.

In publishing the information, every precaution will be taken that no particulars relating to individual establishments are made known, and when only one establishment of a particular kind is returned, the information relating to it will be combined with that of others in a similar condition.

The Proprietor or person in charge is reminded that any person refusing to supply correct particulars for insertion in this schedule is liable to a penalty not exceeding Ten pounds.

HENRY HEYLYN HAYTER
Government Statist.

Directions to collectors (in relation to 'manufactories, works, etc.')

The collector must procure complete information respecting the flour mills, breweries, tobacco manufactories, soap and candle works, distilleries, woollen mills, brick yards and potteries, tanneries, fellmongeries, saw-mills, and other manufactories throughout his district; also respecting the stone quarries. On the back of the form is a list of the principal kind of works concerning which it is desired to collect particulars; but he is not to be prevented by omissions in this list from making returns of any other important branches of industry which may have sprung up. He must make it a rule to return all manufacturing

establishments where machinery worked by steam, gas, or water power is used, also retail clothing manufactories employing not less than ten hands and retail boot factories employing not less than five hands, the proprietor or manager of the establishment is to be included with the hands employed, but care must be taken not to return salesmen or saleswomen in retail establishments as factory workers. The supplying of particulars respecting these establishments, as well as those of the private schools, is, by the *Local Government Act*, made compulsory; but it is wished, if possible, to avoid prosecutions, and it is not anticipated that information will be refused when asked for civilly, and when it is explained that the returns of individual establishments are treated as strictly confidential. In the event of refusal, however, the collector should warn the person in charge of the penalty to which he renders himself liable. A separate estimate is to be made of the value of the lands and of the buildings, and this is to be done in the case of rented as well as of freehold premises. In places where manufacturing is carried on in connexion with some other business, as in a large drapery establishment, the value of only that portion of the premises in which the manufacturing is carried on is to be given. Smelting works should be returned, but it will not be necessary to make any return of machinery and works used directly in connexion with mining operations.

It is worth observing at this point that Thompson goes too far in his condemnation of the *Statistical Register* data and is not nearly critical enough of the problems involved in, and utility of, substituting occupational information derived from the decennial population censuses. The need to distinguish between *factory* employment (the basis of the tables set out in this Appendix) and the more general *manufacturing* employment was stressed in Chapter 8. This is not to suggest, however, that the *Statistical Register* data are without serious faults, and these must now be discussed.

It is particularly difficult to be sure how small factories were treated. In 1860 a footnote in the *Statistical Register* states that 'only Manufactories where more than one person is employed' are included. There is no further hint of a minimum size until 1875 when a headnote indicates that the 'works, manufactories, etc. . . . are all of an extensive character' and not merely shops at which some manufacturing is carried on. This definition was repeated annually although 'industries of an uncommon or interesting nature' were added from 1876, and places 'where expensive machinery is used' from 1889. The following extract from the *Victorian Year-Book*, 1880-1 (pp. 396-7) serves as a warning about the nature and content of the data:

The statistics of mills, manufactories, etc., were, on this occasion, collected by the census sub-enumerators, who were directed to obtain particulars respecting all establishments where goods were manufactured of the total value of £100 or upwards per annum, and all works at which steam, gas, horse, or water power was employed. They were, however, told to exercise some discretion in the case of bootmakers', tailors', dressmakers', saddlers', bakers', and confectioners' shops, and not to return such as were carrying on a purely retail business; also in the case of carpenters' and blacksmiths' shops, and not to return

those whose business lay in repairing old rather than in making new articles. This was the first occasion in Victoria in which it was attempted to collect these particulars by means of the census officers, and it was not entirely successful, as, although many establishments were doubtless returned which in former years had escaped the notice of the collectors employed by the municipal authorities, a number of establishments were also omitted, probably owing to the circumstance that the sub-enumerators found it impossible to obtain particulars in the short space of time necessarily allowed for the census collection; also, that many of the manufactories were closed at the time of their visit, and such as were open were frequently not in charge of any one capable of giving the desired information. To rectify the omissions an officer was sent round from this department to the missed establishments in Melbourne and suburbs, and the same object was attained in country districts by means of correspondence.

Another illustration of the difficulty of interpreting the factory statistics is given by a return 'Employés in Factories' [VV&P(LA), 1889, vol. 1, p. 871] which revealed that of the 3,154 factories (including quarries) shown in the *Statistical Register* for the year ending 1 March 1889, 36 had one worker; 243 had two; 379 had three; and 372 had four. Together these accounted for 3,147 workers (or 5.6 per cent) out of 56,271. A footnote explained that factories with fewer than five hands were included if of a special character or having expensive plant or machinery. The same note sounds another warning: 'notwithstanding the instructions to include the proprietor or the manager in the return of hands employed, there is reason to believe that, in many instances, this is not done'. A further uncertainty is the extent to which the statistics covered government as well as private establishments: the government printing office, for example, was footnoted as being included in the 1875-6 returns but it is unclear whether or not it had previously been taken into account.

As mentioned already, attempts were made in the mid-1890s to clarify the definition of 'manufacturing' and to place the Victorian and New South Wales factory statistics on a comparable basis. The *Victorian Year-Book*, 1895-8 (p. 930) indicates that for the 1894-5 collection 'a general rule was made excluding factories employing less than four hands, unless machinery worked by steam, gas, electric, water, wind, or horse power was used, or the industry was of an unusual character'. Furthermore, a footnote in the *Statistical Register* ('Production', p. 45) relating to the same year indicates that the 'number of Hands usually employed' included 'the proprietors or managers, overseers, clerks, carters, labourers, home-workers, and all other persons working in connexion with the factory, whether in or out of doors. Formerly no specific instruction was given.' The report for 1895 enumerates these categories separately and gives the number of home-workers as 134 males and 726 females. The *Victorian Year-Book*, 1895-8, then clouds the issue for, in a list of changes made in 1895 (p. 930), it refers to 'the definite inclusion of "home-workers", chiefly in boot and clothing factories, which were probably included previously'. Another change that crept into the 1895 figures and which may have had

some significance was the rewording of the heading 'number of hands usually employed' to 'average number of persons employed'.

In 1896, under an agreement with New South Wales, dressmaking, millinery, tailoring and underclothing factories were included which 'formerly for the most part [had been] excluded altogether', and factories that had slipped below the minimum size 'owing to the depression' were omitted. The *Victorian Year-Book*, 1895-8, p. 930, indicates that 'railway repairing workshops' were included in 1896, and on p. 931 that twelve such workshops with 227 employees had been added. But on p. 937 it states that 'in previous years the Railway Workshops were returned with Engine Machine Manufactories and Ironfoundries' and gives the total employment in 1896 as 1,062. The apparent confusion may simply result from the fact that a distinction had previously been made between 'making' and 'repairing': the inclusion of railway repair workshops seems to have been an exception to general practice since the *Victorian Year-Book*, 1902, p. 256, indicates that repairing establishments were included for the first time in that year.

Within the very obvious limits created by these uncertainties, the *Statistical Register* data have been reviewed to try to make the industrial coverage reasonably consistent over time and between the colonies. The total omissions and additions are shown in Table A1.4 and the revised data are disaggregated by the sixteen industry classes in Table A1.5. The details of the amendments made can be briefly summarised.

Omissions

- (i) Waterworks omitted from 1861 to 1875-6 inclusive.
- (ii) Hydraulic power works omitted from 1894-5 to 1900 inclusive.
- (iii) Stone quarries omitted from 1868 to 1896 inclusive.
- (iv) Chaff-cutting omitted from 1861 to 1900 inclusive.
- (v) Mint omitted in 1884-5 and from 1889-90 to 1897 inclusive.
- (vi) Gas distribution (as distinct from production) employees omitted from 1861 to 1894-5 inclusive. The reductions from 1890-1 to 1894-5 are taken from the *Victorian Year-Book*, 1895-8 (p. 932); for previous years employment in this industry has been reduced by one-quarter.

Additions

- (i) Bakeries added from 1861 to 1900 inclusive. Data from the annual reports of the Inspector of Factories have been used to compile an estimate from 1886 to 1900 which has been extended back to 1868 on the basis of the fluctuations in five cereal industries in Class IX.
- (ii) Creameries are included in the *Statistical Register* from 1895. Estimates for 1891 to 1894 inclusive are shown in the *Victorian Year-Book*, 1895-8 (p. 932); estimates for 1888 to 1890 added from literary sources.
- (iii) Dressmaking, tailoring, underclothing and millinery have been added from 1861 to 1895 inclusive. From 1896 employees in these activities were included in the *Statistical Register* and the *Victorian Year-Book*, 1895-8 (pp. 931-2) gives an estimate of 1,882 hands in these trades from 1890 to 1895 inclusive. For prior years an estimate has been based on the fluctuations in other Class VIII industries. An allowance has also been made for the years prior to 1895 when the statistical limit for the inclusion of clothing factories was reduced

from ten to four hands. Nonetheless, there is probably still a discontinuity in the clothing trades in Class VIII between 1894-5 and 1895.

- (iv) Coach-building added from 1861 to 1873-4 inclusive. Prior to 1874-5 only the coach and wagon works operated by steam were included and thus an allowance has been made for other works.
- (v) Cabinet-making added from 1861 to 1874-5 inclusive: only steam operated works were included prior to 1875-6.
- (vi) Printing added from 1861 to 1873-4; previously only printeries using steam power were included.

The geographical basis of data publication adopted by the Victorian Statistician differed from that used in New South Wales, although both were seeking ways to avoid disclosing information about particular enterprises. In Victoria data relating to the number of establishments, employment, power, and the values of land, buildings and plant are given annually in the *Statistical Register* for each city, town, borough and shire but these are *totals* for *all* factories in each area. There are some exceptions: information about some industries (e.g. flour-milling, brewing, and brick and pottery making) is also shown by local government areas. This is less useful than might appear at first sight because the particulars of areas having only one establishment in an industry are summed—again to avoid disclosing information about a particular firm. (As indicated already, in New South Wales more information is given about particular industries—though summarised by classes from 1886-7 to 1890-1 inclusive and 1896 to 1900 inclusive—but only for the twofold division ‘metropolitan district’ and ‘country districts’.)

Estimates have been set out in Table 9.1 to show, for five-year intervals from 1868 to 1888-9, the distribution of industrial activity between Melbourne, twelve other towns, and the rest of Victoria. For this purpose ‘Melbourne’ was taken to be the Metropolitan Board of Works area as defined in 1890 (see Fig. 9.1). The dozen other towns are those which most consistently over the whole period had at least 100 industrial workers, namely Greater Ballarat, Greater Bendigo, Greater Castlemaine, Echuca, Greater Geelong (including Newtown and Chilwell), Hamilton, Horsham, Maryborough, Sale, St Arnaud, Stawell and Warrnambool. Two kinds of estimates had to be made. First, the omissions and additions already mentioned had to be allocated between Melbourne, the twelve towns, and the rest of the colony. Second, up to and including 1886 the assumption had to be made that some towns had equal shares of the workforce in some industries like flour-milling, brewing, tanning, making of soap and candles, and brick and pottery making: this problem arose when the *Statistical Register* showed a combined total for several towns that each had only one establishment in a particular industry.

Annual reports, Chief Inspector of Factories, Workrooms, and Shops

The annual reports arising from The Factories and Shops Act, 1885 (the first appearing in *VPPP*, 1887, vol. 3, no. 80) have appendices which list the numbers of registered factories and of males and females employed in each industry. At first the Act covered only factories that were ‘within any city, town, or borough’ where

six or more persons worked or where steam power was used. The details of subsequent legislation are given in Chapter 8.

The data derived by the Chief Inspector and the Statistician are not comparable. The former were collected on a more limited geographical basis and did not cover government establishments such as the railway workshops, industries such as ship and boat building, and certain categories such as proprietors, managers, clerks and carters (see the 1895 Report). Yet, although they were maintained separately until 1902 (when the Statistician was given access to the Chief Inspector's lists), the two collections presumably had some problems in common. For example, the reports of the Chief Inspector during the latter part of the 1890s reiterate the difficulties of tracing home-workers. Similarly, in his 1894 Report the Chief Inspector commented on the inadequacy of the records maintained in factories: when at the end of that year he demanded a return he found that manufacturers were unable to give particulars about the period of employment of their workers and he 'was therefore compelled to accept a return for one week at the close of the year, and even this was supplied in an unsatisfactory manner'. In the 1898 Report, however, it is stated (p. 24) that the employment statistics were collected in January of that year and this apparently became the regular procedure (compare the 1900 Report, p. 9).

No attempt has been made to adjust the Chief Inspector's annual statistics except that some marginal categories, including tea packers, chaff-cutters, bottle washers, wool sorters and laundry workers, have been omitted from Table A1.7. The validity of these series is considered in Chapter 8.

South Australia

The data in the *Statistical Register* lack continuity, completeness and geographical detail. Prior to 1876 only the numbers of establishments in certain industries (gradually increasing in variety) were published. Then, simultaneously with the population census held on 26 March 1876, factory employment information was collected and set out in the *Statistical Register* for that year. This was reprinted without alteration in subsequent editions until replaced by information dated 3 April 1881 (corresponding with the next population census). For the next four years—1881–2 to 1884–5—details of the numbers of establishments and employment in industries were published for the year ending 31 March. Comparative returns for the years ending 31 March 1884 and 1889 were printed in the *Statistical Register* for 1889, and then data were published, for the year ending 31 March, from 1890–1 to 1892–3 and from 1896–7 to 1900–1.

The data in Tables A1.8 and A1.9 have been prepared as follows.

- (i) For the years from 1860 to 1874 estimates have been based on the numbers of establishments shown for each year and the average employment in each industry in and after 1875–6. It has been assumed (using evidence from the other colonies) that the average size of establishments increased gradually between 1860 and 1875.
- (ii) For the years after 1874 for which data are available, the classification into the

usual sixteen sub-classes has been made. While several activities (such as chaff-cutting, laundries, quartz crushing and wool pressing) have been omitted to try to achieve comparability with the other colonies, no attempt has been made to include estimates for some industries which may be understated or excluded altogether. The almost complete lack of text or footnotes in the *Statistical Register* obscures changes in definitions and coverage.

(iii) For those years in which the *Statistical Register* simply repeats previous tabulations (1877-8 to 1879-80 and 1893-4 to 1895-6) or for which there is no return (1885-6 to 1887-8 and 1889-90) employment figures have been estimated on a trend line basis to help derive the Australian totals used in Chapter 15.

Geographical breakdowns of the data are almost entirely lacking. There are two exceptions. From 1860 to 1871 the numbers of establishments in municipal towns and country districts are given but these data are of little practical value. For several years between 1877 and 1901 the location of flour-mills operating in the colony are listed in detail along with information about total horse-power, numbers of pairs of stones (and, later, of rollers), and employment.

No data are available in the nineteenth century about the value of land, buildings or plant, or the value or quantity of production.

Tasmania

The numbers of establishments in each industry in each municipal/police district were published annually in the *Statistics of Tasmania* from 1860 to 1900. In the 1880s additional information about employment, capital invested, and the quantity and value of production was set out for some industries: for breweries and jam factories from 1882; for gas-works and sawmills from 1884; for soap- and candle-works, brickyards, potteries, tanneries and fellmongeries from 1885; and for flour-mills, woollen-mills, bark-mills and engineering establishments from 1886.

The estimates set out in Tables A1.10 and A1.11 were calculated with the aid of Victorian data. A comparison was made between employment in ten Tasmanian industries from 1886 to 1900 and the same ten industries in Victoria: this enabled a ratio to be obtained between the average size of factories in the two colonies which formed the basis for calculating annual estimates. Where actual employment figures were available for particular industries these were, of course, used in preference.

This method did not overcome all the problems. One was the difficulty of distinguishing between retail premises, individual tradesmen and factories which were included together in the annual table published in *Statistics of Tasmania* under the heading 'trades, manufactories, and other industries'. Thus in 1897 there were 296 'establishments' listed as 'boot and shoe-makers' in the general table but only 12 (employing 373 people) in a more detailed table headed 'boot factories'. For this and some other industries (including furniture, confectionery, and butter and cheese making) special series had to be developed in the light of more detailed information available for 1902 and subsequent years. Employment in smelting was

a particular problem since it accounted for 17 per cent (1,263 men) of the factory workforce in 1902. Since in previous years there was confusion between mining and smelting activities, a series was developed taking account of the growth of metallurgical processing in Tasmania and data on the quantity of concentrates produced or exported.

Queensland

Prior to 1892 employment data were published in *Statistics of Queensland* for only a few industries. However there is information available from 1865 for the number of establishments in each industry and this has been used as the basis for the employment estimates set out in Table A1.12. Average employment in each industry was calculated from the data available in the 1890s and these averages were gradually reduced back to 1865 in the light of knowledge of the size-trends in Victoria. At best the resulting series is crude and unsuitable for sophisticated statistical manipulation. A further problem is that the sugar and meat processing industries which employed a considerable proportion of the manufacturing workforce (26 per cent in 1892) were subject to both seasonal and cyclical variations in activity that cannot easily be quantified in terms of employment. Furthermore, the earlier returns of numbers of establishments are obviously incomplete; they gradually improve but occasional lapses occurred such as in 1873 and 1874 when notes in the *Statistics of Queensland* indicated that the data were incomplete.

Beginning in 1892, employment details of various industries were shown for three divisions (Northern, Central and Southern) of the colony. In the present context these divisions are of little analytical value. Moreover, some of the 'industries' are in fact groupings of activities so that estimates have had to be made of some of the components in order to fit them into the sixteen sub-clauses used in this book. (For example, in Table A1.13 employment in 'meat and boiling down' has had to be allocated between Class III and Class IX.) The broad classifications used by the Statistician and the absence of almost any explanatory notes to his tables leave some uncertainties. Thus in 1897 and 1898 there were, respectively, 2,689 and 2,711 persons defined as 'metal workers of all kinds': it is not clear why this same category increased to 3,862 in 1899 and 3,931 in 1900. There is no way of telling whether the increase between 1898 and 1899 represented a real change in industrial emphasis, an extension of the existing classification, or simply the result of better or different collecting methods. Similarly, it is difficult to interpret the reasons for the large number (28,883) of factory workers in 1899 which is in marked contrast to that for 1898 (24,809) and 1900 (25,953). Some of the explanation may be seasonal factors (for instance, employment in boiling down fell by 705 between 1899 and 1900, in sugar-milling by 857, and in butter and cheese making by 1,330) but this is probably not the whole story.

A particular problem about Queensland's industrial statistics is continuing uncertainty about the minimum size of establishment included. No indication is

given about this in the *Statistics of Queensland* but in the *Official Year Book of the Commonwealth of Australia* . . . , No. 1, p. 437, it is noted that factories down to two hands were included in that State whereas the minimum size elsewhere was four hands. Apparently the compilers were unable to correct earlier figures but the 1906 totals published in the *Statistics of Queensland* were reduced in the *Year Book* by 689 factories and 1,447 hands. There appears to be a strong possibility that the employment totals published from 1892 onwards may be overstated, compared with the other colonies, by between 1,000 and 1,500 persons.

The coarseness of the basic data makes it inappropriate to try to adjust them for omissions. Thus, the total employment figures for the years 1892 to 1900 in Tables A1.12 and A1.13 are those quoted by the Statistician: it will be clear from the foregoing discussion that considerable reservations are felt about their accuracy.

Western Australia

Prior to 1897 the only data available for Western Australia are the numbers of establishments in the main industries. There is a complete run of such information in the *Blue Books* from 1860 through 1895 and then in the *Statistical Register of Western Australia* for 1896. The Industrial Statistics Act, 1897 required returns to be supplied by each factory, workshop or mill where either four or more persons had been employed at any one time during the year or where an engine, driven by steam, gas, oil or electricity, had been used whatever the number of employees. Thus in 1897 an annual series began in the *Statistical Register* which contained information about employment, machinery used, the value of production and, from 1899, the value of salaries and wages paid.

In Tables A1.14 and A1.15 the employment data for 1897 through 1900 have been taken at face value except that quarries, water condensing works, firewood cutting, photography and chaff-cutting have been omitted and the return of home-workers included. For the period from 1890 through 1896 the employment figures shown in Table A1.14 have been estimated by multiplying the number of establishments in each industry by the average size of the factories in that industry from 1897 to 1900. An exception has been made in the case of sawmills which in 1897 employed nearly two-fifths of the factory workforce: for this industry timber exports were used to help guide an employment series. From 1870 to 1889 estimates have been prepared in a way similar to that used for South Australia and Tasmania: these estimates must necessarily be regarded as very tentative.

Table A1.1 New South Wales factory employment 1861-1900 (summary)

Year ^a	NSW/SR data	Omissions ^b	Additions ^b	Author's estimate	Edwards (1950) ^c	Butlin (1962) ^d
1861-62	—	—	—	6,297	—	—
1862-63	—	—	—	6,441	—	—
1863-64	—	—	—	7,918	—	6,461
1864-65	—	—	—	8,516	—	7,584
1865-66	—	—	—	9,453	—	8,645
1866-67	—	—	—	13,246	—	10,854
1867-68	—	—	—	13,548	—	12,033
1868-69	—	—	—	16,285	—	15,183
1869-70	—	—	—	17,219	—	15,093
1870-71	—	—	—	17,853	—	15,059
1871-72	—	—	—	19,324	—	16,136
1872-73	—	—	—	20,613	—	18,614
1873-74	—	—	—	21,517	—	21,353
1874-75	—	—	—	22,397	—	20,937
1875-76	—	—	—	26,467	—	25,452
1876-77	—	—	—	28,709	—	28,382
1877-78	24,430	54	5,966	30,342	}	29,396
1878-79	25,452	247	6,321	31,526		30,835
1879-80	25,110	184	5,930	30,856		29,860

1880-81	27,588	211	5,805	33,182	33,257
1881-82	30,544	411	6,236	36,369	35,241
1882-83	33,363	410	5,986	38,939	36,420
1883-84	34,084	707	6,561	39,938	38,546
1884-85	38,159	1,031	7,266	44,394	42,843
1885-86	41,360	1,216	7,532	47,676	46,567
1886-87	45,783	2,634	4,386	47,535	47,584
1887-88	44,360	2,530	4,394	46,224	46,304
1888-89	45,564	938	4,685	49,311	49,880
1889-90	44,989	1,033	6,168 ^e	50,124	49,164
1890-91	46,135	861	4,976	50,250	51,410 ^f
1891	—	—	—	—	—
1892	(48,632) ^g	974	2,070	(49,728) ^g	49,728
1893	38,918	1,298	3,886	41,506	41,651
1894	42,751	1,868	4,510	45,393	45,682
1895	43,833	980	5,659	48,512	48,528
1896 ^h	49,840	482	1,066	50,424	51,115
1897	51,439	498	1,089	52,030	52,645
1898	52,518	482	1,203	53,239	53,555
1899	55,646	417	1,299	56,528	56,879
1900	60,779	480	1,418	61,717	61,889

^a Years ending 31 March up to and including 1890-1; calendar years from 1892 to 1900 inclusive.

^b See Appendix text for details of omissions and additions.

^c Edwards, 'Employment in the New South Wales Manufacturing Industries, 1877 to 1938-39', pp. 274-5.

^d Butlin, *Australian Domestic Product*, p. 161; Butlin adopts Edwards's figures from 1877-8 on.

^e Adjustment of 1,557 explained in Appendix text.

^f Edwards appears to have made an arithmetical slip in this figure by overstating Class X by 1,000.

^g These figures are overstated by about 1,800 persons because the colonial statistician incorporated additional data from another source in this year (see text).

^h Minimum factory size reduced from five to four hands.

Table A1.2 Employment in factories by class of industry, New South Wales, 1877-8 to 1900

Year ^a	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	Total									
	Non-metallic mineral products	Bricks, pottery, glass, etc.	Chemicals	Boiling down	Total chemicals	Metals, engineering	Railway workshops	Vehicles (coaches and wagons)	Boats, ships, and slips	Total metals and products	Jewellery	Textiles	Skins, tanning, etc.	Clothing	Footwear	Total clothing and footwear	Food, drink, and tobacco	Sawnmills and joinery	Furniture, etc.	Paper, printing, etc.	Rubber goods ^b	Musical instruments	Miscellaneous	Power and light		
1877-78	401	2,004	358	89	447	3,203	795	1,049	779	5,826	109	362	2,730	6,718	1,915	8,633	5,706	1,978	732	1,175	—	—	10	47	182	30,342
1878-79	440	2,342	361	50	411	2,868	843	1,164	704	5,579	109	350	2,470	7,004	1,883	8,887	6,124	2,349	852	1,363	—	—	9	59	182	31,526
1879-80	349	2,192	323	83	406	2,912	823	1,224	663	5,622	117	405	2,387	5,789	2,123	7,912	6,280	2,350	884	1,706	—	—	13	68	165	30,856
1880-81	420	3,086	351	155	506	4,221	976	1,450	525	7,172	123	353	2,649	4,855	2,379	7,234	5,798	2,993	869	1,700	—	—	9	72	198	33,182
1881-82	516	2,857	375	282	657	4,854	1,001	1,578	614	8,047	122	489	2,771	5,566	2,226	7,792	6,876	3,116	920	1,867	—	—	11	81	247	36,369
1882-83	492	3,562	381	148	529	4,949	1,482	1,539	676	8,646	131	479	3,290	4,641	2,036	6,677	7,942	3,757	1,026	2,021	—	—	7	100	280	38,939
1883-84	442	3,466	394	169	563	4,845	1,594	1,848	742	9,029	136	533	2,945	5,103	2,125	7,228	7,384	4,294	1,151	2,345	—	—	4	105	313	39,938
1884-85	548	3,541	404	220	624	5,008	2,141	1,936	1,356	10,441	146	504	3,022	5,890	2,289	8,098	8,692	4,398	1,246	2,718	—	—	—	86	330	44,394
1885-86	588	4,098	524	272	796	4,926	2,171	2,144	1,174	10,415	130	532	2,887	6,990	2,105	9,095	9,329	4,806	1,293	3,123	—	—	—	118	466	47,676
1886-87	636	3,413	818	172	990	5,510	1,736	1,900	965	10,111	155	379	2,746	6,768	2,272	9,040	9,504	4,890	1,273	3,654	—	—	—	269	475	47,535
1887-88	601	2,655	847	121	968	5,512	1,286	1,814	687	9,299	170	388	2,521	6,807	2,273	9,080	9,935	4,740	1,311	3,768	—	—	—	289	499	46,224
1888-89	626	2,580	828	127	955	6,475	2,521	1,978	979	11,953	178	370	2,766	7,324	2,045	9,369	8,919	4,963	1,477	4,369	—	—	—	270	516	49,311
1889-90	670	2,305	695	174	869	6,064	2,229	1,958	1,123	11,374	220	376	2,871	6,980	2,481	9,461	9,840	4,772	1,448	4,672	—	—	—	714 ^c	532	50,124
1890-91	637	2,514	688	273	961	6,090	4,146 ^c	1,486	978	12,700	186	382	2,275	7,161	2,806	9,967	9,293	4,958	1,192	4,185	—	—	—	428	572	50,250
1891	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1892	565	1,823	922	83	1,005	7,667	2,586	1,999	1,384	13,636	161	420	2,397	4,967	2,708	7,675	8,285	5,531	1,048	4,498	—	—	—	163	721	47,928
1893	324	1,668	839	1,453	2,292	4,225	2,488	1,121	1,374	9,208	—	333	1,916	4,203	3,090	7,293	8,712	4,077	647	4,152	—	—	—	203	681	41,506
1894	386	1,631	801	1,616	2,417	4,675	2,745	1,224	1,439	10,083	34	406	2,790	5,326	3,420	8,746	8,756	4,087	811	4,302	—	—	—	226	718	45,393
1895	541	1,330	828	832	1,660	5,151	2,737	1,212	988	10,088	52	411	3,103	6,110	3,743	9,853	10,530	4,235	798	4,888	—	—	—	279	744	48,512
1896 ^d	440	1,839	811	651	1,462	6,248	2,473	1,230	1,062	11,013	103	413	3,225	5,903	3,526	9,429	11,244	4,252	1,183	4,900	—	—	—	18	448	50,424
1897	540	1,708	811	443	1,254	7,685	2,767	1,298	1,297	13,047	118	403	3,035	6,232	3,520	9,752	10,757	3,939	1,327	4,942	—	—	—	452	756	52,030
1898	700	2,032	738	53	831	7,497	2,748	1,401	1,228	12,874	118	449	2,883	6,946	3,500	10,446	11,143	4,041	1,569	4,882	—	—	—	532	739	53,239
1899	707	2,227	938	57	995	9,064	2,908	1,472	1,397	14,841	114	474	2,991	7,262	3,510	10,772	11,304	4,187	1,701	5,027	—	—	—	454	734	56,528
1900	828	2,339	939	37	976	9,812	3,246	1,574	1,566	16,198	142	490	2,970	8,936	3,953	12,889	11,791	4,357	1,916	5,444	—	—	—	443	811	61,717

^a Years ending 31 March up to and including 1890-1; calendar years from 1892 to 1900 inclusive. No data for the period from 1 April to 31 December 1891.^b Rubber stamp making included as part of 'manufacturing stationers' activities.^c See discussion in text about this abnormally high figure.^d Minimum size of factory reduced from five to four hands.

Table A1.3 Employment in factories by sex and area, New South Wales, 1877-8 to 1900^a

Year ^b	Sydney ^c			Rest of New South Wales			Total New South Wales		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
1877-78	13,075	5,490	18,565	11,117	660	11,777	24,192	6,150	30,342
1878-79	13,773	5,404	19,177	11,647	702	12,349	25,420	6,106	31,526
1879-80	13,943	4,465	18,408	11,682	766	12,448	25,625	5,231	30,856
1880-81	16,287	3,379	19,666	12,741	775	13,516	29,028	4,154	33,182
1881-82	16,987	4,130	21,117	14,466	786	15,252	31,453	4,916	36,369
1882-83	18,307	3,523	21,830	16,335	774	17,109	34,642	4,297	38,939
1883-84	18,623	3,719	22,342	16,584	1,012	17,596	35,207	4,731	39,938
1884-85	20,633	4,208	24,841	18,686	867	19,553	39,319	5,075	44,394
1885-86	21,164	5,490	26,654	20,202	820	21,022	41,366	6,310	47,676
1886-87	(23,164)	(5,503)	(28,667)	(18,338)	(530)	(18,868)	41,502	6,033	47,535
1887-88	(22,162)	(5,729)	(27,891)	(17,699)	(634)	(18,333)	39,861	6,363	46,224
1888-89	(23,458)	(6,277)	(29,735)	(18,821)	(755)	(19,576)	42,279	7,032	49,311
1889-90	(23,257)	(6,366)	(29,623)	(19,649)	(852)	(20,501)	42,906	7,218	50,124
1890-91	(25,463)	(6,657)	(32,120)	(17,253)	(877)	(18,130)	42,716	7,534	50,250
1891	—	—	—	—	—	—	—	—	—
1892	22,786	5,523	28,309	20,263	1,156	21,419	43,049	6,679	49,728 ^d
1893	20,543	4,035	24,578	16,231	697	16,928	36,774	4,732	41,506
1894	22,279	5,188	27,467	17,249	677	17,926	39,528	5,865	45,393
1895	23,127	6,077	29,204	18,579	729	19,308	41,706	6,806	48,512
1896 ^e	(23,442)	(5,936)	(29,378)	(19,881)	(1,165)	(21,046)	43,323	7,101	50,424
1897	(24,137)	(6,143)	(30,280)	(20,614)	(1,136)	(21,750)	44,751	7,279	52,030
1898	(25,574)	(6,721)	(32,295)	(19,628)	(1,316)	(20,944)	45,202	8,037	53,239
1899	(27,333)	(7,324)	(34,657)	(20,404)	(1,467)	(21,871)	47,737	8,791	56,528
1900	(30,255)	(8,881)	(39,136)	(20,974)	(1,607)	(22,581)	51,229	10,488	61,717

^a See Appendix text and Tables A1.1 and A1.2 for detailed notes. Between 1886-7 and 1890-1 and between 1896 and 1900 the spatial breakdown is based on less satisfactory data so that the figures quoted have been enclosed in brackets.

^b Years ending 31 March up to and including 1890-1; calendar years from 1892 to 1900 inclusive.

^c Sydney defined as the Metropolitan Police District plus Ryde and Hunters Hill municipalities.

^d These figures are overstated by about 1,800 persons because the colonial statistician incorporated additional data from another source in this year (see text).

^e Minimum factory size reduced from five to four hands.

Table A1.4 Victoria factory employment 1861-1900 (summary)

Year ^a	<i>Vic. SR</i> data	Omissions ^b	Additions ^b	Author's estimate	Butlin (1962) ^c	Butlin (1964) ^d	Hall (1965) ^e
1861	4,395	293	1,238	5,340	—	—	—
1862	6,405	216	1,302	7,491	6,405	—	—
1863	7,369	259	1,366	8,476	6,875	—	—
1864	7,046	110	1,430	8,366	7,046	—	—
1865	10,059	330	1,520	11,249	(8,500)	—	—
1866	11,488	442	1,638	12,684	11,488	—	—
1867	14,230	499	1,742	15,473	14,230	—	—
1868	17,316	1,209	1,846	17,953	16,612	17,949	16,598
1869	19,618	1,455	1,950	20,113	18,720	17,706	18,715
1870-71	18,599	1,582	2,058	19,075	17,630	18,470	17,618
1871-72	20,822	1,983	2,185	21,024	19,468	20,722	19,460
1872-73	22,484	1,693	2,385	23,176	21,493	21,675	21,478
1873-74	25,192	1,499	2,564	26,257	24,411	25,023	24,396
1874-75	29,045	1,783	2,273	29,535	27,959	28,728	27,852
1875-76	30,479	1,381	1,845	30,943	29,821	29,911	29,700
1876-77	32,286	1,519	1,922	32,689	31,478	30,965	31,378
1877-78	33,204	1,216	2,027	34,015	32,688	32,688	32,525
1878-79	33,758	1,218	2,040	34,580	33,278	32,013	33,129
1879-80	33,749	1,276	2,156	34,629	33,247	32,670	33,123

1880-81	38,705	1,273	2,899	40,331	38,141	37,692	38,034
1881-82	43,779	1,565	3,102	45,316	43,209	42,075	43,042
1882-83	46,308	1,615	2,907	47,600	45,698	45,466	45,329
1883-84	47,729	1,926	3,265	49,068	46,857	45,718	46,576
1884-85	50,123	1,785	3,326	51,664	49,393	49,204	49,066
1885-86	50,563	2,310	3,206	51,459	49,297	49,044	49,297
1886-87	47,231	2,497	2,910	47,644	45,773	45,370	45,773
1887-88	50,582	2,539	3,069	51,112	49,084	47,744	49,084
1888-89	56,271	2,993	3,000	56,278	54,488	51,604	54,488
1889-90	59,181	2,954	3,204	59,431	57,432	58,287	57,432
1890-91	58,175	3,158	3,622	58,639	56,369	58,036	56,369
1891-92	53,525	2,642	3,631	54,514	52,225	52,976	52,225
1892-93	43,921	2,039	3,635	45,517	43,192	43,493	43,192
1893-94	39,815	1,595	3,662	41,882	39,473	41,142	39,473
1894-95	41,273	1,473	3,741	43,541	41,000	41,777	41,000
1895	46,331	1,183	2,716	47,864	45,235	—	46,095
1896	50,754	1,182	867	50,439	49,383	—	50,448
1897	52,701	875	934	52,760	51,774	—	52,701
1898	54,778	806	966	54,938	54,360	—	54,836
1899	60,070	902	965	60,133	59,376	—	60,121
1900	64,207	935	991	64,263	63,308	—	64,259

^a Calendar years 1861 to 1869; years ending 31 March for period 1870-1 to 1882-3 inclusive; years ending 1 March for period 1883-4 to 1894-5 inclusive; calendar years 1895 to 1900 inclusive.

^b See Appendix text for details of omissions and additions.

^c Butlin, *Australian Domestic Product*, p. 160.

^d Butlin, *Investment in Australian Economic Development*, p. 203.

^e A. R. Hall, 'Victorian Manufacturing Employment 1860-1900', unpublished seminar paper (The Australian National University) dated 27 May 1965.

Table A1.5 Employment in factories by class of industry, Victoria, 1868-1900

Year ^a	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	Total							
	Non-metallic mineral products	Bricks, pottery, glass, etc.	Chemicals	Boiling down	Total chemicals	Metals, engineering	Railway workshops	Vehicles (coaches and wagons)	Boats, ships, and slips	Total metals and products	Jewellery	Textiles	Skins, tanning, etc. ^d	Clothing	Footwear	Total clothing and footwear	Food, drink, and tobacco	Sawmills and joinery	Furniture, cabinets, etc.	Paper, printing, etc.	Rubber goods ^e	Musical instruments	Miscellaneous	Power and light
1868	136	980	317	206	523	2,194	876	307	3,377	—	210	1,083	3,732	615	4,347	3,474	2,122	368	1,123	—	53	33	124	17,953
1869	158	1,266	467	183	650	2,529	1,065	52	3,646	—	268	1,246	4,128	748	4,876	4,065	2,101	356	1,209	—	63	35	174	20,113
1870-71	288	1,223	399	130	529	2,395	942	190	3,527	—	320	1,262	3,189	882	4,071	4,030	1,989	402	1,195	—	18	61	160	19,075
1871-72	259	1,443	453	170	623	2,570	1,040	148	3,758	3	353	1,401	2,981	1,471	4,452	4,350	2,256	496	1,346	—	46	78	160	21,024
1872-73	291	1,237	591	66	657	3,017	1,067	210	4,294	6	444	1,593	3,755	1,467	5,222	4,443	2,578	558	1,472	—	60	129	192	23,176
1873-74	597	1,393	648	83	731	3,531	1,075	205	4,811	6	526	1,677	4,224	1,599	5,823	4,932	2,904	699	1,719	—	61	169	209	26,257
1874-75	589	1,382	704	102	806	3,908	1,140	231	5,279	140 ^e	810	2,238	5,534	1,809	7,343	4,701	2,944	806	2,022	—	53	191	231	29,535
1875-76	600	1,204	829	111	940	4,466	1,226	212	5,904	264	1,009	2,255	5,224	2,051	7,275	4,856	2,979	757	2,306	—	51	255	288	30,943
1876-77	551	1,321	873	89	962	4,355	1,386	287	6,028	407	1,212	2,512	5,587	2,264	7,851	5,088	3,009	807	2,359	—	38	280	264	32,689
1877-78	650	1,261	800	118	918	4,598	1,521	236	6,355	396	1,255	2,413	5,987	2,470	8,457	5,282	3,018	961	2,497	—	55	279	218	34,015
1878-79	602	1,152	838	73	911	5,306	1,603	254	7,163	365	1,194	2,180	5,887	2,615	8,502	5,312	2,797	916	2,687	—	32	546 ^g	221	34,580
1879-80	538	1,045	858	86	944	5,184	1,283	256	6,723	423	1,307	2,174	5,901	3,212	9,113	5,153	2,450	1,023	2,860	—	28	549	299	34,629
1880-81	698	1,213	889	98	987	6,069	1,380	227	7,676	371	1,034	2,667	7,171	3,929	11,100	5,841	3,308	1,343	3,091	—	51	694	257	40,331
1881-82	788	1,599	1,013	113	1,126	6,716	1,638	289	8,643	398	1,348	2,571	8,543	4,013	12,556	6,325	3,731	1,589	3,519	—	43	645	435	45,316
1882-83	1,083	1,653	930	145	1,075	6,987	1,819	309	9,115	382	1,428	2,450	9,269	3,672	12,941	6,730	4,359	1,458	3,873	—	50	628	375	47,600
1883-84	1,166	1,902	985	169	1,154	7,365	2,124	302	9,791	350	1,281	2,491	8,856	4,088	12,944	6,729	4,503	1,854	3,989	—	56	465	393	49,068
1884-85	1,487	2,109	1,009	139	1,148	8,035	2,204	200	10,439	378	1,366	2,760	8,663	4,165	12,828	7,015	4,767	1,875	4,452	—	54	567	419	51,664
1885-86	1,024 ^b	2,388	1,045	116	1,161	8,217	2,395	386	10,998	372	1,171	2,587	8,243	4,100	12,343	6,897	5,235	1,685	4,603	—	46	542	407	51,459
1886-87	981	2,440	1,003	72	1,075	8,120	2,407	326	10,853	305	1,038	2,162	6,465	3,574	10,039	6,658	4,964	1,613	4,549	—	44	523	400	47,644
1887-88	949	2,795	935	138	1,073	8,522	2,720	214	11,456	318	1,144	2,166	7,279	3,886	11,165	6,843	5,867	1,752	4,555	—	47	564	418	51,112
1888-89	1,152	3,565	1,107	82	1,189	9,354	2,950	212	12,516	334	1,296	2,415	7,092	3,860	10,952	7,286	6,956	2,177	5,308	—	50	545	537	56,278
1889-90	1,034	3,629	1,102	71	1,173	10,958	2,980	214	14,152	416	1,193	2,462	8,215	3,819	12,034	7,668	6,612	2,345	5,530	—	51	515	617	59,431

1890-91	1,255	3,445	1,170	80	1,250	10,633	2,781	254	13,668	404	1,268	2,561	9,085	3,787	12,872	7,466	5,825	2,167	5,320	—	48	455	635	58,639	
1891-92	1,127	2,695	1,193	79	1,272	9,282	2,359	236	11,877	356	1,295	2,533	8,512	4,109	12,621	7,559	4,581	1,873	5,340	—	45	426	914	54,514	
1892-93	816	1,658	1,037	88	1,125	7,428	1,968	212	9,608	227	875	2,167	8,025	3,341	11,366	7,070	3,396	1,128	4,672	—	47	441	921	45,517	
1893-94	487	1,181	1,050	111	1,161	6,052	1,576	136	7,764	198	932	2,110	7,890	3,307	11,197	7,161	2,758	935	4,793	—	32	427	746	41,882	
1894-95	432	1,222	1,280	120	1,400	5,708	1,475	128	7,311	185	1,020	2,219	8,574	3,734	12,308	7,914	2,790	939	4,580	—	26	495	700	43,541	
1895	503	1,295	1,319	127	1,446	6,158	1,534	108	7,800	377	1,253	2,370	10,247	3,796	14,043	8,721	2,769	1,165	4,906	—	25	557 ^b	634	47,864	
1896	476	1,452	1,329	118	1,447	6,239	1,062 ^c	128	9,089	377	1,233	2,544	10,324	4,078	14,518	9,024	2,984	1,482	4,913	—	24	302	680	50,439	
1897	471	1,325	1,332	83	1,415	6,776	1,283	132	9,842	420	1,247	2,471	11,328	4,280	15,598	9,555	2,884	1,414	4,949	—	43	280	846	52,760	
1898	553	1,538	1,334	79	1,413	7,298	1,641	137	10,759	434	1,307	2,385	11,227	4,019	15,246	10,410	3,192	1,339	5,189	—	29	296	848	54,938	
1899	554	1,841	1,484	88	1,572	7,973	1,697	125	11,612	470	1,409	2,474	12,653	4,250	16,903	11,563	3,735	1,563	5,246	—	44	289	858	60,133	
1900	605	1,907	1,622	71	1,693	8,199	1,577	2,006	126	11,908	551	1,531	2,701	14,501	4,764	19,265	11,723	4,053	1,561	5,595	—	28	287	855	64,263

^a Calendar years 1868 and 1869; years ending 31 March for period 1870-1 to 1882-3 inclusive; years ending 1 March for period 1883-4 to 1894-5 inclusive, calendar years 1895 to 1900 inclusive.

^b In 1885 stone processing associated with quarry operations included with quarries and thus excluded from manufacturing statistics.

^c Railway workshop data first became available in 1896. In *Victorian Year-Book*, 1895-8, pp. 936-7 it was noted that in previous years 'the Railway Workshops were returned with Engine Machine Manufactories and Ironfoundries'. No correction to Class IV thus appears necessary.

^d In 1877-8 fellmongering, and in 1879-80 wool-washing were included with tanning. As wool-washing was not shown separately it cannot be excluded and thus Class VII in Victoria is not strictly comparable with the same class in the tables for the other colonies.

^e Manufacturing jewellers and goldsmiths added to Class V in 1874-5.

^f The definition of saddlery and harness-making broadened after 1873-4.

^g Rubber stamp making (listed separately in *Vic.SR* 1875-6 to 1882-3) included in Class XII since it was included as part of 'manufacturing stationers' activities from 1883-4.

^h From 1878-9 to 1895 inclusive, data relating to single establishments were combined for confidentiality purposes. These totals have been added to Class XV except for some major establishments (e.g. a sugar refinery) where estimated employment has been added to the appropriate class.

Table A1.6 Employment in factories by sex and area, Victoria, 1868-1900

Year ^a	Melbourne ^b			Rest of Victoria			Total Victoria		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
1868	8,625	3,234	11,859	5,901	193	6,094	14,526	3,427	17,953
1869	9,397	3,475	12,872	6,900	341	7,241	16,297	3,816	20,113
1870-71	9,459	2,955	12,414	6,400	261	6,661	15,859	3,216	19,075
1871-72	10,711	2,785	13,496	7,216	312	7,528	17,927	3,097	21,024
1872-73	11,620	3,554	15,174	7,557	445	8,002	19,177	3,999	23,176
1873-74	13,499	4,167	17,666	8,182	409	8,591	21,681	4,576	26,257
1874-75	14,615	5,244	19,859	8,931	745	9,676	23,546	5,989	29,535
1875-76	15,118	5,289	20,407	9,720	816	10,536	24,838	6,105	30,943
1876-77	16,660	5,398	22,058	9,652	979	10,631	26,312	6,377	32,689
1877-78	16,336	5,965	22,301	10,583	1,131	11,714	26,919	7,096	34,015
1878-79	17,468	6,186	23,654	9,878	1,048	10,926	27,346	7,234	34,580
1879-80	17,434	5,851	23,285	10,117	1,227	11,344	27,551	7,078	34,629
1880-81	20,422	7,666	28,088	11,115	1,128	12,243	31,537	8,794	40,331
1881-82	22,949	8,615	31,564	12,459	1,293	13,752	35,408	9,908	45,316
1882-83	23,503	8,920	32,423	13,609	1,568	15,177	37,112	10,488	47,600
1883-84	24,205	9,251	33,456	14,239	1,373	15,612	38,444	10,624	49,068

1884-85	26,467	9,328	35,795	14,513	1,356	15,869	40,980	10,684	51,664
1885-86	27,350	8,813	36,163	13,961	1,335	15,296	41,311	10,148	51,459
1886-87	26,036	7,144	33,180	13,296	1,168	14,464	39,332	8,312	47,644
1887-88	27,294	7,971	35,265	14,505	1,342	15,847	41,799	9,313	51,112
1888-89	30,491	8,123	38,614	16,412	1,252	17,664	46,903	9,375	56,278
1889-90	33,351	9,416	42,767	15,398	1,266	16,664	48,749	10,682	59,431
1890-91	32,241	9,500	41,741	15,105	1,793	16,898	47,346	11,293	58,639
1891-92	29,956	9,213	39,169	13,711	1,634	15,345	43,667	10,847	54,514
1892-93	23,448	8,690	32,138	12,053	1,326	13,379	35,501	10,016	45,517
1893-94	20,567	8,685	29,252	11,462	1,168	12,630	32,029	9,853	41,882
1894-95	21,422	9,913	31,335	11,105	1,101	12,206	32,527	11,014	43,541
1895	23,770	11,512	35,282	11,584	998	12,582	35,354	12,510	47,864
1896	26,105	10,837	36,942	11,669	1,828	13,497	37,774	12,665	50,439
1897	27,044	12,248	39,292	11,686	1,782	13,468	38,730	14,030	52,760
1898	28,077	12,237	40,314	12,714	1,910	14,624	40,791	14,147	54,938
1899	30,610	13,871	44,481	13,494	2,158	15,652	44,104	16,029	60,133
1900	32,075	16,087	48,162	13,775	2,326	16,101	45,850	18,413	64,263

^a Calendar years 1868 and 1869; years ending 31 March for period 1870-1 to 1882-3 inclusive; years ending 1 March for period 1883-4 to 1894-5 inclusive; calendar years 1895 to 1900 inclusive.

^b As nearly as possible the Melbourne and Metropolitan Board of Works area as defined in 1890.

Table A1.7 Employment in establishments registered under The Factories and Shops Acts, Victoria 1886-1900^a

Employment in establishments registered under the Factories and Workshops Act, 1901																									
Year	I	II	III	IV			V	VI	VII	VIII		IX	X	XI	XII	XIII	XIV	XV	XVI	Total					
	Non-metallic mineral products	Bricks, pottery, glass, etc.	Chemicals	Boiling down	Total chemicals	Metals, engineering	Railway workshops	Vehicles (coaches and wagons)	Boats, ships, and slips	Total metals and products	Jewellery	Textiles	Skins, tanning, etc.	Clothing	Footwear	Food, drink, and tobacco	Sawmills and joinery	Furniture, cabinets, etc.	Paper, printing, etc.	Rubber goods	Musical instruments	Miscellaneous	Power and light		
1886	517	1,218	674	—	674	6,256	—	1,696	—	7,952	432	944	1,323	9,868	3,644	13,512	4,209	2,589	1,739	3,550	—	19	270	10	38,938
1887	461	1,268	570	—	570	6,887	—	2,057	—	8,944	382	856	1,522	9,835	3,653	13,488	4,540	2,474	1,832	3,685	—	19	300	22	40,363
1888	538	1,541	624	—	624	7,198	—	1,977	—	9,175	390	829	1,577	10,373	3,915	14,288	4,803	2,677	1,986	3,796	—	30	246	10	42,510
1889	482	1,644	651	—	651	7,692	—	2,321	—	10,013	481	959	1,776	11,090	3,854	14,944	5,259	3,226	2,463	4,265	—	21	304	70	46,558
1890	411	1,719	716	—	716	8,354	—	2,340	—	10,694	429	844	1,577	11,190	3,875	15,065	5,497	3,086	2,129	4,622	—	28	296	79	47,192
1891	474	1,692	742	—	742	7,885	—	2,061	—	9,946	396	1,096	1,667	10,943	3,838	14,781	5,498	2,605	2,314	4,328	—	26	331	59	45,955
1892	446	973	732	—	732	6,329	—	1,737	—	8,066	345	1,040	1,524	9,243	3,657	12,900	5,228	2,054	1,618	4,334	—	36	299	69	39,664
1893	248	601	682	—	682	5,121	—	1,295	—	6,416	260	884	1,477	9,135	3,472	12,607	4,694	1,425	1,112	3,894	—	24	252	72	34,648
1894 ^a	190	677	650	—	650	4,199	—	1,193	—	5,392	286	790	1,558	9,391	3,795	13,186	4,782	1,094	963	3,676	8	18	270	83	33,623
1895	174	750	823	—	823	4,316	—	1,165	—	5,481	292	890	1,690	9,912	4,227	14,139	4,977	1,079	1,007	3,605	14	16	299	134	35,370
1896	245	836	821	—	821	4,742	—	1,219	—	5,961	334	973	1,646	11,529	4,270	15,799	6,141	1,168	1,511	3,750	30	11	302	113	39,641
1897	243	750	855	—	855	5,974	—	1,278	—	7,252	365	1,112	1,981	12,273	4,590	16,863	6,713	1,214	2,071	3,878	61	34	421	118	43,931
1898	251	989	840	—	840	5,856	—	1,435	—	7,291	396	1,141	1,934	12,919	4,235	17,154	6,978	1,300	1,803	3,943	49	17	374	116	44,576
1899	277	1,073	908	—	908	6,613	—	1,438	—	8,051	417	1,318	1,950	14,162	4,266	18,428	7,238	1,310	2,053	4,253	101	24	398	128	47,927
1900	311	1,263	952	—	952	7,092	—	1,545	—	8,637	547	1,284	2,006	15,020	4,304	19,324	8,368	1,526	2,171	4,419	148	22	422	120	51,520

^a Excludes non-manufacturing activities such as wool sorting, laundering, etc.^b Minimum size of factory reduced from six to four hands as from 1 January 1894 except in the case of establishments employing Chinese where the minimum size, interpreted as two hands, was reduced to one hand in 1896.

Source: Annual 'Report of the Chief Inspector of Factories, Workrooms, and Shops', V/PPP.

Table A1.9 Employment in factories by class of industry, South Australia, 1875-6 to 1899-1900

Year ^a	I Non-metallic mineral products	II Bricks, pottery, glass, etc.	Chemicals Boiling down	III Total chemicals	Metals, engineering	Railway workshops	Vehicles (coaches and wagons)	Boats, ships, and products	IV Total metals and products	V Jewellery	Textiles	VI Skins, tanning, etc.	Clothing	Footwear	VIII Total clothing and footwear	IX Food, drink, and tobacco	X Sawmills and joinery	XI Furniture, cabinets, etc.	XII Paper, printing, etc.	XIII Rubber goods	XIV Musical instruments	XV Miscellaneous	XVI Power and light	Total
1875-76	176	144	71	11	82	1,850	236	121	2,207	85	28	555	540	675	1,215	1,479	577	64	239	—	—	6	53	6,910
1880-81	287	503	122	8	130	2,450	411	110	2,971	71	59	440	936	732	1,668	1,951	552	250	724	—	6	25	52	9,689
1881-82	265	621	127	3	130	2,445	524	104	3,073	98	53	664	1,146	681	1,827	2,038	679	257	841	—	9	13	109	10,677
1882-83	263	610	133	15	148	2,106	515	124	3,246	96	48	702	1,434	843	2,277	2,156	783	337	846	—	14	18	60	11,604
1883-84	272	571	122	—	122	2,247	586	167	3,407	87	96	646	1,170	804	1,974	2,124	446	342	807	—	9	13	83	10,999
1884-85	221	471	134	9	143	2,188	383	228	2,799	51	88	575	1,138	834	1,972	1,845	335	190	773	—	10	21	79	9,573
1888-89	168	270	233	6	239	3,339	281	126	3,746	68	127	674	1,457	1,080	2,537	2,086	496	289	894	—	10	67	80	11,751
1890-91	144	325	320	—	320	3,492	373	105	3,970	130	132	679	1,733	819	2,552	2,340	650	393	929	—	10	66	121	12,761
1891-92	144	328	365	—	365	3,616	423	105	4,144	130	132	667	1,718	1,077	2,795	2,331	818	408	1,232	—	10	66	134	13,704
1892-93	163	264	272	—	272	2,773	330	89	3,192	50	138	526	1,437	1,131	2,568	2,229	502	318	987	—	—	43	73	11,325
1896-97	124	271	280	—	280	4,248	310	72	4,630	50	144	475	1,302	1,051	2,353	2,698	476	202	950	—	—	71	87	12,811
1897-98	136	418	265	—	265	4,435	296	76	4,807	91	143	532	1,364	940	2,304	2,335	456	200	1,033	—	8	60	76	12,864
1898-99	127	333	296	—	296	5,552	342	91	5,985	64	165	547	1,504	949	2,453	2,596	403	344	1,038	—	5	72	66	14,494
1899-1900	155	385	368	4	372	5,790	384	70	6,244	85	167	591	1,734	834	2,568	2,339	440	433	989	—	10	84	65	14,927

^a For details of the statistical years see notes to Table A1.8.^b Data for these periods are not available.

Table A1.8 South Australia factory employment 1860-1900 (summary)

Year ^a	SASR data	Omissions	Additions	Author's estimate
1860	—	—	—	3,140 ^f
1861	—	—	—	3,391 ^f
1862	—	—	—	3,646 ^f
1863	—	—	—	3,877 ^f
1864	—	—	—	3,940 ^f
1865	—	—	—	4,360 ^f
1866	—	—	—	4,876 ^f
1867	—	—	—	5,644 ^f
1868	—	—	—	5,852 ^f
1869	—	—	—	6,322 ^f
1870	—	—	—	5,902 ^f
1871	—	—	—	6,584 ^f
1872	—	—	—	6,649 ^g
1873	—	—	—	6,714 ^g
1874	—	—	—	6,779 ^g
1875-76 ^b	7,036	126	—	6,910
1876-77	—	—	—	7,247 ^g
1877-78	^c	—	—	7,587 ^g
1878-79	^c	—	—	8,264 ^g
1879-80	^c	—	—	8,941 ^g

1880-81 ^c	10,667	978	—	9,689
1881-82 ^d	10,995	318	—	10,677
1882-83 ^d	12,273	669	—	11,604
1883-84 ^d	11,382	383	—	10,999
1884-85 ^d	9,946	373	—	9,573
1885-86	—	—	—	10,082 ^e
1886-87	—	—	—	10,637 ^e
1887-88	—	—	—	11,192 ^e
1888-89 ^d	12,070	319	—	11,751
1889-90	—	—	—	12,254 ^e
1890-91 ^d	13,183	422	—	12,761
1891-92 ^d	14,099	395	—	13,704
1892-93 ^d	11,488	163	—	11,325
1893-94	^e	—	—	11,707 ^e
1894-95	^e	—	—	12,075 ^e
1895-96	^e	—	—	12,443 ^e
1896-97 ^d	13,090	279	—	12,811
1897-98 ^d	13,154	290	—	12,864
1898-99 ^d	14,675	181	—	14,494
1899-1900 ^d	15,137	210	—	14,927

^a Calendar years 1860 to 1874 inclusive.

^b Year ending 26 March.

^c Year ending 3 April.

^d Year ending 31 March.

^e Previous data repeated.

^f Estimate based on published returns of numbers of establishments.

^g Interpolated estimate only.

Table A1.10 Tasmania factory employment 1860-99 (summary)

Year ^a	Author's estimate ^b	Butlin ^c	Year ^a	Author's estimate ^b	Butlin ^c
1860	3,226	—	1880	6,586	8,010
1861	3,392	—	1881	6,758	9,323
1862	3,387	—	1882	6,634	9,549
1863	3,869	3,876	1883	6,630	9,207
1864	3,913	4,234	1884	6,405	8,690
1865	4,195	4,709	1885	6,236	9,064
1866	4,080	5,424	1886	6,073	8,050
1867	4,532	5,960	1887	6,381	7,191
1868	4,531	5,751	1888	5,945	7,620
1869	4,607	5,272	1889	6,021	7,680
1870	5,085	5,599	1890	6,478	7,620
1871	4,681	5,431	1891	6,367	7,890
1872	5,416	6,400	1892	5,929	6,240
1873	6,132	7,317	1893	5,532	5,607
1874	6,204	7,163	1894	5,930	5,752
1875	5,991	6,970	1895	5,983	4,095
1876	6,035	7,369	1896	5,945	7,530
1877	6,273	7,139	1897	6,659	9,132
1878	6,336	7,102	1898	7,129	10,990
1879	6,556	7,820	1899	7,383	12,240

^a Calendar year.^b See text.^c Butlin, *Australian Domestic Product*, p. 163.

Table A1.11 Employment in factories by class of industry, Tasmania, 1880-99

Year ^a	I Non-metallic mineral products	II Bricks, pottery, glass, etc.	III Chemicals ^b	IV Metals, engineering Railway workshops Vehicles (coaches and wagons) Boats, ships, and slips Total metals and products	V Jewellery	VI Textiles	VII Skins, tanning, etc.	VIII Clothing Footwear	Total clothing and footwear	IX Food, drink, and tobacco	X Sawmills and joinery	XI Furniture, cabinets, etc.	XII Paper, printing, etc.	XIII Rubber goods	XIV Musical instruments	XV Miscellaneous	XVI Power and light	Total
1880	117	168	117	2,081	22	71	894	617	336	953	704	138	390	—	9	8	18	6,586
1881	117	153	108	2,236	24	71	971	554	327	881	703	92	390	—	9	9	18	6,758
1882	99	165	108	2,142	25	62	961	558	323	881	759	112	390	—	9	8	18	6,634
1883	126	153	108	2,209	25	44	835	531	312	843	846	92	360	—	9	8	18	6,630
1884	150	172	75	2,069	20	47	544	580	306	886	934	104	330	—	30	9	20	6,405
1885	150	347	59	1,991	27	84	275	523	274	797	927	108	364	—	30	6	20	6,236
1886	120	239	86	1,988	110	120	333	475	280	755	873	116	308	—	30	7	20	6,073
1887	168	250	101	2,191	144	104	237	388	280	668	934	120	448	—	24	5	36	6,381
1888	126	254	88	1,886	126	108	203	572	288	860	731	88	364	—	18	5	27	5,945
1889	108	244	104	1,874	144	109	223	554	284	838	751	96	364	—	18	5	27	6,021
1890	132	233	103	2,014	198	109	225	621	268	889	823	116	504	—	22	5	33	6,478
1891	110	216	97	1,989	190	108	202	680	274	954	790	106	540	—	20	5	30	6,367
1892	90	201	77	1,919	198	95	188	603	289	892	723	762	580	—	18	5	27	5,929
1893	117	109	99	1,778	198	49	205	509	281	790	722	611	609	—	18	7	27	5,532
1894	150	109	92	1,841	210	118	196	675	267	942	756	645	630	—	20	5	30	5,930
1895	90	146	97	1,833	210	118	206	675	278	953	795	727	600	—	20	5	30	5,983
1896	110	157	107	1,820	200	139	201	676	296	972	815	631	570	—	20	5	30	5,945
1897	132	175	138	1,943	228	180	203	834	373	1,207	826	835	540	—	24	6	36	6,659
1898	120	204	134	2,071	204	231	173	942	316	1,258	1,080	138	489	—	24	5	48	7,129
1899	84	246	135	1,997	276	198	173	919	366	1,285	1,225	132	537	—	24	7	48	7,383

^a Calendar years.^b 'Boiling down' was not distinguished separately.

Table A1.12 Queensland factory employment 1865-1900 (summary)

Year ^a	Author's estimate ^b	Butlin ^c	Year ^a	Author's estimate ^b	Butlin ^c
1865	520	—	1883	10,220	9,856
1866	1,080	—	1884	11,351	10,505
1867	1,567	783	1885	12,516	11,869
1868	1,764	1,088	1886	12,666	11,180
1869	2,340	2,000	1887	13,265	11,880
			1888	13,857	13,299
1870	3,344	3,446	1889	16,056	14,674
1871	4,371	4,460			
1872	4,238	4,744	1890	16,002	14,542
1873	4,219	5,337	1891	14,952 ^a	14,608
1874	4,118	4,479	1892	13,369	13,290
1875	5,238	4,646	1893	14,439	15,301
1876	5,065	5,060	1894	15,224	15,876
1877	5,607	5,272	1895	18,728	18,728
1878	5,802	5,741	1896	19,733	—
1879	5,489	6,180	1897	22,843	—
			1898	24,809	—
1880	5,595	5,710	1899	28,883	—
1881	6,340	7,232			
1882	7,940	8,452	1900	25,953	—

^a Calendar year.^b Author's estimate 1865 to 1891 (see text); as in QSR 1892 to 1900.^c Butlin, *Australian Domestic Product*, p. 162.^d Beginning in 1891 mills used only to crush sugar-cane excluded.

Table A1.13 Employment in factories by class of industry, Queensland, 1892-1900

Year ^a	I	II	III	IV			V	VI	VII	VIII		IX	X	XI	XII	XIII	XIV	XV	XVI	Total																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
				Non-metallic mineral products	Bricks, pottery, glass, etc.	Chemicals				Boiling down	Total chemicals										Metals, engineering	Railway workshops	Vehicles (coaches and wagons)	Boats, ships, and slips	Total metals and products	Jewellery	Textiles	Skins, tanning, etc.	Clothing	Footwear	Total clothing and footwear	Food, drink, and tobacco	Sawmills and joinery	Furniture, cabinets, etc.	Paper, printing, etc.	Rubber goods	Musical instruments	Miscellaneous ^c	Power and light																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
1892	83	255	118	150	268	2,124	604	40	2,768	—	—	—	—	—	351	331	1,067	1,398	4,827	1,467	53	1,272	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—</

^a Calendar year.^b Coverage of Class I changed in 1897.^c Class XV includes the residual category 'other' used in QSR; less use was made of this category after 1895.

Table A1.14 Western Australia factory employment 1870–1900 (summary)

Year ^a	Author's estimate	Year ^a	Author's estimate	Year ^a	Author's estimate
1870	743	1880	1,848	1890	5,113
1871	790	1881	1,895	1891	5,068
1872	692	1882	2,167	1892	5,220
1873	855	1883	2,664	1893	5,827
1874	1,448	1884	2,892	1894	7,028
1875	1,445	1885	3,309	1895	7,590
1876	1,360	1886	3,600	1896	9,478
1877	1,380	1887	3,620	1897	9,457 ^b
1878	1,545	1888	3,390	1898	9,640 ^b
1879	1,685	1889	4,202	1899	9,917 ^b
				1900	10,836 ^b

^a Calendar year.^b As stated in *Statistical Register* minus quarries, water condensing works, firewood cutting, photography and chaff-cutting, and plus home-workers.

Table A1.15 Employment in factories by class of industry, Western Australia, 1897-1900^a

Class	1897	1898	1899	1900
I Non-metallic mineral products				
II Bricks, pottery, glass, etc.	83	115	118	125
III Chemicals	516	338	292	371
IV Metals and products	118	145	89	94
V Jewellery	1,777	1,950	2,202	2,569
VI Textiles	26	43	32	41
VII Skins, tanning, etc.	—	—	—	—
VIII Clothing and footwear	134	117	92	133
IX Food, drink, and tobacco	750	965	1,201	1,335
X Sawmills and joinery	1,362	1,341	1,396	1,450
XI Furniture, cabinets, etc.	3,484	3,585	3,339	3,416
XII Paper, printing, etc.	206	118	160	212
XIII Rubber goods	876	811	782	859
XIV Musical instruments	25	—	—	—
XV Miscellaneous	—	—	—	—
XVI Power and light	4	—	74	88
	96	112	140	143
Total	9,457	9,640	9,917	10,836

^a See note *b* to Table A1.14.

Notes to Text

Chapter 1. Introduction

¹ N. G. Butlin, *Investment in Australian Economic Development 1861–1900*, *passim*.

² Butlin, *Investment in Australian Economic Development*, pp. 400–1.

³ See, for instance, E. A. V. Angier, *Fifty Years Freights 1869–1919*, London, 1920, *passim*.

Chapter 2. Origins: 1788 to 1814

¹ See K. Dallas, 'The First Settlements in Australia, considered in Relation to Sea-power in World Politics', *PPTHRA*, 1(1952), pt 3; M. Roe, 'Motives for Australian Settlement: A Document', *PPTHRA*, 1(1952), pt 4; G. Blainey, *The Tyranny of Distance*, *passim*; G. C. Bolton, 'The Hollow Conqueror: Flax and the Foundation of Australia', *AEHR*, 8(1968), pp. 3–16; G. Blainey, 'Botany Bay or Gotham City?', *AEHR*, 8(1968), pp. 154–63; and G. C. Bolton, 'Broken Reeds and Smoking Flax', *AEHR*, 9(1969), pp. 64–70; N. B. Nairn, 'The Selection of Botany Bay', pp. 46–56 in G. J. Abbott and N. B. Nairn (eds), *Economic Growth of Australia 1788–1821*, which is reviewed by K. Dallas, *PPTHRA*, 17(1970), pp. 103–10; A. G. L. Shaw, 'The Hollow Conqueror and the Tyranny of Distance' and G. Blainey, 'A Reply: I Came, I Shaw . . .', *Historical Studies*, 13(1967–9), pp. 195–206.

² Considerable use was made in preparing this chapter of *HRA*, Series I, vols. i–x and Series III, vols. i–iii; *HRNSW*, vols. ii–vii; and D. Collins, *An Account of the English Colony in New South Wales*, vols. 1 and 2. For the most part, detailed citations of these sources have been omitted.

³ For a much fuller statement of all these factors see B. Fitzpatrick, *British Imperialism and Australia 1783–1833*, London, 1939.

⁴ J. W. McCarty, 'The Staple Approach in Australian Economic History', *BAH*, 4(1964), pp. 1–22; G. C. Abbott, 'Staple Theory and Australian Economic Growth 1788–1820', *BAH*, 5(1965), pp. 142–54.

⁵ S. Macarthur Onslow (ed.), *Some Early Records of the Macarthurs of Camden*, Sydney, 1914, pp. 50–1 (but see E. Dunsdorfs, *The Australian Wheat-Growing Industry 1788–1948*, p. 13 about the dating of this evidence). For a discussion of the problems of the farmers between 1795 and 1800 see B. H. Fletcher, 'The Development of Small-Scale Farming in New South Wales under Governor Hunter', *JPRAS*, 50(1964–5), pp. 1–31.

⁶ C. J. King, 'The First Fifty Years of Agriculture in New South Wales', *Review of Marketing and Agricultural Economics*, 16(1948), p. 447.

⁷ See E. A. Beever, 'The Origin of the Wool Industry in New South Wales', *BAH*, 5(1965), pp. 96–106.

⁸ D. R. Hainsworth, 'In Search of a Staple: The Sydney Sandalwood Trade 1804–09', *BAH*, 5(1965), pp. 1–20.

⁹ M. Steven, *Merchant Campbell 1769–1846*, p. 213.

¹⁰ For a detailed discussion of these events see King, 'The First Fifty Years', pp. 685–97, and T. G. Parsons, 'Governor Macquarie and the Economic Crisis in New South Wales, 1810–1815', *New Zealand Journal of History*, 2(1968), pp. 178–200.

¹¹ P. Mathias, *The Brewing Industry in England 1700–1830*, Cambridge, 1959, pp. 63–78.

¹² For a review of the growth of knowledge about the properties of plants and trees see L. A. Gilbert, 'The Bush and the Search for a Staple in New South Wales, 1788–1810', *Records of Australian Academy of Science*, 1(1966), pp. 6–17.

¹³ J. G. Glover and W. B. Cornell, *The Development of American Industries*, New York, 1951, p. 195.

¹⁴ There is some confusion about the number of persons who actually landed at Sydney Cove: see, for example, editorial notes in *HRA*, I, i, pp. 712 and 727 and T. A. Coghlan, *General Report on the Eleventh Census of New South Wales* [1891], pp. 28–9. The vessels started to arrive in Port Jackson on 25 January but the women did not disembark until 6 February.

¹⁵ A. G. L. Shaw, *Convicts and the Colonies*, pp. 363–4.

¹⁶ See, for instance, J. H. Rose *et al.*, *The Cambridge History of the British Empire*, vol. 7, pt 1, pp. 68–9; C. M. H. Clark, *A History of Australia*, vol. 1, *passim*.

¹⁷ Clark, *History of Australia*, vol. 1, p. 92. For method of 'selection' see 'Report from the Select Committee on Transportation [10 July 1812]', *House of Commons Papers*, 1812, vol. 2, pp. 573–689.

¹⁸ A detailed treatment is R. B. Madgwick, *Immigration into Eastern Australia 1788–1851*, *passim*.

¹⁹ For the assignment system see T. A. Coghlan, *Labour and Industry in Australia*, vol. 1, pp. 24–39.

²⁰ Macarthur Onslow, *Early Records*, p. 49; Dunsdorfs, *Australian Wheat-Growing Industry*, p. 13.

²¹ See W. O. Henderson, *Britain and Industrial Europe 1750–1870*, Liverpool, 1954; and *The Industrial Revolution on the Continent, Germany, France, Russia 1800–1914*, London, 1961. The export of machinery and emigration of artisans took place despite legislation that made these movements illegal: see 'Reports from the Select Committee on Artizans and Machinery [3 February to 25 June 1824]', *House of Commons Papers*, 1824, vol. 5.

²² Caley to Banks (n.d.), *HRNSW*, v, p. 298.

²³ Settlement at Norfolk Island commenced on 29 February 1788 but as a result of Lord Hobart's instruction of 24 June 1803 the island was evacuated between February 1805 and March 1814. At Newcastle a small party mined coal for a few months in 1801–2 and was then withdrawn but a penal settlement was set up early in 1804.

²⁴ These data, and other details of freight movements referred to later in the chapter, have been derived from the Naval Officer's Returns reprinted in J. S. Cumpston, *Shipping Arrivals and Departures Sydney, 1788–1825*, pp. 70–95. Data are not available prior to July 1810 and are missing for the period 15 February to 31 March 1814.

²⁵ J. T. Bigge, 'Report of the Commissioner of Inquiry, on the State of Agriculture and Trade in the Colony of New South Wales [10 January 1823]', *House of Commons Papers*, 1823, vol. 10, no. 136, p. 54.

²⁶ For details see J. M. Ward, *British Policy in the South Pacific (1786–1893)*, Sydney 1948; G. Greenwood, *Early American-Australian Relations*, Melbourne, 1944; and A. E. Bax, 'Australian Merchant Shipping, 1788–1849', *JPRAS*, 38(1952–3), pp. 249–84.

²⁷ M. H. Ellis, *John Macarthur*, Sydney, 1955, p. 428.

²⁸ 'The General Order [28 February 1807]', *HRA*, I, vii, p. 825.

²⁹ Macquarie to Bathurst (28 June 1813), *HRA*, I, vii, pp. 773–4.

³⁰ Macquarie to Bathurst (24 March 1815), *HRA*, I, viii, p. 463 (see also p. 667). Four partners undertook to build a hospital in three years in return for the exclusive right to import spirits during that time. For the contract itself see Macquarie to Liverpool (18 October 1811), *HRA*, I, vii, pp. 401–5.

³¹ Macquarie to Bathurst (28 June 1813), *HRA*, I, vii, pp. 773–4. Dunsdorfs, *Australian*

Wheat-Growing Industry, p. 68 discusses the technical question of sailing north from Tasmania.

³² The lack of spirits also increased the price of labour because spirits were used to pay overtime work: on this see K. Dallas, 'Transportation and Colonial Income', *Historical Studies, Australia and New Zealand*, 3(1944-9), p. 303.

³³ W. C. Wentworth, *A Statistical, Historical, and Political Description of the Colony of New South Wales and . . . Van Diemen's Land*, p. 129.

³⁴ No attempt is made here to cover the ground brilliantly traversed by S. J. Butlin, *Foundations of the Australian Monetary System 1788-1851*.

³⁵ Butlin, *Foundations*, pp. 2-3; other writers (e.g. Dunsdorfs, *Australian Wheat-Growing Industry*, p. 18) make the same point.

³⁶ D. D. Mann, *The Present Picture of New South Wales*, pp. 69-70.

³⁷ For a detailed account of Thompson's career see J. V. Byrnes, 'Andrew Thompson, 1773-1810—Macquarie and the Thompson Legacy', *JPRHS*, 48(1962-3), pp. 105-41 and 161-207.

³⁸ L. L. Robson, *The Convict Settlers of Australia*, p. 119.

³⁹ Robson, *Convict Settlers*, p. 115; see 'Samuel Terry' in D. Pike (ed.), *Australian Dictionary of Biography*, vol. 2, pp. 508-9.

⁴⁰ A. H. Imlah, 'British Balance of Payments and Export of Capital, 1816-1913', *Economic History Review* (second series), 5(1952-3), pp. 226-7. For details of the direction of British trade see E. B. Schumpeter, *English Overseas Trade Statistics 1697-1808*, Oxford, 1960, p. 17.

⁴¹ Robert Campbell's career has been reviewed at length in C. E. T. Newman, *The Spirit of Wharf House*, Sydney, 1961, and Steven, *Merchant Campbell*, *passim*.

⁴² Castlereagh to King (13 July 1805), *HRA*, I, v, p. 490.

⁴³ Collins to Sullivan (4 March 1804), *HRA*, III, i, pp. 232-3.

⁴⁴ Although much of the machinery of these mills was made of wood, a great deal of skill was required; each toothed wheel had to be built up out of wood (usually iron-bark when available), then have its rim mortised, then be cogged, and then be pitched and have the teeth formed by hand. See N. Selfe, 'Annual Address to the Engineering Section', *Journal and Proceedings of the Royal Society of New South Wales*, 34(1900), p. XLIII.

⁴⁵ Cattle numbers in New South Wales increased from 7 in 1788 to 1,000 in 1800 and 26,000 in 1814. Sheep numbers at these dates were 29, 6,000 and 75,000 respectively.

⁴⁶ See, for example, Butlin, *Foundations*, pp. 61-4 on the implementation of regulations relating to interest rates and wages.

⁴⁷ See discussion by Steven, *Merchant Campbell*, pp. 105-36; 'Minutes of Trade Committee of Privy Council [22 December 1806]', *HRNSW*, vi, pp. 222-3; East India Company to Tierney (5 February 1807), *HRNSW*, vi, pp. 240-6. In 1813, as part of a general reorganisation of its rights and functions, the East India Company was left only with the prerogative of the China trade (until 1833) and the trade in tea: see Ward, *British Policy*, pp. 14-30.

⁴⁸ Launchings included the schooner *Cumberland* (26 tons) 1801, the schooner *Resource* (30 tons) 1803 and the cutter *Integrity* (45 tons) 1804.

⁴⁹ Dunsdorfs, *Australian Wheat-Growing Industry*, p. 70. The largest vessels built during this period were the *King George* of 185 tons (1805) and the *Perseverance* of 136 tons (1807). In fact it was not until 1847 that two vessels each of more than 400 tons were launched (in Tasmania).

⁵⁰ For a discussion of the tonnage restriction see D. S. Macmillan, 'The Rise of the British Australian Shipping Trade, 1810-1827: Its Problems, Progress and Promoters', pp. 1-22 in A. Birch and D. S. Macmillan (eds), *Wealth & Progress; Studies in Australian Business History*.

⁵¹ This, in part, amended 'An Act for further encouraging and regulating the Southern Whale Fisheries', 35 George III c. 92 (22 June 1795).

⁵² Useful sources are L. Norman, *Pioneer Shipping of Tasmania*, Hobart, 1938, p. 44; H. O'May, *Hobart River Craft*, n.d., p. 14.

⁵³ The evidence for this calculation is from Collins, *Account of the English Colony*, vol. 1, p. 327 (December 1793); 'Government and General Orders [9 October 1795]', *HRNSW*, ii, p. 323; 'Government and General Order [19 May 1801]', *HRA*, I, iii, p. 253.

⁵⁴ Bigge, *Agriculture and Trade*, pp. 58–9.

⁵⁵ The first freehold grant was made in 1808 but was not approved until 1811: a regular procedure for issuing town grants was not instituted until 1828.

⁵⁶ Quoted by G. P. Walsh, 'The Geography of Manufacturing in Sydney, 1788–1851', *BAH*, 3(1963), p. 34.

⁵⁷ This calculation is based on the evidence of W. E. Leith before Commissioner Bigge, *HRA*, III, iii, p. 412 and assumes a 75 per cent yield.

⁵⁸ J. T. Bigge, 'Report of the Commissioner of Inquiry into the State of the Colony of New South Wales [6 May 1822]', *House of Commons Papers*, 1822, vol. 20, no. 448, p. 41. The treadmill for punishment was not introduced into the colony until 1823.

⁵⁹ Collins, *Account of the English Colony*, vol. 1, pp. 316, 366 and 378 (October 1793 to June 1794). The flour output is a rough calculation based on the assumption that the mill could have been operated for ten hours a day and on Collins's statements about the work done (p. 359) and the yield obtained (p. 327).

⁶⁰ The same assumptions have been used as in the previous note. Obviously some wheat would have been lost and spoilt, some kept for seed, and some ground in hand-mills, but even so the problem was a serious one.

⁶¹ Prices from Collins, *Account of the English Colony*, vol. 1, p. 498 (September 1796); quantity of flour in wheat from Collins (p. 327); Hunter to King (1 June 1797), *HRA*, I, ii, p. 13 says almost one-half wheat paid, but Collins (vol. 2, p. 24, March 1797) says one-third.

⁶² The complex account of the cornering of the wheat supplies and the operation of these two mills by Blaxcell can be found in Byrnes, 'Andrew Thompson', pp. 161–207.

⁶³ See J. M. Freeland, *The Australian Pub*, pp. 9–38.

⁶⁴ King to Sullivan (15 March 1804), Mitchell Library (MS A2015, p. 385).

⁶⁵ King to Camden (15 March 1806), *HRA*, I, v, p. 654. The brewery was then leased privately (*SG*, 2 March 1806).

⁶⁶ For information about early brewing problems see James Squire, *Bigge Evidence*, K, no. 7, CO 201/129.

⁶⁷ Brabyn to Paterson (18 February 1809), *HRNSW*, vii, p. 37; Dallas, 'Transportation and Colonial Income', p. 298.

⁶⁸ Walsh, 'The Geography of Manufacturing', pp. 26 and 28.

⁶⁹ Informal encouragement may, however, have been of some significance. For example in the *Blaxland Papers* (Mitchell Library MS A1322, p. 99) it is suggested that John Blaxland set up a salt-works at Newington on the Parramatta River 'at the suggestion of the Ministry'.

⁷⁰ There had been two previous attempts to publish a newspaper in Tasmania. During 1810–12 a few issues of the *Derwent Star and Van Diemen's Land Intelligencer* appeared, and in 1814 a few issues of the *Van Diemen's Land Gazette and General Advertiser*.

⁷¹ See 'Robert Nash' in Pike (ed.), *Australian Dictionary of Biography*, vol. 2, pp. 278–9.

⁷² *SG*, 17 November 1805; T. M. Perry, 'The Lower Shoalhaven District: 1797–1822', *AG*, 6(1952–6), no. 3, p. 30.

⁷³ M. Roe, 'Charles Bishop, Pioneer of Pacific Commerce', *PPTHRA*, 10(1962–3), p. 12; T. Dunbabin, 'Whalers, Sealers, and Buccaneers', *JPRAS*, 11(1925), p. 9; F. H. Bauer, 'The Regional Geography of Kangaroo Island', Ph.D. thesis, The Australian National University, 1959, vol. 1, p. 297; J. Earnshaw, 'Select Letters of James Groves, Convict, Port Phillip and the Derwent', *PPTHRA*, 8(1959–60), pp. 32–3.

⁷⁴ J. K. Lavett, 'The Kissing Point Squires: Pages from the History of a Nation. The Story of James Squire and Frederick Garling', Adelaide, 1965 (National Library MS 1251).

Chapter 3. Manufacturing in New South Wales 1815 to 1850: The Spatial Setting

¹ Macquarie to Bathurst (18 March 1816), *HRA*, I, ix, pp. 90–1.

² Madgwick, *Immigration into Eastern Australia*, pp. 29–46, esp. p. 33.

³ Madgwick, *Immigration into Eastern Australia*, pp. 49 and 54, and Coghlan, *Labour and Industry*, vol. 1, p. 216, both quote the same figures.

⁴ Derived from Shaw, *Convicts and the Colonies*, pp. 96 and 257. For 'ticket of leave' system see Shaw, *passim*; a convict with a 'ticket' was to all intents and purposes free although his movements and legal rights were restricted.

⁵ Shaw, *Convicts and the Colonies*, p. 255.

⁶ Immigration policies, problems, and programs are discussed at length in Madgwick, *Immigration into Eastern Australia*, *passim*; see also his statistics for arrivals p. 223.

⁷ R. J. Shultz, 'Immigration into Eastern Australia, 1788–1851 [Review article]', *Historical Studies*, 14(1969–71), pp. 273–82.

⁸ M. D. George, *London Life in the Eighteenth Century*, Peregrine ed., London, 1966, p. 166: the 'war' is, of course, the Napoleonic War 1793 to 1815.

⁹ 'Report no. 5, "The Manufacture of Woollen Cloth", under Census and Industrial Returns Act of 1891—Information respecting', *NSWV&P(LA)*, vol. 7, 1891–2, p. 1097; W. J. Gould, 'Stockton Tweed Factory', *Newcastle and Hunter District Historical Society Journal and Proceedings*, 1(1947), pp. 20–1; *Sydney Herald*, 13 July 1840.

¹⁰ These figures, rounded from Shaw, *Convicts and the Colonies*, pp. 363–7, must be regarded as approximate only and in any case do not allow for transfers from one colony to another.

¹¹ A. F. Wilshire, *To the Honorable James Martin . . .* Sydney, 5 June 1867, p. 9 [being a printed letter (23 pp.) seeking compensation for the enforced closure of the tannery—see Chapter 4].

¹² Coghlan, *Labour and Industry*, vol. 1, p. 183 (without a supporting reference or date).

¹³ Bathurst to Darling (1 October 1826), *HRA*, I, xii, pp. 591–2.

¹⁴ For a detailed examination of the 1841 census, see R. Mansfield, *Analytical View of the Census of New South Wales for the year 1841*; and of the 1846 census F. G. P. Neison, 'Analysis of the Census of New South Wales', *Journal of the London Statistical Society*, 11(1848), pp. 38–54, and R. Mansfield, *Analytical View of the Census of New South Wales for the Year 1846*.

¹⁵ For a discussion of the spread of settlement see T. M. Perry, *Australia's First Frontier*, and S. H. Roberts, *History of Australian Land Settlement (1788–1920)*.

¹⁶ *NSWV&P(LC)*, 1847, vol. 1, pp. 283–91.

¹⁷ See 'Report from the Select Committee, on the Petition from Distressed Mechanics and Labourers, with Minutes of Evidence', *NSWV&P(LC)*, 1843 for evidence about this.

¹⁸ The census data are obviously incomplete. Thus, R. B. Walker, *Old New England*, p. 36 reports that Armidale had a population of 76 in October 1845, but this town is not even mentioned in the 1846 census although a dozen villages with smaller populations are. The delimitation of the urban boundaries is also uncertain, a point that is taken up again more specifically in relation to the definition of 'Sydney'.

¹⁹ Enclosure (10 June) with Macquarie to Bathurst (24 June 1815), *HRA*, I, viii, p. 574; see reprint of letters by 'X.Y.Z.' to the *Australian*, 13 March 1827 onwards, in G. Mackaness, *Fourteen Journeys over the Blue Mountains of New South Wales 1813–1841*, Sydney, 1965, esp. pp. 183–4.

²⁰ D. N. Jeans, 'Town Planning in New South Wales 1829–1842', *Journal of the Australian*

Planning Institute, 3(1964-5), pp. 188 and 191-6 traces the evolution of the regulations. See also H. Wright, 'Town Planning in New South Wales in 1829', *JPRAHS*, 12(1926), pp. 231-5, and H. W. H. King, 'County, Shire and Town in New South Wales', *AG*, 6(1952-6), no. 3, pp. 14-25.

²¹ Proclamations of towns and villages can be found in the *NSWGG* beginning with Bungonia, 13 March 1833, p. 92. For the special case of Goulburn, a plan of which was approved by Darling on 1 October 1829 but which was altered and gazetted on 27 March 1833, see W. A. Macdonald, 'Old Goulburn and the Southern District', *JPRAHS*, 18(1932-3), esp. pp. 178-9. Jeans's map in 'Town Planning', p. 188, shows the location of towns and villages proclaimed in New South Wales 1829-42 (though not all the towns shown came to anything and others remained little more than wayside stopping places). See also D. N. Jeans, 'Territorial Divisions and Locations of Towns in New South Wales, 1826-1842', *AG*, 10(1967), pp. 243-55.

²² B. Ryan, 'The South Coast of New South Wales: A Regional Survey of Urban Growth', *BAH*, 6(1966), p. 153. The sub-collector of customs was appointed on 3 September 1846: *NSWV&P(LC)*, 1847, vol. 1, p. 609.

²³ The characteristics of the landholders and their farms have been analysed in detail by Perry, *Australia's First Frontier*, pp. 52-78.

²⁴ *NSWBB*, 1829, p. 200.

²⁵ An editorial, 'Government Blunders—Townships—Maitland', *SMH*, 13 February 1841, berated the government for allowing three towns to grow up near each other instead of fostering a single large one.

²⁶ For the importance of water transport see H. W. H. King and E. R. Woolmington, 'The Role of the River in the Development of Settlement in the Lower Hunter Valley', *AG*, 8(1960-2), no. 1, pp. 3-16.

²⁷ For two views, see M. T. Daly, 'The Development of the Urban Pattern of Newcastle', *AEHR*, 10(1970), pp. 190-203, and J. W. Turner, 'The Development of the Urban Pattern of Newcastle: A Critique', *AEHR*, 11(1971), pp. 179-90 with Daly's reply, 'Further Views on Newcastle's Urban Pattern', pp. 191-7.

²⁸ *SG*, 9 and 30 October 1823; J. Jervis, *The Cradle City of Australia: A History of Parramatta 1788-1961*, pp. 60-1; H. Norrie, 'Sydney's Ferry Boats', *JPRAHS*, 21(1935), pp. 1-26; M. Swann, 'Early Ferry Services to Parramatta', *Parramatta and District Historical Society Journal and Proceedings*, 4(1935), pp. 108-17.

²⁹ Butlin, *Foundations*, p. 303.

³⁰ 'Sydney' has been defined here as the parishes of St Philip, St James, St Lawrence, St Andrew, Alexandria, and Willoughby (the latter taking account of development on the North Shore). Parishes have been used as a convenient 'building block' since they are the smallest areas for which tabulations were published, beginning in 1836. The decision about which parishes to include was made after examining the characteristics of the population and contemporary maps and plans. Ideally, some sort of moving boundary concept should be used but this is impracticable; the use of a fixed boundary means, of course, that fringe rural settlements are overstated. The general problem of boundary definition is discussed in G. J. R. Linge, *The Delimitation of Urban Boundaries*, Canberra, 1965, esp. pp. 1-11. It is believed that the definition used here is preferable to the 'City and Suburbs' boundary adopted in 1846 and 1851 [used later by Coghlan and accepted (for 1851) by J. W. McCarty, 'Australian Capital Cities in the Nineteenth Century', *AEHR*, 10(1970), p. 131] both because the data are available for a longer period and because it is somewhat more akin to a continuous built-up area concept. The 'City and Suburbs' definition gives a figure of 45,190 population at the census of 1846 and 53,934 in 1851.

³¹ The census returns do not show the sex composition of the workforce (except for the category 'domestic servants') but a rough estimate of female employment has been obtained

in Table 3.9 by assuming that all males aged fourteen to sixty were at work and the remainder of the workforce must, therefore, have been women and girls.

³² Butlin, *Foundations*, *passim*.

³³ D. Waugh, *Three Years' Practical Experience of a Settler in New South Wales*, p. 25; also Gipps to Stanley (4 November 1843), *HRA*, I, xxiii, pp. 211-2.

³⁴ 'Alexander Harris', *Settlers and Convicts*, reprint ed. Melbourne, 1953, pp. 202-5.

³⁵ J. P. S. Bach, 'Land and sea communications between Sydney and Melbourne, 1837-1864', M.A. thesis, University of Sydney, 1954, p. 3.

³⁶ A useful series of articles under the general title of 'Historical Roads of New South Wales' was published by the Department of Main Roads in its journal *Main Roads*: e.g. the Hume Highway, 13(1948), pp. 122-6; and the Pacific Highway, 14(1949), pp. 77-86 and 18(1952), pp. 41-8.

³⁷ To try to increase the area in contact with the road surface and hence spread the weight Macquarie followed the English practice of ordering certain types of vehicles to have four wheels with rims at least 2½ inches in width (*SG*, 5 December 1818) but the order could not be enforced because there was a shortage of iron for the 'tyres' (*SG*, 16 October 1819). By 1829 there were some 1,800 men in road gangs but these were the most recalcitrant convicts (450 were in irons) and their productivity and skill were low: see Darling to Murray (20 August 1829), *HRA*, I, xv, pp. 125-6.

³⁸ See H. H. Newell, 'Road Engineering and Its Development in Australia 1788-1938', *Journal of the Institution of Engineers Australia*, 10(1938), pp. 41-106.

³⁹ Waugh, *Three Years' Practical Experience*, p. 41.

⁴⁰ *NSWV&P(LC)*, 1847, vol. 2, p. 331.

⁴¹ Mitchell to Darling (30 August 1830), *HRA*, I, xvi, p. 141.

⁴² The Bathurst Land Conveyance Company paid an average of £41.4.2 for 67 horses in the mid-1830s compared with an average of £9.1.6 for 110 bullocks: see J. Nisbet, 'Transport on the Western-road in 1836', *JPRHS*, 11(1925), pp. 231-7. Horse and bullock rations can be found in government tender notices (e.g. *NSWGG*, 29 January 1834, pp. 56-7). For the relative merits of horses and bullocks see J. Atkinson, *An Account of the State of Agriculture and Grazing in New South Wales*, pp. 34-6. The Bathurst Land Conveyance Company as such is discussed by R. M. Teale, pp. 23-50 in Birch and Macmillan, *Wealth & Progress*.

⁴³ *SG*, 18 March 1824; Darling to Murray (21 November 1829), *HRA*, I, xv, p. 254; *SG*, 3 January 1832. Realignments reduced the distance from 137 miles in the early 1820s to about 125 miles in the mid-1830s. A useful compilation is Mackaness, *Fourteen Journeys over the Blue Mountains*, *passim*.

⁴⁴ E. Macarthur, sub-enclosure in Normanby to Gipps (10 July 1839), *HRA*, I, xx, p. 223.

⁴⁵ *SG*, 14 August 1823, 29 July 1824 and 13 January 1825.

⁴⁶ Darling to Huskisson (10 April 1828), *HRA*, I, xiv, p. 139.

⁴⁷ *SMH*, 25 October 1854; S. Mossman and T. Banister, *Australia Visited and Revisited*, London, 1853, pp. 134-5; the placing of the border between New South Wales and Victoria at the Murray rather than the Murrumbidgee River was a continual source of rivalry, the transport aspects of which are discussed by R. H. T. Smith, 'Transport and Commodity Movements in Southern New South Wales', Ph.D. thesis, The Australian National University, 1961.

⁴⁸ Many estimates were made of the costs involved: see, for example, Gipps to Stanley (31 May 1844), *HRA*, I, xxiii, pp. 627-31. For the actual announcement, see *NSWGG*, 29 June 1846. Surprisingly, historians and geographers have assumed this to be a turning point in Newcastle's development: in reality, as discussed in Chapter 10, its practical benefits were largely frustrated by the activities of powerful commercial interests in Sydney.

⁴⁹ Only in 1847 was a separate return (for items totalling £14,112) published for Newcastle as distinct from Sydney exports in the normal *NSWBB* tabulations. A detailed return for 1848 is available [*NSWV&P(LC)*, 1849 vol. 1, p. 958] when exports were valued at £10,331

but no wool was among the items. Some other total Newcastle export figures are available, [NSWV&P(LC), 1851, vol. 2, p. 507]: 1849 £8,621; 1850 £16,264; 1851 £9,576. Unofficial returns are then available in the *MM*: 1852 £62,933; 1853 £89,523; 1854 £152,596. Of the total value of exports in 1854, £80,248 was in respect of 46,388 tons of coal; the destinations were Victoria £117,246, New Zealand £19,311, other British colonies £11,531, United States £1,894, other places £2,614.

⁵⁰ This was made up of 730 tons of coal, lime and grain, and 49,000 feet of timber from places on the coast between Port Stephens and Shoalhaven; 228 tons of grain, oil, salt and meat from Bass Strait and Tasmania; and 142 tons of sandalwood and pork, and 9,000 feet of timber from the Pacific islands and New Zealand. Calculated from *Bigge Evidence*, K, no. 6, CO 201/129.

⁵¹ Compiled from daily 'coasters inwards' returns in *SMH* during 1846. Original data were converted into long tons for Figs. 3.4 and 3.5 by assuming that bales of wool averaged 300 lb and bushels of wheat averaged 60 lb.

⁵² Compiled from shipping news in *Port Phillip Herald*, 1846. Precise data about the quantity of wool and tallow from other colonies passing through Sydney are not available. However, in a produce circular issued by T. S. Mort on 1 November 1849 (*MM*, 21 November 1849) it was estimated that wool imported from Port Phillip, Tasmania, Adelaide and New Zealand in the 1846–7 season amounted to 185 tons or 2.8 per cent of Sydney's exports (assuming that one-tenth of the bales was clean wool in bales of 270 lb and the rest was greasy wool in bales of 350 lb). Similar estimates for 1847–8 and 1848–9 were 619 and 634 tons representing 9.6 and 7.9 per cent of Sydney's exports. For tallow the estimates were: 1846–7, 111 tons (3.1 per cent of Sydney's exports); 1847–8, 148 tons (3.1 per cent); 1848–9, 409 tons (6.7 per cent).

⁵³ These simply represent possible orders of magnitude assuming wool was packed in bales of 300 lb and tallow in casks grossing 500 lb. No account can be taken of produce in store or consumed locally. The production of tallow in New South Wales in 1846 (based on incomplete data) was only 840 tons compared with 2,343 tons in 1845 and 2,948 tons in 1847.

⁵⁴ This assumes that the weekly consumption (derived from contemporary accounts of rations provided to employees) was: sugar 2 lb per adult and 8 oz per child; of tea and salt, each 4 oz per adult; of tobacco 6 oz per adult male; and of soap 2 oz per person. Wool exports of, and population in, the Moreton Bay and Port Phillip areas are excluded.

Chapter 4. Manufacturing in New South Wales 1815 to 1850: Its Development and Location

¹ NSWAO, N.S.W. Colonial Secretary Letters Received, 'Article of Agreement between Deputy Commissary General and Simeon Lord [28 August 1816]', 4/1735, quoted by Walsh, 'The Geography of Manufacturing', p. 32.

² The 1815 figure of rations provided is derived from *HRA*, I, ix, pp. 90–1, but there is a discrepancy between this statement and a Commissariat quarterly return of rations provided from September 1813 to December 1820: see *Bigge Evidence*, I, no. 10, CO 201/128. In 1819 the actual daily consumption of flour was equivalent to 125 bushels of wheat; Drennan to Macquarie (20 February 1819), *HRA*, I, x, p. 117.

³ For the various viewpoints see the series of documents *HRA*, I, x, pp. 106–35.

⁴ During 1813 and 1814, when wheat was scarce and the two government mills had been leased to a private individual, the Commissariat bought the equivalent of 8,700 bushels of wheat in the form of bread and flour: see J. V. Byrnes, 'Andrew Thompson, 1773–1810—Macquarie and the Thompson Legacy', *JPRAS*, 48(1962–3), pp. 161–207; 'Government and General Order [17 December 1814]', *SG*, 17 December 1814; *Bigge Evidence*, I, no. 10, CO 201/128. During 1819 and 1820, millers were paid £3,925 for their services of which £3,552 went to Sydney firms: *Bigge Evidence*, I, no. 11, CO 201/128.

⁵ In 1816 Lord claimed—probably with some exaggeration—that £8,000 had been invested in his water-driven mill which commenced operations in 1814 on a stream flowing into Botany Bay. See E. C. Rowland, 'Simeon Lord—A Merchant Prince of Botany Bay', *JPRHS*, 30(1944), pp. 157–95; *Bigge Evidence*, K, no. 14, CO 201/129; 'Simeon Lord' in Pike (ed.), *Australian Dictionary of Biography*, vol. 2, pp. 128–31; and D. R. Hainsworth, *Simeon Lord*, Melbourne, 1968.

⁶ This argument is only partially valid. In the five years 1815 through 1819 it can be estimated from quantities bought and prices given (*Bigge Evidence*, I, no. 10, CO 201/128) that the government paid about £272,000 to settlers for wheat, maize and meat. Three-fifths of this was spent on meat which was provided mainly by the more affluent settlers who had, however, been severely hit by droughts and insect infestations (for livestock losses, see Perry, *Australia's First Frontier*, pp. 30–2). Between one-third and one-quarter of the colonial wheat harvest was bought by the Commissariat, mainly from small settlers, but these were operating at little more than subsistence level and were in no position to cope with droughts and then floods (Macquarie to Bathurst, 4 April 1817, *HRA*, I, ix, p. 340). The effects of difficult climatic conditions during this period cannot be ignored.

⁷ Bathurst to Macquarie (15 March 1813), *HRA*, I, vii, p. 693; Macquarie to Bathurst (28 April 1814), *HRA*, I, viii, p. 159; *SG*, 3 and 17 June 1815; Drennan to Macquarie (20 February 1819), *HRA*, I, x, p. 117. See also 'John Dickson' in Pike (ed.), *Australian Dictionary of Biography*, vol. 1, p. 306.

⁸ Wentworth, *Statistical, Historical, and Political Description*, p. 111; the same figure was repeated in the second edition (1820), p. 144, but no estimate was given in his rewritten version, *A Statistical Account of the British Settlements in Australasia*, London, 1824.

⁹ *Bigge Evidence*, K, no. 2, CO 201/129. Bigge, *Agriculture and Trade*, p. 51; in 1815 James Wilshire suggested to Macquarie (*Bigge Evidence*, K, no. 15, CO 201/129) that, as in England, tanners should be licensed, but this was still being argued in 1824 (*Australian*, 30 December 1824).

¹⁰ Bigge, *Agriculture and Trade*, pp. 33, 51–3 and 103; *Colony of New South Wales*, p. 155. See also J. Webster, 'The Early Breweries of Australia', n.d. [1931?], typescript (Mitchell Library Q 991/W).

¹¹ Bigge, *Colony of New South Wales*, p. 158.

¹² No attempt is made here to repeat the details of the boom and slump of the 1820s which have been considered by Butlin, *Foundations*, pp. 190–224, and R. M. Hartwell, 'Australia's First Trade Cycle: Boom, Crisis, Depression and Recovery in New South Wales, 1820–1832', *JPRHS*, 42(1956–7), pp. 51–67.

¹³ Butlin, *Foundations*, p. 208; Wollstonecraft to McLeay (15 August 1826), *HRA*, I, xii, pp. 507–10; J. C. Foley, *Droughts in Australia*, Bulletin no. 43, Commonwealth Bureau of Meteorology, Melbourne, 1957, p. 54.

¹⁴ Evidence of Savage before the executive council (18 December 1828), *HRA*, I, xiv, p. 554.

¹⁵ Retained imports of breadstuffs in terms of bushels of wheat (assuming 45 lb of flour to the bushel) were: 1826, 3,600; 1827, 66,100; 1828, 91,000; 1829, 105,600; 1830, 64,900; 1831, 68,800; and 1832, 23,700. Retained imports in 1831 and 1832 may have been less since some wheat and flour was probably included in the value of re-exports which is not broken down by commodities.

¹⁶ 'Report by Board of Enquiry on the Bank of New South Wales [12 May 1826]', *HRA*, I, xii, p. 302 (dollar figure converted to £ at 4/4d); *SG*, 29 September 1829.

¹⁷ The conditions under which the distilleries could operate were published in *SG*, 10 February 1821. Further details are in D. I. McDonald, 'The Worst Step That Was Ever Adopted', *JRAHS*, 56(1970), pp. 206–24; Stewart to Bathurst (12 December 1825), *HRA*, I, xii, pp. 86–7; *NSWV&P(LC)*, 1839, p. 511.

¹⁸ This assumes that 13 pints of proof spirit could be made from a 60 lb bushel of wheat

and 9 gallons from a hundredweight of sugar: see enclosure (dated 15 January 1825) with Brisbane to Bathurst (4 February 1825), *HRA*, I, xi, p. 488. Some sugar was produced at Port Macquarie beginning in 1823 but the quantity was small: see *SG*, 14 October and 18 November 1824; Morisset and Busby to McLeay (4 August 1828), *HRA*, I, xv, pp. 493-5; and F. R. Eipper, 'The Birth of the Sugar Industry', *Scone and Upper Hunter Historical Society Journal*, 2(1961), pp. 108-11.

¹⁹ 1825: Cooper and Levey's Darling Harbour mill (*SG*, 7 August 1825; *Australian*, 29 December 1825). 1826: Raine's Darling Mills near Parramatta (*SG*, 28 July and 4 August 1825, 3 May and 15 July 1826; J. K. Houison, 'The Darling Mills Parramatta', *Parramatta and District Historical Society Journal and Proceedings*, 3(1925-6), pp. 123-33). 1829: Cooper's Brisbane Mills near Sydney (*Australian*, 30 June 1829). This list tallies with Darling to Huskisson (10 April 1828), *HRA*, I, xiv, p. 129.

²⁰ During the nine years 1822-30, 874 vessels, averaging 262 tons, entered Sydney. In this same period 50 vessels, averaging 48 tons, were launched in New South Wales.

²¹ Butlin, *Foundations*, p. 193; see also J. Waldersee, 'Emancipist in a Hurry: François Girard', *JRAHS*, 54(1968), pp. 238-55.

²² *SG*, 30 September 1820 and 15 July 1824; *Australian*, 3 February 1825; Butlin, *Foundations*, p. 193.

²³ *SG*, 8 and 29 July and 14 October 1824; *Australian*, 28 October 1824. Cooper then started his own distillery project: *SG*, 14 October 1824 and 8 December 1825.

²⁴ Walsh, 'The Geography of Manufacturing', p. 40.

²⁵ *SG*, 21 October 1824 and 1 February 1826; *Australian*, 23 June 1825; Walsh, 'The Geography of Manufacturing', p. 42.

²⁶ *Bigge Evidence*, I, no. 12, CO 201/128.

²⁷ Brisbane to Bathurst (9 November 1824), *HRA*, I, xi, p. 417; J. Jervis, 'The Tread Mill', *JPRAS*, 31(1945), pp. 337-40; *SG*, 23 August and 24 November 1822.

²⁸ 'Comparative Statement of Prices of Labour and Materials July 1830', sub-enclosure Darling to Murray (3 October 1830), *HRA*, I, xv, pp. 754-5.

²⁹ No attempt is made to duplicate the analysis by Butlin, *Foundations*, pp. 225-314, or S. H. Roberts, *The Squatting Age in Australia 1835-1847*.

³⁰ A. Barnard, *The Australian Wool Market 1840-1900*, esp. pp. 48-65.

³¹ The *Sydney Herald* began publishing share-lists in 1839. For an incomplete list see H. Kolsen, 'Company Formation in N.S.W.: 1828-1851 A Preliminary Report', *Bulletin of the Business Archives Council of Australia*, 1(1959), pt 6, pp. 11-21. For details of banks see Butlin, *Foundations*, *passim*. For the gas company see J. Ginswick, 'Foundations of the Australian Gas Light Company', *JPRAS*, 45(1959-60), pp. 226-65; J. Ginswick, 'Early Australian Capital Formation 1835-1850: A Case Study The Australian Gaslight Company', *Bulletin of the Business Archives Council of Australia*, 1(1959), pt 6, pp. 22-49; pt 7, pp. 43-9; and pt 8, pp. 39-48.

³² Advertisements in *Sydney Herald*, 8 January and 3 September 1832 quoted by Barnard, *Australian Wool Market*, p. 51.

³³ *SG*, 28 January 1836; Walsh, 'The Geography of Manufacturing', p. 48.

³⁴ 'Adult male equivalents' (numbering 93,174 in 1841 and 131,468 in 1851) have been derived by adding two-thirds the number of adult females and half the number of children to the number of adult males.

³⁵ Butlin, *Foundations*, pp. 315-78.

³⁶ Personal communication from Mr J. Ginswick (15 September 1967).

³⁷ Girard had decided in 1840 to sell his Sydney holdings and move to northern New South Wales some two years before he became insolvent: see Waldersee, 'Emancipist in a Hurry', pp. 250-1.

³⁸ B. Dyster, 'Prosperity, Prostration, Prudence: Business and Investment in Sydney 1838-1851', in Birch and Macmillan, *Wealth & Progress*, p. 55.

³⁹ The 5 per cent duty on grain, flour and bread was temporarily suspended in 1838 and 1840 [2 Vic. no. 26 (26 October 1838) and 3 Vic. no. 29 (16 June 1840)].

⁴⁰ *Sydney Herald*, 3 March 1841; *SG*, 6 March 1841.

⁴¹ The rapidly changing age and sex structure of the population makes per capita consumption figures meaningless: between the censuses of 1836 and 1851 total population increased by 141 per cent and 'adult male equivalents' by 108 per cent. The consumption figures take into account local production and external trade but cannot allow for opening and closing stocks. The Port Phillip District is excluded.

⁴² See the reports from the Select Committees on distressed labourers in *NSWV&P(LC)*, 1843 and 1844 (vol. 2); also Gipps to Stanley (19 August, 1 September, 7 October and 4 November 1843), *HRA*, I, xxiii, pp. 86, 95, 182 and 211-2.

⁴³ See J. M. Freeland, *Architecture in Australia*, pp. 84-8 for a discussion of the architectural significance of these regulations.

⁴⁴ By 6 Vic. no. 3 (20 July 1842) the 'Town' of Sydney was designated a 'City' but the boundaries remained the same.

⁴⁵ *SMH*, 11 November 1842, 8 September 1843 and 12 March 1844; *Colonial Observer*, 15 June 1842.

⁴⁶ It is uncertain whether 'houses' meant the same as the term 'dwellings' used in modern censuses. The figures used here include both finished and unfinished 'houses' since these were not differentiated in terms of construction materials used.

⁴⁷ Gipps to Stanley (1 January 1844), *HRA*, I, xxiii, pp. 292-3.

⁴⁸ *NSWBB*, 1850, p. 22.

⁴⁹ NSWAO, 'Companies Memorials and Documents', 3/3151, folio 7.

⁵⁰ A. Birch, 'The Origins of the Colonial Sugar Refining Company 1841-55', *BAH*, 5(1965), pp. 21-31, esp. p. 24.

⁵¹ P. H. Russell, 'Sir Peter Nicol Russell, 1816-1905; His Family and Associates. Pioneers of the Australian Iron and Engineering Industry', *JPAHS*, 50(1964-5), pp. 129-43.

⁵² P. Cox and J. Freeland, *Rude Timber Buildings in Australia*, p. 37; *Sydney Herald*, 2 April 1841; *SMH*, 12 September 1842 and 30 September 1846.

⁵³ Thus, at Yass in 1842 a three-storeyed mill with a total floor area of 6,000 square feet was designed by the firm in Sydney which manufactured the 10 horse-power high-pressure engine and ancillary equipment: *SMH*, 17 August 1842.

⁵⁴ N. S. Pixley, 'The History of the A.U.S.N. Co. Ltd and Its Predecessors', *Historical Society of Queensland Journal*, 5(1953-7), pp. 969-1003; *SMH*, 8 January 1846 and 24 August 1848.

⁵⁵ S. Elliott, *On the Introduction of Local Industries into New South Wales*; J. I. Bleasdale, 'Meat Preserving', appendix B, pp. 27-34, in 'Report of the Secretary for Agriculture', *VPPP*, 1873, no. 59. In a letter to the *Australasian*, 5 May 1866, Elliott claimed that he had recently opened a tin of beef which he had made in 1846 and had found it perfectly satisfactory.

⁵⁶ *MM*, 22 July 1848, 5 May and 27 October 1849, 8 May 1850, 29 October and 22 November 1851.

⁵⁷ See letter from F. G. Dangar (son of Henry Dangar who, with his brother William, established the works), *SMH*, 14 February 1872. Also 'Henry Dangar' in Pike (ed.), *Australian Dictionary of Biography*, vol. 1, pp. 280-2.

⁵⁸ *South Australian Gazette and Colonial Register*, 13 June 1846; *MM*, 15 July 1846.

⁵⁹ D. S. Macmillan, *Scotland and Australia 1788-1850: Emigration, Commerce and Investment*, Oxford, 1967, p. 365.

⁶⁰ *MM*, 15 February 1851, 26 February 1852, 4 March and 23 September 1854; 'Report from the Select Committee on the Newcastle Coal and Copper Mining Company's Bill', *NSWV&P(LC)*, 1853, vol. 2.

⁶¹ Adelaide is about 1,030 nautical miles from Newcastle; although copper ore was raised

in small quantities from deposits in New South Wales from 1847 (e.g. at Carcoar, Bathurst, Yass and especially Molong) there is no evidence that these first smelting ventures looked to any but New Zealand and South Australian sources.

⁶² H. Hughes, *The Australian Iron and Steel Industry, 1848-1962*, pp. 2-5.

⁶³ This legislation, 'An Act to alter and amend the Duties of Customs', 7 Vic. no. 24 (22 December 1843), proposed fixed duties in place of ad valorem duties. But whereas flour was to be charged 2/6d per 112 lb and wheat 1/-d per bushel (almost exactly equivalent in terms of flour content), the Act also proposed a charge of £2.6.0½ per ton on unrefined sugar and of £6.18.1½ on refined sugar. The Act was disallowed.

⁶⁴ As a result of a proclamation by Darling, dated 16 October 1828, unmanufactured tobacco was charged 1/6d and manufactured tobacco 2/- per lb.

⁶⁵ This, presumably, explains the allusion by E. Shann (*An Economic History of Australia*, p. 263) to 'some traces of protection to local industries such as . . . sugar refining' in pre-gold tariffs.

⁶⁶ The Australasian Sugar Company took over a rival sugar-works operated (1847-9) by T. W. Bowden in Sydney. About this time Robert Cooper began to refine sugar but in 1852 the company acquired these works and the associated Brisbane Distillery which thus provided a wholly owned outlet for molasses. See *SMH*, 2 April 1853.

⁶⁷ NSWAO, 'Police Magistrates' Returns', 4/7268, 1847-50.

⁶⁸ Bigge, *Agriculture and Trade*, p. 87.

⁶⁹ An anonymous paper (an enclosure dated 15 January 1825 with Brisbane to Bathurst, 4 February 1825, *HRA*, I, xi, pp. 488-92), which reviews the profitability of distilling spirits in New South Wales from grain and sugar, is a comprehensive analysis of the relationship between manufacturing costs, excise duty, and import duty.

⁷⁰ T. L. Mitchell, 'Report on the Great Road Southward (26 March 1830)', Mitchell Library (MS A331, p. 49).

⁷¹ NSWAO, 'Police Magistrates' Returns', 4/7267.

⁷² Darling to Huskisson (10 April 1828), *HRA*, I, xiv, p. 139.

⁷³ *Berry Papers* (Mitchell Library uncatalogued MSS 315), vols. 1 and 5, *passim*.

⁷⁴ H. Lowe, 'William Lowe—Shipbuilder', *Newcastle and Hunter District Historical Society Journal and Proceedings*, 2(1948), pp. 24-31; H. Lowe, *William Lowe, Pioneer Shipbuilder of Clarencetown*, Raymond Terrace, n.d.

⁷⁵ NSWAO, 4/7267; *SG*, 18 March and 23 August 1837; *Sydney Herald*, 2 April 1841.

⁷⁶ 'With a fall of 30 feet it will take one cubic yard of water [168 gallons] per minute for every horse-power, or 4,000 cubic yards [672,000 gallons] per day [of 13 hours], and one million during the dry season, for 5 horse-power working regularly, but by day only, and this would require a reservoir 10 yards deep at the embankment, and about 600 yards in diameter.' *MM*, 15 May 1850; see also the *Colonist*, 28 May 1835.

⁷⁷ *SMH*, 10 January 1843, 21 June 1844 and 10 January 1845; *MM*, 1 February 1845.

⁷⁸ *SMH*, 15 May and 19 June 1844. A detailed description of the boiling and steaming down processes can be found in W. Gardner, *Northern Districts of New South Wales*, vol. 1, 1854, pp. 231-44 (Mitchell Library MS A176-1, microfilm copy in National Library G6747-48).

⁷⁹ A. Bickford, 'James King of Irrawang: A Colonial Entrepreneur', *JRAHS*, 57(1971), pp. 40-57.

⁸⁰ Goold, 'Stockton Tweed Factory', pp. 20-1; NSWAO, 4/7268; *SMH*, 27 March and 21 June 1844; *MM*, 5 July 1851.

⁸¹ NSWGG, 15 April 1840, p. 369; H. W. H. King, *The Urban Pattern of the Hunter Valley*, p. 71.

⁸² 'Report from the Select Committee on Slaughter Houses, with Minutes of Evidence', NSWV&P(LC), 1848, pp. 405-52; 13 Vic. no. 42 (12 October 1849) which came into operation on 1 January 1850.

⁸³ The detail can be found in 'Report from the Select Committee on the Tanners and Curriers Bill 1859-60; together with . . . Minutes of Evidence', *NSWV&P(LA)*, 1862, vol. 5; 'Petition of A. F. Wilshire [16 March 1865]' and 'Report from the Select Committee on Mr. Austin Forrest Wilshire (Tanneries, Etc.); together with . . . Minutes of Evidence', *NSWV&P(LA)*, 1865, vol. 2; Wilshire, *To the Honorable James Martin . . .*, Sydney, 5 June 1867. Wilshire's tannery ceased operations in 1861. A further petition (18 May 1880) was also rejected: *NSWPD*, 1881, vol. 2, pp. 1482-9 (7 October 1881) and p. 2578 (9 December 1881).

⁸⁴ Walker, *Old New England*, pp. 43-4; R. B. Walker, 'Flour Milling in New England', *Armidale and District Historical Society Journal*, no. 9, 1966, pp. 3-8.

⁸⁵ The figure for 1851 was calculated by Dr M. E. Robinson, formerly of The Australian National University.

⁸⁶ The evidence, however, is not unambiguous. See W. A. Bayley, *Blue Haven, Centenary History of Kiama Municipality, New South Wales*, p. 22; *SMH*, 12 September 1842 (Advertisement p. 1); *NSWAO* 4/7267-8.

⁸⁷ See, for instance, *MM*, 20 May 1843, 3 February 1844 and 18 April 1846.

Chapter 5. Manufacturing in the Other Colonies 1815 to 1850

¹ Distances in nautical miles are: Brisbane to Sydney, 520; Sydney to Melbourne, 580; Sydney to Hobart, 630; Melbourne to Hobart, 470; Melbourne to Adelaide, 515; and Adelaide to Fremantle, 1,380.

² H. Melville, *The History of the Island of Van Diemen's Land, from the Year 1824 to 1835 Inclusive*, p. 9.

³ The reports of the census gave the population as 70,126 excluding Aborigines. However, J. Barnard, 'Observations upon the Census Taken throughout Van Diemen's Land, 1st March, 1851', *Report of the Royal Society of Van Diemen's Land for the Year 1852*, p. 34, notes that 2,813 convicts were double-counted at the census of 31 December 1847.

⁴ By 6 and 7 Vic. c. 7 (3 April 1843), 'An Act to amend the Law affecting transported Convicts with respect to Pardons and Tickets of Leave', the possessors of tickets enjoyed almost the same privileges as free inhabitants; they could enter business (e.g. as shopkeepers) but could not hold landed property and had to attend musters.

⁵ 'An Account of the Land in Cultivation . . . 1819', *HRA*, III, iii, p. 585; P. Scott, 'Land Settlement' in J. L. Davies (ed.), *Atlas of Tasmania*, Hobart, 1965, pp. 42-5; A. McKay (ed.), *Journals of the Land Commissioners for Van Diemen's Land 1826-28*, Hobart, 1962; R. M. Hartwell, *The Economic Development of Van Diemen's Land 1820-1850*, pp. 31-62.

⁶ Hartwell, *Economic Development*, p. 102. Adjustments have been made to some of his figures; for example, a large outward movement of specie has been deducted from the export figures for 1830—the only time such an item appeared in the detailed returns.

⁷ See R. J. Solomon, 'External Relations of the Port of Hobart 1804-1961', *AG*, 9(1963-5), pp. 43-53; and 'Four Stages in Port Evolution: The Case of Hobart', *Tijdschrift voor Economische en Sociale Geografie*, 54(1963), pp. 159-69.

⁸ Calculated on the basis of data in the *Tasmanian Journal of Natural Science, Agriculture, Statistics, etc.*, 3(1849), pp. 140 and 374. An obvious parallel is the export trade of the Hunter River district. Exactly comparable data are lacking but for the year ending 30 September 1849 the *MM* (10 November 1849) estimated that produce valued at £284,000 had been sent to Sydney of which about £175,000 worth had subsequently been sent overseas; in the calendar year 1849 exports from Launceston were valued at £267,000.

⁹ No census town populations are available. G. M. Goodridge, *Statistical View of Van Diemen's Land*, pp. 170 and 232, gives 'about' 6,000 as the population of Hobart Town and 2,500 as the population of 'the district of Launceston'. Excluding convicts on public works, the Hobart and Launceston police districts had populations of 11,293 and 5,189, respectively, at the census of January 1842; excluding the military, their families, and convicts on

public works, the two police districts had populations of 21,429 and 10,100, respectively, in December 1847.

¹⁰ *Argus*, 3 July 1850, quoting the *Hobart Town Britannia*, 20 June 1850.

¹¹ Hartwell, *Economic Development*, p. 152.

¹² The data in this section come from several sources: *TBB*; *Statistical Returns of Van Diemen's Land* 1824-49 (compilers and titles differ); L. Norman, *Pioneer Shipping of Tasmania*, Hobart, 1938, pp. 44-5; and contemporary newspapers.

¹³ Hartwell, *Economic Development*, p. 159; *Colonial Times*, 29 October 1839; *Hobart Town Courier*, 30 December 1848.

¹⁴ For example, Degraives, Gray, Griffiths, Hoy, the McGregors, Ross, Watson and Williamson. See an account of David Hoy's work as master shipwright in T. G. Lempriere, 'Account of Macquarie Harbour', *Tasmanian Journal of Natural Science, Agriculture, Statistics, etc.*, 2(1846), pp. 112-4; in seven years (1826-32) thirteen vessels totalling nearly 1,000 tons were launched at this penal settlement using unskilled convict labour.

¹⁵ 'Reports exhibiting The Past and Present State of Her Majesty's Colonial Possessions', *House of Commons Papers*, 1847-8, vol. 46, p. 236. For a useful background, see G. S. Graham, 'The Ascendancy of the Sailing Ship, 1850-85', *Economic History Review*, second series, 9(1956-7), pp. 74-88.

¹⁶ Melville, *The History of Van Diemen's Land from the Year 1824 to 1835, Inclusive*, George Mackaness edition [entitled *History of Van Diemen's Land*], Sydney, 1959, pt 3, p. 32.

¹⁷ The importance of water-power has been emphasised by K. M. Dallas, 'Water Power in Tasmanian History', *PPTHRA*, 8(1959-60), pp. 85-93.

¹⁸ At Hobart in 1830 and 1839, Launceston in 1838 and Colebrook (then known as Jerusalem) in 1839.

¹⁹ H. Melville, *The Present State of Australasia . . . also Remarks on Prison Discipline*, p. 301.

²⁰ Data are available for wheat production in police districts and for external trade so that, after making an allowance for seed and wastage, the average consumption per adult male equivalent can be calculated. This, in turn, indicates the surplus and deficit districts.

²¹ J. R. Morris, 'Early Convict History of Maria Island', *PPTHRA*, 11(1963-4), pp. 156-77.

²² 8 Vic. no. 18 (28 February 1845), the circumstances of which are explained in J. West, *The History of Tasmania*, Launceston, 1852, p. 183; 'An Act to abolish certain Differential Duties of Customs', 10 Vic. no. 7 (13 July 1846) effective 1 April 1847; C. D. Allin, *A History of the Tariff Relations of the Australian Colonies*, pp. 5-13.

²³ *HTG*, 21 June 1839. Evidence given to the Board set up to assess these claims (CO 280/113) contains detailed information about the nature and scale of operations of the distillery firms, including balance sheets.

²⁴ The Terrys are cited as an example of the way milling 'went in the family' by L. Syson, *British Water-Mills*, London, 1965, p. 46; see also 'John Terry' in Pike (ed.), *Australian Dictionary of Biography*, vol. 2, pp. 507-8.

²⁵ Early population estimates are given in 'Appendix to Report from the Select Committee on South Australia', *House of Commons Papers*, 1841, session 1, vol. 4, p. 551.

²⁶ For instance, A. G. Price, *The Foundation and Settlement of South Australia 1829-1845*; D. Pike, *Paradise of Dissent*; M. Williams, 'Two Studies in the Historical Geography of South Australia', pp. 71-98 in G. H. Dury and M. I. Logan (eds), *Studies in Australian Geography*.

²⁷ Net immigration was 15,100 from 1836 to 1840, 2,900 from 1841 to 1845 and 25,000 from 1846 to 1850; these totals are from Pike, *Paradise of Dissent*, p. 517.

²⁸ The harvesting machine developed by John Ridley and J. W. Bull in 1843-4 probably had little immediate impact on industrial development since only fifty to sixty machines

valued at about £50 each had been built by 1850. For various aspects see A. E. Ridley, *A Backward Glance*; G. L. Sutton, 'The Invention of the Stripper', *Journal of the Department of Agriculture of Western Australia*, 14(1937), pp. 193-247.

²⁹ Information about early breweries is contained in the Pioneers' Association of South Australia, *Some Brief Records of Brewing in South Australia*.

³⁰ The first steam engine to be built in South Australia was for the maker's own foundry (SAR, 9 September 1843); *South Australian Gazette and Mining Journal*, 15 April 1848.

³¹ The categories, with the 1851 employment, are: brewers (70), brickmakers (267), cabinet-makers (145), millers (103), saddlers and harness-makers (102), shoemakers (586), smiths (420), tailors (195), and tanners (74). 'Abstract of Census Returns', SAGG, 6 February 1851.

³² SAAO, 'Correspondence with Flour Mill Company [7 October 1841]', Colonial Secretary Miscellaneous Papers.

³³ Details of the destinations of flour sent out during the year ended 30 September 1844 are given in J. Allen, *The Royal South Australian Almanack and General Directory for 1845*, Adelaide, 1844, p. 168.

³⁴ G. B. Wilkinson, *South Australia; Its Advantages and Its Resources*, pp. 55-6.

³⁵ MM, 16 August 1845; 10 January, 2 May, 15 August and 2 September 1846; and 31 May 1848.

³⁶ C. M. Penny and W. Owen even arranged a Private Act of the South Australian Legislative Council, 10 and 11 Vic. no. 17 (18 November 1847) to safeguard their rights to a new process.

³⁷ J. Stephens, *The Royal South Australian Almanack and General Directory for 1848*, Adelaide, 1847, pp. 49-50; *South Australian*, 24 November 1848; SAR, 26 August and 27 September 1848 and 18 August 1849. See also H. Brown, 'The Copper Industry of South Australia (An Economic Study)', Adelaide, 1960, unpublished manuscript, University of Adelaide, p. 27.

³⁸ *South Australian Gazette and Mining Journal*, 25 November and 9 December 1848; SAR, 13 January 1849. The reasons for the choice of this remote location are obscure, and it is uncertain how long the smelting works remained in operation.

³⁹ SAR, 1 December 1845; 29 August and 15 September 1846; 29 April, 4 October and 15 December 1849; and 2 October 1850. *South Australian*, 26 September 1848. For the directors' 1846 report and balance sheet see Wilkinson, *South Australia*, pp. 283-91.

⁴⁰ See D. B. Barton, *Essays in Cornish Mining History*, vol. 1, Truro, 1968, 'Cornishmen and Australian Copper', p. 98; Brown, 'The Copper Industry', pp. 31-71.

⁴¹ Documentation relating to the formation of the English and Australian Copper Company is available in Public Record Office, London (BT 31 14379/2921C pt 1). It obtained provisional registration in London on 25 November 1851, with a nominal capital of £350,000, in order to purchase and enlarge the Spitty Copper Works at Swansea in Wales and the Kooringa Works in South Australia owned by Sir William Foster of Norwich and H. W. Schneider, J. D. Powles and H. Ewbank of London who were paid £306,108 for these assets. By April 1852 the whole of the capital had been called and subscribed, almost entirely by people resident in Great Britain.

⁴² Life in the mining area was, however, somewhat primitive: in the laconic words of the census return 'there are no houses, the dwellings being excavated in the banks of the Burra Creek'.

⁴³ Bourke's Proclamation [26 August 1835], NSWGG, 1835, p. 613; Bourke to Glenelg (10 October 1835), HRA, I, xviii, pp. 153-8. The subsequent legal relationship between Victoria and New South Wales is discussed briefly in the prologue to Part C.

⁴⁴ J. M. Powell, *The Public Lands of Australia Felix*, especially maps pp. 5 and 7.

⁴⁵ McCarty, 'Australian Capital Cities in the Nineteenth Century', p. 130 correctly points out that the 1851 City of Melbourne figure is too low to represent 'urban Melbourne';

however, it is arguable whether physically quite separate entities like Brighton or Williamstown, even if related economically, should be included within 'Melbourne'. Moreover, the Police District (*not* the County) of Bourke, excluding the City of Melbourne, held 18,348 people which embraced the counties of Bourke (16,819), Evelyn (644) and Mornington (885). McCarty does not explain the basis for his estimate that 6,000 people in Bourke County should be regarded as urban and added to the City of Melbourne figure to produce his 'Melbourne' population of 29,000. To be fair, almost any figure for 'Melbourne' in 1851 must be rather arbitrary.

⁴⁶ Portland gained recognition as a free warehousing port seven months before Geelong: the former from 1 January 1848 by Order in Council dated 28 September 1847 announced NSWGG, 1848, p. 545; the latter from 1 August 1848 by Order in Council dated 15 April 1848 announced NSWGG, 1848, p. 1262.

⁴⁷ VGG, 1854, p. 800. Population estimates are: Warrnambool, 200 (*Argus*, 16 February 1849); Port Fairy, 980 (*Argus*, 4 May 1850); Portland, 1,000 (*Argus*, 26 March 1851).

⁴⁸ See, for a more detailed discussion, J. A. Clements and W. H. Richmond, 'Port Albert and Gippsland Trade, 1840-66', *AEHR*, 8(1968), pp. 129-38.

⁴⁹ S. Priestley, *Echuca, passim*; D. M. Whittaker, *Wangaratta, passim*.

⁵⁰ It does not seem possible to make satisfactory adjustments to allow for these inter-colonial movements even though they were of some consequence. W. Westgarth, *A Report, Commercial, Statistical and General, on the District of Port Phillip, New South Wales, for the Half Year Ended 31st July, 1846*, Melbourne, 1846, p. 7, gives figures from which it can be estimated that in the 1845-6 season 430 tons of Port Phillip wool were shipped to New South Wales and 192 tons to Tasmania which would have been worth about £75,000.

⁵¹ E. A. Mackay, 'The First Flour Mills of Port Phillip', *VHM*, 16(1936-7), pp. 117-20. Early in 1840 it was estimated that 16 tons of flour were consumed weekly in Melbourne: *Port Phillip Herald*, 24 March 1840.

⁵² In 1848 Sydney had on register 287 sailing vessels (22,662 tons) and 18 steam vessels (1,704 tons); Melbourne had 31 (918 tons) and 2 (154 tons); Hobart had 116 (8,318) and 4 (142); and Launceston had 38 (2,793) and 1 (44).

⁵³ The different attitudes of the squatters and townsmen towards the resumption of transportation and the effect on the separation issue are discussed in A. A. Morrison, 'Queensland: A Study in Distance and Isolation', pp. 191-203 in E. L. French (ed.), *Melbourne Studies in Education 1960-1961*, Melbourne, 1962.

⁵⁴ Butlin, *Foundations*, pp. 375-8. For an account of the developments leading to separation in 1859 see W. Coote, *History of the Colony of Queensland from 1770 to the Close of the Year 1881*.

⁵⁵ T. Welsby, 'John Campbell—A Squatter of '41', *Historical Society of Queensland Journal*, 3(1937-47), pp. 27-36.

⁵⁶ A. Meston, *Geographic History of Queensland*, p. 227.

⁵⁷ The general reference for the early development of the colony is F. K. Crowley, *Australia's Western Third*; see also Shaw, *Convicts and the Colonies*, pp. 353-7.

⁵⁸ P. Hasluck and F. I. Bray, 'Early Mills of Perth', *JPAHS*, 1(1927-31), pt 8, pp. 62-84; *Perth Gazette*, 13 July 1839, 17 June 1843 and 4 May 1884; *Western Australian Almanack*, 1853, p. 47.

Prologue to Part C

¹ The general reference for the politics of this period is G. Serle, *The Golden Age*. The imperial Parliament retained some constitutional powers although these diminished: see I. D. McNaughtan, 'Colonial Liberalism, 1851-92', pp. 98-144, in G. Greenwood (ed.), *Australia* (esp. p. 132).

Chapter 6. Victoria 1851 to 1890: The Spatial Setting

¹ Details of mining areas and techniques are given in great detail in R. B. Smyth, *The Gold Fields and Mineral Districts of Victoria*.

² For a useful summary see 'The Past and Future of Gold-Mining', *AIBR*, 1 (1877), p. 254.

³ Report of C. P. Hodges (31 May 1880) printed as 'Chinese in Victoria', Return to an Order, *VV&P(LC)*, 1881, A2 (6 December 1881).

⁴ The definition of 'Melbourne' used in this discussion is that designated in the Melbourne and Metropolitan Board of Works Act, 1890 (54 Vic. no. 1197, 20 December 1890), measuring 132 square miles (see Fig. 6.8). This boundary was chosen so as to achieve comparability with estimates of factory employment derived from other sources since not all industrial establishments were contained within the 'built-up' or 'more densely settled' areas. This pragmatic solution, decided upon several years ago, turns out to be a compromise between Coghlan's 10 mile radius definition and the somewhat arbitrary arithmetic proposed by McCarty ('Australian Capital Cities in the Nineteenth Century', p. 130) as the following tabulation of the population of 'Melbourne' (in thousands) indicates:

	Coghlan	McCarty	Linge
1861	140	125	131
1871	207	191	202
1881	283	268	277
1891	496	473	477

⁵ For a description of Bendigo see *SMH*, 8 August and 13 November 1854, and of Ballarat *SMH*, 25 June 1855.

⁶ See evidence of J. Goodman, 'Report of The Commissioners appointed to enquire into the best mode of providing for The Internal Communications of The Colony', *VV&P(LC)*, 1854-5, vol. 1, A4, questions 600-17; and of J. E. Hopkins, 'Progress Report from The Select Committee of the Legislative Council on Railways', *VV&P(LC)*, 1854-5, vol. 3, D7, questions 191-211.

⁷ Annual details are available in G. H. Knibbs, *Local Government in Australia*, which also, p. 28ff., gives details of some of the relevant Acts.

⁸ Evidence of J. Goodman (see note 6). Dray-loads varied from 15 to 25 hundredweight on horse-drawn drays and from 50 to 60 hundredweight on bullock drays depending on the terrain and state of the roads. For an account of the coaching industry and a useful bibliography, see K. A. Austin, *The Lights of Cobb and Co.*

⁹ Some of these data come from H. S. Chapman, 'The Industrial Progress of Victoria as Connected with Its Gold Mining', *Journal of the Statistical Society of London*, 26(1863), pp. 424-42. Railway freights are discussed in Chapter 9.

¹⁰ The most useful single account is L. J. Harrigan, *Victorian Railways to '62*, Melbourne, 1962. But see also 'Report of Andrew Clarke . . . upon Railways', *VPPP*, 1856-7, vol. 4, pt 1, no. 33, esp. pp. v-xlvii; L. J. Harrigan, 'The Melbourne and Essendon Railway Company—1858-1864', *VHM*, 21(1945-6), pp. 1-15; J. L. Buckland, 'Notes on the Early Railways of Victoria', *Australian Railway Historical Society Bulletin*, 5(1954), pp. 117-20.

¹¹ G. R. Bartlett, 'Political Organisation and Society in Victoria 1864-1883', Ph.D. thesis, The Australian National University, 1964. See especially the discussion of the Railway Leagues, pp. 274-95.

¹² Extract from proceedings of New South Wales executive council, 23 December 1845 in 'Opinion of the Solicitor-General regarding The Claim of the Government of Victoria to the Territory (known as the Riverina) lying between the Murray and Murrumbidgee Rivers', *NSWPP*, 1911-2, vol. 4, p. 717.

¹³ See J. A. La Nauze, 'Merchants in Action: The Australian Tariffs of 1852', *ER*, 31(1955), pp. 77-89, and three articles 'The Murray and Border Customs', *Argus*, 26 September and 3 and 7 October 1864; G. D. Patterson, 'The Murray River Border Customs

Dispute, 1853-1880', *BAH*, 2(1962), pp. 122-36; J. Quick and R. R. Garran, *The Annotated Constitution of the Australian Commonwealth*, pp. 101-3.

¹⁴ See the very detailed analysis by Allin, *History of the Tariff Relations of the Australian Colonies*, *passim*.

¹⁵ N. W. Pollard, *The Prize Essay on Internal Communications*, p. 30. *Argus*, 10 February 1860 (supplement).

¹⁶ R. H. T. Smith, *Commodity Movements in Southern New South Wales*, Department of Geography, The Australian National University, 1962, pp. 14-23. For a New South Wales official viewpoint and maps see memorandum 'Re specially low rates on the Victorian Railways to secure traffic from New South Wales [1 August 1894]', in appendix paper no. 2, 'Proceedings of the Australasian Federal Convention', *VPPP*, 1897, vol. 2 (March-May).

¹⁷ Priestley, *Echuca*, pp. 70-72 (the firm was McCulloch and Company).

¹⁸ The Melbourne figure excludes the value of commodities sent overland direct. Imports at the four ports named were valued at £713,000, Melbourne £349,000,000, and Geelong £5,400,000.

¹⁹ The import figure includes estimates of the value of wool brought into Victoria from New South Wales 1866 to 1872; the export figure includes the value of goods sent direct from Melbourne and allocated to that port in the published trade returns.

²⁰ 'Report of the Board appointed to consider the report upon the question of the Competitive Rates between the States of Victoria, New South Wales, South Australia, and Queensland', Melbourne, 12 September 1904 (VAO, printed, but labelled 'confidential').

Chapter 7. Manufacturing in Victoria 1851 to 1865

¹ H. G. Turner, *A History of the Colony of Victoria* . . . , vol. 1, pp. 364-90. See also T. Tooke and W. Newmarch, *A History of Prices* . . . , vol. 6, London, 1857, pp. 802-44.

² For a summary, see Coghlan, *Labour and Industry*, vol. 2, pp. 733-40 and 1033-42.

³ N. G. Butlin, *Australian Domestic Product, Investment and Foreign Borrowing 1861-1938/39*, *passim*.

⁴ See the invaluable series of articles on the building and related trades in the *Argus*, 8, 14, 19 and 30 October and 5 November 1863.

⁵ H.-R. Hitchcock, *Early Victorian Architecture in Britain*, vol. 1, London, 1954, pp. 405 and 527-8.

⁶ *ATCJ*, 20 April 1872, pp. 496-7; for a general account see Freeland, *Architecture in Australia*, pp. 111-37.

⁷ C. Mayes, 'Essay on the Manufactures More Immediately Required for the Economical Development of the Resources of the Colony . . .', pp. 241-387 in *The Victorian Government Prize Essays 1860*, esp. pp. 282-3.

⁸ Smyth, *Gold Fields and Mineral Districts of Victoria*, pp. 448 and 455-6; 'Report of the Commission Appointed to Enquire into the condition of the Gold Fields of Victoria', *VV&P(LC)*, 1854-5, vol. 2, A76, questions 1354-7 (23 December 1854).

⁹ *Colonial Mining Journal, Railway and Share Gazette*, February 1860, p. 99; *Argus*, 20 October 1860.

¹⁰ A valuable account is W. H. Archer, 'Agricultural and Live Stock Statistics of Victoria for the Year Ending 31st March, 1859; with Preliminary Statistical Notes, Illustrative of the Progress of Victoria from the Year 1835 to 1860', *VPPP*, 1859-60, vol. 3, no. 10, pp. i-xlix.

¹¹ 'Patent Slip', Return to an Order, *VV&P(LC)*, 1857-8, A1 (10 November 1857); *The Victorian Hansard*, vol. 4, p. 18 (12 October 1858).

¹² This estimate has been derived by (i) averaging several reports about the total costs and gross tonnages of particular vessels thus producing overall figures of £10 per gross ton for sailing-ships and £27 per gross ton for steamships; (ii) applying these figures to the tonnages of new ships launched; and (iii) taking into account various reports suggesting that

paddle-steamers grossing nearly 700 tons were launched from the Victorian side of the River Murray. The figures shown by Butlin, *Australian Domestic Product*, p. 278 for just the three years 1863-5, totalling £121,000, seem much too high.

¹³ Calculated from 'Railway Locomotives', Return to an Order, *VV&P(LA)*, 1871, vol. 1, C2 (19 May 1871); no locomotives were added to the stock from 1863 through 1870. No government orders for locomotives were placed locally until early 1872 (see Chapter 8); prior to this, however, three engines had been built (in Melbourne in 1854 and 1862, and in Geelong in 1856) to fulfil orders from a private railway company and two permanent way contractors.

¹⁴ Details and specifications of the first contract (1856) for twenty carriages and sixty-two wagons are given in Appendices XX and XXXIV to 'Report of Andrew Clarke . . . upon Railways', *VPPP*, 1856-7, vol. 4, pt 1, no. 33. Evidence of Thomas Higinbotham (25 February 1863), 'Report of the Select Committee . . . on Railways', *VV&P(LC)*, 1862-3, D4, p. 6.

¹⁵ For the detail see J. L. Buckland and W. Jack, 'The Locomotive Builders of Ballarat', *Australian Railway Historical Society Bulletin*, 12(1961), pp. 185-98; *Argus*, 27 August 1864.

¹⁶ 'Depressed State of Trade in The Colony', *VV&P(LA)*, 1858-9, vol. 1, Petition no. 24. See also reports of public meetings, e.g. *Argus*, 21 February 1860.

¹⁷ The activities of one thriving Melbourne importing agency, initially established to provide an outlet for a Massachusetts shoe factory but soon trading in other goods as well, are considered in E. D. Potts and A. Potts, 'James Maguire of Randolph, Massachusetts, and the Australian Shoe Trade, 1855-67', *AEHR*, 8(1968), pp. 139-55.

¹⁸ The relevant legislation was 16 Vic. no. 2 (13 August 1852), 17 Vic. no. 6 (19 January 1854) and 18 Vic. no. 9 (8 December 1854). A useful statement is 'Returns showing the Customs Revenue, Costs of Collection and Population of the Colonies of Victoria, New South Wales and South Australia, during the Years 1851 to 1858 . . .', *VV&P(LA)*, 1859-60, vol. 1, A30.

¹⁹ See, for example, G. D. Patterson, *The Tariff in the Australian Colonies 1856-1900*, p. 17.

²⁰ 'Report from the Select Committee upon Manufactures', *VV&P(LA)*, 1864-5, vol. 2, D6. These conclusions are generally borne out by contemporary newspaper reports of developments such as in the cigar-making industry (e.g. *Argus*, 20 September 1862).

²¹ Evidence of L. A. Moody (19 December 1864), 'Report from the Select Committee upon Manufactures', *VV&P(LA)*, 1864-5, vol. 2, D6, p. 32; *Statistics of The Colony of Victoria*, 1863, 'Production', p. 41.

²² See *Age* and *Argus* 3 July to 5 September 1865 for almost daily attacks and counter-attacks.

²³ *VGG*, 1865, p. 1342; VAO, Defunct Company Papers, pkt 48.

²⁴ 'The Treasurer's Statement of the Receipts and Expenditure . . . 1869', *VV&P(LA)*, 1870, vol. 1, A6, p. 23. The best description of the mill itself is *Argus*, 20 April 1868.

²⁵ 'Report of the Board . . .', *VPPP*, 1867, vol. 3, no. 2, p. 10.

²⁶ *Argus*, 23 January, 29 April, 4 May and 19 October 1868. For a general account, see J. A. Rawson, 'A History of the Australian Paper Making Industry 1818-1951', M.A. thesis, University of Melbourne, 1961.

²⁷ See J. R. Poynter, *Russell Grimwade*, esp. pp. 16-19.

²⁸ Perhaps the most interesting application of steam power was to a clothing factory, the Steam Sewing Company, in about 1859 ['Progress Report from the Select Committee upon The Tariff', *VV&P(LA)*, 1859-60, vol. 2, D26, evidence pp. 81-2 (24 February 1860)] because the sewing machine had only been invented in 1851 in North America and even the treadle version was a newcomer to Melbourne factories.

²⁹ A useful contemporary, though selective, account is D. M'Leod, *Melbourne Factories*.

³⁰ *Vic.SR*, 1854, p. 189 (referring to conditions in the Government Printing Office).

³¹ *Argus*, 10, 17 and 28 October 1863: three articles, part of a series, entitled 'The Workers

in Metals', 'Workers in Metals—Moulders and Boiler-Makers', and 'Workers in Metals—Fitters, Pattern-Makers, Turners, and Smiths'.

³² H. Lennon, 'The Experiences of a Colonial Manufacturer', *Journal of the National Agricultural Society of Victoria*, no. 69, December 1879, pp. 3-4.

³³ M. G. A. Wilson, 'Town Gas Manufacturing in Australia', *Australian Geographical Studies*, 5(1967), p. 101, finds it 'difficult to accept' that 'coal was hauled overland from Geelong and Melbourne' to these gas-works. There is no doubt, however, that this was indeed the case. The railway to Ballarat was completed in April 1862 and to Bendigo in October 1862. As an example it is necessary only to cite the evidence of the eighth balance sheet of the Ballarat Gas Company for the half-year ending 31 January 1862 (in the La Trobe Library, *Victorian Pamphlets*, quarto series, vol. 1, pamphlet 2) which reports that during the six months 473 tons of coal were carbonised to produce 4,150,000 cubic feet of gas (8,776 cubic feet per ton), of which 3,840,000 cubic feet were recorded by consumers' meters thus indicating a (not unusual) loss of about 7 per cent by condensation and leakage. At Bendigo gas was first produced on 31 March 1860.

³⁴ M. Michaelis, *Chapters from the Story of My Life*, pp. 110-2. The firm in 1873 opened a branch in London and dispensed with its former agents; in 1876 it became a sleeping partner in a Sydney tanning business; in 1880 it opened a tannery at Port Chalmers (near Dunedin) in New Zealand; and in 1892 was transformed into a limited liability company, all the shareholders in which had to be the sons or sons-in-law of the four original partners.

³⁵ By the time the refinery at Port Melbourne came into operation in May 1859 it had cost £90,000—by far the largest single industrial investment during this period. The distillery operated only briefly because 'the company's rum did not hit the taste of the Australian public'. The refinery, by then producing about 200 tons of refined sugar and molasses each week and employing 220 hands, was severely damaged by fire on 8 June 1875; within a matter of weeks a replacement was obtained by buying the rival refinery of Joshua Brothers at Yarraville. The company helped finance some sugar plantations in Queensland in the early 1880s. On 4 March 1887 nominal capital stood at £400,000 in 8,000 shares of which 7,580 had been taken up; £50 per share had been called and an average of £49. 2. 7 received, or £372,412 altogether. On 24 June 1887 the shareholders agreed to sell the assets of the company (i.e. the Yarraville Refinery, interests in three Queensland plantations and £100,000 invested in a New Zealand refinery) for £400,000 to the Colonial Sugar Refining Company. *Argus*, 12 January 1870, 14 June and 12 July 1875 and 14 August 1876; *Age*, 9 June 1875; VAO, Defunct Company Papers, pkt 10.

³⁶ 'An Act for the Incorporation Regulation and Winding-up of Trading Companies and other Associations', 27 Vic. no. 190 (20 April 1864) which required partnerships of twenty or more persons to register and which enabled any group of five people to sign a memorandum of association that could then be registered. An invaluable, but apparently almost untapped, wealth of material is contained in the Defunct Company Papers held by the VAO. Most companies registered under the 1864 Act are represented by a packet containing, at one extreme, hardly any documents or, at the other, almost complete sets of half-yearly balance sheets spanning several decades. Evidence that the policing of the 1864 Act was fairly lax appears in the form of letters written in the 1890s to companies that had gone out of business twenty to thirty years previously.

³⁷ VAO, Defunct Company Papers, pkts 44 (Warrenheip), 110 (Langlands) and 43 (Ararat Flour Mill).

³⁸ L. J. Hume, 'Working Class Movements in Sydney and Melbourne before the Gold Rushes', *Historical Studies, Australia and New Zealand*, 9(1959-61), pp. 266-7.

³⁹ See, for instance, J. Norton (ed.), *The History of Capital and Labour*, pp. 116-67; J. Rae, 'The Eight Hours Day in Victoria' and 'The Eight Hours' Day in Australia', *Economic Journal*, 1(1891), pp. 15-42 and 525-31; H. Hughes, 'The Eight Hour Day and the Deve-

lopment of the Labour Movement in Victoria in the Eighteen-Fifties', *Historical Studies, Australia and New Zealand*, 9(1959-61), pp. 396-412.

⁴⁰ These disputes received extensive newspaper coverage: e.g. *Argus*, September to December 1859 and January to May 1864.

⁴¹ *Argus*, 9 May and 10 August 1864 and 15 July 1865.

Chapter 8. Manufacturing in Victoria 1866 to 1890

¹ A. R. Hall, *The Stock Exchange of Melbourne and the Victorian Economy 1852-1900*, pp. 49 and 114.

² This outflow of investment funds was never far from the notice of the *AIBR*; see, for instance, leading articles in the issues of 8 March 1877 and 9 January 1878.

³ Butlin, *Australian Domestic Product*, p. 158.

⁴ 'Report of the Chief Inspector of Factories, Workrooms, and Shops, for the year ended 31st December, 1889', *VPPP*, 1890, vol. 2, no. 22, p. 11.

⁵ For a perceptive description of dwellings and their contents see R. E. N. Twopeny, *Town Life in Australia*, pp. 30-48.

⁶ Freeland, *Architecture in Australia*, pp. 138-45.

⁷ *Age*, 5 June 1877. Freeland, *Architecture in Australia*, p. 161 attributes—apparently incorrectly—'the first passenger lift to be seen in Australia' to the Sydney Exhibition of 1879 and the first application to Toohey's Brewery in Sydney.

⁸ 'Property in Melbourne and Its Suburbs', *AIBR*, 13 June 1885, pp. 315-6.

⁹ *VGG*, 1887, p. 3187; 1888, p. 2833; and 1889, p. 516. The Austral Otis Company, for example, was formed in June 1887 to take over a business started in 1881 and to acquire the rights to American patents: see A. Sutherland *et al*, *Victoria and Its Metropolis Past and Present*, vol. 2, p. 620.

¹⁰ Registered as a limited liability company on 30 October 1889: *VGG*, 1889, p. 3722.

¹¹ W. B. McCann, *History of the Descendants of Peter McCann Who Landed in Australia in 1799*, pp. 34-41 (duplicated, in La Trobe Library, Melbourne); *ATR*, 24(1894), p. 181.

¹² H. Lennon, 'Victorian Ploughs and Ploughing', paper no. 2, pp. 112-7, (esp. p. 113) in 'Report of the Secretary for the Department of Agriculture for the year 1883', *VPPP*, 1884, vol. 2, no. 26. See also Lennon, 'The Experiences of a Colonial Manufacturer', pp. 3-4.

¹³ The opening up of the mallee is summarised in Dunsdorfs, *Australian Wheat-Growing Industry*, pp. 154-61. See also J. Andrews, 'The Emergence of the Wheat Belt in South-eastern Australia to 1930', pp. 5-65 in J. Andrews (ed.), *Frontiers and Men: A Volume in Memory of Griffith Taylor (1880-1963)*, Melbourne, 1966, esp. pp. 26-35.

¹⁴ In this respect the evidence, including a searching examination of McKay's contribution, gathered by the 'Royal commission on Customs and Excise Tariffs', *CPPP*, 1906, vol. 4, Progress Report no. 57, 'Stripper Harvesters', pp. 127-64, is both pertinent and revealing.

¹⁵ See *Victorian Year-Book*, 1890-1, vol. 2, pp. 162-4; J. D. Keating, *Mind the Curve! A History of the Cable Trams*, Melbourne, 1970, pp. 33-45.

¹⁶ The estimates for the year ending 31 March 1881 are included in the usual *Vic.SR* tabulations; those for the year ending 31 March 1891 are in the *Victorian Year-Book*, 1890-1, vol. 2, pp. 331-47. On p. 347 of that *Year-Book* the summary given for both years appears to double-count the value of bricks and pottery. For instance, in 1890-1 (p.346) a figure of £534,284 is given as the value of articles from brickyards and potteries and this is included in the total of £22,390,251: on p. 347 a further £310,088 is added as the value of bricks and pottery.

¹⁷ Attempts to draw up further estimates by classifications like manufactured raw materials, semi-processed materials or finished goods proved to be less satisfactory. Nonetheless, this approach was adopted by I. P. Macneil, 'Economic Growth through

Exports of Primary Products: The Experience of the Colony of Victoria, 1856-1896', Ph.D. thesis, University of Cambridge, 1965, p. 181.

¹⁸ Articles made in footwear factories in 1880-1 were valued at £687,000 while the value of exports of overseas-made footwear more than matched imports (presumably because of time lags or different valuations). In 1890-1 footwear production was valued at £844,000 and retained imports at £106,000. In 1880-1 the agricultural machinery made locally was valued at £203,000 and retained imports at £8,000; for 1890-1 the respective figures were £692,000 and £110,000.

¹⁹ These events can be followed in: *Argus*, 9 January 1867; *Age*, 5 January and 16 July 1870 and 8 October 1872; *VPD*, vol 10, pp. 1107-8 (7 July 1870), p. 1165 (12 July 1870), pp. 1208-9 (13 July 1870) and vol. 12, pp. 724-5 (2 August 1871); 'Railway Locomotives', Return to an Order, *VV&P(LA)*, 1871, vol. 1, C2 (19 May 1871).

²⁰ *VPD*, vol. 12, p. 637 (27 July 1871) and p. 885 (16 August 1871). Presumably this comment referred to Mort and Company and P. N. Russell and Company (see Chapter 11).

²¹ In addition the Phoenix Foundry made three locomotives for railway contractors in Victoria and one for a sawmilling company in Western Australia; the Atlas Company of Engineers also built a locomotive for private sale in 1871. See *Age*, 25 February 1871 and 19 January 1877; *Argus*, 3 April 1873.

²² Buckland and Jack, 'The Locomotive Builders of Ballarat', p. 191. A very useful publication is Victorian Railways Rolling Stock Branch, *Diagrams and Particulars of Locomotives, Cars, Vans and Trucks (revised to 1 November 1907)*; this also gives specifications, makers' names, and dates with scale plans and elevations.

²³ See the report drawn from the Railway Inquiry board, *Argus*, 22 March 1877.

²⁴ See, for instance, the contract for stationery placed with Sands & McDougall for the year ending 30 June 1874 in *VGG*, 1873, pp. 761-2.

²⁵ Even so, Butlin's observation (N. G. Butlin, 'Colonial Socialism in Australia, 1860-1900', pp. 26-78 in H. G. J. Aitken (ed.), *The State and Economic Growth*, p. 72) that 'barely 10 percent of government demand for equipment in railway building . . . was placed in the colonies' does not give an accurate impression of the circumstances in Victoria; here a very much higher proportion of the equipment orders was placed with local manufacturers although it is impossible to evaluate how much they subsequently spent on imported materials. For example, over 90 per cent of the value of contracts for locomotives in the twenty years to 1890 was placed with Victorian firms; the same is true of an even higher percentage of other kinds of rolling stock.

²⁶ Namely, Wright & Edwards (£282,000); P. Bevan, Melbourne Engineering and Railway Carriage Works (£270,000); Robison Bros, Campbell, and Sloss Ltd (£121,000); W. Williams (£119,000); Johnson & Sons, Tyne Foundry (£110,000); and Langlands Foundry Company Ltd (£109,000).

²⁷ Contracts worth more than £40,000 were handled by the Phoenix Foundry Ltd at Ballarat (£844,000); Thompson and Company at Castlemaine (£155,000); P. Ellis, Bendigo Rolling Stock Works (£133,000) and its predecessor G. Pickles and Sons' Carriage and Manufacturing Company Ltd (£123,000); Humble & Nicholson at Geelong (£55,000), Quayle & Williams at Ballarat (£47,000); and Harkness and Company, Victoria Foundry, at Bendigo (£42,000).

²⁸ *Age*, 5 June 1877; *Argus*, 20 April 1882. See also Victorian Railways, *Official Report of the Carriage Timber Board* [26 May 1884], Melbourne, 1884.

²⁹ Illustrated by 'Tenders for Public Works [tenders over £100 accepted 1883-4 to 1886-7 without being advertised]', Return to an Order, *VV&P(LA)*, 1886, vol. 1, C40 (25 November 1886).

³⁰ *VPD*, vol. 15, p. 1817 (17 October 1872).

³¹ *VGG*, 19 September 1873, p. 1660.

³² This sequence of events can be traced in *Age*, 6 August 1878, 15 February and 21 March

1879, 7 October 1880, and 21 and 30 March 1882; *VPD*, vol. 29, pp. 1148-9 (25 September 1878) and pp. 1182-94 (26 September 1878) and vol. 39, p. 76 (27 April 1882).

³³ Little credence can be given to the data in 'Pipes—Breakages in Colonial and Imported', Return to an Order, *VV&P(LA)*, 1885, vol. 1, C1 (15 July 1885). This claimed that 84 out of the 599 miles in the Yan Yean reticulation system consisted of colonial pipes and commented, inaccurately, that (i) these were first brought into operation in 1879-82 (in fact a much earlier contract for 188 tons can be found in *VGG*, 1874, p. 2045), and that (ii) these had subsequently been the only type obtained.

³⁴ There is a discrepancy between general knowledge of the contract (*Age*, 14 February 1885) and its formal announcement on 7 August 1885 (*VGG*, p. 2202). See also *Age*, 12 October 1885 (for technical description) and 19 February 1886; *Argus*, 15 October 1885.

³⁵ *VGG*, 1886, p. 440 and 1887, pp. 532 and 2709. *VPD*, 1887, vol. 54, pp. 804-10 (16 August) and pp. 861-73 (18 August). *Age*, 18, 23 and 30 August 1887.

³⁶ Prior to separation, Victoria's customs arrangements were derived from New South Wales legislation, especially 9 Vic. no. 15 (7 November 1845). Under the first Victorian Act regulating customs, 16 Vic. no. 23 (31 December 1852), there was no provision for drawback, but Section 6 of subsequent amending legislation, 17 Vic. no. 17 (8 April 1854), allowed drawbacks on wine, coffee and tea. Then, under 18 Vic. no. 29 (27 April 1855), 21 Vic. no. 13 (27 August 1857) and 25 Vic. no. 144 (18 June 1862), drawback was extended to chicory, sugar and rice.

³⁷ Equal partners in this enterprise were The Colonial Sugar Refining Company, the Victoria Sugar Company Ltd and New Zealand investors. CSR (which became a limited liability company in 1887) absorbed the Victorian company in 1887 and the New Zealand company in 1888.

³⁸ On 16 June 1887, for instance, a representative of Robison Bros and Company told the Premier that 'a very large amount of work had been done by the engineers and ironfounders of Melbourne for [the sugar industry in] Queensland and Fiji', and his firm had fulfilled a contract for supplying and installing the equipment in a sugar refinery in Queensland: *ATR*, 28 June 1887, pp. 393-4.

³⁹ *Argus*, 6 March, 7 April, 2 October and 16 December 1868.

⁴⁰ A survey carried out in January-March 1872 in response to a request from the British Admiralty showed that the five companies actually operating in Victoria claimed they could preserve 133 tons of meat a week, the three in New South Wales 59 tons, and the two in South Australia 42 tons; VAO, Chief Secretary's Correspondence, 1872, B2753, box 693.

⁴¹ *Argus*, 12 April 1870 and 27 February and 4 December 1871; J. C. Drummond and A. Wilbraham, *The Englishman's Food: A History of Five Centuries of English Diet*, rev. ed., London, 1957, p. 316.

⁴² Quoted by Drummond and Wilbraham, *The Englishman's Food*, p. 322.

⁴³ *Age*, 27 May and 9 November 1881, 2 September 1882, 29 November 1883, 1 December 1884, 9 September and 1 December 1885 and 17 April and 1 June 1886. *Argus*, 4 July and 13 September 1881, 5 June and 20 December 1882 and 14 January 1885. The Newport works was bought by the Melbourne Refrigerating and Agency Company Ltd (which for a fee slaughtered, froze and exported sheep at owner's risk) and then, in turn, was acquired by the Victorian government as part of its effort to encourage the export of dairy produce: see, for instance, *Argus*, 7 April 1886 and 18 December 1889.

⁴⁴ The best reports of the half-yearly meetings can be found in three sources: *Age*, 3 October 1882 and 3 April 1883; *Argus*, 10 October 1883; and *AIBR*, *passim* (e.g. 10 April and 13 October 1884 and 13 May and 14 October 1885).

⁴⁵ Among the many descriptions of this company's works at Maribyrnong are those in the *Argus*, 2 October 1868, 26 February 1870 and 6 October 1874.

⁴⁶ An excellent review of this literature is given by C. D. W. Goodwin, *Economic Enquiry in Australia*, pp. 3-59.

⁴⁷ These were derived from the annual 'Treasurer's Statement' and from the estimates, such as sales of stamps attributable to post office operations, incorporated in the *Vic. SR*.

⁴⁸ For a summary of government financial problems and solutions see Butlin, 'Colonial Socialism in Australia', pp. 26-78.

⁴⁹ See P. N. Lamb, review of 'G. D. Patterson, *The Tariff in the Australian Colonies 1856-1900*, Melbourne, 1968', *AEHR*, 9 (1969), pp. 186-7. Moreover, Patterson's figures are not always consistent: for instance on p. 93 the figures for 'general revenue' sometimes include and sometimes exclude loans recouped and assets realised. However, he covers such criticisms in a general way on p. 170.

⁵⁰ These items generated 29.6 per cent of the total customs revenue in 1870, 32.3 per cent in 1880 and 42.6 per cent in 1890. It can also be noted that in 1870 74.9 per cent of the value of all imports (except gold, silver, wool, livestock and re-exports) were dutiable, compared with 58.0 per cent in 1880, and 50.3 per cent in 1890. The average level of duty on *all* dutiable items in these three years was, respectively, 17.1, 26.6 and 31.6 per cent *ad valorem*.

⁵¹ This is necessarily a brief summary: for the detail see F. W. Taussig, *Some Aspects of the Tariff Question*, 3rd ed., Cambridge (Mass.), 1934, pp. 322-41.

⁵² G. Serle, *The Rush to Be Rich*, p. 75.

⁵³ W. A. Sinclair, 'The Tariff and Manufacturing Employment in Victoria, 1860-1900', *ER*, 31 (1955), pp. 100-4.

⁵⁴ *ATCJ*, 15 September 1888, p. 548.

⁵⁵ *VPD*, vol. 29, pp. 1870-2 (14 November 1878) and pp. 1927-32 (19 November 1878); *Argus*, 21 November 1878.

⁵⁶ This account draws on W. J. Reader, *Imperial Chemical Industries: A History, Volume 1 The Forerunners 1870-1926*, Oxford, 1970, *passim*; *Age*, 6 January 1877; Public Record Office, London (BT 31 14526/9298). On 10 September 1888 the name was changed to Australian Explosives and Chemical Company Ltd (incorporated in London on 11 October 1888), and in July 1895 the capital increased to £60,000. By 1901 almost all the shares were held by the Nobel Dynamite Trust Company Ltd or its directors. On 29 May 1908 it was resolved that the status should be changed to that of a private company and on 26 April 1926 the decision was made to wind up its affairs voluntarily.

⁵⁷ *Argus*, 18 April 1885. The value of exports on which drawback was claimed and the proportion this formed of total exports were: apparel and slops (1872-90) £1,383,000 (55.5 per cent); confectionery (1873-89) £161,000 (84.1 per cent); preserved meat (1880-6) £145,000 (30.8 per cent); sugar (1872-90) £125,000 (11.0 per cent); jams and preserves (1879-90) £122,000 (86.9 per cent); and boots, shoes and saddlery (1880-90) £58,000 (6.6 per cent).

⁵⁸ Prior to that date only a partial refund was allowed: see *VGG*, 1872, p. 553; 1874, p. 1954 and p. 2103; and 1880, p. 193.

⁵⁹ *ATCJ*, 29 June 1878, p. 1232.

⁶⁰ VAO, Defunct Company Papers, pkt 735.

⁶¹ It should be noted, however, that some attempts were made to rationalise the structure of the tariff: see *VPD*, vol. 21, esp. pp. 706-7 (15 July 1875).

⁶² Perhaps such ideas were originally implanted by the views of R. E. Cameron, 'The Victorian Boot and Shoe Industry', *ER*, 13 (1937), pp. 31-46 who suggested (p. 31) that 'nurtured in this manner [tariff walls raised higher and higher], Victoria's boot and shoe industry, despite a few setbacks, developed steadily before Federation'.

⁶³ This estimate took into account: (i) the Phoenix Company's contract prices (and extras allowed when applicable); (ii) the value of materials supplied by the government; and (iii) the 'steam-up' costs of imported locomotives.

⁶⁴ The regulations were published in *VV&P(LA)*, 1871, vol. 1, A30; *VPPP*, 1872, vol. 3, no. 111 and 1875-6, vol. 3, no. 53.

⁶⁵ *VV&P(LA)*, 1864-5, vol. 2, D33 (18 July 1865) and 1886, vol. 1, C21 (22 July 1886).

⁶⁶ Competition between governments in this way became more important later: see summary in G. J. R. Linge, 'Governments and the Location of Secondary Industry in Australia', *Economic Geography*, 43(1967), pp. 43-63.

⁶⁷ 'Arsenal and Small-arms Factory', Return to an Order [a copy of all letters and correspondence], *VV&P(LA)*, 1888, vol. 1, C18, p. 31.

⁶⁸ The Colonial Ammunition Company was formed during a visit to England in 1887 by John Whitney who, for some years, had been operating an ammunition factory (Whitney and Sons) at Mount Eden in Auckland, New Zealand.

⁶⁹ 'Lease of land, etc., for an Ammunition Factory', *VPPP*, 1889, vol. 4, no. 147. 'An Act to ratify a Lease of certain land granted by the Government of Victoria to the Colonial Ammunition Company Limited for the purposes of an Ammunition Factory', 53 Vic. no. 1022 (4 November 1889). See also *VPD*, vol. 62, pp. 2001-3 (23 October 1889). Subsequent events are recorded in J. K. Lyons, *The Colonial Ammunition Company (Aust.) Ltd 1888-1926*.

⁷⁰ The sequence of events can be traced in: *VPD*, vol. 53, p. 2152 (28 October 1886) and vol. 56, pp. 2085-8 (15 November 1887) and pp. 2703-4 (15 December 1887). *VGG*, 1887, p. 1781. *Age*, 29 October and 26 November 1887. *ATR*, 17 November and 15 December 1887, pp. 688 and 805. 'The Treasurer's Statement . . . year ending 30 June 1889', *VV&P(LA)*, 1889, vol. 1, A5, p. 74.

⁷¹ Some of the problems have been outlined in N. G. Butlin and J. A. Dowie, 'Estimates of Australian Work Force and Employment, 1861-1961', *AEHR*, 9(1969), pp. 138-55.

⁷² Registered as the Hoffman Patent Steam Brick Company Ltd on 22 July 1882 (*VGG*, 1882, p. 1823). See *Argus*, 7 September 1870, 26 April 1872 and 28 December 1881.

⁷³ See, for instance, A. Thompson, 'The Enigma of Australian Manufacturing, 1851-1901', *Australian Economic Papers*, 9(1970), pp. 76-92.

⁷⁴ An estimate of 51,260 males and 28,160 females engaged in manufacturing (i.e. a wider definition than *factory* employment) has been made from the census held on 5 April 1891 after compiling detailed series of sub-estimates for doubtful and ill-defined codes. These figures are thus not intended to be directly compared with the re-worked *Vic. SR* factory data though these, for the year ending 1 March 1891, were 47,076 males and 11,563 females. The census-generated figure for manufacturing of 79,420 given above can be 'compared' with the 91,710 quoted in the *Victorian Year-Book*, 1895-8, p. 928, and the 87,656 given by T. A. Coghlan, *A Statistical Account of the Seven Colonies of Australasia*, 1897-8, p. 331 (both claiming to be derived from the 1891 census).

⁷⁵ *Victorian Year-Book*, 1895-8, pp. 931-2.

⁷⁶ Some commentators have wrongly assumed that the Chief Inspector's reports included outworkers. In fact, as will be discussed later, he seems to have had little idea of the extent of the outworking system.

⁷⁷ Thompson, 'The Enigma of Australian Manufacturing', p. 76.

⁷⁸ No satisfactory basis can be found on which to adjust the original *Vic. SR* data for value of investment and quantities produced to take account of changes in definition and coverage so that this part of the discussion relies on uncorrected *Vic. SR* data.

⁷⁹ The 'discontinuities' indicated in Figs. 8.7 to 8.9 arise because the coverage was widened to include premises other than those using steam power in the case of coach and wagon works in 1874-5 and cabinet works in 1875-6.

⁸⁰ Butlin, *Investment in Australian Economic Development*, pp. 209-10.

⁸¹ See, for instance, the essay (relating to the United States) by P. Temin, 'Steam and Waterpower in the Early 19th Century', *Journal of Economic History*, 26(1966), pp. 187-205.

⁸² *VGG*, 1874, pp. 1179 and 2086; VAO, Defunct Company Papers, pkt 326.

⁸³ *VGG*, 1872, p. 770; VAO, Defunct Company Papers, pkt 242.

⁸⁴ Hall, *Stock Exchange of Melbourne*, p. 72. Until 1880 much of the business was 'carried on in the open street': *Argus*, 30 July 1879.

⁸⁵ VGG, 1882, p. 497; 1883, p. 200; and 1885, p. 295. VAO, Defunct Company Papers, pkts 242, 733 and 891. AIBR, 12 December 1885, p. 706. ATR, 16 December 1885, pp. 829-30 and 25 August 1890, p. 383. It is impossible to verify the accusation of the *Argus* (19 April 1877) that Kitchens and the Apollo Company had come to a pricing arrangement in October 1876 which enabled them to raise the price per lb from 8d to 10d, and an 'agreement to divide the export trade between them, the company [Apollo] undertaking to supply New South Wales and Queensland and the private firm the other colonies'.

⁸⁶ VGG, 1867, p. 927 and 1882, pp. 1594 and 1658; VAO, Defunct Company Papers, pkts 110 and 685. In the meantime Langlands in 1880 took over the assets of the Fulton Foundry Company Ltd registered on 20 April 1871 (VGG, 1871, p. 671) but originating in the 1840s.

⁸⁷ G. Blainey, *One Hundred Years: Johns and Waygood Ltd 1856-1956; Johns and Waygood Ltd Papers* (Australian National University Archives 33/1-17); VGG, 1889, p. 516 and 1893, p. 3880.

⁸⁸ The *Age* editorial on 8 January 1881 sums up the many detailed references to this attitude. The number of female domestic servants increased from 20,219 in 1871 to 21,515 in 1881, and to 21,981 in 1891 but the proportion they formed of the female workforce declined from 35.9 to 26.7 per cent during these two decades. In these years, however, the number of females described as 'housekeepers' and 'inn servants' or as 'others engaged in attendance' increased from 4,083 to 4,545, and to 16,185. The main objection to domestic service was the lack of freedom at weekends.

⁸⁹ J. Hagan, 'Employers, Trade Unions and the First Victorian Factory Acts', *Labour History*, no. 7, 1964, pp. 3-10.

⁹⁰ 'An Act for the supervision and regulation of Workrooms and Factories and the Employment of Females therein', 37 Vic. no. 466 (11 November 1873).

⁹¹ VAO, Chief Secretary's Correspondence, 1878, N5349, box 73, includes the original petitions dated November and December 1873, and response of Board of Management, Melbourne Woollen Mill Company Ltd to Chief Secretary (11 December 1873).

⁹² *Age*, 30 May and 14, 16, 18 and 25 June 1879 and 14 September 1880.

⁹³ The council of the Victorian Chamber of Manufactures met on 24 November (*Argus*, 25 November 1884) and appointed a deputation to meet the Premier (*Argus*, 26 November 1884) who indicated that 'no attempt would be made to rush [the Factories Bill] through unduly'. The Victorian Parliamentary Committee appointed by the Second Intercolonial Trades' Union Congress (held in Melbourne, 22-25 April 1884) reported to the Third Congress in 1885 that the Bill 'was not all that could be desired from our point of view, and its abandonment till another session was not deplored by the Committee'.

⁹⁴ J. A. La Nauze, *Alfred Deakin*, vol. 1, pp. 83-4 gives a simplistic account of Deakin's role in this episode.

⁹⁵ This restricted definition of sweating coincides with that of E. C. Fry, 'Outwork in the 'Eighties: An Examination of Outwork in the Infant Industries of the Eastern Australian Colonies, c. 1880-90', *University Studies in History and Economics*, 2(1953-6), pp. 77-93. The systems of outwork in the boot trade are well described in the *Age*, 15 December 1884.

⁹⁶ Report of C. P. Hodges (31 May 1880) printed as 'Chinese in Victoria', Return to an Order, VV&P(LC), 1881, A2 (6 December 1881). The Chinese question in its wider context is discussed by Serle, *The Rush to Be Rich*, pp. 295-302.

⁹⁷ The amendment contained in 51 Vic. no. 961 (17 December 1887) uses the wording 'in which Chinese are engaged' but this was in fact interpreted to mean a minimum of two: see VPD, vol. 78, p. 2635 (17 October 1895).

⁹⁸ Serle, *The Rush to Be Rich*, pp. 93-123.

⁹⁹ 'The Board of Conciliation for the Colony of Victoria' came into being after protracted negotiations, beginning in November 1885, between the Victorian Employers' Union and

the Trades Hall Council (its constitution can be found in *Argus*, 5 September 1887). The Board met for the first time on 16 February 1888 to settle a dispute between the Ironworkers' Assistants' Union and the Ironmasters' Association. On 29 February it published its award: inter alia this included 6/9d for an eight-hour day and time and a quarter overtime for the first two hours. It was the failure of the Ballarat foundries to pay these rates, which came into effect in Melbourne on 5 March 1888, that precipitated the dispute in that town nearly a year later.

¹⁰⁰ *Argus*, 26 January 1878. The red gum export duty, imposed by 41 Vic. no. 593 (18 January 1878), was soon afterwards amended to exempt (i) red gum imported across the Murray River to be sawn and re-exported, and (ii) exports of what amounted to 'marketable waste'. Later the red gum export duty was suspended and then repealed and the duties refunded (see Chapter 9).

¹⁰¹ *Age*, 30 September 1874, 20 July 1875 and 1 October 1879; *Argus*, 28 January 1875 and 3 July 1879.

¹⁰² Quoted by C. R. Hall, *The Manufacturers*, p. 28.

¹⁰³ Hall, *The Manufacturers*, gives the details of these conferences (pp. 49-71).

¹⁰⁴ *SMH*, 8 June 1888.

¹⁰⁵ T. G. Parsons ('Some Aspects of the Development of Manufacturing in Melbourne 1870 to 1890', Ph.D. thesis, University of Melbourne, 1970) also emphasises the importance of the role of government but places less stress than the present account on its inter-related consequences and hence pervasive nature. For a more general review, largely through case studies of events in Australia since the Second World War, see G. J. R. Linge and P. J. Rimmer (eds), *Government Influence and the Location of Economic Activity*, Department of Human Geography Publication HG/5, The Australian National University, Canberra, 1971.

Chapter 9. The Geography of Manufacturing in Victoria 1851 to 1890

¹ 13 Vic. no. 39 (12 October 1849), the architectural significance of which is discussed by Freeland, *Architecture in Australia*, p. 88. An example of the spatial effect of this Act was the rapid evolution of the eastern (Collingwood) side of Smith Street into an important commercial and retail district since wooden buildings were permitted; the western (Fitzroy) side stagnated because it remained within the City boundaries until 1858 and was still regarded as the less attractive side even in the mid-1880s (*Argus*, 9 August 1884).

² See 'Progress Report of Proceedings Taken under "The Land Act, 1862"', *VPPP*, 1862-3, vol. 3, no. 17, p. 3; and 'Novel Industries—Return of Allotments leased and licensed on the south side of the Yarra, between the south side of the River and the Sandridge Road, for industrial purposes, under the Regulations of the 47th section of *The Land Act* 1869', *VV&P(LC)*, 1872, A6.

³ In the *Vic.SR* a number of establishments in different areas were sometimes lumped together (as in the case of woollen-milling) for confidentiality reasons: the pragmatic solution was to divide the totals shown equally between establishments and locations. See also Appendix Table A1.6.

⁴ Only the more significant notices and by-laws have been reported here: others imposed innumerable conditions and additional charges for particular services. These are all available in the *VGG* along with consolidated schedules which were published from time to time and formed the basis of the *Merchandise Rates, including Live Stock etc.* used by the Victorian Railway Department.

⁵ Subsequently published under this title: see *Victorian Pamphlets* (La Trobe Library), vol. 107, nos. 3-10.

⁶ *Colonial Mining Journal, Railway and Share Gazette*, January 1859, p. 71.

⁷ *Ovens and Murray Advertiser*, 10 February 1855.

⁸ W. B. Withers, *History of Ballarat*, p. 295.

⁹ S. L. Lacey, *Laceys of Gippsland, The History of a Pioneer Firm 1870-1970*.

¹⁰ For the details of these problems see T. G. Parsons, 'Technological Change in the Melbourne Flour-Milling and Brewing Industries, 1870-90'. *AEHR*, 11(1971), pp. 133-46.

¹¹ *Argus*, 11 March 1875.

¹² *Age*, 6 August 1875.

¹³ Except in a few licensing districts, the number of hotels was only very gradually reduced to anything like the formula figure, despite the efforts of temperance organisations, because much depended on a complicated local option system.

¹⁴ Evidence of E. Wild (7 November 1866), 'Report of the Royal Commission . . . to enquire into and report upon the operations and effect of the Wine and Spirits Sale Statute . . .', *VPPP*, 1867, vol. 5, no. 61, pp. 115-6; *Argus*, 24 April and 24 September 1869.

¹⁵ J. Jamieson, 'Colonial Beer', *Melbourne Review*, 3(1878), pp. 304-14; *Argus*, 6 June 1885; Parsons, 'Technological Change in the Melbourne Flour-Milling and Brewing Industries', pp. 142-3; J. C. MacCartie, *A Handbook for Australian Brewers*, *passim*.

¹⁶ *ATR*, 27 July 1885, p. 501; *Argus*, 6 January 1887; *Australian Brewers' Journal*, 20 February 1887, pp. 138-9. On 21 February 1894, in evidence reported in 'First Report of the Board Appointed . . . to Inquire into the Effect of the Fiscal System of Victoria upon Industry and Production . . .', *VPPP*, 1894, vol. 2, no. 37*, pp. 236-7, Jacob Cohn said that the 'Foster Lager Beer Brewery [Melbourne] sells it at a price at which it would be quite impossible for me to make it'. As noted in Chapter 7, a brewery at Bendigo installed a refrigerating plant during the 1850s: it has not been possible to establish exactly how this was used but it seems to have been for storage purposes only.

¹⁷ Calculated from 'Comparative Statement of Tariff Charges Current on the Railways of the Australian Colonies, 1879', Return to Order, *SAPP*, 1880, vol. 4, no. 181 (6 October 1880), pp. 2-3.

¹⁸ See three articles, 'The Melbourne Liquor Traffic', in the *Age*, 20 and 27 January and 10 February 1883; also the evidence of J. Vale (secretary of the Victorian alliance for the suppression of the liquor traffic), 'Report [First Part] of the Intoxicating Drink Inquiry Commission', *NSWV&P(LA)*, 1887-8, vol. 7, p. 437 (5 November 1886).

¹⁹ See D. O'Hara, 'History of Carlton Brewery Ltd', typescript dated 14 January 1958 (National Library MS 500).

²⁰ Sutherland *et al.*, *Victoria and Its Metropolis Past and Present*, vol. 2, p. 189.

²¹ G. F. James, 'The Manager's Letter-book, Union Bank, Portland, 1846-54', *Historical Studies, Australia and New Zealand*, 2(1942-3), p. 46 (entry for 8 May 1852) illustrates this problem.

²² Data are available about the operations of the Wahgunyah Steam Mill for the period 1859 to 1875 (with breaks) in the *John Foord Papers*, and of the flour-mill at Smeaton owned by Anderson and Company 1862 to 1954 (with breaks): both held in the University of Melbourne Archives Collection.

²³ *Australasian*, 17 July 1886, p. 107; the regulations were quickly altered to close this loophole: *VGG*, 1886, pp. 1883-4.

²⁴ Records of the transactions during 1859-63 of the Wahgunyah Steam Mill, located on the Murray River west of Wodonga, support this view. However, during the eighteen months to the end of July 1874, the Wahgunyah Steam Mill, in contrast with its locally orientated activities in the 1860s, sent one-fifth of its output to Melbourne.

²⁵ An examination of the lists of fires published monthly from 1877 in the *AIBR* shows that only a handful of flour-mills—on average less than one a year—was 'seriously damaged' or 'totally destroyed' by fire or by mishaps like boiler explosions. Flour-mills were among the more durable buildings in the landscape and were subsequently used for a wide variety of purposes ranging from chaff-cutting to cheese making.

²⁶ *VGG*, 1885, p. 233 (by-law no. 30).

²⁷ R. Bennett and J. Elton, *History of Corn Milling*, London, 1900, vol. 3, Appendix B 'Roller-mills', pp. 296-318.

²⁸ *Official Record of the Sydney International Exhibition, 1879*, pp. 604-6.

²⁹ It was claimed (*Age*, 4 October 1884) that in March 1884 there were only three roller-mills in Australia: Gibson's at Melbourne, Hayes's at Goulburn (New South Wales) and a mill at Adelaide. There was in fact another at Pemmell and Company's Sydney mill (*ATCJ*, 6 December 1884, p. 1172) and others in South Australia (see Chapter 13).

³⁰ Parsons, 'Technological Change in the Melbourne Flour-Milling and Brewing Industries', p. 138.

³¹ Exports of Victorian wheat during each of the three years 1879 through 1881 were, respectively, 536,000, 2,453,000 and 2,918,000 bushels; exports of Victorian flour (in bushel equivalents) were 453,000, 1,104,000 and 892,000.

³² *Argus*, 14 April, 11 September and 7 December 1869.

³³ VAO, Defunct Company Papers: e.g. pkts 207 (Maffra), 227 (Stratford) and 326 (Newry).

³⁴ *Argus*, 6 October 1875; *Age*, 26 July 1886.

³⁵ *Australasian*, 11 October 1884, p. 682 and 21 September 1889, p. 583.

³⁶ *Vic.SR*, 1891, p. 54.

³⁷ Evidence of D. Wilson to Royal Commission on Vegetable Products, *Second Progress Report and Continuation of the Minutes of Evidence*, Melbourne, 1886, pp. 92-102 (18 June 1886). Wilson's evidence is all the more significant in that he was appointed as the first Government Dairy Expert in 1888. See the *Australasian*, 19 January 1889, p. 120, for official report critical of farm dairies.

³⁸ The first de Laval machines were those installed at the Albion Park (New South Wales) factory in November 1885; prior to that Danish machines were used at Romsey (Victoria) and at Mittagong and Kiama (New South Wales). See Royal Commission on Vegetable Products, *Sixth Progress Report . . .*, Melbourne, 1888, p. 52; *Age*, 18 December 1882.

³⁹ *Australasian*, 12 October 1889, p. 743; *Argus*, 18 February 1890.

⁴⁰ *Australasian*, 28 September 1889, p. 639; *Argus*, 1 March 1890; *ATR*, 14 November 1892, p. 445 and 5 March 1894, p. 81; J. P. Dowling, *Practical Dairying for Australia*, p. 160.

⁴¹ *Proposed Action of New South Wales Government Relative to the Supervision of the Butter Export Trade, Representative Deputation to Minister for Agriculture, December 10th, 1896*, Sydney, 1896.

⁴² This and the next paragraph rely mainly on numerous reports in the *Australasian*, 1880-95. A useful account of the industry is available in a series of five articles under the heading 'The Victorian butter export' in *SMH*, 15, 17, 20, 26 and 27 January 1894.

⁴³ All but a handful of the country factories were within four elliptically-shaped areas located between (i) Cobden and Port Fairy (50 miles); (ii) Kerang and Swan Hill (35 miles); (iii) Euroa and Wangaratta (50 miles); and (iv) Bairnsdale and Warragul (100 miles).

⁴⁴ 'Report of the Dairy Expert', *Victoria Department of Agriculture Bulletin*, no.14, December 1891, p. 76.

⁴⁵ The Government Dairy Expert was a director of The Fresh Food and Frozen Storage Company during its first year: his family continued to be employed by it after he resigned from the Board (see *Age* and *Argus*, 1 March 1890). The manager of the government's travelling model dairy resigned to become Manager of The Victorian Creamery and Butter Company Ltd formed in April 1891.

⁴⁶ 'Mineral Statistics of Victoria': for 1870, *VPPP*, 1871, vol. 2, no. 4, p. 43; for 1872, *VPPP*, 1873, vol. 3, no. 7, p. 45.

⁴⁷ *SMH*, 21 June 1858.

⁴⁸ 'Papers Relating to Forest Conservancy', *VPPP*, 1874, vol. 3, no. 86, p. 1.

⁴⁹ *Age*, 23 August 1880.

⁵⁰ *VPPP*, 1878, vol. 3, no. 50, p. 3.

⁵¹ *Age*, 23 August 1880.

⁵² 'Tenth Progress Report [Forest Royalties and the Royalty System], Royal Commission on State Forests and Timber Reserves [20 June 1900]', *VPPP*, 1900, vol. 2, no. 16, p. 13.

⁵³ *VGG*, 1892, pp. 4435-6. It is probable that the measurements were calculated on the Hoppus String measure (sometimes known as the Quarter Girth Method) based on the formula: (mean girth in feet)² x $\frac{1}{4}$ (length in feet) = contents in super feet. Thus a log with a girth of 16.75 feet and a length of 19 feet would have measured 4,000 super feet and been subject (as first class timber) to a duty of £2. See N. A. Wallis, *Australian Timber Handbook*, rev. ed., Sydney, 1970, p. 25.

⁵⁴ *Colonial Mining Journal, Railway and Share Gazette*, March 1860, p. 115.

⁵⁵ *SMH*, 11 March 1864. *ATCJ*, 2 December 1871, p. 715. A list of the main operators is available in 'Mineral Statistics of Victoria for . . . 1874', *VPPP*, 1875-6, vol. 2, no. 2, p. 50.

⁵⁶ *VPPP*, 1872, vol. 3, no. 8, Appendix D, p. 48 and 1874, vol. 2, no. 8, pp. 51-2. *VPD*, vol. 17, p. 2191.

⁵⁷ Hughes, *Australian Iron and Steel Industry*, p. 16, suggests that this company was formed 'as a subsidiary' by the Phoenix Foundry Company Ltd of Ballarat. Although the pig iron was worked up in a section of this Ballarat foundry, suggesting that there was *some* connection, the Phoenix Foundry as such is not named in any of the *VGG* notices relating to the Lal Lal venture and there was no overt coincidence between the lists of shareholders. Moreover, it is difficult to believe that an alert and successful company like the Phoenix Foundry would have allowed a *subsidiary* to flounder in a technical and financial muddle for over a decade.

⁵⁸ These events can be traced in *VGG*, 1874-83 (including call notices) and VAO, Defunct Company Papers, pkt 776.

⁵⁹ Quoted by *Colonial Mining Journal, Railway and Share Gazette*, February 1860, p. 99.

⁶⁰ Few accounts agree about the details of the vessels built and these figures have been compiled, therefore, from a variety of sources including R. H. Parsons, *Paddle Steamers of Australasia, passim*; and P. J. Phillips, *River Boat Days on the Murray, Darling, Murrumbidgee*, Melbourne, 1972, esp. pp. 130-2.

⁶¹ R. S. Maynard, *Sugar, Ships, Locomotives*.

⁶² VAO, Defunct Company Papers, pkt 201. Buckland and Jack, 'The Locomotive Builders of Ballarat', p. 188. Hughes, *Australian Iron and Steel Industry*, p. 17.

⁶³ *Age*, 8 and 26 February 1868, 8 and 9 May and 11 November 1871, and 5 February and 7 October 1872. *Argus*, 8-16 February and 16 July 1870 and 5 April and 26 October 1872.

⁶⁴ The evidence on which this and subsequent paragraphs are based has been distilled from the VAO, Defunct Company Papers; numerous press reports of shareholders' meetings: *VPPP*, 1883, second session, vol. 4, no. 50, 1894, vol. 2, no. 37* and 1895-6, vol. 2, no. 3; and Minutes of Evidence, 'Woollen Piece Goods', pp. 1553-724, *CPPP*, 1906, vol. 4.

⁶⁵ In contemporary usage 'union' cloths were those in which threads of cotton, or often a cotton and wool mixture, formed the warps (i.e. running lengthways) and woollen threads formed the weft; 'angola' cloths were those in which both the warp and weft threads were spun from a cotton and wool mixture.

⁶⁶ The mills' petition is available in VAO, Chief Secretary's Correspondence, 1886, F8900, box 741. The consent was gazetted in *VGG*, 1886, p. 647.

⁶⁷ *Age*, 18 February and 1 June 1886.

⁶⁸ Memorandum, unsigned and undated, in VAO, Chief Secretary's Correspondence, 1886, F8900, box 741.

⁶⁹ *VPD*, vol. 52, p. 1043 (10 August 1886).

⁷⁰ *VPD*, vol. 61, p. 1477 (19 September 1889).

⁷¹ 'Woollen Factory Sites—Report by Mr James Smail, Manager [24 July 1912]', *CPPP*,

1912, vol. 3. pp. 211-3. The Federal Woollen Mills Ltd were established at Geelong and commenced operations on 23 September 1915: *CPPP*, 1917-9, vol. 4, pp. 1189-90.

⁷² Evidence of R. Fulton and W. Shaw (9 March 1860), 'Progress Report from the Select Committee upon The Tariff', *VV&P(LA)*, 1859-60, vol. 2, D26, pp. 119-24.

⁷³ 'Railway Workshops at Inland Depôts', *VV&P(LA)*, 1885, vol. 1, C23 (26 November 1885), p. 2.

⁷⁴ The widespread nature of the movement can be seen from the fact that representatives attended from Wimmera Shire, Castlemaine, St Arnaud, Creswick, Echuca, Marong, Bendigo, Ararat Shire, Ararat Borough, Avoca, Geelong, Geelong West, Dunolly, Ballarat City, Stawell, Buninyong, Scarsdale, Bungaree, Strathfieldsaye, and Huntly Shire, and apologies were received from Colac Shire, Maryborough, Hamilton, Warrnambool, Daylesford, Kilmore, and North Ovens Shire. Delegates also attended from the Ballarat and Bendigo Miners' Associations.

⁷⁵ For a later view, see 'Report of the Select Committee upon the causes of The Drift of Population from Country Districts to the City [17 December 1918]', *VV&P(LA)*, 1918, vol. 1, pp. 641-7.

Chapter 10. New South Wales 1851 to 1890: The Spatial Setting

¹ During the 1870s and 1880s the estimated 59,000 people who arrived from other Australian colonies were supplemented by 58,000 assisted and 149,000 other migrants from overseas.

² For a list see W. B. Clarke, 'On the Progress of Gold Discovery in Australasia, from 1860 to 1871', pp. 533-55 in *The Industrial Progress of New South Wales*.

³ A useful map of stock-routes can be found in 'Second Annual Report upon the Occupation of Crown Lands . . .', *NSWV&P(LA)*, 1881, vol. 3, following p. 510.

⁴ During the fourteen years 1876 through 1889, the northern, southern and western fields produced, respectively, 74.4, 16.4 and 9.2 per cent of the New South Wales total.

⁵ G. Blainey, *The Rush That Never Ended*, p. 130.

⁶ The value of imports from South Australia through Cockburn increased from £298,000 in 1885-6 to £981,000 in 1887-8; exports increased from £458,000 to £908,000: *NSWV&P(LA)*, 1888-9, vol. 1, pp. 915 and 919.

⁷ G. Blainey, *The Rise of Broken Hill*, p. 27.

⁸ A point made by Blainey, *The Rush That Never Ended*, p. 153.

⁹ D. N. Jeans, *An Historical Geography of New South Wales to 1901*, p. 296.

¹⁰ Towns which appeared for the first time (apart from Broken Hill) included Katoomba (1,592 in 1891), Peak Hill (1,577), Silverton (1,397), Nyngan (1,355), Nymagee (1,321) and Mount Victoria (664).

¹¹ T. A. Coghlan, *General Report on the Eleventh Census of New South Wales* [1891], p. 121.

¹² McCarty, 'Australian Capital Cities in the Nineteenth Century', p. 131. The arithmetic can be resolved as follows.

1851: Linge, Hundreds of Sydney and Packerham plus parish of Hunters Hill = 61,105; Coghlan, Sydney City (44,240) plus suburbs (9,684) = 53,924 (Coghlan's area bears little resemblance to SMPD).

1861: metropolitan electorates (95,494) plus Victoria Barracks (295) = 95,789; SMPD (93,686) plus Ryde Registry District (2,103) = 95,789; Coghlan, incorporated areas (78,054) plus unincorporated areas (17,735) = 95,789.

1871: metropolitan electorates (137,765) plus arithmetic error in returns (11) = 137,776; SMPD (134,890) plus Ryde and Hunters Hill municipalities (2,886) = 137,776; Coghlan, incorporated areas (127,414) plus unincorporated areas (10,362) = 137,776.

1881: metropolitan electorates (220,984) plus Ryde and Hunters Hill municipalities now

included in Central Cumberland electorate (3,955) = 224,939; SMPD (220,984) plus Ryde and Hunters Hill municipalities (3,955) = 224,939; Coghlan, incorporated areas (216,133) plus unincorporated areas (8,806) = 224,939.

1891: metropolitan electorates (378,902) plus Ryde and Hunters Hill municipalities (6,858) = 385,760; SMPD (378,902) plus Ryde and Hunters Hill municipalities = 385,760; Coghlan, incorporated areas (382,811) plus unincorporated areas (472) = 383,283 (Coghlan appears to have excluded 2,477 people in unincorporated areas).

It is clear that Coghlan always included unincorporated areas within his definition of Sydney and that he used different, and not always advancing, boundaries between censuses.

¹³ *MM*, 1 November 1848; *Newcastle Chronicle*, 19 February 1868.

¹⁴ *Newcastle Chronicle*, 9 March 1861; G. H. Kingswell, *The Coal Mines of Newcastle, New South Wales*, Newcastle, 1890.

¹⁵ For the detail, see J. Rae, 'Report on the origin and progress of the Railways of New South Wales from 1846 to 1864, inclusive', *NSWJLC*, 1865-6, vol. 13, pp. 337-8.

¹⁶ Production in the area in 1874 totalled 1,035,000 tons: *Newcastle Chronicle*, 7 August 1875.

¹⁷ Coghlan, *General Report*, pp. 121-2.

¹⁸ R. J. S. Thomas, 'Some Aspects of the History of the Roads of New South Wales', *JRAHS*, 53(1967), p. 57.

¹⁹ T. Mitchell, 'Report upon the Progress Made in Roads and in the Construction of Public Works in New-South-Wales from the Year 1827 to June 1855', Sydney, 1856, p. 325 (Mitchell Library MS A331).

²⁰ *NSWV&P(LA)*, 1870-1 vol. 3, p. 175.

²¹ *NSWJLC*, 1865-6, vol. 13, p. 247; W. Denison, 'A Brief Outline of the Development of the Railway System in England, with Suggestions as to Its Application to the Colony of New South Wales', *Magazine of Science and Art*, 1(1858), pp. 11-12 sets out the cost of transport and tonnage moved between various centres in New South Wales during, presumably, 1855. In a later comment, 'Railroads', p. 63 he calculated that the freight task on the Northern road during that year totalled 1,184,000 ton-miles at an average cost of 1/10½d; on the Western road, 1,616,000 at 1/11½d; and on the Southern road, 1,916,000 at 1/11½.

²² A. Birch, 'The Sydney Railway Company, 1848-1855', *JPRHS*, 43(1957), p. 51. G. J. Abbott, 'The Introduction of Railways into New South Wales 1846-1855', *JRAHS*, 52(1966), pp. 33-50. C. D. W. Goodwin, 'Economists and Railways in Colonial Australia', *Journal of Transport History*, 6(1963-4), pp. 65-86.

²³ 'Proceedings of the Executive Council [9 November 1852]', *NSWV&P(LC)*, 1852, vol. 2, p. 1002.

²⁴ 'Final Report from the Select Committee on Roads and Railways . . . [15 November 1854]', *NSWV&P(LC)*, 1854, vol. 1, p. 1200.

²⁵ Denison, 'Railroads', pp. 62-8.

²⁶ In February 1882 the two colonies agreed to complete their lines to the border at this point and to share the cost of bridging the Murray River. On 11 June 1883 the 5'3" Victorian system was 'connected' with the 4'8½" New South Wales system. This meant that passengers and freight had to be transferred from the rolling stock of one gauge to that of the other until January 1962 when a standard gauge line was completed to Melbourne, thus enabling the through-running of rolling stock.

²⁷ This line was proposed in the early 1860s but the government refused to allow the project to proceed. The proposal was again revived early in 1872, was approved, and the line, built and operated by a joint stock company, was opened to traffic in 1876.

²⁸ Formally, the northbound rates on goods manufactured in New South Wales were not reduced until October 1887, but the lower rates were in fact being charged by the end of 1885: *NSWV&P(LA)*, 1888-9 vol. 2, p. 851.

²⁹ Quoted by Walker, *Old New England*, p. 161.

³⁰ Some of this detail is drawn from G. Harman, 'Politics and Railway Development in New England', *JRAHS*, 56(1970), pp. 281-95, and I. M. Laszlo, 'Railway Policies and Development in Northern New South Wales 1846 to 1889', M.A. thesis, University of New England, 1956.

³¹ *NSWV&P(LA)*, 1883, vol. 2, pp. 1-66, esp. p. 58; see also annual 'Appendix to the Report on the Railways . . .' beginning with summary from 1861 in *NSWV&P(LA)*, 1875-6, vol. 4, p. 139.

³² The essential details of the account that follows can be traced from reports in the *Newcastle Chronicle*, 10 June and 29 July 1863, 17 August 1864, 20 April 1869 and 22 June and 5 July 1871, and *NMH*, 4 August, 10 September and 30 November 1883.

³³ *The First Annual Report by the Committee of the Newcastle Chamber of Commerce*, Newcastle, 1886, p. 10.

³⁴ 'Prospectus', *MM*, 31 July 1852.

³⁵ *NSWV&P(LA)*, 1892-3, vol. 7, p. 501.

³⁶ T. A. Coghlan, *The Wealth and Progress of New South Wales 1886-87*, p. 343.

³⁷ *NSWSR*; *NSWV&P(LA)*, 1883, vol. 2, p. 58 and 1885, p. 147.

Chapter 11. Manufacturing in New South Wales 1851 to 1890

¹ Parkes subsequently became a staunch advocate of free trade. See also J. A. La Nauze, '"That Fatal, That Mischievous Passage": Henry Parkes and Protection, 1859-66', *Australian Quarterly*, 19(1947), no. 2, pp. 52-61.

² Tariff proposals late in 1863 generated sixteen petitions [see *NSWV&P(LA)*, 1863-4, vol. 2, pp. 1005-35] between September 1863 and January 1864 containing 12,482 signatures. In support were 5,385 inhabitants of Sydney, Parramatta, Maitland and Goulburn, and 1,515 coach-builders, tailors, cabinet-makers, saddlers and harness-makers; against were 5,486 merchants, importers and consumers, and 57 chemists and cabinet-makers who did not want specified materials taxed. A further 39 bankers and merchants simply wanted the whole situation cleared up one way or the other as quickly as possible. For an account of the meeting held under the auspices of the 'League for the Promotion of Colonial Industry' which led to one of these petitions, see *SMH*, 24 November 1863.

³ Evidence of G. S. Lang (19 March 1863), 'Report from the Select Committee on the Riverine Districts . . .', *VV&P(LA)*, 1862-3, vol. 2, D42, Minutes of Evidence, p. 4.

⁴ Butlin, *Australian Domestic Product*, p. 158.

⁵ *SMH*, 16 August 1873.

⁶ *SMH*, 25 December 1862 and 22 June 1869.

⁷ Probably the best known was M. A. Munn's Merimbula Maizena Works which began operations in July 1867. See *ATCJ*, 2 December 1871.

⁸ Butlin, *Australian Domestic Product*, p. 260. There are unexplained differences (in 1862-3 and 1878-82) in the series on this page and that on p. 266.

⁹ One of the first group of three lifts, worked by gas engines and suspended by ropes, was built by Vale & Lacy and installed in Gray & Sons warehouse in 1879: *ATCJ*, 10 May 1879, p. 885.

¹⁰ Freeland, *Architecture in Australia*, p. 165; *Official Record of the Sydney International Exhibition, 1879*, pp. 566-8; *ATCJ*, 14 December 1889, p. 31.

¹¹ *SMH*, 28 May 1869. Prior to 1889 all the Portland cement used in the colony (such as for lining tunnels and waterproofing foundations) was imported. In that year the Cullen Bullen Lime and Cement Company erected eight stationary bottle-kilns and produced limited quantities of Portland cement until the company was wound up in 1895.

¹² Mort & Nicolle showed household ice-making machines (possibly the first in the world) at the Agricultural Society's Exhibition in 1874 and these 'frigorific' appliances were put on

the market in September 1875: *SMH*, 28 September 1875. In 1884 Hudson Brothers Ltd introduced the 'Clyde Premier Refrigerator' which was made on a semi mass-production basis at their Granville works: *ATCJ*, 29 November 1884, p. 1121.

¹³ *ATCJ*, 18 April 1885, p. 805. C. B. Schedvin, 'Rabbits and Industrial Development: Lysaght Brothers & Co. Pty Ltd; 1884 to 1929', *AEHR*, 10(1970), pp. 27-55. Since different branches of the family were involved, it seems probable that there was no connection between the Parramatta wire-netting works (which was subsequently sold to Gibbs, Bright and Company and later to The Broken Hill Proprietary Company Ltd) and the importing agency which in 1899 was renamed Lysaght's Galvanised Iron Pty Ltd and in 1917 became John Lysaght (Australia) Pty Ltd.

¹⁴ *NSWV&P(LA)*, 1871-2, vol. 2, pp. 53-106.

¹⁵ *ATCJ*, 26 November 1892, pp. 28-9. At least three companies were set up to develop shearing machines: the Wolseley Sheep Shearing Machine Company Ltd (registered 25 October 1887), Silvers Patent Sheep Shearing and Flexible Shaft Company Ltd (registered 2 December 1889) and the Australian Shearer Company Ltd (registered 17 December 1889). All had become defunct by the end of 1894 (*NSWAO*, Defunct Company Papers, pkts 1033, 75 and 823). The Wolseley Company, for example, was wound up on 13 August 1891 after the patent rights had been acquired by a newly formed English concern which had the machines made in Birmingham.

¹⁶ *The Industrial Progress of New South Wales*, pp. 347-8.

¹⁷ *ATCJ*, 20 September 1884.

¹⁸ *SMH*, 1 September 1868.

¹⁹ This conclusion is reached from figures relating to about a dozen vessels for which prices are available. Although a very small sample, it does cover steamships of different sizes and types of construction.

²⁰ This figure approaches gross investment rather than simply new investment: it is difficult to take account of the substantial annual tonnage lost by sinkings, fires and scrappings or to allow for the tonnage converted from sail to steam (the reverse process was not unknown but infrequent) and expenditure on regular maintenance and major overhauls which sometimes included the lengthening of vessels and the complete replacement of major components like engines, boilers and crankshafts.

²¹ R. Parsons, *Detail of Steamships Registered at Sydney N.S.W. prior to 1900*.

²² The Customs House registration records do not identify the builder in a significant number of cases. With this reservation, the most prolific yard in Sydney appears to have been that of William Dunn on the North Shore (74 vessels of 2,804 tons), and the leading yard elsewhere was probably that of the Davis family at Brisbane Water (42 vessels of 2,572 tons).

²³ The main Sydney makers were Chapman and Company (39), Mort's Dock and Engineering Company (33), Vale & Lacy (32), Halliday and Company (26) and the Atlas Engineering Company (21).

²⁴ In *NSWAO*, Defunct Company Papers pkt 573 is missing. An account of events leading to the formation of this company is in A. Barnard, *Visions and Profits: Studies in the Business Career of Thomas Sutcliffe Mort*, Melbourne, 1961, pp. 107-31; see also *SMH*, 17 June 1868.

²⁵ R. Parsons, *A Pioneer Australian Steamship Company; J. P. Franki Papers* (Mitchell Library MSS 69), item 8, Private Minute Book, p. 21.

²⁶ *SMH*, 14 July 1866; *Age*, 1 January 1868; *ATCJ*, 25 February 1871, p. 241 and 29 November 1873, p. 690.

²⁷ *SMH*, 27 April 1871 and 6 January 1872.

²⁸ See, for instance, *NSWV&P(LA)*, 1878-9, vol. 7, pp. 729-60 and 1887-8, vol. 3, pp. 913-5.

²⁹ *NSWV&P(LA)*, 1861-2, vol. 1, p. 499.

³⁰ *ATCJ*, 12 June 1880, p. 1110.

³¹ *NSWV&P(LA)*, 1885-6, vol. 8, pp. 1183-99.

³² *ATCJ*, 25 November 1871, p. 688; 26 December 1874, p. 1018; and 21 July 1877, p. 101.

³³ C. Hoskins, *The Hoskins Saga*, pp. 24-5.

³⁴ *NSWV&P(LA)*, 1892-3, vol. 6, pp. 1155-79.

³⁵ The following paragraphs draw on: *NSWV&P(LA)*, 1870, vol. 2, pp. 19-130; *SMH*, 3 August 1870 and 21 October and 5 November 1875; Department of Railways, *New South Wales Steam Locomotive Data*.

³⁶ J. Rae, Commissioner for Railways, 'Railways of New South Wales. Report on their Construction and Working, from 1872 to 1875 inclusive', *NSWV&P(LA)*, 1875-6, vol. 4, p. 12.

³⁷ *NMH*, *passim* (e.g. 5 December 1878 and 2 June 1879).

³⁸ *NSWPD*, 1880-1, p. 67 (11 January 1881) and 1881, vol. 2, pp. 2620-1 (13 December 1881).

³⁹ Henry Vale and Company 24 for £80,820; Mort and Company 12 for £36,180; Vale & Lacy 10 for £33,460; and the Atlas Engineering Company 8 for £26,744. Detailed records (held by the Department of Railways) available for the 237 imported locomotives put in service by February 1887 show that the invoice price made up 93.1 per cent of the steam-up cost, freight 2.6 per cent, insurance 0.5 per cent and erection in Sydney or Newcastle 3.8 per cent.

⁴⁰ The sequence of events can be traced in: *NSWV&P(LA)*, 1890, vol. 5, pp. 1023-30 and 1905, vol. 3, pp. 39-88; *SMH*, 10 April 1890; *NMH*, 28 March, 19 and 22 April, 10 May, 5 July 1890; half-yearly reports by directors of Hudson Brothers Ltd, *Business Archives Council Collection*, Fisher Library, University of Sydney.

⁴¹ *NSWV&P(LA)*, 1870, vol. 2, pp. 51-130; *SMH*, 2 March 1870.

⁴² *Argus*, 14 March 1876; *SMH*, 13 July 1905; A. J. Goldsmith, *Reminiscences of an Old Engineer*, p. 8.

⁴³ *NMH*, 18 May 1880.

⁴⁴ *NMH*, 16 January 1886.

⁴⁵ *Newcastle Chronicle*, 8 March 1873.

⁴⁶ *ATCJ*, 22 March 1879, p. 560.

⁴⁷ *ATCJ*, 16 July 1870, p. 11.

⁴⁸ Public Record Office, London (BT 31 1183/2599C). The nominal capital of the company was £100,000 in £10 shares. By 14 May 1866, 1,294 shares had been taken and paid to £4: Tindall had 150 shares, ten other people each had 100, and six others held a total of 144. Five years later, when 2,760 shares had been called to £7, the three Australian shareholders were Tindall (605 shares), Joseph Page, grazier of Ramornie (30) and Henry Baldock, manager of the Ramornie works (10): the remaining 2,115 shares were held by twenty-seven people resident in Great Britain. When the company decided to go into voluntary liquidation on 16 February 1881, the subscribed capital stood at 3,450 shares paid to £10 of which Tindall owned 1,624. The assets were acquired by Tindall and the plant was enlarged in 1894 (*ATCJ*, 23 October 1897, p. 31).

⁴⁹ On 22 January 1880 the company (with a paid-up capital of £59,652, of which Whitehead had subscribed £19,050) agreed to sell its assets to the Australian Meat Importation (Whitehead's) Company Ltd which was incorporated in London on 10 February 1880 but dissolved by notice in the *London Gazette* on 19 August 1887 because no returns had been received by the Companies Registrar: Public Record Office, London (BT 31 2031/8819 and BT 31 2607/13753).

⁵⁰ Canned meat made by this company (encouraged, and perhaps even partially financed, by Mort) was being displayed in Sydney in October 1868: *SMH*, 7 October 1868. There are also references to other small works in operation at about this time, such as at Millers Point, Sydney (*ATCJ*, 20 August 1870, p. 10) and at Newcastle (*Newcastle Chronicle*, 27 January

1872), but little is known of their activities. Several ventures were projected but not proceeded with, like the Hunter River Meat Preserving Company at Maitland (*Newcastle Chronicle*, 1 and 17 July 1869 and 24 January 1871; *SMH*, 28 June 1869) and the Victoria, Twofold Bay, and London Meat-preserving Company at Eden (*Argus*, 2 January 1871).

⁵¹ *SMH*, 11 November 1869.

⁵² 'Report from the Select Committee on the Goulburn Meat-Preserving Company's Incorporation Bill . . . [25 August 1870]', *NSWJLC*, 1870-1, vol. 19, pt 1, pp. 1113-7; 'An Act to incorporate the Goulburn Meat-preserving Company (Limited)', 26 October 1870.

⁵³ *SMH*, 27 January 1871; R. T. Wyatt, *The History of Goulburn, N.S.W.*, p. 274.

⁵⁴ *ATCJ*, 9 September 1871, p. 342; 'Report from the Select Committee on the Sydney Meat-Preserving Company's Incorporation Bill . . . [20 April 1871]', *NSWJLC*, 1870-1, vol. 19, pt 1, pp. 1119-24; 'An Act to incorporate the Proprietors of . . . "The Sydney Meat-preserving Company (Limited)" . . .', 17 June 1871.

⁵⁵ *SMH*, 25 April 1873; *ATCJ*, 22 November 1873, p. 656.

⁵⁶ *Argus*, 13 October 1877. It is uncertain how long this works remained in active operation for by the mid-1880s it was simply preserving and shipping on a commission basis (*ATCJ*, 28 November 1885, p. 1108). On 4 February 1887 a public company was formed, with a subscribed capital of nearly £11,000, by local farmers and graziers but it was defunct within a year (NSWAO, Defunct Company Papers, pkt 824).

⁵⁷ *ATCJ*, 18 April 1885, p. 820; *NSWJLC*, 1883, vol. 35, p. 293.

⁵⁸ These events can be traced in: *SMH*, 28 December 1860, 14 November 1864, 18 September 1867 and 4 September 1875; *ATCJ*, 27 November 1875, p. 854, 18 December 1875, p. 970 and 14 July 1877, p. 52; NSWAO, Defunct Company Papers, pkt 655; Barnard, *Visions and Profits, passim*; *Australasian Pastoralists' Review*, 4(1894-5), p. 444.

⁵⁹ *SMH*, 28 May and 12 December 1881.

⁶⁰ Report of deputation to Minister for Works, *ATCJ*, 10 September 1887, p. 536; *Argus*, 22 March 1889.

⁶¹ 'The Initiation of Chilling in New South Wales', *Australasian Pastoralists' Review*, 4(1894-5), pp. 128-9; *Age*, 10 February 1890.

⁶² The shipment from the Aberdeen works through Newcastle on 8 February 1892 (*NMH*, 8 February 1892) was the first consignment from an inland works. The Australian Chilling and Freezing Company Ltd was registered in England on 19 June 1890 with a nominal capital of £250,000 and a paid-up capital of £21,186: *House of Commons Papers*, 1890-1, vol. 77, p. 84.

⁶³ Patterson, *The Tariff in the Australian Colonies*, pp. 61-2.

⁶⁴ 'Import Duty on Paper (Petition for Retention of—Employés of the Sydney Paper Mill Company, Liverpool)', *NSWV&P(LA)*, 1887, vol. 3, p. 419.

⁶⁵ The colonial legislation can be traced in Section 16 of 11 George IV no. 6 (19 March 1830); Section 18 of 5 Will. IV no. 15 (22 August 1834); Section 28 of 3 Vic. no. 3 (24 July 1839); and Section 41 of 9 Vic. no. 15 (7 November 1845).

⁶⁶ 42 Vic. no. 19 (14 May 1879) and regulations *NSWV&P(LA)*, 1880-1, vol. 1, pp. 859-70 and 1887-8, vol. 3, pp. 865-7.

⁶⁷ Thenceforward zinc sheet and the various forms of iron remained on the free list but the 40/- per ton impost on lead sheets, rolls and pipes was restored from 7 April 1886 to 30 September 1887.

⁶⁸ 'Duty on iron (Petition—Certain Iron Ship Builders, Engineers, and Others) [12 March 1873]', *NSWV&P(LA)*, 1872-3, vol. 1, p. 1081.

⁶⁹ *ATCJ*, 9 December 1871, p. 746.

⁷⁰ Kerosene was first produced by the Pioneer Kerosene Works near Wollongong in 1865 using local shales. The following year works were established by the Hartley Kerosene Oil and Paraffine Company near Lithgow and by the Australasian Mineral Oil Company at Sydney. In 1868 the Western Kerosene Oil Company erected a refinery at Waterloo, south

of Sydney. See *SMH*, 21 April 1866, 30 May and 5 December 1867 and 7 and 11 September 1868.

⁷¹ *ATCJ*, 2 March 1878, p. 411. J. Vicars, *The Tariff, Immigration, and the Labour Question*, characterised the government's treatment of the woollen manufacturing industry as 'unfair and discouraging in the extreme', one example being the duty on olive oil (20 to 25 lb of which was required per 100 lb of clean wool to make it card and spin properly) that together with freight raised its price by £10 per ton.

⁷² Coghlan, *Labour and Industry*, vol. 3, p. 1247.

⁷³ Evidence of J. G. Ross, Manager Colonial Sugar Refining Company [11 July 1862], 'Report from The Select Committee on the Bonded Distilleries and Sugar Houses Bill . . . [2 September 1862]', *NSWV&P(LA)*, 1862, vol. 2, pp. 661-70.

⁷⁴ This point, in reference to the smaller North Coast sugar-mills, is made by B. W. Higman, 'The Regional Impact of the Sugar Industry of New South Wales 1870-1912', *Australian Geographical Studies*, 6(1968), p. 50. On several occasions the sugar-millers sought to have the legislation relating to distilleries, 13 Vic. no. 27 (27 September 1849), amended but to no avail. See, for instance, 'Amendment of The Distillation Act (Petition—Farmers, Merchants, Storekeepers, and others, of Wagga Wagga)', *NSWV&P(LA)*, 1870-1, vol. 4, p. 1253, and 'Sugar Industry (Petition of Sugar-Planters and Others)', *NSWV&P(LA)*, 1883-4, vol. 11, pp. 863-4.

⁷⁵ *NSWV&P(LA)*, 1887-8, vol. 3, p. 867.

⁷⁶ Butlin, 'Colonial Socialism in Australia', p. 44, note 35.

⁷⁷ *ATCJ*, 2 March 1878, p. 411.

⁷⁸ F. P. Powers, 'The Australian Tariff Experiment', *Quarterly Journal of Economics*, 3(1888-9), pp. 87-98, esp. p. 98.

⁷⁹ 'Railway Bars, Plate Iron for Locomotives, Hydraulic Cement (Bonuses for Manufacture of)', Return to Order, *NSWV&P(LA)*, 1876-7, vol. 5, pp. 159-62 (27 July 1876).

⁸⁰ *NSWPD*, vol. 39, pp. 2100-1 (12 June 1889).

⁸¹ Mitchell to Parkes (3 September 1890), *Sir Henry Parkes Correspondence* (Mitchell Library MS A897), vol. 27, pp. 97-100.

⁸² Under-Secretary Barling to Mitchell (7 November 1890), *Sir Henry Parkes Correspondence* (Mitchell Library MS A875), vol. 5, pp. 191-3.

⁸³ *NSWGG*, 1896, p. 4530 (notice dated 30 June 1896), the closing date for tenders being 30 December 1896. G. & C. Hoskins submitted a tender of £7.14.0 per ton which was unacceptably high because the imported price had averaged only £5.8.9 over the previous nine years: Essington Lewis, 'Iron and Steel in Australia', *Journal of the Institution of Engineers Australia*, 1(1929), pp. 125-37.

⁸⁴ *NSWV&P(LA)*, 1862, vol. 5, p. 1062.

⁸⁵ The earliest reference to the use of riveting machines is an advertisement in the *Empire*, 19 August 1861, by James Vickery who claimed that the advantage of rivet boots was 'that every nail being clenched on iron lasts inside the boot, it is impossible they can come to pieces'.

⁸⁶ Evidence of P. Quealy (16 November 1866) and R. Douglas (27 November 1866), 'Report from the Select Committee on The Unemployed . . .', *NSWV&P(LA)*, 1866, vol. 5, pp. 666 and 675.

⁸⁷ Evidence of J. Byrnes (7 October 1862), M. M. Campbell (14 October 1862) and W. M. Alderson (22 October 1862), 'Progress Report from the Select Committee on the State of Manufactures and Agriculture in the Colony . . .', *NSWV&P(LA)*, 1862, vol. 5, pp. 1047, 1056 and 1066.

⁸⁸ A good deal of information also emerged during the investigations of the Select Committee on Employment of Children in 1876 [*NSWV&P(LA)*, 1875-6, vol. 6, pp. 871-931]: this is discussed later in the chapter.

⁸⁹ See series of articles on the leather trade in *SMH*, 15, 18, 23, 25 and 28 September and 3 and 7 October 1868.

⁹⁰ *ATCJ*, 9 July 1870, p. 12.

⁹¹ These were:

Name of company	Date of incorporation	Date of original deed of settlement	Nominal capital
The Fitz Roy Iron and Coal Mining Company	31/10/54	1851	£200,000
The Australian Paper Company	1/6/65	1/7/64	£25,000
The Fitz Roy Iron Works Company	21/6/65	1863	£60,000
Australasian Mineral Oil Company	7/4/66	25/10/65	£70,000
The Hartley Kerosene Oil and Paraffine Company	6/11/66	31/7/65	£30,000
Western Kerosene Oil Company	1/2/68	12/2/66	£50,000
Goulburn Meat-preserving Company	26/10/70	15/1/70	£15,000
The Sydney Meat-preserving Company	17/6/71	10/6/70	£25,000
The New South Wales Shale and Oil Company	10/2/73	1/10/71	£100,000

⁹² The first share-list found relates to the half-year ending 30 June 1887 which indicates that five members of the Hudson family between them held 100,000 fully paid shares and 21,295 paid to 12/6d. Thus they held £113,310 of the issued capital as against £111,690 by 239 other people. Unfortunately pkt 428 (box R37808) in the Defunct Company Papers, NSWAO, which probably contained earlier lists of shareholders, is missing. An almost complete set of half-yearly and annual reports (1882-95) is available in *Business Archives Council Collection*, Fisher Library, University of Sydney.

⁹³ W. J. Goold, 'Charles Upfold and the Sydney Soap and Candle Factory', *Newcastle and Hunter District Historical Society Journal and Proceedings*, 3(1949), pp. 108-11.

⁹⁴ The events are recorded in: *NMH*, 11 February and 10 August 1886; NSWAO, Defunct Company Papers, pkt 915 (box R37821); C. Wilson, *The History of Unilever: A Study in Economic Growth and Social Change*, vol. 1, London, 1954, pp. 196-8.

⁹⁵ See Poynter, *Russell Grimwade*, p. 31. For Australian Drug Company, see NSWAO, Defunct Company Papers, pkt 56; legal documents in Mitchell Library (MSA5318).

⁹⁶ This paragraph draws on a detailed examination of NSWAO, Defunct Company Papers, esp. pkts 20, 22, 40, 47, 75, 102, 103, 129, 163, 193, 613, 668, 823 and 1033.

⁹⁷ The details are: 50 companies with a nominal capital of less than £5,000 (total £89,625); 18 £5,000-£9,999 (£99,900); 16 £10,000-£19,999 (£182,000); 21 £20,000-£49,999 (£514,000); 11 £50,000-£99,999 (£657,000); 12 (identified in Table 11.13) of £100,000 or more (£4,205,000). These 128 companies had a total nominal capital of £5,747,525.

⁹⁸ *Kiama Independent*, 18 February and 29 November 1881.

⁹⁹ T. J. Redmond, 'The History of Anthony Hordern and Sons Ltd', *Hordernian Monthly*, vol. 15, no. 5, January 1938, *passim*.

¹⁰⁰ 'The Municipalisation of Works in New South Wales', Appendix AA (11g), *Report of the Royal Commission on Strikes*, Sydney, 1891, p. 101.

¹⁰¹ 'Census and Industrial Returns Act of 1891 ... Report No. 9—Bootmaking', *NSWV&P(LA)*, 1891-2, vol. 7, pp. 1108-10. *Report of the Royal Commission on Strikes*, evidence, p. 337.

¹⁰² 'Census and Industrial Returns Act of 1891 ... Report No. 1—The Tailoring Industry', *NSWV&P(LA)*, 1891-2, vol. 7, pp. 1080-6.

¹⁰³ *NSWV&P(LA)*, 1891-2, vol. 7, pp. 1087-91.

¹⁰⁴ *NSWV&P(LA)*, 1891-2, vol. 7, pp. 1094-6.

¹⁰⁵ *NSWJLC*, 1892-3, vol. 50, pt 2, p. 1154.

¹⁰⁶ By 8 Vic. no. 2 (1 August 1844) children over twelve could be bound in apprenticeship to 'any householder or any tradesman, or other person exercising any art, mystery, or manual occupation'.

¹⁰⁷ Cabinet-makers and joiners in Sydney held several meetings during the 1880s to try to devise some means for protesting against, and remedying, the 'unfair competition' from the Chinese factories: see, for instance, *ATCJ*, 11 October 1884, p. 746.

¹⁰⁸ *NSWV&P(LA)*, 1891-2, vol. 7, Appendix 'Chinese in the Furniture Trades', pp. 1116-8.

¹⁰⁹ Under the Influx of Chinese Restriction Act, 1881 (45 Vic. no. 11), ships' masters were allowed to land only one Chinese per 100 tons register, and a £10 per head entry charge was made on all Chinese (excluding British subjects) arriving in the colony. Under the Chinese Restriction and Regulation Act, 1888 (52 Vic. no. 4), ships' masters were restricted to one Chinese per 300 tons register; the entry tax was raised to £100 per head; new arrivals were forbidden to work in gold, silver or other mines; and Chinese could not be naturalised.

¹¹⁰ *NSWJLC*, 1891-2, vol. 49, pt 5, p. 717.

¹¹¹ *NSWGG*, 1897, p. 561 (effective 1 February 1897) and 1899, p. 1026 (effective 6 February 1899).

¹¹² A general account is available in J. T. Sutcliffe, *A History of Trade Unionism in Australia*.

¹¹³ *NSWV&P(LA)*, 1876-7, vol. 3, p. 159 and 1883-4, vol. 6, p. 301.

¹¹⁴ Held at Sydney (1879), Melbourne (1884), Sydney (1885), Adelaide (1886), Brisbane (1888), Hobart (1889) and Ballarat (1891).

¹¹⁵ J. Norton (ed.), *Official Report of the Third Intercolonial Trades' Union Congress* [5-7 October 1885], p. xi.

¹¹⁶ *Official Report* . . . , p. 70.

¹¹⁷ 'Proceedings of the Committee and Minutes of Evidence taken before the Select Committee on the Trades Conciliation Bill', *NSWV&P(LA)*, 1890, vol. 8, p. 65. Literary Appendices L(3) and L(4) to *Report of the Royal Commission on Strikes*.

¹¹⁸ *SMH*, 20 May, 5 and 14 June, 30 August and 31 October 1861.

¹¹⁹ N. G. Butlin, 'An Index of Engineering Unemployment, 1852-1943', *ER*, 22(1946), pp. 241-60, and K. Buckley, 'A New Index of Engineering Unemployment 1852-94', *ER*, 43(1967), pp. 108-18.

¹²⁰ *SMH*, 17 November 1873 and 7 January 1874; *Argus*, 28 October 1873.

¹²¹ The timetabling of these events suggests that the action of the employers was not as 'concerted' as K. D. Buckley (*The Amalgamated Engineers in Australia, 1852-1920*, p. 53) suggests. Nor was this a new issue, as is made clear by Russell's advertisement on 24 October 1873. The nine firms that eventually became involved were Mort's Dock and Engineering Company; P. N. Russell and Company; Chapman and Company; Vale & Lacy; Taylor & Wearing; J. R. Bubb; S. Forster and Sons; A. M'Farlan; and William Hargreaves. Together they employed about 1,500 men.

¹²² *NSWV&P(LA)*, 1879-80, vol. 5, p. 815.

¹²³ *NSWV&P(LA)*, 1880-1, vol. 3, p. 294. The total number of adult male assisted migrants declined from 2,892 in 1877 to 1,150 in 1880.

¹²⁴ *ATCJ*, 22 November 1879, p. 984.

¹²⁵ *SMH*, 14 September 1882.

¹²⁶ *ATCJ*, 17 September 1881, p. 543.

¹²⁷ *SMH*, 11 September 1882.

¹²⁸ Evidence of George Long, President of the Amalgamated Society of Engineers (14 May 1891), *Report of the Royal Commission on Strikes*, p. 400. Buckley, *The Amalgamated Engineers*, pp. 68-71, sets out the fine print of this agreement.

¹²⁹ A Chamber of Commerce had been formed in June 1826 (*SG*, 14 June 1826), but appears to have become defunct during the 1840s.

¹³⁰ Judging from a report of the speeches made at the first annual dinner of the Builders' and Contractors' Association (*SMH*, 5 December 1873) few employers' organisations were then in existence. A comment by the president of this Association is revealing: 'if every

workman were just, upright, and competent there would be no need for such an association as this; but they had to take things as they found them'.

¹³¹ Hall, *The Manufacturers*, p. 19.

¹³² *SMH*, 31 July 1885. At this meeting it was mentioned that 'some years ago a Chamber of Manufactures had been started in Sydney, which died a natural, or unnatural, death'.

¹³³ Quoted by Hall, *The Manufacturers*, p. 25.

¹³⁴ The rise of support for protection is discussed in B. Atkins, 'Antecedents of the N.S.W. Protection Party, 1881-1891—The Protection and Political Reform League', *JPRAS*, 44(1958), pp. 239-58.

¹³⁵ See, for example, 'Despatch Enclosing Tasmanian Inter-colonial Free Trade Bill', *SAPP*, 1870-1, vol. 3, no. 162.

Chapter 12. The Geography of Manufacturing in New South Wales 1851 to 1890

¹ *ATCJ*, 9 August 1884, p. 288. McCarty, 'Australian Capital Cities in the Nineteenth Century', p. 131, is quite wrong in suggesting that the Clyde Engineering Works employed 800 hands in 1890: this firm was not incorporated until 1 October 1898 when it took over the assets of Hudson Brothers Ltd. See, for instance, Clyde Engineering Company Pty Ltd, *The Clyde Apprenticeship Handbook*, Clyde, 1950, pp. 8-15. Among other firms established in the Granville area during this decade were the Springfield Abattoir (1880), W. Ritchie's Agricultural Implement Works (1882), J. Byrnes and Company (tweed manufacturers, 1882), Marsh Brothers Tannery (1882), and Goodlet and Smith (timber millers, 1882): for a brief history of the district see Executive Committee of the Granville Brotherhood, *Progressive Granville*.

² Coghlan, *Wealth and Progress of New South Wales 1894*, pp. 541-2.

³ *NSWGG*, 1860, p. 478; this, however, continued the arrangement introduced in December 1858 (*NSWGG*, 1858, p. 2295) whereby minerals, bricks, pig and bar iron, and unwrought metals in owner's trucks were carried at 2d per ton-mile. Freight rate schedules and regulations are available for this period in *NSWGG*.

⁴ *NSWV&P(LA)*, 1888-9, vol. 2, pp. 822-3.

⁵ *NSWV&P(LA)*, 1888-9, vol. 2, p. 831.

⁶ See, for example, *Evening News*, 15 October 1887.

⁷ These arguments can be traced in *NSWV&P(LA)*, 1888-9, vol. 2, pp. 856, 865-7 and 871.

⁸ A list in *NSWV&P(LA)*, 1887, vol. 4, p. 744, showed that, of the 3,132 tons carried from Sydney at the £20 truck rate 1 July to 31 December 1885, two agency and carrying companies, Wright, Heaton and Company (1,920 tons) and Permewan, Wright and Company (629 tons), were by far the main users.

⁹ Jeans, *An Historical Geography of New South Wales*, p. 309.

¹⁰ Higman, 'The Regional Impact of the Sugar Industry of New South Wales', p. 47.

¹¹ A revealing picture of the ramshackle pubs, boarding-houses and stores set up by camp followers during the construction of the Northern Line between Tamworth and Uralla, on which 1,000 men were employed, is given by a survey dated 4 May 1880: *NSWV&P(LA)*, 1880-1, vol. 2, pp. 993-6.

¹² Copies of some early rolling stock contracts are available in the New South Wales Railway Archives, box 2C/E. During the 1860s and 1870s a typical contract with a small firm was for forty wagons at about £80 each, the deliveries to be phased over nine months with a penalty of £5 per wagon per week in the event of deliveries falling behind schedule.

¹³ *NSWV&P(LA)*, 1888-9, vol. 2, p. 864.

¹⁴ Prior to the imposition of an excise tax on beer on 27 September 1887 there were no reliable figures of beer production in New South Wales. Estimates of the gallonage brewed

from 1881 to 1886 were prepared for the Legislative Assembly but the Chief Inspector of Distilleries pointed out that 'the large Metropolitan and Newcastle brewers refuse to give any information as to their output, and other means have therefore been resorted to for obtaining the information sought'.

¹⁵ *ATCJ*, 22 November 1879, p. 983.

¹⁶ *SMH*, 22 January and 4 March 1874.

¹⁷ *NSWV&P(LA)*, 1887-8, vol. 7, pp. 36-7, 259 and 507 of minutes of evidence.

¹⁸ Webster, 'The Early Breweries of Australia', pp. 150-3 suggests that the brothers took this step secretly to indicate their resentment at what they regarded as inadequate recognition of their father's forty years service to Tooth and Company by which he was employed as head brewer when he died in 1883.

¹⁹ The Castlemaine Brewing and Malting Company Ltd, registered on 30 November 1881 with a nominal capital of £65,000, was reconstructed as The Castlemaine Brewing, Malting, Wine and Spirit Company Ltd on 18 December 1883 'to enlarge the trade of the company by combining wine and spirit business with brewing'. An almost complete set of annual reports and balance sheets is available in the *Business Archives Council Collection*, Fisher Library, University of Sydney.

²⁰ Webster, 'The Early Breweries of Australia', pp. 150-6, points to the role that might have been played by Castlemaine Company's Bank, one of whose directors was also a director of Tooth and Company Ltd and whose Auditor was a director of Tooheys Ltd.

²¹ *NSWV&P(LA)*, 1887-8, vol. 7, p. 267 of minutes of evidence.

²² *Newcastle Chronicle*, 14 May 1874. The brewery came into operation in March 1876 (*Newcastle Chronicle*, 4 March 1876) and on 24 November the firm was registered as the Castlemaine Brewery and Wood Bros & Company Ltd with a nominal capital of £250,000. This company, which virtually had a monopoly of the Hunter River district trade for thirty years, was wound up in March 1921 upon being taken over by Tooth and Company Ltd: NSWAO, Defunct Company Papers, pkt 189 (box R37810).

²³ *NSWV&P(LA)*, 1881, vol. 4, p. 1163.

²⁴ *ATCJ*, 21 November 1885, p. 1068.

²⁵ *NSWPD*, vol. 2, pp. 1676-7 (20 October 1881) and 2178-9 (24 November 1881).

²⁶ See P. J. Herborn, 'A Model of Railway Network Growth and Industrial Localization, Applied to the New South Wales Brewing Industry from 1891 to 1921', B.A. thesis, University of Sydney, 1972, pp. 47-8.

²⁷ For example, W. H. Elwin and Company, owners of the Standard Brewery at Orange, won prizes for draught and bottled beer at the 1886 Indian and Colonial Exhibition in London and by establishing a reputation of this kind were able to claim in 1892 that their products were being distributed over a larger area of the colony than any other country brewery: *ATCJ*, 26 March 1892, p. 27.

²⁸ Tooth and Company Ltd, *Over a Century of Brewing Tradition*. Sometimes (as at Newcastle) these newly acquired country breweries were kept in operation for a few years.

²⁹ Jeans, *An Historical Geography of New South Wales*, *passim*.

³⁰ The following account draws on two works by M. E. Robinson: 'Some Influences on the Wheat Frontier in New South Wales 1851-1911', Ph.D. thesis, The Australian National University, 1969, and 'The Decline of Wheat-growing in the Coastal Districts of New South Wales, 1860-80', *Australian Geographical Studies*, 8(1970), pp. 44-56.

³¹ Walker, 'Flour Milling in New England', pp. 3-8.

³² *Kiama Independent*, 30 March and 1 September 1864 and 12 April and 6 September 1866.

³³ C. Lyne, *The Industries of New South Wales*, p. 80.

³⁴ *ATCJ*, 13 May 1871, p. 593 and 12 August 1871, p. 206.

³⁵ Walker, 'Flour Milling in New England', p. 5.

³⁶ *ATCJ*, 25 September 1880, p. 594.

³⁷ There is no reference to milling-in-transit concessions in any of the rate-books or gazetted notices prior to that in *NSWGG*, 1888, p. 79 which was made retrospective.

³⁸ Hayes's mill was reported to have discarded stones in favour of rollers in October (*ATCJ*, 13 October 1883, p. 693) and Pemmell's mill was reported (*ATCJ*, 6 December 1884, p. 1172) to have added roller plant in November 1883.

³⁹ G. A. Knight, 'Locational Change in the New South Wales Flour Milling Industry 1860-1968', B.A. Hons. thesis, University of Sydney, 1968, used catalogues published by Henry Simon Ltd, the Manchester firm which supplied many of the roller plants and much of the grain handling and storage equipment installed in New South Wales at this time, to trace the spread of this new technology.

⁴⁰ *ATCJ*, 9 June 1883, p. 1082. The Bombala Farmers Joint Stock Flour Mill Company Ltd was registered with a nominal capital of £1,000 on 7 August 1882: NSWAO, Defunct Company Papers, pkt 1054 (box R37823).

⁴¹ Walker, *Old New England*, p. 67.

⁴² For example, at Wellington (registered 11 May 1888), Dubbo (29 August 1888), Cowra (11 December 1889), Young (13 June 1890), Mudgee (25 November 1890), Cootamundra (1 December 1890).

⁴³ *The Industrial Progress of New South Wales*, p. 314.

⁴⁴ A. Meston, 'Report on the Sugar Industry on the Clarence and Richmond Rivers [September 1882]', *QV&P(LA)*, 1882, vol. 2, pp. 1117-21. A valuable summary of contemporary technology is A. MacKay (ed.), *The Sugar Cane in Australia, A Series of Essays upon the Cultivation and Manufacture*.

⁴⁵ A. G. Lowndes, *South Pacific Enterprise*, p. 25.

⁴⁶ Higman, 'The Regional Impact of the Sugar Industry of New South Wales', p. 47.

⁴⁷ *ATCJ*, 7 February 1880, p. 260.

⁴⁸ L. T. Daley, *Men and a River*, pp. 137-43. J. A. Despeissis, 'Sugar Industry in North-Coast District', *Agricultural Gazette of New South Wales*, 2(1891), p. 48.

⁴⁹ *ATCJ*, 1 January 1887, p. 10.

⁵⁰ *ATCJ*, 22 November 1890, p. 27.

⁵¹ Estimated from Lowndes, *South Pacific Enterprise*, p. 435; and *NSWSR* 1890, p. 528.

⁵² Higman, 'The Regional Impact of the Sugar Industry of New South Wales', pp. 52-3.

⁵³ Thomas Mort's interest in cheese making and preserving milk by refrigeration is discussed by A. Barnard, *Visions and Profits: Studies in the Business Career of Thomas Sutcliffe Mort*, Melbourne, 1961, pp. 97-106 and 200-1.

⁵⁴ The extent to which the Fresh Food and Ice Company was involved in the Pioneer Factory is uncertain: it gave technical advice prior to its construction and bought the produce. Some of the more significant references in the *Kiama Independent* are 28 March and 4 April 1882, 7 September to 26 October 1883, 8 August 1884 and 2 February 1885.

⁵⁵ *ATCJ*, 25 March 1882, p. 548. This report also estimated the sources of the 102,500 casks (about 2,750 tons) of butter sent to Sydney during 1881: Kiama-Wollongong, 40.5 per cent; Moss Vale-Kangaroo Valley-Camden, 24.4 per cent; Shoalhaven, 15.6 per cent; and the Far South Coast, 19.5 per cent.

⁵⁶ J. P. Dowling, *Dairying in Australasia*, p. 19.

⁵⁷ *NSWV&P(LA)*, 1891, vol. 2, pp. 917-9.

⁵⁸ T. C. Kennedy, *20 Years of Progress 1895-1915*, *passim*.

⁵⁹ However, anyone wishing to 'erect machinery' such as for a sawmill had to apply for a grant by auction of a portion of Crown land.

⁶⁰ *NSWV&P(LA)*, 1883-4, vol. 4, p. 881.

⁶¹ *NSWV&P(LA)*, 1885-6, vol. 6, p. 114.

⁶² *Newcastle Chronicle*, 3 September 1872 and 8 March 1873; the best description is *SMH*, 14 September 1871. Production figures from SAAO, 'Wollaroo Statistics 1860-89', BRG 40/A748 shelf 203.

⁶³ Five consecutive operations were involved: (i) 'calcining' the ore; (ii) reducing the unfused ore into 'regulus' (about 33 per cent copper); (iii) 'roasting' the regulus into coarse metal (about 60 per cent copper); (iv) 'roasting' the coarse metal; and (v) refining the coarse copper.

⁶⁴ *NMH*, 29 April 1879.

⁶⁵ *First to Fifth Annual Report by the Committee of the Newcastle Chamber of Commerce, passim.*

⁶⁶ For a description of the smelting plant in 1888, see *ATCJ*, 28 April 1888, p. 862.

⁶⁷ NSWAO, 'Companies Memorials and Documents', 3/3153, folio 61. Seven people (including a builder, a surgeon and a draper) held 2,530 of the shares. Hughes, *Australian Iron and Steel Industry*, p. 5.

⁶⁸ This account of the Fitz Roy works largely draws on *SMH*, 2, 6 and 20 August 1864; 6 and 7 June and 21 October 1865; 23 July 1866; 31 May, 1, 6 and 8 June and 30 July 1867; 1 and 30 July 1868; 14 June 1869 and 11 January 1870.

⁶⁹ The allocation of some shares, regarded as fully paid-up, to existing shareholders was formalised in Schedule A to the Fitz Roy Iron Works Company Act. The nominal capital was subsequently raised to £100,000.

⁷⁰ E. F. Pittman, *The Mineral Resources of New South Wales*, pp. 193-6.

⁷¹ *NSWV&P(LA)*, 1876-7, vol. 5, p. 160.

⁷² On 29 January 1867, sixty-two people held 11,027 fully paid-up £5 shares. Of these 134 were held in England, 83 in Yass, 9 in 'New Sheffield' (still the ambitious local appellation for the village on the site at Nattai) and the remaining 10,801 in Sydney. The leading shareholders were E. Vickery (1,251), J. Frazer (1,215), H. C. Burnell (800), S. Zollner (691), E. T. Beilby (687), L. E. Threlkeld (570) and J. Keep (534). These details from NSWAO, 'Companies Memorials and Documents', 3/3153, folio 62.

⁷³ Public Record Office, London (BT 31 1809/6952). The assets (which included 1,512 acres and the plant itself at Nattai, 150 acres at Jellore and 40 acres at Marulan) were bought initially by six people. This consortium was, in turn, issued with (i) 9,000 ordinary £10 shares deemed fully paid in the new company, plus (ii) £45,000 in cash and 1,500 preference shares deemed paid to £10 that were to be forwarded to the original vendors in Sydney. The company formally took possession on 8 January 1873. By 10 June 1873, 4,831 new preference shares had been taken up by 152 people resident in Great Britain and called to £5, thus injecting £24,155 new capital into the venture. A further 288 preference shares had been sold by 24 August 1877 and these, with the other shares by then called to £10, produced an additional cash flow of £27,035. On 12 January 1880, 1,472 of the 1,500 shares that had originally been issued as fully paid-up were still held in New South Wales. Subsequent records are incomplete but the liquidator's final meeting was held on 20 March 1893.

⁷⁴ *SMH*, 27 November and 14 December 1875 and 16 February 1876; *ATCJ*, 8 April 1876, p. 581; Pittman, *Mineral Resources of New South Wales*, p. 195.

⁷⁵ See *NSWV&P(LA)*, 1889, vol. 5, pp. 315-8 and *CPPP*, 1904, vol. 2, pp 1478-9.

⁷⁶ The terms were £5,000 payable on signing, £10,000 at the end of three months, and the balance in £7,000 instalments at six-monthly intervals plus 6 per cent interest: *Sandford Papers*, Mitchell Library (MS A2416).

⁷⁷ *SMH*, 2 January 1875 and 9 February 1876; Hughes, *Australian Iron and Steel Industry*, p. 22.

⁷⁸ The quantity and value of production (as stated in the annual reports of the Department of Mines) were:

	Pig iron (tons)	Bar, angle and rail iron (tons)	Value (£)
1878	389	511	6,666
1879	118	1,000	10,550
1880	1,200	800	15,335
1881	2,738	3,351	42,007
1882	4,320	2,139	35,451

⁷⁹ CPPP, 1904, vol. 2, p. 1508.

⁸⁰ Letter from J. Rutherford to H. Sparks (8 May 1905) quoted by Sparks, 'Iron and Steel', pp. 32-4, in Federal Council of the Chambers of Manufactures of Australia, *Australian Industry*.

⁸¹ The Eskbank Company was awarded government contracts for 670 tons of tramway rails in 1880 but neither party was satisfied with the results: NSWV&P(LA), 1881, vol. 4, pp. 453-98 (21 January 1881).

⁸² A week's notice was given on 17 July 1882 to all employees at the Eskbank works 'except such as may be required to finish uncompleted contracts': SMH, 19 July 1882. During the whole period it was operating, the Eskbank furnace produced 8,844 tons of pig iron. By comparison, the 565 blast furnaces in Britain during 1882 each made an average that year of 15,030 tons of pig iron.

⁸³ The conventional accounts must be set straight in two respects. First, the lease agreement was not formally signed until 16 August 1877 and was for a period of seven years computed from 1 November 1886. This agreement (*Sandford Papers*, Mitchell Library MS A2416) required Sandford to pay a rent or royalty of 12/6d per ton 'for all finished iron including both cast- and wrought-iron steel rails and all steel work wire and nails and . . . of 2/6d per ton for all pig iron manufactured', and 'unless prevented by unavoidable accident or by strikes or combination of workmen' to keep sufficient workmen to produce not less than 750 tons of finished iron each three months. Second, the agreement provided for an extension of the lease to fourteen or twenty-one years, not an option to purchase.

⁸⁴ CPPP, 1906, vol. 5, Division VI, Section 80(A), 'Metals and Machinery', p. 2570.

⁸⁵ Under the Customs Tariff Act, Commonwealth no. 14 of 1902, assented to on 16 September 1902 but deemed to be effective from 8 October 1901, a duty of 10 per cent was placed on galvanised iron plate and sheet but not on other iron and steel products.

⁸⁶ As indicated in Chapter 11 tenders had been called in 1883, 1891, 1892 and 1896 for the supply of locally made steel rails.

⁸⁷ The Blythe River iron deposits (near Burnie, Tasmania) were owned locally. The company was formed to negotiate with governments in Australia and with prospective investors in Britain: the speculators concerned hoped to launch a company in London with a nominal capital of £1,000,000 and, in effect, to sell the mineral lease which it held.

⁸⁸ NSWV&P(LA), 1900, vol. 5, pp. 1465-76.

⁸⁹ On 30 October 1900 (NSWPD, vol. 107, p. 4493) the Treasurer, Lyne, admitted that public tenders were not invited for the supply of these rails.

⁹⁰ CPPP, 1904, vol. 2, pp. 1461-6.

⁹¹ 'Development of the Iron and Steel Industry (Papers in connection with the application of William Sandford, Limited, for financial assistance from the government)', NSWV&P(LA), 1907 (second session), vol. 1, p. 405.

⁹² *Sandford Papers*, uncatalogued, Mitchell Library (MSS 1556).

⁹³ The schedule agreed to on 25 May 1903 reduced wages over 16/- per day by 15 per cent, those between 12/- and 16/- by 10 per cent and those between 8/- and 12/- by 5 per cent. It was also agreed that, beginning in June 1904, if the net average selling price of iron and steel made in the bar mills rose above £9 per ton and of galvanised iron above £18.10.0 per ton,

wages would rise and fall at the rate of 2½ per cent for every 5/- increase or decrease. The Arbitration Court ruled that this agreement was to remain in force until 7 June 1907: *The Industrial Arbitration Reports and Records, New South Wales*, 2(1903), p. 566 and 3(1904), pp. 321-2.

⁹⁴ *NSWPP*, 1905, vol. 3, pp. 1151-62; *NSWV&P(LA)*, 1905, vol. 3, pp. 729-51.

⁹⁵ *Sandford Papers*, uncatalogued, Mitchell Library (MSS 1556). The reply to this letter is not among these papers.

⁹⁶ Hoskins, *The Hoskins Saga*, p. 42: the same source describes the state of the works when it was taken over in 1908.

⁹⁷ At the Fitz Roy Works, 2,394 tons in 1864-5 and 3,273 tons in 1876-7; at the Eskbank works, 8,844 tons 1876-82 and 18,631 tons April-December 1907.

⁹⁸ *CPPP*, 1914-7, vol. 6, p. 1787.

⁹⁹ J. B. Jaquet, *The Iron Ore Deposits of New South Wales* . . . , p. 25. The detailed breakdown was 2½ tons of ore at 8/3d per ton, 18/7d; calcining ore, 2/-; 1 ton of coke at 15/- per ton, 15/-; 10 hundredweight of limestone, 2/-; labour, 6/-; repairs, 2/-; and sundries, 2/-.

CPPP, 1904, vol. 2, pp. 1444-9.

¹⁰⁰ *NSWV&P(LA)*, 1907 (second session), vol. 1, p. 407.

¹⁰¹ The woollen-mill at Stockton was destroyed by fire on 2 July 1851 and never re-opened; two tiny mills at Orange and Muswellbrook (which together produced only 3,000 yards in 1850—NSWAO, 4/7268) both ceased production the following year.

¹⁰² Coghlan, *Labour and Industry*, vol. 2, pp. 683-4.

¹⁰³ Details of the woollen-milling industry can be traced in *SMH*, 11 April 1865; 12, 20 and 23 October 1868 and 2 June 1870; *ATCJ*, 8 July 1871, p. 48; 25 May 1872, p. 645; 26 October 1872, p. 519 and 23 March 1878, p. 551.

¹⁰⁴ These six smaller mills were: the Darling Mills (Parramatta); the Cumberland Mill (Parramatta); the Parramatta Junction Tweed Factory; the Regentville Mill (Penrith); the Emu Mills (near Penrith); and the Coerwull Woollen Mills (near Bowenfels).

¹⁰⁵ The output data recorded in *NSWSR* are clearly unreliable: in the case of some mills the same yardage was incorporated for several years running. During the period 1877 to 1885 inclusive, the one Sydney firm (John Vicars and Company) 'declined' to give any information. A comparison of the *NSWSR*, 1885, p. 198, and 1886, p. 192, indicates that at the latter date it was decided to add 150,000 yards to the previously published totals for each of the preceding nine years and to omit the footnote warning 'no return from one manufactory'.

¹⁰⁶ *SMH*, 24 December 1887. The deputation told Parkes that the mills closed included those of A. & J. Raynor (Emu Mills), John French and Sons (Cumberland Mill, Parramatta), Byrnes and Company (Australian Mill, Parramatta/Clyde), and John Vicars and Company (Sydney); operating mills were the Coerwull Woollen Mill near Bowenfels ('not doing as well as they should'), the Camden Mills ('have not done well since starting three years ago, have been standing for three weeks'), Bergan Brothers' Parramatta Junction Tweed Factory ('will have to close by middle of year unless there is a change'), and Murray Brothers' Parramatta mill ('not doing anything like well').

¹⁰⁷ 'Census and Industrial Returns Act of 1891 . . . Report No. 5—The Manufacture of Woollen Cloth', *NSWV&P(LA)*, 1891-2, vol. 7, pp. 1097-8. The details of the four mills were:

Number of	Mill 1	Mill 2	Mill 3	Mill 4
Employees	72	34	14	25
Cards	4	3	1	1
Looms	26	14	8	8
Spindles	1,800	1,200	600	800
Yards (capacity)	150,000	90,000	20,000	75,000

¹⁰⁸ Details are in *ATCJ*, 14 and 21 July 1877, pp. 59 and 89 and 11 June 1892, p. 13; E. Lea-Scarlett, *Queanbeyan District and People*, Queanbeyan, 1968, pp. 163–4.

¹⁰⁹ See J. E. Carne, *Geology and Mineral Resources of the Western Coalfield*, Memoirs of the Geological Survey of New South Wales, No. 6, Sydney, 1908, p. 229.

¹¹⁰ W. J. Goold, 'The Soho Foundry, Morrison and Bearby, Newcastle's Oldest Engineering Works', *Newcastle and Hunter District Historical Society Journal and Proceedings*, 6(1952), pp. 113–22; *Knagg's Newcastle Nautical Almanac*, 1882, p. 90 and 1884, p. 89; John Windross and J. P. Ralston, *Historical Records of Newcastle 1797–1897*, Newcastle, 1897, pp. 19 and 70–1; *Newcastle Chronicle*, 19 November 1862, 20 May 1865 and 14 October 1869; *NMH*, 8 August 1885 and 17 October 1889.

¹¹¹ William Arnott Pty Ltd, *Arnott's Biscuits—One Hundred Years*; 'William Arnott', in Pike (ed.), *Australian Dictionary of Biography*, vol. 3, pp. 53–4; *NMH*, 16 October 1889.

¹¹² Events in 1888 relating to the activities of the decentralisation league are reported in *NMH* from 12 January to 28 February, 12 September and 26 November.

Chapter 13. Manufacturing in South Australia 1851 to 1890

¹ Some of the problems associated with the definition of 'Adelaide' are outlined in McCarty, 'Australian Capital Cities in the Nineteenth Century', pp. 131–5. It is impossible here to explain the detailed bases of the figures set out in Table 13.1 for which cartographic and literary material was used to try to reach a meaningful representation of Adelaide and the suburbs closely related physically and economically. Some of the available estimates are (thousands):

	Coghlan	Hirst	McCarty	Linge
1851	15	33	18	23
1861	18	45	35	36
1871	43	61	51	50
1881	104	104	92	92
1891	133	133	117	117

(Figures from T. A. Coghlan, *A Statistical Account of Australia and New Zealand 1903–4*, p. 155; J. B. Hirst, *Adelaide and the Country 1870–1917*, p. 227.)

² Williams, 'Two Studies in the Historical Geography of South Australia'.

³ South Australian Mining Association, Directors' Half-yearly Reports 1845–1914, SAAO, A25.

⁴ Details of the produce shipped from 1854 to mid-1865 are available in 'Exports from Colonial Outports', *SAPP*, 1857–8, vol. 2, no. 84 and 1865–6, vol. 2, no. 37.

⁵ 'An Act to Regulate the Alienation and Sale of the Waste Lands of the Crown', 35 and 36 Vic. no. 18 (15 August 1872), the First Schedule to which defines Goyder's Line. Goyder, Surveyor-General of South Australia 1861–94, was directed in November 1865 (during a particularly droughty period) to indicate from personal observation 'the line of demarcation between that portion of the country where the rainfall has extended, and that where the drought prevails': see *SAPP*, 1865–6, vol. 2, nos. 62 and 78.

⁶ The estimates of South Australian country town populations in Hirst, *Adelaide and the Country*, p. 299 have been adopted here.

⁷ J. B. Austin, *The Mines of South Australia Including also an Account of the Smelting Works in That Colony*, pp. 98–100.

⁸ O. Pryor, *Australia's Little Cornwall*, p. 33.

⁹ SAAO, 'Return of Town and Suburban Lands surveyed since the year 1853 [to 1874]', A641/C1.

¹⁰ D. W. Meinig, *On the Margins of the Good Earth*, *passim*.

¹¹ SAAO, The Caltowie Steam Flour Mill Company Ltd (GRG 1 CB/3/10/1880); The Mallala Flour Company Ltd (GRG 1 CB/3/4/1878).

- ¹² SAR, 22 April and 6 November 1873 and 4 December 1875; *ATCJ*, 29 June 1889, p. 19.
- ¹³ Hirst, *Adelaide and the Country*, p. 2.
- ¹⁴ S.A. Registrar of Companies, pkts 31 and 99 of 1888.
- ¹⁵ SAR, 22 and 23 June and 9 July 1868 and 4 and 22 January, 16 March and 15 June 1876.
- ¹⁶ SAR, 13 April 1876.
- ¹⁷ These details from SAR, 18 June 1870, 28 March 1871 and 10 May 1876.
- ¹⁸ Butlin, *Australian Domestic Product*, p. 264.
- ¹⁹ 'William Lewis. Miscellaneous papers connected mainly with the establishment of cement works at Brighton', SAAO, group 1491.
- ²⁰ Shortly afterwards the name was changed to South Australian Portland Cement Company Ltd; SAAO, GRG 1 CB/3/5/1892.
- ²¹ *Official Record of the Sydney International Exhibition, 1879*, p. 982.
- ²² J. H. Mellor, *Joseph Mellor; Adelaide Observer*, 15 October 1859 and 21 December 1861.
- ²³ Details of many leading Adelaide and country firms are given in SAR, 22 May, 20 June and 4 and 21 July 1868.
- ²⁴ However, the conditions were not proclaimed until 3 July 1878, *SAGG*, 1878, vol. 2, pp. 1-2.
- ²⁵ SAR, 27 December 1879.
- ²⁶ SAAO, GRG 1 CB/3/13/1891.
- ²⁷ G. E. Loyau, *The Gawler Handbook*, pp. 46-53; *Adelaide Observer*, 22 July 1882, p. 179.
- ²⁸ *Adelaide Observer*, 21 January 1888, p. 125; *Port Augusta Dispatch*, 10 October 1890.
- ²⁹ *Adelaide Observer*, 6 May 1865; SAR, 22 April 1873 and 27 March 1875.
- ³⁰ J. F. Conigrave, *South Australian Manufactures and Industries* (a paper read to a meeting of the Chamber of Manufactures on 8 November 1875), pp. 16-17.
- ³¹ *SAPP*, 1891, vol. 4, no. 153, pp. 227-8.
- ³² The following discussion of railway rolling stock draws on: SAR, 13 April 1872, 10 January 1883 and 12 April 1890; SAAO, A387 and A921; *SAPP*, 1884, vol. 3, no. 161; 1887, vol. 3, no. 58; 1891, vol. 4, no. 153, pp. 229-30; 1898-9, vol. 3, no. 131.
- ³³ Curiously, no mention of Beyer Peacock's tender (submitted despite the fact that English contracts were not sought) was made in the 'Final Report of the Royal Commission on Stores' (*SAPP*, 1893, vol. 3, no. 60B, p. iii) even though it went to some pains to make a precise comparison between the cost of buying locomotives from local and overseas firms. It noted that Martin's had tendered £2,863 each for Class Y tender engines, to which should be added £14 for delivery and inspection, bringing the total cost to £2,877. Since then Beyer Peacock had delivered fourteen Class Y engines to Port Adelaide for £2,533. It suggested, therefore, that the 'subsidy' to Martin's for this type of locomotive (which made up 35 out of the 52 involved) was £344 each. On this basis Beyer Peacock's proven price was about 12 per cent below Martin's, or say £143,500 for the whole contract.
- ³⁴ Details of the contracts for water-pipes may be found in *SAPP*, 1884, vol. 3, no. 131 and vol. 4, no. 194; 1886, vol. 3, no. 75; 1892, vol. 3, no. 177.
- ³⁵ SAR, 23 May and 17 July 1868, 9 November 1869, 12 July 1871 and 28 February and 12 August 1873; SAAO, GRG 1 CB/3/65 regd 1869 (nominal capital £15,000 in 10,000 shares).
- ³⁶ Namely, the Booyoollee Meat Works, a private venture which originally commenced operations early in 1869 on the pastoral station of this name and was transferred to Port Adelaide in August 1873 (*SAR*, 2 February 1869 and 12 August 1873); The Port Augusta Boiling down and Meat Preserving Company Ltd, incorporated 9 July 1869 (nominal capital £5,000 in 500 shares) final report of liquidator 18 November 1873; and The Alberton Meat Preserving Company Ltd, incorporated 17 June 1874, resolved to wind up 16 May 1881.
- ³⁷ *Christian Weekly and Methodist Journal*, 5 October 1881, p. 1; *Mount Barker Courier, Onkaparinga and Gumeracha Advertiser*, 29 July 1887; E.F.L.H. [E., F. and L. Hill], *The*

Staff of Life . . . and a Sketch of the Career of John Dunn Esq., J. P., Adelaide, 1883, p. 31ff.; 'The Mills That Grind for Gold: A Great Milling Enterprise', *Critic*, 11 June 1898, pp. 25-8.

³⁸ Hirst, *Adelaide and the Country*, p. 24.

³⁹ Austin, *The Mines of South Australia*, p. 16.

⁴⁰ Brown, 'The Copper Industry', p. 68.

⁴¹ H. Y. L. Brown, *Record of the Mines of South Australia*.

⁴² SAAO, 'Walleroo Statistics 1860-89: Statement showing Comparative Results of the Operations of the Wallaroo Mines, the Wallaroo Smelting Works, and the Hunter River Copper Works . . .', BRG 40/A748 shelf 203.

⁴³ The Wallaroo and Moonta Mining and Smelting Company suspended mining operations in 1923 and the Wallaroo smelter was dismantled. In 1899 the availability of sulphuric acid at the smelter (and the increased use of superphosphate) led to the formation of the Wallaroo Phosphate Company which in 1913 was amalgamated with the Mount Lyell Mining and Railway Company Ltd.

⁴⁴ *SAPP*, 1862, vol. 2, no. 21.

⁴⁵ *SAPP*, 1863, vol. 2, no. 44.

⁴⁶ A detailed analysis is available in 'Comparative Customs Duties, 1877', *SAPP*, 1878, vol. 4, no. 172.

⁴⁷ Printed circular in 'William Lewis. Miscellaneous papers connected mainly with the establishment of cement works at Brighton', SAAO, group 1491.

⁴⁸ *SAPP*, 1884, vol. 3, no. 171.

⁴⁹ *SAPP*, 1870-1, vol. 3, no. 180 and 1871, vol. 2, no. 38.

⁵⁰ The following details from: *SAPD*, 1870-1, col. 872 (21 September 1870) and 1872, cols 2740-1 (22 September 1872); *SAPP*, 1882, vol. 3, no. 72.

⁵¹ *SAPD*, 1870-1, cols 238-40 and 247 (15 and 16 June 1870) and 1872, cols 709-11 and 1014-7 (1 and 29 May 1872); SAAO, GRG 1 CB/3/1/74; SAR, 31 December 1875.

⁵² SAAO, GRG 1 CB/3/6/1874; SAR, 1 February, 15 May and 12 August 1875.

⁵³ SAAO (GRG 1), CB/3/7/1874, CB/3/25/1882 and CB/3/22/1890; S.A. Registrar of Companies, pkt 78 of 1909; SAR, 12 August 1875 and 12 July 1877; *Adelaide Observer*, 5 June and 4 December 1886 and 3 September 1887.

⁵⁴ On 16 October 1928 the name of the South Australian Woollen Company Ltd was changed to Onkaparinga Woollen Company Ltd by which it is still known.

⁵⁵ SAAO, GRG 1 CB/3/117/1888.

⁵⁶ S.A. Registrar of Companies, pkt 31 of 1888. The company disposed of the wine and spirit business in February 1893 and on 1 March changed its name to The South Australian Brewing Company Ltd under which it still operates.

⁵⁷ SAAO, GRG 1 CB/3/3/1882. The company was wound up voluntarily in 1887 when the business was sold to W. H. and B. Burford.

⁵⁸ SAAO (GRG 1), CB/3/7/1885, CB/3/42/1889.

⁵⁹ *SAPP*, 1891, vol. 4, no. 153, p. 44.

⁶⁰ For an account of the various disputes, see Buckley, *The Amalgamated Engineers in Australia*, pp. 57-8 and 66-8.

⁶¹ *Argus*, 29 April 1890.

⁶² *SAPP*, 1885, vol. 3, no. 56.

⁶³ *SAPP*, 1876, vol. 2, no. 18, p. iii.

⁶⁴ 'An Act to authorise the Establishment of Manufacturing Districts . . .', 44 and 45 Vic. no. 212 (18 November 1881); 'Regulations under Manufacturing Districts Act, 1881', *SAPP*, 1883-4, vol. 4, no. 49.

⁶⁵ *SAPP*, 1881, vol. 3, no. 80.

Chapter 14. Manufacturing in the Other Colonies 1851 to 1890

¹ 'Progress of Tasmania, 1881-1885: Report', *TJPPP*, 1886, vol. 9, no. 178, p. 4.

² Butlin, *Australian Domestic Product*, p. 265.

³ G. Blainey, 'Population Movements in Tasmania, 1870-1901: An Interpretation of the Tasmanian Censuses of 1861, 1870, 1881, 1891 and 1901', *PPTHRA*, 3(1954), pp. 62-70.

⁴ It was not until 1883 that the first steamship brought migrants to Tasmania direct from the United Kingdom: see F. K. Crowley, 'Immigration into Tasmania from the United Kingdom, 1860-1919', *PPTHRA*, 3(1954), pp. 103-8, esp. p. 106.

⁵ W. A. Townsley, 'Tasmania and the Great Economic Depression, 1858-72', *PPTHRA*, 4-7(1955-9), pp. 35-46.

⁶ It is not possible to obtain a clear view of population changes in 'Hobart and suburbs': the figures of 24,454 (1857), 24,773 (1861), 25,004 (1870) and 26,831 (1881) are for an area of nearly 85 square miles which included large rural tracts.

⁷ Townsley, 'Tasmania and the Great Economic Depression', p. 45.

⁸ Namely, Beaconsfield (1,520); Mt Bischoff (1,250); Lefroy and vicinity (1,050); Ringarooma-Moorina-Weldborough in the North East district (1,860); and others (730).

⁹ *TJPPP*, 1891, vol. 24, no. 142, evidence pp. 3-5.

¹⁰ *TJPPP*, 1891, vol. 24, no. 129, p. 82.

¹¹ Blainey, 'Population Movements in Tasmania', p. 66.

¹² Compiled from *Walch's Tasmanian Almanac for 1889*, Hobart, 1888, pp. 249-53. Only five of the locally registered mining companies had their offices outside Launceston or Hobart, and only ten companies operating in the colony were based elsewhere (mainly Melbourne).

¹³ The 48 mile Emu Bay and Mt Bischoff horse tramway came into operation on 1 February 1878; it was converted into a steam railway that was opened for traffic on 14 July 1884.

¹⁴ R. M. Johnston, *Tasmanian Official Record*, 1892, Hobart, 1892, p. 94. This was in marked contrast with the Mt Bischoff area where, during the same year, 2,910 tons of ore were produced by 460 men from only 7 claims.

¹⁵ The works of the Tasmania Company and Mount Bischoff Company are described in *ATCJ*, 10 June and 1 July 1893.

¹⁶ *Walch's Tasmanian Almanac for 1886*, Hobart, 1885, p. 308.

¹⁷ Blainey, *The Rush That Never Ended*, p. 214.

¹⁸ For many years Tasmania had advocated a free trade agreement between the Australian colonies. In 1866 and again in 1870 an 'Intercolonial Free Trade Bill' was passed by both branches of the Tasmanian legislature but failed to gain Royal Assent because Imperial Act 13 and 14 Vic., cap. 59, Section 27, did not provide for the imposition of differential duties. After a conference in Sydney in January 1873, Tasmania tried to give effect to the expressed opinion of the meeting by passing a Bill 'to make better provision for the interchange of Colonial Products and Manufactures' (37 Vic. no. 10, 31 October 1873). Nothing resulted from this, nor from another conference in Sydney in January 1881. For a useful summary, see *TJPPP*, 1889, vol. 18, no. 97.

¹⁹ *TJPPP*, 1889, vol. 17, no. 93.

²⁰ Butlin, *Australian Domestic Product*, p. 163 (the comparative figures are shown in Table A1.10).

²¹ Most of the detail in this paragraph is drawn from T. C. Just, 'On the Iron Ore Deposits of the River Tamar District, Tasmania, and on the Manufacture of Pig Iron Therefrom', pp. 457-70 in R. M. Johnston, *Tasmanian Official Record*, 1891, Hobart, 1891. See also *VGG*, 1872, vol. 2, p. 1729 and 1874, vol. 1, p. 1011; *Age*, 18 January 1873; *Australian*, 24 June 1876.

²² It is convenient to classify all railways as belonging to the public sector even though the Launceston-Deloraine, Waratah-Burnie, and Launceston-Hobart lines were built as

private lines. Formally, on 31 December 1899, 171 of the 374 miles of railway open were privately owned.

²³ *TJPPP*, 1885, vol. 6, no. 113.

²⁴ *TJPPP*, 1886, no. 35, p. 3.

²⁵ *THAJ*, 1866 (second session), no. 18.

²⁶ "'The Customs Duties Act, 1880:' Report from the Select Committee . . .', *THAJ*, 1881, vol. 41, no. 122, p. vi.

²⁷ *TJPPP*, 1889, vol. 18, no. 141.

²⁸ 27 Vic. no. 35 (18 September 1863). Drawbacks were also allowed on some other commodities, such as malt made from imported barley (1870) and hats and caps from imported textiles (1873) but these were of small consequence.

²⁹ *TJPPP*, 1898, vol. 39, no. 48, pp. 3-6.

³⁰ *THAJ*, 1875, vol. 29, no. 96.

³¹ *Statistics of Tasmania*, 1884, p. 275.

³² L. G. Irby, 'Forestry in Tasmania', *Handbook to Tasmania* [ANZAAS, January 1928], Hobart, 1927, p. 55.

³³ '2. Forests of Tasmania: Their Conservation and Future Management: Report by Mr. George S. Perrin [Conservator of State Forests, Victoria]', *TJPPP*, 1898, vol. 39, no. 48, p. 8.

³⁴ In an effort to revive the cotton industry, the Legislative Assembly on 6 November 1888 sought approval for 'a reward of £5,000 to be offered to the person or company that first manufactures from cotton grown in the colony cotton goods to the value of £5,000. The plant used in the manufacture to be of a fair value of not less than £10,000'. An award along these lines was announced in a notice dated 23 January 1889 (*QGG*, 1889, vol. 46, p. 278). The Queensland Cotton Manufacturing Company Ltd was formed soon afterwards. In August 1892, when 14,529 shares had been taken up by 1,118 people of whom 657 were farmers, the company sought a grant of half the bonus (to enable it to purchase cotton) on the grounds that it had already met one of the two conditions by spending £10,000 on, as yet untested, plant and machinery. This extraordinary request was debated at length in the Legislative Assembly and, apparently to everyone's relief, was eventually manoeuvred off the notice paper (*QPD*, vol. 68, pp. 935-41, 1002-7 and 1474). On 17 May 1893, however, the company successfully claimed the whole bonus having manufactured the necessary quantity of twill sheeting (the first in Australia), but in 1897 the company ceased operations.

³⁵ *QV&P(LA)*, 1865, pp. 1211-3 and 1866, pp. 1459-61.

³⁶ H. L. Roth, *A Report on the Sugar Industry in Queensland*, Brisbane, 1880, pp. 30-3.

³⁷ *QV&P(LA)*, 1863, second session, pp. 533-87.

³⁸ 'Report from The Select Committee on the Petition from the Queensland Smelting and Assaying Company (Limited.) . . .', *QV&P(LA)*, 1874, vol. 2, pp. 889-904.

³⁹ Blainey, *The Rush That Never Ended*, pp. 235-6.

⁴⁰ *QSR*, 1860, p. xv.

⁴¹ *QV&P(LA)*, 1879, vol. 2, p. 629.

⁴² Butlin, *Australian Domestic Product*, p. 263.

⁴³ For information on timber industry, see *QV&P(LA)*, 1875, vol. 2, pp. 1221-91.

⁴⁴ *QV&P(LA)*, 1878, vol. 2, p. 505.

⁴⁵ *QV&P(LA)*, 1879, vol. 2, pp. 873-8.

⁴⁶ 'Report . . . into the Working of the Railway Workshops . . .', *QV&P(LA)*, 1879, vol. 2, pp. 535-668.

⁴⁷ *QV&P(LA)*, 1883-4, pp. 1761-84 and 1884, vol. 3, pp. 633-8.

⁴⁸ *ATCJ*, 11 July 1885, p. 64. *Brisbane Courier*, 7 August 1886.

⁴⁹ *Ninth Annual Report of the Maryborough Chamber of Commerce*, 1882, Maryborough, 1882, *passim*; *ATCJ*, 17 June 1882, p. 1131.

⁵⁰ *AIBR*, 14(1890), pp. 661-2.

⁵¹ J. T. Critchell and J. Raymond, *A History of the Frozen Meat Trade: An Account of*

the Development and Present Day Methods of Preparation, Transport, and Marketing of Frozen and Chilled Meats, London, 1912, p. 9.

⁵² Public Record Office, London (BT 31 1565/5085). The 180 £100 shares were called to £70 by 18 August 1871 and fully paid-up by 31 March 1876. Six of the shareholders (who by the latter date had 120 fully paid £100 shares) lived in Great Britain and the remaining two (each with 30 fully paid shares) were squatters at Drayton and Glengallan in Queensland. These eight shareholders resolved on 8 March 1875 to wind up the company; the plant then continued to operate as a private concern.

⁵³ *Brisbane Courier*, 3 July 1871.

⁵⁴ *ATCJ*, 29 July 1871, p. 138.

⁵⁵ Public Record Office, London (BT 31 1532/4858). By 22 January 1873, 11,148 of the 15,000 £3 shares had been taken and fully paid. Twelve Rockhampton residents subscribed £3,021, seven elsewhere in Queensland £2,331 and two in Sydney £669. The remaining £27,423 were subscribed in Great Britain mainly by people with London addresses. The company was wound up by a Court Order dated 2 May 1874.

⁵⁶ *Brisbane Courier*, 14 July 1879, 14 September 1883, 2 February and 21 May 1884 and 29 and 30 April 1886; *ATCJ*, 19 August 1882, p. 363; *QGG*, 1886, Vol. 38, p. 1714.

⁵⁷ For an account of this company see, for example, *Australasian Pastoralists' Review*, 1(1891), pp. 112-3.

⁵⁸ Roth, *A Report on the Sugar Industry in Queensland*, p. 50.

⁵⁹ For descriptions of the old and new systems, see *SMH*, 6 August 1867, and *ATCJ*, 24 March 1888, p. 589.

⁶⁰ *QV&P(LA)*, 1874, vol. 1, pp. 669-77.

⁶¹ *ATCJ*, 15 July 1882, p. 123.

⁶² *QV&P(LA)*, 1889, vol. 4, p. 63. The Yengarie establishment ceased operations in the 1890s; the Millaquin refinery in 1907 was the only one in Australia that had not been taken over by The Colonial Sugar Refining Company Ltd.

⁶³ For the central mill system see: *QV&P(LA)*, 1885, vol. 1, pp. 1157-79 and 1890, vol. 3, pp. 847-66; *QPD*, 1893, vol. 70, pp. 939-40.

⁶⁴ Swallow and Ariell Ltd, *The First Hundred Years*, Melbourne, 1954, *passim*.

⁶⁵ Lowndes, *South Pacific Enterprise*, p. 28.

⁶⁶ *QV&P(LA)*, 1879, vol. 2, p. 613.

⁶⁷ *QV&P(LA)*, 1880, vol. 1, p. 1095, signed by 491 electors at Brisbane and 196 at Warwick.

⁶⁸ Details of this company are in *Brisbane Courier*, 17 October 1877; *ATCJ*, 11 February 1882, p. 271; *QV&P(LA)*, 1885, vol. 3, pp. 715-7.

⁶⁹ *QV&P(LA)*, 1895, vol. 3, pp. 1013-4.

⁷⁰ *QV&P(LA)*, 1895, vol. 3, pp. 1107-9.

⁷¹ W. Lees, *Coaching in Australia: A History of the Coaching Firm of Cobb & Co.*, Brisbane, 1917, advertisement, pp. 101-3.

⁷² Crowley, *Australia's Western Third*, p. 43.

⁷³ 'Report of Colonial Secretary for the year 1870', *House of Commons Papers*, 1872, vol. 42, p. 462.

⁷⁴ 'Despatch Governor to the Earl of Kimberley', *House of Commons Papers*, vol. 42, pp. 459-60.

⁷⁵ *WAV&P(LC)*, 1893, A26.

⁷⁶ 36 Vic. no. 4 (30 August 1872); and 40 Vic. no. 6 (7 September 1876).

⁷⁷ *WAV&P(LC)*, 1882, no. 24.

⁷⁸ 'Correspondence with reference to Erection of Smelting Works in the Victoria District', *WAV&P(LC)*, 1881, A2.

⁷⁹ *WAV&P(LC)*, 1872, no. 5, p. 5.

⁸⁰ *WAV&P(LC)*, 1884, A8; 1885, A23; 1886, no. 34.

⁸¹ J. R. Robertson, 'A History of the Timber Industry of Western Australia', B.A. Hons. thesis, University of Western Australia, 1956, p. 30.

⁸² *House of Commons Papers*, 1898, vol. 84, p. 630 and 1903, vol. 64, p. 564.

Chapter 15. Manufacturing in Australia: Retrospect and Prospect

¹ See Butlin's estimates of average wage factory income in New South Wales and Victoria, *Australian Domestic Product*, pp. 160-1.

² Actual data for these years are displayed in Table 11.11.

³ Butlin, *Australian Domestic Product*, pp. 159-68.

⁴ There are also several technical problems that frustrate direct comparisons with the official estimates. In New South Wales, as Butlin, *Australian Domestic Product*, p. 155, points out, there seems to have been a confusion between the concepts of gross output and value added; in Victoria the value of brick production was double-counted (see Table 8.5); and in both colonies there is uncertainty about the treatment of the clothing and gas-making industries, and of working proprietors and homeworkers. Nonetheless, Butlin's wage income calculations and his assumption that the total wage and salary bill made up one-fifth of gross output seem justified at the aggregate level. The figures in the text can be compared with Butlin's estimates of £22,100,000 for Victoria and £22,500,000 for New South Wales. It must be noted, however, that H. R. Edwards ['Employment in the New South Wales Manufacturing Industries, 1877 to 1938-39', *ER*, 26(1950), p. 274], whose series was followed by Butlin, made an arithmetical slip that resulted in the 1890 employment figure being overstated by 1,000 (see Appendix Table A1.1): if this error had been removed, Butlin's estimate for New South Wales would have become £22,100,000 (or, by chance, exactly the same as that for Victoria).

⁵ Incorporating Butlin's figures for average factory wage income and the employment data from Appendix 1.

⁶ It has been assumed, for want of detailed evidence, that wage rates in Western Australia were similar to those in Tasmania. Because of the shortage of labour actual wages were probably higher but, offsetting this, there is abundant evidence that the quality and productivity of labour were low.

⁷ Butlin, *Australian Domestic Product*, p. 455; the index was based on 1910-1 prices.

⁸ Some of the problems are discussed, in relation to Victoria, in Chapter 8.

Appendix 1. A Note on Statistics of Manufacturing in Australia 1860 to 1900

¹ See 'Development of Statistics', pp. 1-16 in Commonwealth Bureau of Census and Statistics, *Official Year Book of the Commonwealth of Australia . . . 1901-1907 . . . No. 1*, Melbourne, 1908.

² This is discussed in the *Victorian Year-Book*, 1895-8, pp. 928-66.

³ The quotations are taken from VAO, Chief Secretary's Correspondence, 1891, R458.

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G. J. R. Linge is Professorial Fellow in the Department of Human Geography, Research School of Pacific Studies, The Australian National University, Canberra. He graduated from the London School of Economics in 1954 and then in New Zealand completed a doctoral dissertation on the development of manufacturing in Auckland. From the staff of the University of Canterbury he joined The Australian National University in 1959.

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He graduated from the London School of Economics in 1954, and then went to New Zealand where he completed a doctoral dissertation on the development of manufacturing in Auckland. After two years on the staff of the University of Canterbury he joined The Australian National University in 1959.

Research for this book began shortly after Dr Linge arrived in Canberra but it was interrupted a number of times by administrative and other commitments. Apart from time spent in libraries and archival collections in many places in Australia, opportunities were sought wherever possible to visit a wide variety of industrial and mining installations to try to see at first hand the nature of the processes being discussed.

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