PART II

AN EMPIRICAL STUDY OF UNITED KINGDOM IMMIGRATION
Introduction: History and Model Building, the Translation

The scientific value of research in economic history depends on the extent to which the economic premises borrowed or invented by the economic historian for explanatory purposes have withstood fairly rigorous predictive tests; it also depends on the quality of the historical investigation of the background conditions under which the economic historian proposes to employ those economic premises.

Robert Basmann

If you put a match to a dry piece of paper the paper will burn, while if you subject human beings to torture some will break down and others will not, and, more confusing, the same individual may react differently to torture at different times. Whether human behaviour does or does not show sufficiently stable responses to factors influencing it as to be predictable within an acceptable margin of error is a positive question that can only be settled by an appeal to evidence and not by a priori speculation.

Richard Lipsey

Part I of the thesis is largely a narrative of population transfers, and in particular of the nature of governments' intervention in economic matters and their strategy of peopling Australia. This part of the thesis is an attempt to test certain conjectures about the behavioural responses behind the population transfers that took place. But the two parts of the thesis are far from mutually exclusive, and this for at least two reasons. First, to understand the determinants of immigration, it is necessary to understand what Basmann has termed 'the background conditions' - the institutional, economic, social and political setting of the period. Predictive and retrodictive testing of


hypotheses must be anchored to and informed by the 'conditions' of the times. In this sense Part I offers a story of many of these 'conditions' and also, indirectly, an appraisal of the quality and reliability of time series which have been used in its making.

Second, migration occurs in response to both supply and demand forces. My emphasis in Part I has been on government intervention in the market place and on why Australia wanted migrants. In this part of the thesis some of my arguments of a speculative nature as to why migrants were wanted (demanded) and of the significance of government intervention (in terms of both supply and demand for migrants) are subjected to statistical testing - an appeal to the quantitative evidence, one of the tenets of 'positive economics'.

Part II consists of three chapters. The first, Chapter 7, seeks to identify the 'proffered economic laws' of population transfers, to assess how they have withstood predictive tests, and the reliability and soundness of such tests. In Chapter 8, I outline my own model of immigration, one which it is hoped, is both innovative and cognisant of Australia's background conditions of development and her strategy of population growth. The final chapter reports the results of subjecting this model - both as a single and a simultaneous equations system - to test.

All this perhaps seems straightforward. But there are many difficulties in translating history into testable hypotheses and it is best at the outset to state that the exercise has only been partly successful, for it was only feasible to test certain aspects, albeit important ones, of the story. Figure 19 sets out some of the related dimensions of UK immigration, my intention being to illustrate to the reader the nature of the problems encountered rather than to specify, at this juncture, the precise model finally explored.

It is argued in Chapter 7 that most models proffered by past writers have been supply oriented, or 'unidentified' amalgams of supply and demand influences. In analysing the determinants of UK migration into Australia, I have sought to delineate demand forces and supply influences. From what has already been said, governments intervened extensively in the economy and in the labour market, partly with the intention of accelerating the pace of immigration. Migrants were wanted, and in this sense there was a 'public demand' for them. I am not suggesting by the term 'public demand', simply the demand of the
'public sector'. The distinction is important. For there was no strong element of separatism in the relations and actions of the 'public sector' and the 'private sector'. Both sectors were interdependent and governments provided the corporate machinery of the state to resolve competing claims of different groups, and to give vent to cooperating claims. Governments also provided much of the apparatus necessary for the implementation of these resolutions, by legislative enactments, contractual arrangements and public expenditure. This is not to say that governments and individual ministers never initiated policies nor that the 'public sector' did not draw on immigrant labour, but that governments provided an agency function and what I refer to as 'public demand' is conceived in this fashion - it includes both sectors and all bodies and groups. However, there are many difficulties, both with this concept of demand and in quantifying the influences behind it: utility functions are not directly observable, some components cannot be satisfactorily measured and it is virtually impossible to determine weights for the various components (not to mention problems in aggregating the utility functions of the different governments). A good deal of abstraction and simplification has been necessary. Governments intervened for many reasons and in numerous ways; some of their actions were deliberate and direct, others less so - there was a vector of influences and prices. However I have concentrated most on the direct outlays (assisted passages), public investment, restraints imposed by labour market conditions (capital and labour pressure groups), budgetary capabilities and markets. Nor are all of these unambiguous influences. Public investment, for instance, still would have occurred in the absence of immigration, for its purpose was also to support jobs for residents and to meet the backlog in the demand by residents for services and infrastructure. For this reason, the estimated relationship between migration and investment will appear stronger (more significant) than in fact it was. Further, the hypothesis that the higher the volume of public investment, the happier governments were to receive migrants might be stood on its head; higher migration compelled greater outlays. All this suggests that the model should be expanded to 'explain' changes in the volume of investment. This has not been feasible in the present study owing
to time; it would also change the accent of the study from immigration and take us perilously close to a large macro model of the Australian economy.

Certain other problems and omissions should be borne in mind. Some attempt has been made to gauge the influence of defence and the threat of invasion on the desire to people Australia. The results were inconclusive. Not only is it difficult to quantify such an influence, but the discussion of the times was never very explicit as to whether immigration was a complement or substitute for defence. Nor did the intensity of discussion change very much in the first three decades of this century, so a priori one would not expect such considerations to greatly influence annual variation in the demand for migrants. Difficulties in translating more general and stationary forces, and here scale economies and the tax base might be added, into testable hypotheses, highlights some of the inherent limitations of the model and the techniques of estimation; the model is rooted in the economics of 'marginalism' and offers little insight, with the exception of a conglomerate constant term, into the significance of factors that were not themselves changing.

One other factor, which was variable and is quantifiable - capital imports - has not received direct prominence in the model. Policy makers were keenly aware of the importance of foreign savings in expanding the level of investment and thus aiding their goal of preserving the living standards of an increasing population. But I am not so interested here in the mechanism of the transfers, rather with the goods and services secured. And capital imports largely went in funding public works, the influence of which is explored in the model.

Finally, a number of technical objections and uncertainties may be raised with regard to the model's functional form and estimation. The lag structure of response, for instance, amounts to a combination of informed guesswork and ex post estimation. But related to this hinges the issue of whether the model - the system of equations taken to represent the behavioural responses - is (Wold) recursive or strictly simultaneous, thus whether it should be estimated by ordinary or two stage least squares.
That there are certain difficulties and limitations in formulating and estimating a model of UK immigration must be borne in mind, but these do not altogether detract from the usefulness of the exercise and the substantive results of my empirical enquiry. Many, if not most, of the problems outlined above are not peculiar to the retrodictive testing of historical hypotheses but to the testing of hypotheses in the 'sciences' in general. The essence of any statistical enquiry is to distil from the numerous forces at play conjectures capable of disconfirmation.¹ In this regard Part II formalises and distils the main influences on variability in UK immigration into Australia and offers several tests to assess their significance. And a number of factors which hitherto have either not been tested at all, or which have been dismissed by past researchers as immaterial to fluctuations in migration, have been isolated as significant determinants of population transfers. The enquiry not only sheds light on Australia's 'background conditions' as they related to immigration, but on population transfers in general.

Chapter 7

A SURVEY OF THE LITERATURE ON THE DETERMINANTS
OF INTERNATIONAL MIGRATION

Introduction

This chapter surveys some of the writings of economic historians on the determinants of international migration. The general literature in this area is quite immense and it has not been possible to cover all of it. The chapter concentrates on the writings of those who have sought to conceptualise, quantify and test the economic determinants of migration. The main questions asked of this body of the literature, are the hypotheses, estimation methods and findings of researchers. Further, how much does this literature help - or hinder - in formulating and testing a model of the behavioural relations appropriate to Australia's 'background conditions' of economic development?

It must be stated at the outset that economic historians and economists do not have a monopoly of interpretations of the determinants of migration - nor are the processes of international migration more worthy of study than internal migration. Researchers from other disciplines, principally geographers and sociologists, have made many contributions to both. And economists have written extensively on the determinants of transfers within regions. Two points might, however, be made. First, I am not suggesting that non-economic forces were unimportant in determining international transfers, but rather as a first step, there is more than enough to do in canvassing the economic determinants in a chapter of this sort. Second, with regard to internal migration, the models adopted, at least by economists, have not on the whole markedly differed from those of their contemporary cousins dealing with international flows in history. The extent to which they have is briefly discussed at the end of this chapter.

Within the context of the major writings of economic historians on the determinants of international migration, what lessons can be learned? Through what phases has the literature progressed?
Since the time Jerome coined the terms push and pull fifty years ago, for all but the last four or five years (and even here with qualification) the literature has been preoccupied with exploring the expulsive and attracting influences on migrant behaviour. This question is a highly relevant one, though in my opinion it has snared nearly all writers in an unfortunate trap, namely, of not exploring sufficiently in their analyses the economic supply and demand behavioural relations behind migration.

The literature has passed through three phases. The first, measured between Jerome and Richard Easterlin's papers of the early sixties, came to rest on the side of pull - though with some occasional challenge from within. In terms of methodology, these findings were based almost exclusively on procedures (bivariate correlation analysis and visual assessment) which provided inadequate tests of the underlying multivariate hypothesis. The writings of the second phase attempted to correct this problem by adopting multiple regression. But differences of interpretation remained, these arising in part from different model specifications, differences in data used, and most likely due too, to violations of the assumptions behind the statistical technique. Though findings differed between researchers as to what mattered (there has been, however, marked consensus in the instance of Australia, namely, pull), all writers retained faith in their economic models. It was taken for granted that the single multivariate equation estimated adequately and appropriately captured supply and demand forces. In fact these influences were blurred.

The third phase cannot be chronologically delineated very neatly. It began some five years ago, though nearly all the literature since then still belongs, in characterisation, to the second phase. The key characteristics of the new phase are the attempt to explore explicit supply-demand models, to identify the two separate blades of the Marshallian scissors, and to focus attention on issues of equilibrium-disequilibrium flows, and on interdependencies in the system of equations investigated. One member of this new school, Jeffrey Williamson, has attempted to resurrect push-pull, but within the new framework. I argue however, that as the meaning he attaches to the terms is so restrictive and
dissimilar to what Jerome and others originally had in mind (albeit, clouded minds), then there is little point dwelling further on this issue. Rather the thrust, I suggest, should be on why people emigrated, and why they were wanted — supply and demand questions of the simplest order.

One point requires special emphasis. The literature, both old and new, views migration as taking place within a free market. This is a reasonable enough representation of, say, European migration to the US in the nineteenth century. But is it of Australian experience? I suggest that it is not and that some explicit attempt (there have been implicit attempts) must be made to integrate government intervention in the economy and labour markets into the supply-demand model — a task that partly occupies the next chapter.

I turn now to a more complete exploration of the three phases.

Phase I: early studies of the push-pull hypothesis

Jerome in his NBER study of 1926 was the first economist to study in any detail the influence of economic conditions in both the countries of emigration and the US, and it was Jerome who coined the terms, push, pull. He concluded that 'cyclical fluctuations in the current of migration particularly of the immigration movement into the United States, reveals that this movement is on the whole dominated by conditions in the United States. The "pull" is stronger than the "push"'.¹ This result was largely derived from visually comparing graphs of business conditions in the US and source countries with emigration to the US.

Jerome's conclusion that the pull of improved labour conditions was the prime mover behind immigration into the US², was challenged a decade later by Dorothy Swain Thomas³, at least in

² On Sweden, Jerome concluded that the 'waves of the cyclical movement in Swedish emigration to the US since 1870 have coincided substantially with alterations of prosperity and depression in the US... On the other hand an examination of the major features of agricultural and industrial conditions in Sweden does not afford an equally consistent explanation...' Jerome, op.cit., p.205-6.
the case of emigration from Sweden to the US in the nineteenth century. Using different data series of business conditions in both the US and Sweden from those employed by Jerome, Dorothy Thomas offered two tests. First she computed the simple correlation coefficients between Swedish conditions and emigration to the US, and also between American conditions and Swedish immigration; the results for 1870-82 were respectively, \( r = -0.59 \), \( r = 0.63 \), and for 1883-1908, \( r = -0.48 \), \( r = 0.71 \). From this she concluded both push and pull 'were effective, but that pull, particularly in the later period played a somewhat more important role than push'.

These results mean little as they stand. We do not know which are statistically significant, and if both are, whether the difference between the coefficients is significant. Nor would answers to these questions add very much. For, as Thomas' hypothesis is multivariate, viz. conditions in both source and recipient countries matter, it cannot adequately be tested by bivariate simple correlation coefficients.

Her second test is an improvement on the first, though still somewhat subject to the same criticism. She took consecutive years from 1871/72 to 1907/08, in which there was evidence of pull in America, and cross-classified these with periods of push in Sweden. The same cross-classification was made for years in which there was no evidence of pull in America. Observing the change in emigration within the cells, she concluded that,

'pull from America was quite ineffective in years of prosperity [no push] in Sweden...[for then] Swedish industry was able to compete successfully with the lure to America.'

Kuznets, by contrast, accepted Jerome's general conclusion of the short run response of immigration into the US to business conditions in the US, and posed the further question of the determinants of long swings (of about 20 years) in migration.

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1 Ibid., p.167-8.

2 Evidence of push-pull is deduced from upward or downward movements in her business cycle curves.

3 Dorothy Thomas, op.cit., p.169.
Long swings also interested Brinley Thomas who in his analysis of the Atlantic economy placed considerable emphasis on the role played by a demographic-economic push in Europe. Massive population growth, via upswings in the birth rate, might be expected to be negatively related to economic opportunities some years later, when the young flood onto the land and the labour markets. Examining the course of natural increase and emigration from Europe, Brinley Thomas recorded that,

Although the data leave much to be desired, the analysis suggests that the cycle in the rate of natural increase played a part in determining the timing of major waves of overseas emigration (to the US).  

Kuznets, however, rejected this emphasis on push. His reasoning was that as long swings in total immigration were common to many source countries, then

'Since it is highly unlikely that the timing of the birth cycles or other push elements was the same in so many different parts of the world the similarity must be ascribed to some pull factors.'

The argument as it stands is tenuous, as the assertion that it is highly unlikely that European countries were responding to a common push stimulus is a hypothesis itself, and one which Kuznets leaves untested. As further support of the role played by pull in the US, Kuznets does demonstrate that the timing of emigration swings follow those in additions to gross national product per worker, but precede those in residential construction. If one ignores the problem that long swings may be statistical figments

1 Brinley Thomas, Migration and Economic Growth, Cambridge, 1954, p.157. See also pp.116-18. Thomas argues that 'Sweden's greatest loss through emigration (that) took place in the late seventies and eighties was to some extent predetermined by the births cycle'.


3 Ibid.

4 Ibid., pp.33-37.
generated by the techniques employed in isolating and magnifying the cycles in the first instance, Kuznet's point on timing is some support for the idea that pull was important. In the absence of a multivariate model, however, it is still not powerful evidence that push was an insignificant variable in the statistical sense.

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1 See for instance, Roger C. Bird, M.J. Desai, J.J. Engler and Paul Taubman, 'Kuznets Cycles in Growth Rates: the Meaning', International Economic Review, VI, May 1965, 237-8, and M. Melnyk, Long Fluctuations in Real Series of American Economy, Bureau of Economic Research, Kent State University; Irma Adelman, 'Long Cycles - Fact, or Artifact?', The American Economic Review, LX, no.3, June 1965, p.446. The problem is that in most series (American immigration is an exception) long swings only appear in processed data. And the processes of removing short term variability, moving averages, overlapping quinquennial averages, etc, are often capable of generating 'statistical' cycles. Professor Adelman also has suggested that 'swings' might have nothing to do with endogenous self-generating properties of economic development; she generated undulations roughly similar to the long swings observed in economic data by applying stochastic shocks to the Klein-Goldberger model. See Irma Adelman, 'Long Cycles - A Simulation Experiment', pp.152-81, in Austin C. Hoggatt and Frederick E. Balderston (eds), Symposium on Simulation Model: Methodology and Applications to the Behavioral Sciences, 1963. For some counter to these arguments see William W. McCormick and Charles M. Franks, 'A Self Generating Model of Long Swings for the American Economy, 1860-1940, Journal of Economic History, June 1971, pp.295-343. However their arguments are not altogether persuasive - they demonstrate that if 'swings' are presumed to exist, then it is possible to search iteratively with averaged data for the 'best' system to self generate 'swings'. However they also demonstrate that a similar system to the best, using mainly unaveraged data, furnishes swings sufficiently close to the actual historical series as to, in their opinion, refute the hypothesis that the swings are merely the consequence of averaging techniques.

Another method of analysing the variance characteristics of time series is spectral analysis. There is some new evidence that there are longer cycles than the business cycle but on one account the major one in nominal income peaks at 8 years (7 years for real income) with only a minor peak at the 20 year frequency. See Vittorio Bonomo, 'International Capital Movements and Economic Activity: the United States Experience, 1870-1968', Explorations in Economic History, vol.8, 1970-71, pp.321-41. Here, however, the stationarity assumption of spectral analysis might be questioned. Also see Barry Poulson and J. Malcolm Dowling, 'Background conditions and the Spectral Analysis Test of the Long Swings Hypothesis', Explorations in Economic History, vol.8, 1970-71, pp.343-51. If it is possible to summarise most of these findings then the persuasiveness of the arguments still hinges on the plausibility of the initial shock generating the 'echo' effects.
The evidence bearing on emigration and the push of a 'Malthusian Devil' has been re-examined by Richard Easterlin. He employed two explanators, natural increase lagged 20 years (the 'devil'), and income per capita in each European country, expressed relative to UK per capita income. Using simple correlation (but not regression analysis), he concluded that these influences accounted for a little over half of the variance in secular levels of emigration from northern and western European countries. Turning to Kuznets cycles, Easterlin computed quinquennial averages of emigration and the rate of natural increase and marked off the respective peaks and troughs in the two series. On this basis he found that countries tended to concur in the timing of their peaks and troughs in emigration rates, even though they differed with regard to peaks and troughs in natural increase. Thus we are led back to Kuznets' stance, that is, the several countries were responding to a common external force pull.

If one summarises the 'debate' at this point, clearly a good deal of weight is attached to conditions in the receiving country. All empirical hypotheses are, however, only tentatively confirmed not ultimately proven. And the degree of confidence one has in the hypothesis is partly a function of the prior confidence one has in the methods used in testing that hypothesis. In this regard, and as previously noted, visual assessment and bivariate correlation analysis provide an inadequate appraisal of a multivariate process.

Over the last decade or so (and with greater access to computers) push-pull and other hypotheses of the determinants of migration have been examined using multiple regression. Two other advantages are that one can retrodict by how much migration changed per unit change in the respective exogenous variables, and also estimate the likelihood that the apparent relationships are due to purely chance correlations in the series. But there are many attendant problems when the assumptions underlying the regression model are violated. However, it seems preferable to have the stochastic structure, e.g. a regression model, explicit rather than implicit as it is in such techniques as visual curve matching where the stochastic nature of the world (or our measurement of it) are not discussed.

Regression models are a step in the right direction in this regard. Nonetheless there are many problems, as I hope to show, not only arising from likely violations of the assumptions behind the technique but, and far more importantly, questions arise as to the viability of the underlying economic models employed in the analysis. Below discussion now turns to simple econometric testing - of the push-pull hypothesis and additions to it. I begin with early applications to American migration, the retesting of the Jerome-Kuznets pull hypothesis. This is then followed by a more detailed survey of its application to Australian migration in the nineteenth and twentieth centuries.

Phase II: simple econometric models of migration

a) Some early results for the US

In an article appearing in 1967, Maurice Wilkinson set out to re-examine the determinants of long swings in (Swedish) emigration to the US, and ended with a challenge to the contention that opportunities in the US were the motivators of the flows.¹ The results² of his study are set out below.³

\[
(1) \ log \ M_{US}^t = 1.93 + .59 \ log \ M_{US}^{t-1} + 1.73 \ log \ E_{US}^t - 1.56 \ log \ E_t \ \\
(2.40)(6.24)(4.26)(-4.23) \ \\
R^2 = 0.76, \ d = 1.71
\]

where \( M_{US} \) is migration to US from Sweden

\( E \) is employment opportunities proxy, viz. manufacturing output

Superscripts are countries, subscripts relate to time. Figures in brackets are 't' statistics.

The inclusion of \( M_{US}^{t-1} \) perhaps needs explaining. Its meaning here, is that the weight migrants attached to current and past employment opportunities declined geometrically back through time; migrants

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² The notation and equation numbering are mine.
³ The emigration data relate to fluctuations around the mean value of emigration over 10 or 20 year periods (he does not specify which).
⁴ Wilkinson suggests unemployment data would be best to test the job opportunities hypothesis, but as comparable series for the two countries are not available, he uses series of manufacturing output.
were more influenced by this year's opportunities (in both countries) than last year's etc. The timing of their departure is in this fashion a function of both present and past conditions, but with progressively less weight attached to the more distant past.\(^1\)

His regression analysis suggests then that migration was a lagged response to opportunities in both countries; both push and pull were significant explanators, and together accounted for about three quarters of the variance in emigration. A further conclusion that Wilkinson draws from these results is that as the size and 't' values of the estimated multipliers are similar, then push and pull were equally important.\(^2\) But this is an invalid test, for no account is taken of the variances of the two explanatory variables. There are methods which attempt to take the variance of the respective series into account and thus measure 'relative importance' such as Partial Correlation Coefficients, Beta Coefficients, and Path Analysis\(^3\), although these are rather less than perfect in the absence of orthogonal regressors, that is to say, in the presence of collinearity between regressors.

A further theme in some early econometric studies of migration is the impact of information flows about the economic climate of prospective lands of settlement. The usual information hypothesis is that past migration has a positive effect on subsequent migration. The information flow will be greater, the greater past migration. Two methods of testing this hypothesis are generally apparent in the literature - by using the stock of migrants lagged one period, or the flow of migrants lagged one period as an explanator.

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\(^1\) If an attempt were made to estimate a function with many past values of each exogenous variable, the expression would be cumbersome, not to mention the loss of degrees of freedom which would prohibit estimation using short time series. L.M. Koyck demonstrated that given geometrically declining weights to past observations of the exogenous variables the equation mathematically reduces to the endogenous variable lagged by one year. See, e.g., T. and J. Dernburg, *Macroeconomic Analysis*, London 1969, p.85. On the consequence of lagging the endogenous variable, see subsequent footnotes.

\(^2\) Wilkinson, op.cit., p.34.

\(^3\) For a discussion of some of these methods see A.S. Goldberger, *Economic Theory*, New York, 1964, pp.197-201.
All researchers employing the information or 'friends and relatives' variable have systematically found it to be significant.\(^1\) Nelson and Greenwood have also made the obvious point that omitting consideration of the 'information or friends' variable biases the estimated multipliers of the included variables. However there are problems in both estimating and interpreting the information hypothesis. First migration lagged by one period can be interpreted as either migrants attaching descending weight to past opportunities (Wilkinson, 1967), or the impact of friends and relatives now in the country of destination. Second, estimating any equation with the endogenous lagged variable as an explanator has the attendant problem that the standard test for the presence of serial correlation is inappropriate.\(^2\) Third, friends and relatives themselves play a dual role. They do not simply improve the flow of information, they also lower the costs of migrating. The more friends and relatives the migrant has in his country of destination, the lower the psychic costs. Further, the probability of financial assistance, say in the form of temporary accommodation, rises the greater the past migration of relatives and friends. Thus even if friends and relatives are found to be significant, it is not feasible to determine whether this is because of their information role rather than their role in reducing the costs of transfer.


b) **Australian results**

So far my emphasis has solely been on the determinants of European emigration to the US, and it seems appropriate at this stage to enquire into studies of other geographic flows and the evidence that they shed on the underlying economic determinants of migration. In this regard there have been at least three attempts to estimate migration functions for UK-Australian flows, and to evaluate the significance of job opportunities and measures of differential earnings, Kelley, 1965, Pope, 1968, Richardson, 1972. These studies show a marked consensus. They are unanimous in indicating that the differential earnings hypothesis is of no quantitative importance in explaining year to year changes in migratory flows. Further, two of the three, Kelley and Richardson, conclude that the push element of the push-pull hypothesis can also be dismissed. In other words, at least for two of the three writers, the explanation of migratory flows to Australia can be simplified down to a single influence, pull. This high degree of conformity is all the more impressive considering the differing time spans covered, and the model specifications employed. And the conclusion seems to hold too, for both gross and net movements. However, it would be wrong to think that the answer is so clear cut. There is some doubt about the extent to which the models, which are in the push-pull free market tradition, represent the economic and historical underpinnings of the migration process, particularly in the instance of Australia. Further there are many difficulties in interpreting the econometric results which the models generate.

To begin with, consider Kelley's pioneering study covering 1865-1935. Even accepting his model specification, Kelley's

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1 This section draws substantially on David Pope. 'A Critique of the Push-Pull Model', Australian Economic History Review forthcoming.


results do not strongly demonstrate that push was unimportant. He concluded that push was unimportant and could be ignored on the basis of analysis of variance which suggested that most of the annual 'variation' in UK migration to Australia was related to 'variation in Australian unemployment'. Using annual data of unemployment to represent push and pull, he initially estimated:

\[ M_t = 303.48 - 2.88U_t^A + 1.15U_t^{UK} \]
\[ r^2 = .35 \]

\( M_t \) is net migration to Australia from UK.
U is annual unemployment (per cent).

Superscripts are countries, subscripts relate to time. Figures in brackets are standard errors.

For this equation he analysed the variance\(^1\), and found that:

\[
\text{Total variation in migration} = \left( (2.88)^2 \text{Var}(U_t^A) \right) + \left( (1.15)^2 \text{Var}(U_t^{UK}) \right) - 2(2.88)(1.15)\text{Cov}(U_t^A,U_t^{UK}) + [\text{Error Variance}]
\]

\[ = [801] + [278] - [492] + [\text{Error Variance}] \]

The trouble is that the pull of Australia and the push of the UK to some extent moved in unison over time, this producing the covariance product term of -492. Without omniscient powers, this 'joint variance' cannot be apportioned between \( U_t^A \) and \( U_t^{UK} \). Yet if this (-492) belongs to the \( U_t^A \) variance product, yielding (801-492) = 309, then \( U_t^A \) and \( U_t^{UK} \) are approximately equal contributors. Hence Kelley was not entitled to his strong conclusion that \( U_t^A \) was the principal contributor\(^2\). Moreover, analysis of variance is likely to produce quite different answers for different equation specifications. This means Kelley's conclusion is even more tenuous, for his analysis was confined to one particular specification, equation 2. However, he subsequently

\(^1\) A linear combination of two variables X, Y can be written as
\[ Z = c + aX + bY + \text{error} \] and the variance of
\[ Z = a^2\text{Var}(X) + b^2\text{Var}(Y) + 2ab\text{Cov}(X,Y) + \text{error variance}. \]

\(^2\) He would have been entitled to such a conclusion only if the \( U_t^A \) variance product plus the covariance product had significantly exceeded the \( U_t^{UK} \) variance product and this was not the case.
rejects its linear functional form and lack of lags in favour of the following specification of the migrant's response pattern to job opportunities:

\[
(3) \quad M_t^A = -24.32 + 0.63 M_{t-1}^A + 0.36 (U_{t-1}^A)^{-1} \quad r^2 = 0.77, \quad d = 1.67
\]

This equation suggests that migration was a geometrically lagged response to unemployment conditions in Australia\(^1\), the form of the response to job opportunities in Australia being hyperbolic.\(^2\)

But we are not told how the adoption of this functional form (the lagged hyperbolic response) affects the analysis of variance of push and pull.

To test the incomes differential hypothesis concerning changes in expected long term well being, as distinct from short term job opportunities, Kelley used the trend growth rate in real GNP over the previous 6 years as a variable:

\[
(4) \quad M_t^A = -12.07 + 0.62 M_{t-1}^A + 0.35 (U_{t-1}^A)^{-1} - 5.28 grGNP_t^A - 8.10 grGNP_t^{UK} \quad r^2 = 0.79
\]

where, \(grGNP = \) growth in real GNP per capita

other symbols as previously defined.

In the above equation the estimates of past performance of output in Australia and the UK are not at all statistically reliable, as the error terms in the brackets are many times larger than the estimates themselves. Nor did Kelley have much prior confidence in these two variables. He had previously asserted that expected income differences are '...likely to remain relatively stable in the short run'. Thus, by implication, in a model explaining short term

\(^1\) The inclusion of the term \( M_{t-1}^A \) might also be interpreted as capturing the impact of 'friends and relatives'.

\(^2\) The a priori justification of the hyperbolic response is as follows: because of rigidities in the labour market, unemployment rates at the lower levels fail to indicate increased scope for advancement, over-award and overtime payments etc. Therefore one would expect a bigger absolute response as unemployment reaches very low levels, and the opposite at high unemployment levels. In interpreting the equation it should be remembered that use of the reciprocal function means that an expected negative sign for the parameter of \((U^A)^{-1}\) corresponds to an expected positive sign for the parameter of \((U^A)^{-1}\), as \(U^A\) and \((U^A)^{-1}\) are inversely related.
variation in migration one would not expect such difference to play an important role. The argument however would be stronger had he demonstrated that the differential was fairly constant. Further, Kelley did not adequately test the differential wage-income hypothesis; he entered $\text{grGNP}^A_t$ and $\text{grGNP}^\text{UK}_t$ as separate variables rather than the difference between the two as a single explanator. Finally his omission of a push variable

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1 Consider a simplified version of Kelley's hypothesis involving

(A) $M^*_t = \alpha + \beta_1(\text{grGNP}^A_t) + \beta_2(\text{grGNP}^\text{UK}_t) + (\text{other explanators}) + \text{error}$

Compare this with the straight forward differentials hypothesis of

(B) $M^*_t = \alpha + \gamma (\text{grGNP}^A_t - \text{grGNP}^\text{UK}_t) + (\text{other explanators}) + \text{error}$

An implication of (B) is

(C) $\hat{M}^*_t = \alpha + \gamma (\text{grGNP}^A_t) - \gamma (\text{grGNP}^\text{UK}_t) + (\text{other explanators}) + \text{error}$

Hence for (A) $\equiv$ (B), the implication of (C) is that $\beta_1 = -\beta_2$

Thus for Kelley's test to amount to a test that differential 'well being' was a determinant of migration it is necessary to demonstrate

(1) $\hat{\beta}_1$ and $\hat{\beta}_2$ are statistically significant, and that,

(2) the difference between the two ($\hat{\beta}_1, \hat{\beta}_2$) is insignificant.

Most importantly the method is not efficient, degrees of freedom are lost and multicollinearity aggravated, viz. growth in incomes covary to some extent. There is then the serious disadvantage that $\gamma$ will be less likely to appear statistically significant under such inefficient tests.
is likely to have biased the estimates.\footnote{As push is significant in Kelley's equation 2, it is likely that it really is a variable in the \textit{true} model, the one only God knows, as opposed to the one that the researcher hypothesises, and by omitting the variable in future regressions, the estimated multipliers (partial regression coefficients) are biased. Because the partial regression coefficient of push is positive and the auxiliary coefficient non zero and positive, judging by Kelley's footnote 25, p.342, my deduction is that the estimated regression parameter of pull is biased upwards in equation 3 and 4. The auxiliary coefficient is $\frac{dX_i}{dX_j}$, where $X_i$ is the omitted variable, $X_j$ the included. The direction of bias is determined by the product of the auxiliary coefficient and the multiplier of the omitted variable. We can deduce from his analysis of variance that the sign of covariance was positive which implies that the sign of the auxiliary coefficient was also positive. Thus bearing in mind the positive coefficient attached to push, the bias was positive. Not only were the estimated multipliers upward biased (look larger than they really were), but by omitting UK we would expect positive serial correlation (positive because UK unemployment tended to move more cyclically than erratically). Thus estimated standard errors would also appear smaller than they really were. In equation 3 above, the 'd' statistic appears satisfactory. However use of the endogenous variable lagged, as an explanator invalidates this test for serial correlation.}

From these results Kelley concludes against the income differentials hypothesis, and that

In the context of the push-pull controversy another observation is thus added in support of the pull hypothesis as appropriate to explaining migration flows from the 'Old World' to 'Lands of Recent Settlement'\footnote{Kelley, \textit{p.cit.}, p.350.}...

However he tempered this broad conclusion on the basis of the residuals of Equation 3, i.e. by inspecting deviations of actual historical migration from those estimated by that equation. One interesting problem is the period after WWI, when the equation underestimates actual migration. Kelley's argument is that it is the period of 'the highest level of British unemployment to date'.\footnote{Ibid., p.349.} In short, this means that the model in this period retrodicted poorly because no account was taken of push. At a minimum this suggests that he should have checked to see if his
estimated partial regression coefficients were stationary through time. Does the relationship computed over the very long span, 1865-1935, hold if the long series is broken down into shorter sub-periods? His own analysis of residuals indicates the reverse – that the push element in the push-pull hypothesis may have increased significantly after the war.

But for the earlier period, Kelley suggests that push was unlikely to account for the residuals. Rather, a plausible explanation of such deviations lay in the large reversals in British migration to countries (North America) which competed with Australia for migrants. However, competition as a factor does not fit neatly into either the push-pull (i.e. unemployment in Australia and the UK), nor into the wage-income differentials mould. Hence it must be regarded as an additional and rather ad hoc hypothesis which in Kelley's case is not explicitly tested.

Richardson's study basically reproduces Kelley's results, but for the shorter period, 1870-1914. He likewise investigates the push-pull and income-wage differentials hypotheses, and adds another explanator, dominion population, which is interpreted as a proxy for dominion labour supply. Rises in population, he hypothesises, amount to increases in the domestic labour supply which decrease the recipient country's need for immigration. However, on the basis of statistical tests, Richardson in due course abandons this additional explanator.1 For pull, he employs Dominion domestic investment – advancing the idea that migrants were attracted by investment booms – and for push, UK unemployment was used.

As mentioned above, Richardson duplicates Kelley's conclusions; he rejects push and the differential earnings hypotheses, leaving pull the sole explanator. This might appear

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1 An effort to deal with serial correlation by first differences led him to discard some earlier evidence that domestic population was a significant explanator. It should be remembered that the use of first differences to correct for serial correlation assumes 'rho' equal to one. If 'rho' is actually less than .5 then this method will lead to more severe errors than had nothing been done.
as extra confirmation for Kelley's results were it not that Richardson's methods do not in any way represent an advance on the earlier tests. He does not utilise earlier evidence on the need for hyperbolic functions and lags. Furthermore Richardson's screening device for rejecting hypotheses is cruder. He tests the push-pull and earnings differential hypotheses separately - despite the fact that if proxies for these two influences are correlated, this biases his results. Moreover, he rejects variables on the basis of $r^2$ without reporting the size of the individual regression coefficients relative to their standard errors. Yet an individual explanator can be highly significant regardless of the size of $r^2$. Accordingly Richardson may have discarded some highly pertinent variables via this quite erroneous screening device. Overall, then, his study offers little additional evidence on the push-pull and differential well-being hypotheses.

1 The exception is that he did try incorporating past values in his tests of the wage differential, but failed to state what type of lag he used, commenting merely that it made 'little difference' to the results.

2 Richardson, ibid., describes his use of the goodness of fit statistic, $r^2$ on successive hypotheses, pp.102-04, concluding with the statement, 
'using multiple regression analysis an iterative procedure was adopted in which independent variables...were introduced into the equations one by one and subsequently dropped, depending on how they affected the goodness of fit', Richardson, ibid., p.104.

3 Richardson also repeated Kelley's practice of testing the income-wage differential hypothesis by entering wages in the two countries separately, not the difference as a single variable. However, as pointed out in the discussion of Kelley's work, this is a test of the theory only if certain strict conditions can be shown to hold, and in any case is inefficient and therefore likely to prejudice the findings against this variable. Richardson argues that entering wages in Australia and the UK separately is justified on the grounds that the two wages series are crude and not strictly comparable. But non comparable series will not affect the degree of explanation offered by the wage differentials (as a single variable), provided that the source of error is constant, absolutely or proportionally. Further, if the error takes some other form, the problem of incomparability cannot be alleviated by simply entering the two wage indexes separately in a linear model - Richardson's approach.
From what has been said it will be apparent to the reader that the view taken here is that there is still considerable room for questioning the explanation of a single influence, pull. Uneasiness is also heightened by some inferences to be drawn from this writer's 1968 article. In that paper I explored initially a general model which included push and pull and a real wage difference, for the period, 1910-29. In this form the estimated coefficients possessed a high degree of unreliability. However omitting the wage differential, yielded for Australia statistically significant coefficients both of push and pull.5

\[(5) \quad M_t^A = -6,371 + 411,527 \left( t_{t-1}^A \right)^{-1} -65,609 \left( t_{t-1}^{UK} \right)^{-1} \quad \tau^2 = .50 \]

\[\text{with } (119,444) \quad \text{and} \quad (28,408)\]

The same basic model, but tested on Canadian and New Zealand data suggested that in the instance of these dominions, only pull was

---

1 David Pope, 'Empire Migration to Canada Australia and New Zealand 1910-29', op.cit. This study excludes the war years, 1914-19.

2 Represented by unemployment.

3 The real wage difference RWD was taken as

\[RWD_t = \frac{\text{RW}_t^D - \text{RW}_t^{UK}}{\text{t} - \text{t} - 2}\]

where the superscript D is the respective dominion.

4 One possibility was that the model was overspecified, viz. too many variables relative to my short time span of observations. The wage difference was dropped on the weak a priori grounds that unemployment better represented short term influences.

5 At the .05 level \(\tau^2\) is significant. It should be pointed out that these results are also highly tentative insofar as there were too few observations to test for serial correlation.
important. Critical to my findings was the role of respective governments in altering the costs of relocation. This in turn points to certain inadequacies in the push-pull model itself. The argument might be outlined as follows. The monetary costs incurred by migrants include the time taken to locate a job in Australia and the opportunity cost to the migrant of time in making the journey. The other and most prominent cost is the fare. And it is here that the measurement and meaning of push becomes quite obscure. For while migrants were feeling the expulsive push of deteriorating economic conditions and declining job vacancies in the UK, simultaneously their ability to meet this cost of migrating diminished. For this reason, a priori one can attach both a positive and negative sign to the coefficient of U^UK - it measures two opposite economic forces - hence the difficulty of obtaining very meaningful results. However, inability to respond to push could be alleviated where dominion governments subsidised fares. In this regard a detailed examination of the per cent of migrants assisted and the amount and terms of assistance showed that Australia was far more generous than either Canada or New Zealand. Australia's generous assistance programme thus may have eased the relative cost constraint to the point where unemployment represents more the migrant's positive response to declining job opportunities in the UK than his negative response to the costs of transfer. In hindsight it would have been clearly preferable to include costs as a separate variable. The main point of these findings, however, is that push (deteriorating economic conditions in the UK), as an economic concept is ambiguous.

\[ M^C_t = -9,226 + 451,182 \left(U^C_{t-1}\right)^{-1} - 1,801 \left(U^UK_{t-1}\right)^{-1} \quad r^2 = .81 \]
\[ (79,587) \quad (55,599) \]
\[ M^{NZ}_t = 5,663 + 32,392 \left(U^{NZ}_{t-1}\right)^{-1} - 5,615 \left(U^UK_{t-1}\right)^{-1} \quad r^2 = .42 \]
\[ (11,089) \quad (5,295) \]

where,

\[ M = \text{migration from the UK to respective Dominion} \]
\[ U = \text{annual unemployment (per cent) in the respective Dominion} \]
\[ C = \text{Canada} \]
\[ NZ = \text{New Zealand} \]
\[ UK = \text{United Kingdom} \]
\[ t = \text{time in years} \]

Standard errors in brackets.
One other finding of the paper deserves attention. There was some evidence that changes in the UK population - the effect of the war on the birth rate and more importantly on males in the traditional migration age cohort, 20-45 years - had depleted the British reservoir of migrants. If this view is given credence, then there is yet another variable to be added into the theory of Australian migration - namely the UK stock of decision makers in the migrating age group. A 'devil' in a new guise?

But it is not only on grounds of omitted variables and statistical 'reliability' of reported results that these models may be seriously questioned. There is a broader issue - namely the extent to which the models capture the historical, institutional and economic 'background conditions' of the migration process. And in this regard, at least two points might be made.

First, from the viewpoint of Australian history, no attempt has been made to explicitly incorporate the role of government intervention in the market place. Yet the thrust of previous chapters has been that such intervention - on behalf of the Australian people - was the very hallmark of Australian economic development; 'population strategy' was an intricate part of economic development in the Australian context. There is clearly, in the literature, an awareness of these 'background conditions'. Richardson as noted, used domestic investment as his proxy for pull - and public investment was an important component of total investment. Kelley recorded that governments did furnish assisted passages, but claimed that such assistance did not offer a key to explaining migration, while my 1968 paper found the role of governments in relieving the costs of transference to be rather more important to the migration flow than Kelley had contended. But in all these cases the role of government intervention is basically allowed to be subsumed in the push-pull terms. Government intervention is not ignored, but it is neither highlighted nor its implications explicitly tested.

1 Questions of statistical reliability are always likely to arise.
Second - and this point applies generally to studies of international migration previously mentioned - the push-pull model as specified, fails to clearly capture the economic behavioural relations behind migratory flows. For to say the least, migration theory has mushroomed in an extremely ad hoc arbitrary fashion. Should job opportunities, income differentials, Kelley's rival migrant flow factor, Richardson's dominion population, and my (1968) suggestions of the UK 'eligible population stock' and an explicit transport cost variable, simply be thrown into the melting pot? And should this pot be a single equation? Or should not both blades of the Marshallian scissors be properly and distinctly identified?

By estimating a single function, difficulties in identifying which are the supply factors and which are the demand forces, are compounded. It is always true that some of the factors that enter demand relations also enter supply, thus in sorting out whether a supply or a demand relation has been estimated, care must be taken in initially specifying the two arms of the Marshallian scissors in such a way that they are just this - distinctly two arms not one. For in the latter case, the indistinguishable mix of the arms in one equation, as with push-pull models, might produce perverse empirical results. If arms are less interesting than the equilibrium intersection, then the equilibrium (reduced form) equations might be derived from the two behavioural or structural equations.

In the most recent round of writings greater attention has been paid to these issues in model-building. The focus, generally, has come to rest on more explicit supply-demand analysis, on the equilibrium-disequilibrium implications of such analysis, and on the attendant issues of 'identification' and 'simultaneity bias' in the proffered models. Discussion below now turns to these issues.
In the following chapter a supply-demand model is developed which draws on aspects of these findings, and an attempt is also made to integrate Australian 'background conditions' into the model's specification.

**Phase III: Supply and demand models of migration**

Maurice Wilkinson in his 1970 paper, 'European Migration to the United States: An Econometric Analysis of Aggregate Labor Supply and Demand', set out again to re-examine the determinants of migration in the nineteenth and early twentieth centuries. The paper contains some important and innovative ideas, though there appears some confusion as to what his argument and methods are. H.K. Richardson, for instance, describes Wilkinson's work as '...a complex neo-classical model involving both aggregate demand and supply functions'. Wilkinson, however, never estimates nor, unfortunately, indicates what the separate supply and demand behavioural functions are, rather, he estimates single equations which he proffers as 'equilibrium equations'. These might be reduced form equilibrium equations, analytically derived by substitution from structural supply and demand equations, though it is quite impossible for the reader to deduce what these structural or behavioural functions might have been. In fact, a theoretical model of migration — though not applied to historical experience — using separate supply and demand equations appeared in the year preceding Wilkinson's paper.

2 H.K. Richardson, op.cit., p.100.
3 For one does not know how many endogenous variables were in the structural model (as they are already eliminated in the reduced form equation) nor can one infer which exogenous variables occurred in which structural equation.
Wilkinson canvassed two basic models:

\[ M_t^e = m(GNP_t^{US}, GNP_t^{EU1}, RWD_t), \quad m_1^{>0}, m_2^{<0}, m_3^{>0} \]

where,
- \( M^e \) = equilibrium flow of migrants
- \( GNP \) = gross national product or proxy for GNP
- \( RWD \) = real wage differential
- Superscripts are countries: EUi is respective European source country

\( m_i \) (\( i = 1,2,3 \)) are the a priori signs of partial derivatives of the first, second and third variable respectively in equation 6, e.g. \( m_1^{>0} \) means that a unit rise in \( GNP^{US} \) is expected to positively affect migration to the US etc.

His second equilibrium migrant flow specification is:

\[ (M/P)^e_{EU1} = n \{ GNP_t^{US}, GNP_t^{EU1}, RWD_t, (M/P)_{t-1}^{US} \}, \]

\[ n_1^{>0}, n_2^{<0}, n_3^{>0}, n_4^{<0} \]

where, \( P \) = population; the endogenous variable is the equilibrium flow per population.

All other symbols are previously defined.

Thus in equation 6 he suggests that migrants responded positively to US GNP, negatively to GNP in their own countries and positively to a widening gap between domestic and US real wages. Equation 7 seeks to explain migration per population in the source country, i.e. the migration rate, and adds a fourth explanator, migration per US population lagged one year. Wilkinson's hypothesis is that the higher past migration relative to US population, then the lower migration will be in the current period. His theoretical argument is that higher migration 'last year' depresses economic conditions or opportunities 'this year' in the US so that one would expect fewer migrants in the current period on these grounds. This assertion is tenuous, for just because more migrants arrived in the US from Europe 'last year' does not mean that conditions in the US should deteriorate in the 'current year'. And further, if they do, then this effect should be included in \( RWD_t \); the inclusion of the fourth variable poses problems of multicollinearity.
His main contribution to the development of migration models, is his focussing of attention on equilibrium flows, and his questioning of whether equilibrium levels ruled. His two flow models, equation 6 and 7, are modified by rational distributed lags to take account of the fact that there might be short run adjustments in approaching equilibrium.\(^1\)

With regard to the equations reported, Wilkinson's principal findings were that there was little evidence of pull but, with the exception of the UK, strong evidence of push. Further, for every country for which it was possible to include the real wage differential, RWD, it proved significant.\(^2\) Finally, the one period lagged migration variable was significant in half the countries investigated - though he offers no reason for its lack of significance in the case of the other half. These findings thus contrast markedly with the main thrust of earlier studies which found in favour of pull. However, the story is a continuing one, for Wilkinson's results have been questioned, L. Gallaway and R. Vedder finding evidence of the converse.\(^3\) And they suggest that his findings are spurious owing to undetected serial correlation introduced by Wilkinson's use of a one period lagged endogenous

\(^1\) In specifying the equations Wilkinson, it should be noted, uses output not unemployment, this choice being suggested by the theory (and some empirical studies) that the demand for labour is tied to entrepreneurs' expectations of production (output). It is this element which presumably Richardson had in mind in describing the model as 'complex neo-classical'.

\(^2\) Here one expects that there could be simultaneity bias in RWD, i.e. RWD was not strictly exogenous, but partly determined by the flow of migrants. He tests this proposition but finds that the bias was not significant.

\(^3\) L. Gallaway and R. Vedder, 'Emigration from the United Kingdom to the United States: 1863-1913', Journal of Economic History, December 1971, pp.885-97. They found wages (entered separately) as insignificant, and push and pull significant (their equation 3). On balance they conclude that pull is relatively more important - but this conclusion is derived from a 'stepwise regression' which is an unsatisfactory means of measuring 'relative importance' in the absence of orthogonal regressors. See Goldberger, op.cit. p.199. Finally their model specification involves a number of binary variables to allow for past economic shocks. As such shocks are particular nonpredictable events, this makes their explanation less general.
(migration) variable as an explanator. In some respects the debate was becoming tedious.

Thomas Orsagh and Peter Mooney in a paper published at the end of 1970 made a pioneering attempt to estimate structural supply and demand functions. And they offer supply and demand analysis as an explanation of the apparently conflicting results of earlier studies. They suggest that the differing findings could result from an identification problem: sometimes the single estimating equations captured predominantly supply aspects, at other times, predominantly the demand for migrants. This point, although not novel in econometric theory, is a decisive step forward in the empirical study of migration.

Their actual supply and demand function specifications however, are rather ad hoc, and, further, a number of criticisms can be levelled at their interpretations. However, it is valuable to elucidate their model to indicate just how far the writers moved away from the long standing approach of a single push-pull equation.

1 A test, as I have already mentioned has been developed by Durbin, op.cit. In this regard Gallaway and Vedder might have done well to retest for the presence of serial correlation in Wilkinson's model - although it is obscure whether the researchers all used the same data sources in the first instance. Further, and on a more negative note, all existing tests for serial correlation are not 'very powerful' in detecting its presence.

demand equation:

(8) \[ \frac{L_f}{L} = \alpha_0 W^{\alpha_1} \phi^{\alpha_2} B^{\alpha_3} Y^{\alpha_4} W^{\alpha_5} \]

where,
- \( L_f \): foreign born labour force
- \( L \): gainfully employed labour force
- \( W \): average annual earnings in manufacturing
- \( \phi \): \( Y/W \cdot L_f \), an index of foreign born labour productivity\(^1\)
- \( B \): Bjork's index of the change in demand for migrant labour lagged 10 years, viz.,
- \( B = (P a L_a + P n a L_n a)/C \)
- \( P a \) and \( P n a \) refer to the rates of growth of the US agricultural and non-agricultural labour force, \( L_a \) and \( L_n a \) to the individual state's agricultural and non-agricultural labour forces, and \( C \) to the participation rate of the population in the labour force.
- \( Y \): three year centered mean personal income
- \( \alpha_i \): coefficients to be estimated
- \(^{\prime} \): superscript signifying per annum growth rate of a variable.

The first two exogenous variables are common demand explanators. The Bjork index however is nothing more than a projection of historical employment trends, and as such must contain effects of changes in the supply of labour as well as in demand. Further the division by \( C \), the participation rate, seems misplaced: this effectively multiplies the workforce to give total population requirements when Orsagh and Mooney are predicting working, not total, immigrant stocks. Their latter two explanators are uncertain proxies for excess demand.

supply equation:

(9) \[ \frac{L_f}{L} = \beta_0 W^{\beta_1} S^{\beta_2} R_{-1}^{\beta_3} P^{\beta_4} P^{\beta_5} \]

where,
- \( S \): \( L_n a/L \)
- \( R_{-1} \): foreign born population relative to total population, lagged ten years
- \( P \): population, estimated by forward survival method, relative to base year population
- \( \beta_i \): coefficients to be estimated
- Other symbols as defined above.

\(^1\) The \( \phi \) variable, Orsagh and Mooney illustrate, is a substitute for \( \partial Y/\partial L \) if a generalised Cobb-Douglas production function is assumed.
Conspicuously absent from the supply function is any consideration of the relative attractiveness of that state, to other states and to source countries.

Designating \( W \) as the second endogenous variable, the first being \( L f/L \), Orsagh and Mooney use two-stage least squares to estimate the pair of structural equations, deleting in various combinations, some of the explanators and checking on significance levels of the remaining ones. They find that the crude productivity index, \( \phi \), and the wages level, \( W \), are the only consistently statistically significant demand explanators, the stock of past migrants, and the degree of industrialisation, \( S \), the only such supply parameters. As the estimated coefficients of \( W, \phi, R_\perp \) and \( S \) were of descending magnitude, Orsagh and Mooney state that this reflects their descending level of relative importance as determinants of migration.\(^1\) However this is a nonsensical statement, for the size of estimated parameters can be arbitrarily raised by increasing the units in which the explanators are measured.\(^2\)

Moreover, despite their most significant innovation of separately estimating supply and demand functions, Orsagh and Mooney's findings of which variables are statistically significant are not wholly convincing. Except for the population variables, all the explanators tested were flows, yet they were expected to explain the total stock of migrants (in 1880, 1900 and 1910). Those, for instance, who settled in the US prior to 1900 would only be influenced by the 1900 wages level if, after initially migrating to the US, they then migrated from state to state within the US, depending on current (1900) US economic conditions. A second shortcoming in Orsagh and Mooney's specifications, is the failure to incorporate any explanator in the supply function which reflected European economic conditions, and hence to test the earnings differential hypothesis. Yet Orsagh and Mooney partly justified the separate estimation of supply and demand equations on the grounds that, by overcoming the identification problem, it might

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2 Also see discussion above on difficulties in measuring 'relative importance'.

help to resolve conflicting evidence on hypotheses such as the income differential thesis.

A number of papers by economic historians have appeared in more recent years addressing questions of the distribution of immigrant population in the US and of international migration. Although adding to the stock of knowledge of these processes, the models employed, have for the most part, not broken substantial new ground in their methodological treatment. They have mainly, though importantly, refined the traditional approach of a single (but not 'reduced form') equation of the polyglot influences acting on migrants. They remain


I am definitely not suggesting that these papers have failed to advance our understanding. They have within the basic framework of standard or traditional models. Tomaske demonstrated, for instance, that the wage-income differentials hypothesis, as applied to Sweden in the nineteenth century, holds only if the impact of friends and relatives already in the US is explicitly included. Quigley, again on Swedish migration, found in favour of both push and pull, making the point, and plea, for the disaggregation of farm and non-farm sectors. In his Ph.D.thesis, Carr makes the extremely valuable point that, with respect to UK-US migration in the nineteenth century, past studies - specifically of Gallaway and Vedder - confront a massive 'aggregation problem'; disaggregation yields quite dissimilar results for migration to the US from Ireland as against migration from England to the US - the Rent War and the potato harvest, for instance, were key (push) variables in the instance of Ireland, though basically irrelevant to an explanation of migration from England to the US.

Gallaway et al have also emphasised the import of economic 'panics' to European emigration (though as noted previously, the use of binary variables, as opposed to the a priori specification of functional forms of the equation, makes the study somewhat less general as a broad explanation.

Gallaway et al in other papers and within the framework of a modified gravity model, found in favour of economically rational behaviour among emigrant stocks within the US; migrants being distributed mostly in accord with relative incomes and (contd.)
in Phase II. The important exception is Jeffrey Williamson. Some questions might be raised as to Williamson's model, its estimation and his deductions, though the main strength of his method remains, namely, his considerable effort to couch migration within a broader and more satisfactory framework of economic analysis. The model, and its ramifications are explored below.

Williamson begins with explicit labour supply and demand structural equations for the sending (S) and receiving (R) countries.

**Labour supply equations:**

\[(10) \quad L_S = N_S - M \]
\[(11) \quad L_R = N_R + M \]

where

- \(N\) = native labour force
- \(M\) = net migration

**Labour demand equations:**

\[(12) \quad L_S = \alpha_0 + \alpha_1w_S + \alpha_2Q_S \]
\[(13) \quad L_R = \beta_0 + \beta_1w_R + \beta_2Q_R \]

where

- \(w\) = real wages
- \(Q\) = output levels

Wages in the two markets are linked, though never completely equalised by the migration of labour, the differential in wages being taken as the migrant's decision variable.

**Simple migration equation:**

\[(14) \quad M = \delta_1 [w_R - w_S] - \delta_0 \]

Given the plausible interaction between migration and wages in the two countries (migrants were influenced by wages and migration influenced wages) then some account should be taken of this interdependence. It is possible by algebraic substitution to solve

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for a particular equation, in his case $M$, in terms of the others and by such manipulation derive an equation with only exogenous variables (as originally specified) on the right hand side of that equation. By eliminating $L_R$ and $L_S$—by equating the right hand side of equations 10, 12 and 11, 13—and then eliminating $w_S$ and $w_R$ in a similar fashion, the reduced form equilibrium equation might be obtained.

_reduced form 'equilibrium' migration equation:_

\[
(15) \quad M = \hat{A}_0 + \hat{A}_1 N_R + \hat{A}_2 Q_R + \hat{A}_3 N_S + \hat{A}_4 Q_S
\]

where

\[
\hat{A}_i = \text{coefficients which are compounds of the original structural parameters}^1
\]

\[i = (0 \ldots 4)\]

Wilkinson makes two points with regard to his characterisation of migration. As demonstrated in equation 14, if one believes this characterisation then firstly, wage (or income) variables should never have been analysed as separate variables, as for instance was done by Kelley and Richardson, but rather as a difference (e.g. Pope, 1968). Secondly, bearing in mind the intrinsic endogeneity of wages they should not, in any form, appear in an equilibrium equation such as his equation 15. All the Australian studies and nearly all US studies fail on this criterion. However,

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^1 Specifically,

\[
M = \gamma'' + \frac{\delta_1}{\beta_1[1 - \delta_1/\beta_1 - \delta_1/\alpha_1]} N_R - \frac{\delta_1 \beta_2}{\beta_1[1 - \delta_1/\beta_1 - \delta_1/\alpha_1]} Q_R
\]

\[
- \frac{\delta_1}{\alpha_1[1 - \delta_1/\beta_1 - \delta_1/\alpha_1]} N_S + \frac{\delta_1 \alpha_2}{\alpha_1[1 - \delta_1/\beta_1 - \delta_1/\alpha_1]} Q_S
\]

or rewriting,

\[
M = \hat{A}_0 + \hat{A}_1 N_R + \hat{A}_2 Q_R + \hat{A}_3 N_S + \hat{A}_4 Q_S
\]
here he seems to overstep the mark a little. Wages do appear in the supply and demand structural equations (as distinct from the equilibrium reduced form equation) and past researchers were—or may have been trying—to capture these structural relations. Certainly this is true of the recent model presented by Orsagh and Mooney. Furthermore, the extent to which lags prevailed in responses, wages could validly enter a reduced form equation, though of a different characterisation than Williamson's. The main point is that past writers—with the exception of Orsagh and Mooney—were befuddled in their thinking on these issues; the old push-pull models failed to guide careful economic analysis.

Having developed the model, Williamson makes two further adjustments before empirical estimation. First, to take into account the possibility of disequilibrium in markets he uses a standard stock adjustment model—migration is assumed to be proportional to the difference between 'equilibrium' current migration and actual migration in the preceding year. This can be accomplished by adding a new variable, \(-M_{t-1}\) (the proportionality assumption entails multiplying the other coefficients by the coefficient attached to \(M_{t-1}\)). The inclusion of \(M_{t-1}\) adds yet a further interpretation: it might be variously interpreted as capturing the effects of friends and relatives, information flows, geometrically lagged responses to changes in other variables in the model (due to adaptive expectations or habit persistence) or as Williamson now suggests, as adjustment towards equilibrium.

Second, out migration from country \(j\) to non US countries is taken as exogenous \((M_{j}^*)\), as is immigration to the US from all other countries excluding \(j\), \((M_{j}^{**})\). The resulting equation to be estimated is thus,

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1 I.e. enter as a 'predetermined' variable which would not be a source of 'interdependence'. Further, in Williamson's characterisation, output in the two countries \(Q_R\), \(Q_S\) are taken as fixed, i.e. exogenously determined. Another characterisation would be to have these quantities endogenous to the system, hence eliminated in obtaining the reduced form equation. In fairness to Williamson (his) research indicates that migrants did not have a marked impact on contemporaneous output, thus his treatment of output is suitable.
immigration estimating equation:

\[
(16) \quad dM_j = B_{j0} + B_{j1}(N_{US} + M_j^{**}) + B_{j2}QUS
\]

\[
+ B_{j3}(N_j - M_j) + B_{j4}Q_j - B_{j5}M_j(t-1)
\]

where

\[
dM_j = \text{immigration from } j \text{ to the US}^1
\]

\[
\hat{B}_{j1} = a \hat{A}_{j1}, \quad \hat{B}_{j2} = a \hat{A}_{j2}, \quad \hat{B}_{j3} = a \hat{A}_{j3}, \quad \hat{B}_{j4} = a \hat{A}_{j4} \quad \text{and} \quad \hat{B}_{j5} = a.
\]

The equation was estimated for flows from four European countries, Sweden, Germany, Denmark and the UK. The econometric results in Williamson's own words are 'less than impressive' in terms of $R^2$ and $t$ statistics, though the compound coefficients attached to the US output and workforce variables, and those similarly attached to Danish and Swedish labour forces and output levels possessed the correct signs. However, this is not the end of the exercise, merely the midpoint. From a mixture of his regression results pertaining to equation 16, plus results of other writers$^2$, it is possible to deduce estimates of the structural parameters appearing in equations 10 to 14, i.e. to return to investigate the structural equations.$^3$ In addition to these he focusses on a further concept $\eta M_j$, 

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$^1$ It might be noted that this estimating equation is of immigration, not net migration. It is confusing whether Wilkinson used beginning of the year or end of year data of $N$ (workforce) - presumably he used beginning of year data otherwise $M$ and $M^{**}$ would be irrelevant. If this is the case, then he should have subtracted out migration from the US from $N_{US}$ and added appropriate quantities to $N_j$.

$^2$ Williamson's model is not identified (to be identified, an equation, say $x$, must, inter alia exclude the same number of exogenous variables as there are other equations that include these: thus if there were two equations, $x, y$, then at least one exogenous variable found in $y$ will not be present in $x$, if $x$ is identified). As a consequence of his model not being identified Williamson is unable to furnish estimates of all structural parameters - one 'missing' being $\beta_1$, the wage elasticity in American industry. He adopts an extraneous estimate by Lucas and Rapping which then makes it possible to deduce the remaining parameters of interest to him.

$^3$ Equations 10 and 11 are strictly definitional on Williamson's assumptions.
the 'elasticity' of migration with respect to wages.\(^1\) Bearing in
mind that Williamson is interested in both the reduced form equation
and the structural equations\(^2\), and also interested too, in migration
elasticities, what, briefly, are his main findings?

The elasticity of migration with respect to wages, \(\varepsilon_{M_j}\), was
greatest for the UK and smallest for Sweden; the British were most
sensitive to wage differences or relative gains so defined. Yet
the rate of out migration – defined per head of population or of
employment – was of reverse order – the rate of exodus from Sweden
was higher than from the UK. Williamson suggests that the
structural parameters of the labour demand and supply equations in
the sending countries cast light on this phenomenon. On the
labour demand side, in Sweden, wage and output coefficients (the
sensitivity of entrepreneurs' demand to absolute changes in these)
were very high relative to the UK. And on the supply side the
coefficient attached to the potential labour force \((N_j - \bar{M}_j)\) was
likewise much larger. These larger responses to changes in the
foreign labour markets, he suggests, help explain the higher mean
rate of exodus from Sweden than from the UK, despite Swedish
migrants' weaker proportional responses to wage differentials.\(^3\)

\(^1\) Presumably,
\[
\varepsilon_{M_j} = \frac{\partial M_j}{\partial (w_{US} - \bar{w}_j)} / \bar{M}_j / (w_{US} - \bar{w}_j)
\]
where
- \(\bar{M}\) = mean immigration
- \(\bar{w}\) = mean wage

As the numerator in the square brackets is no other than \(\delta_1\) then
whatever can be said about the absolute and proportional responses
(elasticity) of migrants to real wage differences between
countries can be said about these responses to wage levels in the
US, because \(\delta_1(w_{US} - \bar{w}_j) = \delta_1(w_{US}) - \delta_1(\bar{w}_j)\).

\(^2\) The later being analytically derived, not econometrically estimated, cf Orsagh and Mooney.

\(^3\) This argument does not necessarily follow. One might expect
greater volatility or fluctuations in out migration from Sweden on
account of the larger coefficients but this does not, to this writer,
automatically suggest higher mean rates. Furthermore, to
demonstrate the latter (response to \(N_j - \bar{M}_j\)), one must resort to
the results of his more contentious \textit{ex post} decomposition of
migration, discussed below.
The use of joint information of migration elasticities \( r_{M_j} \), and structural and reduced form parameters in exploring the economics and history of migration is a most useful exercise.

What is more tenuous is Williamson's bid to resurrect push-pull. In this matter his definition and methods can both be questioned. He defines pull only as real wages in the US. In decomposing push-pull he began, in effect, by taking equation 14 with the intention of exploring the change between 1870-1910,

\[
(17) \quad \Delta M = \delta_1 \Delta w_R - \delta_1 \Delta w_S
\]

where, \( \Delta = \text{change} \)

By assuming constant elasticity of response to changes in wages\(^1\), then

\[
(18) \quad \Delta M = Z(w_{R})^r_{M} - \Delta D
\]

where \( Z \) is set such that immigration in the first year, 1870, is accounted for by only pull. The question is how did the shares change from this base? Subperiods within the span 1870-1910 are also canvassed. The conclusion reached was that push measured as the residual, generally declined.\(^2\) An exception was Sweden, where it increased\(^3\) in the course of the late nineteenth century.

Two points might be made. First, his definition of pull is very restricted in terms of what economic historians have said or implied. Pull has often connoted attracting conditions in the receiving country, for instance, output or employment. Yet in a reduced form equation such as Williamson's characterisation, 15, one cannot ascribe the impact of US output to pull alone. The economics are far more complex as Williamson himself rightly points

---

1 There are some ambiguities here. Remember \( r_{M} \) which becomes the exponent of 18 was estimated in a linear system (where \( r_{M} \) is variable) and evaluated at mean migration and wage rates, where the mean wage rates should have referred to wage differentials (see footnote). The very same value of \( r_{M} \) cannot be simply substituted into 18 as was done by Williamson. Since \( r_{M} \) is variable it would need to be evaluated at mean US wages if it were to be at all representative of responses to US wages.

2 This is what is called 'negative push'.

3 'Positive push'.
out. For the coefficient attached to US output is a compound of structural parameters including a structural parameter associated with demand for labour in the sending country (see footnote to equation 15). This indeed is one of his main contributions. But by chasing the push-pull concepts he has been forced to very largely redefine and severely restrict their meaning compared to what Jerome had in mind in coining push-pull some fifty years ago. Second, the ex post decomposition of push-pull defined as wages is subject to many problems. His method is to focus on US wages; any immigration not explained by change in these is ascribed to push. Thus his push influences are simply a residual (akin to measuring the contribution of technical progress to growth as that portion not explained by growth in capital and labour). It is the residual due to push plus other unspecified omitted variables, incorrect functional form and error. The last factor, given his regression results (low t statistics) and use of extraneous information to complete the parameters, could be sizeable. Thus his argument here about the changing share of push would have been far more persuasive had he also reversed the test. Do we arrive at the same conclusions if pull is estimated as the residual? If we do not then this is more a measure of the distortive effects of omitted variables and errors, than a measure of push.

Before concluding this survey, it is instructive to ask whether the literature relating to internal geographic flows has progressed along similar lines to that of economic historians' investigations into international flows. Are there any particular lessons to be learned from the findings?

Research on Internal Migration

The literature for the most part has not differed markedly from the thrust of international migration studies. The emphasis, until recently, has been on estimating a single equation including

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1 This section draws heavily on Michael J. Greenwood, 'Research on Internal Migration in the United States: A Survey', Journal of Economic Literature, June 1975.
some crude representation of net earnings (wage or income) gain, plus employment or job prospects and opportunities. One distinction is that the internal flow models are 'gravity type' (introduced to economists by geographers), in that immigration is hypothesized to be negatively related to distance; and one of the clearest implications of the literature is that gross immigration declines perceptibly with increased distance. In my case, neither distance nor time taken to cover it, are variables. But the cost of covering the distance between UK and Australia in the early twentieth century was. An implication of the literature on internal migration then, is that some attention to costs of transfer - and in my case government efforts to lower these - might prove a useful venture.

The literature makes a number of other points, though only some are relevant to us. Within a single estimating equation, age, education and race have been found significant, as has employment, though not wage differentials. The second and third variables have not gained prominence in the literature of economic historians mainly because of the nature of the data and those involved in the international flows. However, the more general finding of regional studies that job opportunities are important and wage differentials not, is in line with the general findings of economic historians during the second phase of the literature on international flows discussed above.

Finally, the literature on internal or interregional transfers has recently begun to explore interactions among variables in the models. This has arisen in the light of policy implications of migration for urban and regional growth (migration is affected by, but also affects urban growth) and a simultaneous equations approach

1 Strictly speaking, there was some minor gradual shortening in passage time over the period.
2 The first is explored, at least partly, via the Malthusian Devil in the literature by economic historians. Race, that is, colour - blacks versus whites - has not entered into discussions of international transfers, given the historical content of these flows, though 'nationality' has. Data of education levels of migrants (the more educated are hypothesized to be more mobile), are generally unavailable for historical and statistical analysis of international flows in the nineteenth and early twentieth centuries. It might be added that this list of variables influencing internal or interregional transfers is not complete. It is a list of factors generally found significant in internal (US) migration studies.
is being adopted. Such an accent in approach is similar to the new school in economic history, though if anything, the most recent analytics and model building of economic historians are more soundly based on supply-demand analysis.¹

Conclusions

For nearly all of the last fifty years, the literature on the determinants of international migration by economic historians has been preoccupied with Jerome's question of magnetic expulsive and attracting forces behind migrant behaviour. Progressively, over the last decade, new variables and hypotheses have been added, in an ad hoc way, to a single migration equation. These models were assumed to capture, appropriately, supply and demand. The writers, in the first two phases of the literature neither questioned nor investigated, analytically or empirically, the explicit and underlying supply demand relations, nor did they explore the related issues of equilibrium-disequilibrium, not to mention interdependencies within the systems proffered. In the last few years some writers have. The methodology of these writers is not identical², nor are the questions raised. But the basic and explicit focus on supply-demand is the unifying factor in their approaches. Williamson, within this explicit and analytical framework, has proposed a way of resurrecting push-pull, though I have suggested that the definitions of these are too highly restrictive relative to common usage. It is better to concentrate on the supply-demand issues: why did migrants arrive, why were they wanted?

¹ In the sense that the 'regionalists' have become concerned with problems of 'endogeneity', but have not so tightly analysed structural supply and demand or reduced form specifications and the ramifications of these. It must be added, however, that Williamson is the only economic historian to explore these issues at length.

² Nor in Williamson's position of an unidentified system can the econometrics be the same - i.e. Williamson by a combination of single equation method and extraneous information derives the structure. Orsagh and Mooney estimate theirs via Two Stage Least Squares.
These very simple questions also raise, both on the side of demand and supply, the role of government intervention in Australia's development. It will be obvious to readers that I strongly support explicit supply-demand models of migration as a framework. But doubt still surrounds which variables enter the behavioural responses1, and most importantly, the appropriateness of the intrinsically free market models recently presented, to guide historical assessment of Australian history.

I turn now to these issues - migrant supply and demand and government intervention in the market place.

1 And also about the way in which such variables should enter the equation.
Chapter 8

A MODEL OF UK-AUSTRALIAN IMMIGRATION

Introduction

The purpose of this chapter is to develop and present a model of the behavioural relations behind UK migration to Australia. The model differs in two general respects from the ones discussed in the preceding chapter. First, although some of the variables which occur in the literature will also be found in the model proffered here, the range of economic and demographic variables has been broadened, and I have attempted to combine all the variables in a fashion which is more consistent and integrated with the decision theory of human capital. Second, in formulating the model, particular attention has been given to the institutional framework and historical background conditions in which decisions were taken; such considerations have informed both the general theory and the specific behavioural relations postulated in this chapter.

To begin with, the years between Federation and the Great Depression were marked by a drive to people Australia. It was a period of exceptionally close ties and affinities between the UK and Australia, and a period in which the former sought to send some of her population overseas. In Australia, Britain was still referred to as 'Home'. There were almost no racial or socio-economic barriers to integration; in general factories could be manned and railways built equally well by new arrivals as by resident workers. Migrants were not a separate group or class differentiable from residents. For this reason the basic supply demand relations of the model are conceptually derived from 'excess' supply demand functions of the two countries, migrant demand being the 'excess' or difference between Australian demand and supply of labour (and population) and migrant supply being the 'excess' or difference between UK supply and demand of labour (and population).

Attention to Australiads institutional framework and to the goals of public policy has also led me to distinguish between 'labour' and 'population'. More population, of course, meant more labour but as discussed in Chapter 5, the goal of policy was not just to boost
the contemporaneous supply of labour. The determinants of the demand for labour and for population were not identical, nor were the 'prices' and contractual arrangements for acquisition the same. The model has been developed in such a way as to bring out both the distinctions and the similarities between labour and population transfers.

Within this framework of 'excess' demand supply curves of population and labour, the hypotheses of this chapter concern why migrants came, why they were wanted and the role of government intervention in this process.

The Model: some preliminary concepts

Labour and population

A married man and his wife with, say four young children, is a preferable immigrant to three or four single men.

Gullett, Superintendent, Commonwealth Immigration Office.1

We might begin by first asking, what is the market for migrants? Migrants contribute both to the workforce and to the population of a region. Contemporaries like Gullett were well aware of the distinction between additions to the current workforce and additions to the population at large. The latter partly increased the current workforce, but also meant an evergrowing army of producers, consumers, taxpayers and security into the future.

The literature on the determinants of migration (as distinct from its consequences) has almost exclusively concentrated on current labour market aspects of migration flows, ignoring the broader implications of the population market. Of course on the supply side, the distinction is not critical. For there is a nexus between the population and labour markets, labour supply being a proportion of population supply. On the demand side, however, there is no such nexus. Demand for labour is an offer to hire workers now and total demand an aggregation of wage bids by individual

1 Prime Minister's Department, Correspondence file, multi number series (Third system): 'Immigration Encouragement. Main Policy File, 1919-1924', Commonwealth Archives Office: CRS, A458, item G154/7 Pt.1.
employers. By contrast the demand for population was an outcome of collective decision making and it hardly ever entailed a specific wage bid; the demand for people was not simply a function of the contemporaneous demand for workers.

'Excess' market curves

In the era of strong empire affinities, UK labour and population were seen as very close substitutes for Australian born workers and Australian born residents. This was central to Empire Settlement. In developing a theory of population and labour transfers it is, therefore, reasonable to regard migration as a process that made the Australian and UK markets subsets of the total (Australian plus UK) markets. There was no separate demand for migrants per se, nor supply of migrants per se. Rather the migrant supply and demand curves represented 'excess demand' and 'excess supply' curves, excess demand being Australian demand minus Australian supply, and excess supply being UK supply minus UK demand. In this respect the UK-Australian population and labour markets may be likened to integrated world money markets - a phenomenon analysed in some of the monetarist models of international capital flows, where emphasis is placed on the fact that the substitutability of funds from different countries precludes delineating national money supply/demand functions; only excess money supply/demand functions can be delineated.¹

The situation is illustrated in Figures 20-25. For simplicity, relocation costs and the existence of 'other countries' have been omitted. In the figures, L and P represent labour and population stocks; W represents the wage rate and G might be viewed as a vector of prices offered by governments to attract population (in the instance of Australia), or to encourage their departure (in the case of the UK which subsidised people to leave). Figure 20 shows an ordinary set of curves representing Australian demand and supply for a population stock, Pᴬ, expressed in terms of government assistance to live in Australia, Gᴬ. Without migration, the market would be in

equilibrium at the level of government assistance $G^e$. The amounts of negative and positive excess demand, which are derived by subtracting the Australian supply curve from the Australian demand curve, form the excess demand curve of Figure 21. The market for population in the migrant source country, the UK, is shown in Figure 22. The UK considered its population stock 'above optimum', and was therefore willing to subsidise subjects to emigrate to Australia. In such circumstances, government assistance to live in the UK, $G^u$, is negative. The UK excess population stock which is available to the migrant receiving country, Australia, is derived by subtracting the UK supply curve from the UK demand curve. It is drawn in Figure 21, where at the intersection of the two excess curves the assistance level, $G^e$, indicates the equilibrium of the international market in population stocks. A similar set of curves in Figures 23-25, is used to describe the labour market.

The excess curves follow from the overall (Australian plus UK) market situation, since the aggregate demand and supply relations,

$$D^A + D^u = S^A + S^u$$

(1)

can be rewritten in excess terms:

$$D^A - S^A = S^u - D^u$$

(2)

excess or migrant demand excess or migrant supply

The net result of this interaction of the UK and Australian markets is that forces in both countries must be taken into account in constructing the migrant supply function; likewise factors in both countries enter the migrant demand function.

1 At a higher level of assistance than $G^e$, supply (via natural reproduction) would exceed demand; at a lower level of assistance, demand would exceed supply.

2 In Figure 21, above the price $G^e$, the excess demand is negative (or excess supply), below $G^e$ excess demand is positive. Note that the excess demand curve has greater elasticity than the Australian demand curve. If the Australian population supply curve had zero elasticity, viz., a fixed amount regardless of the level of $G^A$, then the slopes of the two curves would have been identical.

3 Note that $G^e$ lies between $G^u$ and $G^A$. 
The above is not, of course, to suggest that these markets for stocks of labour and population were in long run equilibrium.

**Disequilibrium: the speed of adjustment, plans and realities**

Insofar as there were lags in markets adjusting, the annual migration flow would only have moved towards long run equilibrium. Indeed if lags were substantial, migratory flows would have depended more on the determinants of the speed of adjustment, than on factors behind the long run excess demand and excess supply curves. Further, an optimal or equilibrium distribution of population could not be achieved in one bite. For most of the period Australian politicians, for instance, spoke of achieving a more optimal distribution over the course of 20 years or more. Changes in demand from one year to the next depended more on short term factors which set the speed of adjustment or path towards long term equilibrium.

Even within the context of short term demand and supply, disequilibrium may have prevailed insofar as the intentions or plans of demanders and suppliers were not realised.

The remainder of this chapter develops a model of the market for UK population transfers by exploring three central themes:

1. the supply and demand dimensions of the population market
2. the extent to which these supply and demand intentions were realised
3. the relation of this market for UK population to the market for UK workers.

**The supply and demand for UK population**

It perhaps needs to be said again that where the distinction between 'population' and 'labour' is relevant is on the side of demand where additions to population were by no means desired merely to fill current job vacancies. But on the supply side, although migrants may have counted on some net gains for their families which were unrelated to labour market conditions, my conjecture is that the move did reflect by and large the expected rewards from migrant workers joining the Australian labour force. Let us begin with the supply function.
a) The migrant supply function, \( N_s \)

Lack of information about overseas job markets together with liquidity constraints in meeting relocation costs, meant a slow adjustment process towards long run migrant supply \((S^U - D^U)\). Accordingly the short run migrant supply curve depended principally on the speed of adjustment. The central hypothesis is that this speed increased when the net rewards of migrating rose, and when liquidity constraints on meeting relocation outlays were less severe.\(^1\) Other influences on the speed of adjustment may have been important too – for instance risk, information flows and the attractiveness of other countries to which prospective migrants could emigrate.

Consider first the net rewards of migrating. Human capital theory suggests that these rewards are captured in a net wealth calculation:

\[
NB_t = \frac{d}{j=t} \frac{(Y^A_j - Y^U_k)/(1 + e^j)} - C_t
\]

where

- \( NB = \) net present value of human and nonhuman wealth if migrant moves in year \( t \)
- \( Y = \) average expected income from human and nonhuman assets
- \( C = \) relocation costs
- \( d = \) years to death
- \( e = \) time preference rate
- \( j, t = \) time, measured in years

\(^1\) This approach of regarding the UK and Australian markets as subsets of an overall market, and migrant supply response to variables such as an income differential as symptoms of disequilibrium, contrasts somewhat with that of Williamson (1972). Williamson (implicitly) regards the sender and recipient markets as distinct, which enables him to regard the migrant's response to an income difference as an equilibrium flow, rather than as a symptom of disequilibrium between the sender and recipient sub-markets.
Some of the problems in crystallising and testing this general expression for the income difference are discussed immediately below. The section that then follows discusses relocation costs and the liquidity constraints encountered in meeting these outlays.

(i) The income difference

Income is generated by human and nonhuman assets. However, the analysis and calculations can be greatly simplified without too much damage to 'reality' by abstracting from nonhuman capital. Migrants came from a socio-economic background in which earnings, other than from their labour, were probably not very large. And in any case earnings from many such assets, for instance bonds, were largely independent of the owner's country of residence. Still, some loss (or gain) may have occurred where assets were not portable and had to be quickly converted to cash though by and large, such losses (or gains) would be small, one suspects, relative to the life time stream of earnings from human capital. Omitting nonhuman capital from the wealth calculation is less satisfactory in discussing migration to Australia in the early nineteenth century (or Canada in the nineteenth and early twentieth centuries) for then expectations of earnings from land clearly must be considered. But in the twentieth century in the case of Australia, the omission is a small sin.¹

Even after simplifying income to the present value of anticipated real wages, a number of questions and adjustments still remain. As considerable change occurred in working hours over the period, particularly after WWI, an adjustment should also be made to equation 3 for the average number of working hours in the normal week.² The procedure adopted here has been to divide weekly wages by the number of hours in the normal working week. This furnishes

¹ For instance, in the years 1903-10, 34,000 Canadian homesteads were taken up by UK immigrants (Commonwealth Parliamentary Debates, 1911, p.389). Australia offered little land to migrants - a few hundreds being settled in this same period (see Chapter 5). From what is known of the backgrounds of migrants (Chapter 3), their points of entry and their association with relatives and friends (via the nomination system) who were mostly residents of the Australian capital cities, it is improbable that many migrants were misguided land seekers.

² If no allowance at all were made for the length of the working week, there would be an implicit assumption that workers were indifferent about the number of hours required to earn their wages, viz., that they placed zero values on leisure.
an hourly wage rate. Insofar as workers were not free to choose how many hours they worked - the length of the working week was fairly institutionalised - it would have been desirable to make further allowance for changes in leisure hours resulting from changes in the length of the working week. However such refinements were not feasible for this study.

What of unemployment? The implicit approach in empirical studies of migration, and perpetuated explicitly in Paul David's recent theoretical paper, has been to assume that migrants regard job offers, or likely ones, as tenured positions. From this viewpoint therefore, unemployment enters search costs in relocating (see below), but does not influence migrants' present value estimates of real wages. The opposite approach, taken recently by Todaro, is to argue that migrants are less optimistic than this, and that in order to indicate expectations of wages received rather than merely wages while employed, there should be an adjustment for likely periods of unemployment. This approach is adopted here, though in Chapter 9 the alternative hypothesis that migrants thought of their future jobs as tenured positions is also tested.

Ideally some allowance should also be made for differences and changes in the incidence of taxes in the two countries. These, along with government transfer payments, might have influenced the calculation of the gains to human capital associated with migrating. Unfortunately measurement complexities, particularly with regard to indirect taxation, have precluded a quantitative analysis of these considerations; it has been necessary to assume that the rough calculations performed by potential movers were in essence pre-tax ones. With regard to direct transfer payments, it might be recalled

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2 M.P. Todaro, 'A Model of Labour Migration and Urban Unemployment in Less Developed Countries', American Economic Review, March 1969. This idea of weighting wages by unemployment is certainly not new. For instance, Australian Commonwealth Statisticians have used the concept since the early years of the century.
that a committee appointed by the Secretary of State for the Dominions, in November 1925, reported that in their opinion health and old age pensions did 'not have any considerable effect' on migration, although unemployment insurance probably did. Such conclusions must be treated with the utmost care, for they were based on the 'impressions' of committee members and so were conjectures more than the findings of extensive research.

But the committee's findings are helpful in highlighting another related dimension of the net wealth calculation involved in the decision to migrate. The committee suggested that as migrants were in the young age cohorts they placed little weight on old age and health benefits. Data of the age distribution of migrants presented in Chapter 3 certainly confirms the youthfulness of migrants. The theory of human capital also offers an explanation. The younger the migrant, the greater the time horizon over which he can expect to enjoy the difference in wages, and hence the greater the expected rewards of migrating. By contrast, at the top end of the age distribution, the gains are smaller and loss of pensions and lifelong behavioural patterns involved in moving are likely to be extremely high.

This raises the question at the micro level of who were the potential movers and how their behaviour should be aggregated. Should every Briton be regarded as a possible mover? As a simplification, assume that calculations of net gains were taken by UK household heads. Then apart from the dependency ratio, they constitute the potential migrant reservoir. But for household heads in the higher age brackets, the small gains compared to the loss of pension benefits and high psychic costs of relocating probably meant that for them migration was not an option. This suggests that the reservoir of likely movers might be regarded as household heads, say, under

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1 Department of the Treasury. Correspondence file, annual single number series: Invalid and Old-Age Pensions - Reciprocity between Australia and the United Kingdom, 1926-32, Commonwealth Archives Office, CRS A571, item 27/3917.
45 years, together with their dependents.\(^1\) Equation 3 has been modified in two ways to take account of these considerations.

First, the impact on aggregate supply of changes in the size of the reservoir of potential movers has been allowed for by adjusting, namely multiplying, the wage difference by the actual number of males in the 20-44 years of age group, \(n\).\(^2\) Such a factor might have been included in the total supply function as an additive and \textit{ad hoc} term. I suggest, however, that the reservoir of decision makers should be seen as part of an integrated theory of macro behaviour. If in a given year the reservoir of decision makers is \(n\), then on the macro assumption that total migrant supply responds \(n\)-fold to the individual householder's wage gains, the supply function should include \(n\) times the wage difference\(^3\), not the wage difference and \(n\) as unrelated factors.\(^4\)

Second, the impact on the supply function of changes in the age structure within the 20-44 years group has been incorporated. These changes affect the average years to retirement of this reservoir, and hence the gains from migrating. For the greater the average number of years to retirement, \(\Theta\), the larger the absolute gains to be made from the wage difference. But how should \(\Theta\) be incorporated into equation 3? This depends on how rapidly prospective migrants expected their earnings to rise compared with their time preference rate. Did they expect wages in the UK and Australia to rise more or less rapidly than their time preference rate? This is a very recent area of economic research on which at present there is little

\(^{1}\) Alternatively, these age correlated costs could have been captured in an accurate \(C\) series covering both psychic and financial expenses, rather than by using a cut off point such as 45 years. But lack of data on many of the ingredients of \(C\) make this an inferior approach here. P.A. David, \textit{op.cit.}, pp.57-62, gives a more detailed analysis of age effects 'spurious and pure'.

\(^{2}\) Males have thus been taken as a proxy for household heads.

\(^{3}\) It might be thought that this argument implicitly assumes that each potential migrant expected to reap the \textit{identical} real income difference from migrating. This is not so. Rather, my implicit aggregation assumption is the less restrictive one that \textit{changes} in the expected income difference for the various subgroups of UK householders within the 20-44 years group move together.

\(^{4}\) My formulation will still, of course, contain aggregation problems if, for instance, the expected income difference for some sections of UK householders within the 20-44 years group changes relative to the expected income difference for other sections of UK householders within the 20-44 years group. However, such aggregation errors would be minor relative to the gross misspecification of including \(n\) as a separate additive determinant.
evidence, even for the current day. In the absence of information, possibly the most satisfactory assumption is that prospective migrants expected wages to grow neither faster nor slower than their time preference rate.\(^1\) In these circumstances the computation of the discounted stream of wage differences involves the current difference in wages times the number of years over which workers would enjoy the gain. On this assumption, therefore, changes in the age structure of the 20-44 years group has been allowed for by multiplying their impression of the current wage difference by \(\Theta\), the average years to retirement of this age group.\(^2\)

One question which remains, however, is how potential migrants formed their ideas of the current wage difference in the first instance. Was it simply on the basis of the current year's experience or some combination of past years? There is a wide range of possibilities, some of which are illustrated in Figure 26. A priori, an 'inverted V' weighting system, such as \(\omega_a\), seems most probable.\(^3\)

Alternative age structures, however, are tested in Chapter 9.

At this point the hypothesis of the income gains associated with migration may be summarised. The conjecture focusses only on those gains associated with human capital. These, it is hypothesised, resulted from the difference in the real rewards of labour in the two

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1 This assumption, of course, does not imply that migrants thought that the absolute difference in wages would remain constant.

2 \(\Theta\) has been estimated on the assumption that household heads remain in the workforce until age 65 years. These data are chronicled and discussed in Appendix 9.A.2. The time horizon for the calculations of gains is now retirement age not death. It might be thought that this formulation involves an additional unstated assumption that all UK household heads within this age group face the identical number of years to retirement, viz., the average, \(\Theta = \Sigma \phi_i / n\). This however, is not the case. For individual \(i\) the present value of the income gain is \(\phi_i (\phi \Theta_i)\) times the wage difference. Accordingly, for \(n\) individuals, the gains are \(n\phi \Theta_i / n\) times the wage difference or \(n\Theta\) times the wage difference. In short, the additional assumption that all householders face the identical \(\Theta\) is not necessary for this conclusion.

3 An inverted V, because migrants have only limited information about the current year (they leave during the year), and hence are unlikely to give it as much weight as the immediately preceding year. Years much further back presumably receive less weight.

Data series used in the calculation of the wage difference are discussed in Chapter 2 and its appendices, the actual calculations of the wage difference are given in Appendix 9.A.2.
Figure 26
Alternative Lag Structures

Distributed lags:

ωₐ: inverted V weights
ω₀ = .25; ω₋₁ = .5; ω₋₂ = .25

ωₐ: declining weights
ω₀ = 0, ω₋₁ = .67, ω₋₂ = .33

ωₐ: unlagged
ω₀ = 1, ω₋₁ = 0, ω₋₂ = 0
countries measured by nominal wages, consumer price indexes, hours in the normal working week and the probability of obtaining employment. Particular emphasis has been given to the UK reservoir of key decision makers; the wage gains, it has been proposed, should be multiplicatively adjusted by the number of household heads in the migrating age cohort 20-44 years and by the average years over which gains would accrue to this set of household heads. Income gains as an influence on the supply of UK immigrants can therefore be stated as \( n_t \cdot RYD_t \) and

\[
RYD_t = \theta_t \cdot \sum_{j=1}^{t-v} \omega_j \left[ (1-U_j^A) \left( \frac{NW_j^A}{CPI_j^A} \right) \left( 1/H_j^A \right) - (1-U_j^{UK}) \left( \frac{NW_j^{UK}}{CPI_j^{UK}} \right) \left( 1/H_j^{UK} \right) \right]
\]

where

- \( RYD \) is the real income difference
- \( n \) is the number of household heads in the reservoir of potential migrants
- \( \theta \) is the reservoir age structure behind expectations
- \( v \) is the first year that influences current impressions of the wage difference
- \( \omega \) are weights
- \( A \) is Australia
- \( UK \) is the United Kingdom
- \( NW \) is the average money wage rate
- \( CPI \) is the consumer price index
- \( (1-U) \) is the probability of obtaining employment at real wage
- \( H \) is the index of average hours per normal working week
- \( t \) is the current year
- \( v \) is the first year that influences current impressions of the wage difference

A long list of objections may be voiced: it is a pre-tax, pre-transfer calculation; it omits nonpecuniary and some pecuniary gains (it ignores, for instance, the future income gains of the children of migrants); the proxy for household heads is imperfect as is the aggregation assumption; and it fails to offer a test of why older migrants tended not to come. Yet it is a testable hypothesis derived explicitly from the general theory of human capital which integrates in a new way a wide range of economic and demographic supply variables.

1. If the rate of unemployment is \( U \), then the likelihood of being employed is \( (1-U) \).

ERRATUM

Footnote 1a. The reader is reminded that RYD as computed by equation 4 is an estimate of the unrecordable 'true' income difference.
Consider now the second component in the prospective migrant's calculation of the net gain (equation 3), the costs of relocation and the ability to meet such costs.

(ii) Relocation costs and financial constraints

These may be discussed under the general headings of psychic rents foregone\(^1\) and pecuniary relocation costs, namely outlays on the voyage and job search in Australia, and wages lost while travelling and searching.

Psychic rents: One element in psychic rents is the location near friends and relations; these foregone rents would diminish with the number of friends and relatives that have previously migrated. The stock of past migrants, it is hypothesised, captures this effect.

\[
F_t = - \sum_{f=t-x}^{t-1} s_f M_f
\]

where,

- \( s \) = survival probability among past arrivals
- \( M \) = UK arrivals
- \( x \) = the first year of cumulative addition
- \( F \) = foregone psychic rents
- \( f \) = time subscript

Thus the more friends and relatives who have migrated since year \( x \), the smaller the psychic rents foregone. But how should the conjecture be clothed? For how many years, for instance, did friends and relatives resident in Australia communicate with, inform, and encourage/discourage, and nominate their associates in the UK? How soon did relationships and ties fade? In a multiple regression analysis with many determinants of the inflow, the number of combinations of variables quickly explodes. I have only been able to explore two time specific stocks of past migrants, namely unweighted sums of those who had arrived in the past 10 and 15 years. As a simplification, \( s \) has been assumed to take on a value of unity.

\(^1\) Strictly speaking, the present value of the stream of UK psychic rents netted of psychic rents anticipated in Australia - viz. hours of sunshine and so on.
For any specification of an F series, however, there are problems in interpreting the econometric results, since friends and relatives also alleviate search costs¹ and transmit information.²

Transport costs: As noted previously most immigrants settled in the environs of the major ports, principally indeed in the two coastal cities of Sydney and Melbourne. Accordingly, the major transport cost was the transoceanic boat fare. A wide range of accommodation, services and rates were available to general passengers, and shipping companies under contract to governments offered a reduced third class passage rate to migrants; children received further concessions. Some migrants, no doubt, chose to travel at rates other than the contract fare, but all assisted migrants travelled at this third class rate. Given the socio-economic background of migrants, it seems reasonable to presume that most others took advantage of the special rate. I have therefore taken the 'basic average fare' to be the third class contract rates for adults and children, summed and weighted in accord with the proportion of adults and children emigrating in each year. Assisted migrants, of course, did not pay the contract rate, only some part of it.³ The average fare for assisted migrants as a group is the weighted sum of the contract rates minus the subsidies offered by governments. After the war the subsidies include those offered by both Australian and Imperial governments. One fair objection, I think, is that instead of a single average weighted fare, separate fares - at least for typical assisted vis-à-vis typical unassisted migrants - would better capture the supply response to transport costs. Yet two points might be made.

¹ This occurs where incoming migrants may have stayed with friends and relatives, i.e., had their accommodation temporarily subsidized, and may have received assistance with job search.

² Beyond the general negative relation, there is little evidence from theoretical or empirical studies on how friends and relatives decrease psychic costs. The role of migrants who arrive earlier in transmitting information and assisting in search as well as in reducing psychic rents foregone, makes it more difficult to interpret the little available empirical evidence that there is (Chapter 7). A different specification of F would be to adopt the Koyck Transform, though this procedure introduces a number of other problems (see Chapter 7); further it is implausible that home ties were broken as rapidly as the Koyck weights imply.

³ See Appendix 4.A.1 for details.
First, the line dividing potential assisted from unassisted was not fixed throughout the period. As indicated in Chapters 4-6, governments changed the criteria, and the stringency with which they applied their criteria, for offering subsidies as well as the speed with which they processed applications for assisted passages. In this sense, the subset of UK householders eligible for assistance was fairly fluid. Thus the weighted average fare might quite adequately capture the fare that they generally expected to pay.

Second, degrees of freedom impose a constraint on estimation and hence on the practicality of the inclusion of dual or multiple fares. For these reasons, albeit thorns admitted, the average money cost of the transoceanic passage has been computed as the weighted combination of the costs to assisted and to those unassisted (other than by the contract rate). A more detailed discussion of these series may be found in Appendices 4.A.1 (especially Table 2 and associated text) and 9.A.2.

The money cost of the transoceanic passage needs to be deflated to its 'real' value. At first glance the obvious way is to deflate the money costs of the voyage by the UK consumer price index. But such a procedure does not allow for the constraining effect of the household budget on emigration, whereas some empirical work (Pope, 1968), suggests that household liquidity has an important multiplicative impact on passage costs and the ability to emigrate. Money costs should be set against, i.e., deflated by, the liquidity base of the household. The size of this base depended on liquid assets including savings from the earnings streams. It depended too on the ease with which other less liquid assets, for example houses, could be converted into liquid ones. But as a first step, the financial ability constraint has been defined as the nominal savings from human capital during the current and preceding year. Because of the nexus between savings and income received, these savings can be measured by UK money wage rates corrected by the likelihood of employment in the UK.

To summarize, it is hypothesised that UK migration was negatively
related to the real costs of transport\(^1\), and the proposed measure of such costs is,

\[
TC_t = \frac{N}{M} \left( \frac{\omega^a PC^a \omega^c PC^c}{t} - \frac{GS}{N} \right) + \frac{M-N}{M} \left( \frac{\omega^a PC^a \omega^c PC^c}{t} \right) / \sum_{j=1-U_j}^{t-1} (1-U_j) \frac{NW}{M} \frac{UK}{j} \quad (6)
\]

where,
- \(TC\) = expected real transport costs met by the migrant
- \(N\) = numbers assisted
- \(M\) = total number of migrants
- \(PC\) = shipping company contract rate
- \(GS\) = UK plus Australian government outlays on passage subsidies
- \(NW\) = nominal wages
- \((1-U)\) = likelihood of employment
- \(\omega\) = weights
- \(a\) = adults
- \(c\) = children
- \(UK\) = United Kingdom
- \(t\) = time, measured in years

If \(GS\) is decomposed into Australian outlays, \(G^A\), and outlays by the UK, \(G^{UK}\), and if these outlays are expressed in per migrant terms, \(SP^A = G^A/M\), and \(SP^{UK} = G^{UK}/M\), then by the manipulation real transport costs may be rewritten as\(^2\),

\[\text{average fare paid by an assisted migrant} + \text{average fare paid by an unassisted migrant} / \text{ability constraint} \]

\(^1\) One fair objection to this estimation procedure is that the average fare partly reflects a weighting system which is an \textit{ex post} one: average fares are defined by those who actually moved and thus may not reflect the costs of moving as perceived by all potential movers. But as there were different rates for different berths (from 'first class' to 'steerage' and variations within these), and different rates for children and adults plus different levels of subsidies, some method of weighting was required in generating a macro hypothesis.

\(^2\) Expanding the numerator of equation 6, that is,

\[
\frac{N}{M} \omega^a PC^a + \omega^c PC^c - \frac{GS}{N} + \left( \frac{M-N}{M} \right) \omega^a PC^a + \omega^c PC^c \quad (1)
\]

yields

\[
\frac{N}{M} \omega^a PC^a + \omega^c PC^c - \frac{GS}{N} + \left( \frac{M-N}{M} \right) \omega^a PC^a + \omega^c PC^c \quad (2)
\]

As common weights were used for assisted and unassisted adults and for assisted and unassisted children then,

\[
(\omega^a PC^a + \omega^c PC^c) \left( \frac{N}{M} + \left( \frac{M-N}{M} \right) \right) - \frac{GS}{M} \quad (3)
\]

that is

\[
\frac{\omega^a PC^a + \omega^c PC^c}{M} - \frac{GS}{M} \quad (4)
\]

or

\[
\frac{\omega^a PC^a + \omega^c PC^c}{M} - (SP^A + SP^{UK}) \quad (5)
\]

Readers might find equation 6 easier to comprehend. Equation 7, however, is easier to handle when deriving the reduced form equations needed to estimate the simultaneous equations model explored in Chapter 9.

The data used in estimating \(TC_t\) are given in Appendix 9.A.2, Table 4.
Search costs: In addition to the cost of transport, migrants faced another financial outlay, namely their expenses during the period spent in searching for a job. Some search costs may have been incurred prior to embarkation, but of major concern were the costs following disembarkation. There were two components of such costs, the duration of the search and the cost of searching, and while it was not feasible to assign dollar values to search outlays, it was possible to construct a series reflecting changes in both these components. Variation in living costs during this period of search are indicated by the Australian Consumer Price Index. Fluctuations in the time involved in search would have varied with the number of vacancies less the number of job seekers, and can be measured crudely by the proportion of the Australian workforce unemployed, \( U^A \). However, the functional form of the \( U^A \) series was modified to more closely mirror actual search time. First, because of rigidities in the labour market, when unemployment was low further reductions in unemployment may not have indicated the increased number of job vacancies becoming available to the same extent as did falls in \( U^A \) when unemployment levels were higher. The \( U^A \) series can be stretched at its lower values to reflect these circumstances. Second, in times of extremely high unemployment, local knowledge is vital in discovering the few available job openings. As new settlers, migrants' lesser knowledge of local conditions disadvantaged them more than at other times. Stretching the \( U^A \) series at high levels of unemployment would allow for this. Thus if the \( U^A \) series were stretched at both extremities, it would more closely reflect the time involved in searching for jobs. Such a transform of \( U^A \) is

\[
ST_t = \left( U^A_t - \bar{U} \right)^2 \cdot \frac{\left( U^A_t - \bar{U} \right)}{|U^A_t - \bar{U}|} \quad (8)
\]

\[
TC_t = (\omega^a PC^a_t + \omega^c PC^c_t) - (SP^A_t + SP^{UK}_t) / \sum_{j=t-1}^{t} (1-U^{UK}_j)NW^{UK}_j
\]
where,
\[ ST = \text{an index of search time} \]
\[ U^A = \text{proportion of the Australian workforce unemployed,} \]
\[ \bar{U} = \text{mean level of } U^A \text{ during the sample period}. \]

The squared deviation term performs the function of stretching the unemployment function at both extremities, but in so doing eliminates the information on whether \( U^A_t \) is above or below the mean level, \( \bar{U} \).

The modulus deviation term restores this information. If \( U^A_t > \bar{U} \), the modulus deviation term takes on a value of +1, whereas if \( U^A_t < \bar{U} \), its value is -1.

The liquidity base of households also affects search costs, since search costs, like the passage expenses, had to be met before Australian wages were received. Taking into account then the cost of living, the period of job search, and the financial ability constraint\(^1\), variations in real search costs are indicated by

\[
RSC_t = CPI^A_t \cdot (U^A_t - \bar{U})^2 \cdot \frac{(U^A_t - \bar{U})}{|U^A_t - \bar{U}|} / j \sum (1-U^UK_j)NW^UK_j \quad (9)
\]

where,
- \( RSC \) = expected real search costs
- Other symbols as previously defined.

**Forgone earnings:** Finally, the costs of relocating in another country also include earnings forgone during the ocean voyage and during the period of job search in Australia. One measure is

\[
FME_t = (1-U^UK_t)(NW^UK_t/CPI^UK_t) \cdot PT + ST \quad (10)
\]

where,
- \( FME \) = forgone earnings
- \( PT \) = passage time
- \( ST \) = search time
- Other variables as previously defined.

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\(^1\) The financial ability constraint on search costs can be measured in the same way as that for transport outlays which must be met before departure from the UK. Although search cost outlays were made in Australia, no allowance for exchange rate variation is necessary because of the parity of the pound sterling with the Australian pound which prevailed prior to 1931.
Pecuniary relocation costs and normal living expenses: Some of the pecuniary relocation costs discussed above overlapped, and there is a danger for this reason of misrepresenting their total impact. For regardless of whether an individual moved or not, he still incurred the normal expenses of living, NLE, namely food, shelter, fuel, light and so forth. The real costs of relocating are the supramarginal expenses that an emigrant would not have incurred had he stayed at home. One method of taking this into account would be to subtract NLE from aggregate pecuniary costs. However, this is not in fact possible, since not all the pecuniary cost series are in dollar values. One adjustment which is possible however is to subtract the costs the emigrant would have incurred if he had remained at home from what he would have earned had he not emigrated.

1 This point might be expanded by way of a simple example. Suppose there were two brothers with identical consumption habits and one migrates while the other remains at home. Suppose too, that passage and search time, (PT+ST), amounts to two months. In the ensuing 8 weeks both consume the same 'quantity' of shelter, food, fuel and so on, the difference being that the brother who migrates pays the shipping owners, and foreign shop and innkeepers instead of his traditional suppliers (whom his brother continues to use). And, unlike his brother, he does not earn a wage. Extra costs are of course incurred. In addition to paying the shipping company for shelter, food, light, etc., he must pay them for their principal task of conveying him to his destination. And he might purchase other items, perhaps a new suit of clothes, which his brother, secure in his old job, does not. The main point of the tale is that the pecuniary costs of relocation incurred over the period from departure to locating a job are overstated by the normal living expenses which he would have incurred if he had stayed at home. The supramarginal costs - which are the real costs of relocating - equal the total costs minus normal living expenses, viz.,

\[ K = \text{transport costs} + \text{search outlays} + \text{forgone earnings} - \text{NLE} \]

where, \( K \) = pecuniary relocation costs
\( \text{NLE} \) = normal living expenses
\( k \) = normal living expenses per week
\( x,y \) = number of weeks

This need to count only supramarginal outlays in adding up relocation costs is noted in L.A. Sjaastad, 'Costs and Returns of Human Migration' Journal of Political Economy, Vol. LXV, (Supp.1, October, 1962) pp. 80-93.
In these circumstances what then needs to be added to transport and search costs to yield aggregate pecuniary costs, is not forgone earnings, but forgone saving. As this amount would have been comparatively small relative to transport plus search costs,¹ there is perhaps no great harm in omitting it from further consideration — given the severe constraint of degrees of freedom in estimating my model, and hence the need to prune the model of the least likely determinants of supply. Another reason for regarding forgone earnings as the relocation cost which loomed least prominently in the decision to migrate is that potential migrants most probably did not view all the relocation costs in the same light. Search costs differed from transport costs in being a less certain magnitude, but both involved direct cash outlays which could only be met by migrants with an adequate liquidity base. Forgone earnings were in a very different category, for they were not a cost in the sense of involving out-payments. They were less immediate and less perceptible, and it seems reasonable to postulate that potential movers placed less weight on such indirect costs compared to direct cash outlays. In summary then forgone earnings (or forgone savings) can be seen as the least important relocation cost, and in conserving degrees of freedom their impact on migrant supply is not explored in Chapter 9. The hypotheses to be tested in Chapter 9 focus then on three relocation costs, TC and RSC, and psychic costs, F. Finally, to derive the aggregate supply response of individuals to these costs, each should be multiplied by n, the reservoir of decision makers.

¹ From the equation in the preceding footnote, transport plus search costs roughly equalled normal consumption during the relocation period plus some supramarginal components. Relative to these therefore savings, during the relocation period, would have been minor.
I turn now to three other influences on the short run supply of UK migrants - the impact of other countries and the effect of risk and of information flows.

**Competition for UK migrants**

So far the analysis of the decision to migrate from the UK to Australia has been conducted as if there was for each potential migrant only one pair of alternatives - to reside in the UK or to reside in Australia. But UK migrants journeyed to other countries within the Empire, and indeed to all parts of the world. From Chapter 3, it will be remembered that the main destinations, other than Australia, were Canada, New Zealand and the US, and these therefore may have been regarded as substitutes by decision makers in the 'reservoir' of potential movers to Australia. If this was the case, then the attraction of rival countries should also be taken into account in specifying the Australian-UK migrant supply function.

It might be hypothesised that decision makers (roughly) evaluated the present value of their expected income in Australia less the costs of relocating in Australia and compared this with the present value of their expected income less relocation costs for destinations other than Australia, as well as with the present value of their expected income if they remained in the UK. All these comparisons may be algebraically grouped and summarised in the following fashion:

\[ \text{ERRATA} \]

1 Strictly speaking internal migration within the UK was an alternative to emigrating overseas or 'staying put'. The superscript, i, can thus also be interpreted as overseas competitors for UK migrants but also alternative destinations within the UK.

2 The second line can be regarded as condensed from a comparison of each overseas destination with the UK. For instance \( RYD^1 \) is the difference between the present value of income to be earned in Australia compared with that to be earned in country i. Letting \( RY = \text{real income} \), \( A = \text{Australia} \), \( C = \text{Canada} \), \( UK = \text{United Kingdom} \) then we could expand this to

\[ [RY^A - RY^UK] - [RY^C - RY^UK] \]

But of course this is simply \( RY^A - RY^C \).

**ERRATA**

Four pages are wrongly numbered. Read in order 409 - then 411, 410, 413, 412
prevailing level of incentives.\(^1\)

Second, for others in the reservoir, a combination of factors such as cultural affinities, family connections, prospects of entering a particular vocation and so forth meant that there was only one alternative to remaining at home, that is to say that the range of alternatives were not considered. Some may have only looked at prospects in Australia. For this group, of course, the comparison of Australia with alternative or rival destinations would be irrelevant and the simpler two country model is adequate.

Third, there were those who evaluated two or more alternatives to 'staying put', and it is for this group that we require the second line of the above equation. For those for whom one particular alternative residence (after considering all alternatives) was clearly the best alternative to going to Australia, only variables relating to that particular country enter their supply function. However, in an aggregate supply function, \(M\), different subgroups of the UK reservoir would have regarded different countries as the best alternative.\(^2\) Therefore variables relating to all the alternative destinations need to be included. Further, there would have been a group for whom all, or nearly all, alternative destinations would have been equally good alternatives.\(^3\) Likewise on account of this group, variables relating to all alternative destinations need to be included.

Regrettably the inclusion of all variables is just not practical. Even if variables were restricted to those in equation 11\(^A\) and the alternative destinations were limited to NZ and North America this would involve the inclusion of 12 new variables.

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1 The regression equation may be interpreted in the following way: that if higher incentives had prevailed than were the case, more persons in the reservoir would have been stimulated to seriously consider migration - in short the subset who never considered alternatives to 'staying put' would be smaller.

2 For instance, if for a subgroup of potential movers, NZ is much preferred to the US, and NZ is seen as the best alternative to residency in Australia, then for this group their supply function of migrants for Australia includes NZ variables, but US variables (below some threshold) are redundant. However as there were certainly other subgroups for which the converse was true, then the aggregate function must include all variables.

3 i.e. if all countries were equally good alternatives, then the decision to migrate to Australia was affected by marginal variation in variables relating to any alternative country of residence.
\[ W^* = a_{0}^* + a_{1t} n_{t}^{\text{RVD}} + a_{2t} n_{t}^{\text{TC}} + a_{3t} n_{t}^{\text{PSY}} + a_{4t} n_{t}^{\text{SCE}} \]

UK and Australian comparison

\[ + \sum_{i=1}^{I} \gamma_{i}^{11} n_{t}^{\text{RVD}} + \sum_{i=1}^{I} \gamma_{i}^{21} n_{t}^{\text{PSY}} + \sum_{i=1}^{I} \gamma_{i}^{31} n_{t}^{\text{TC}} + \sum_{i=1}^{I} \gamma_{i}^{41} n_{t}^{\text{SCE}} \]  \hfill (11^a)

Comparison between Australia and alternative destinations

where,

\( \alpha, \gamma \) = coefficients

\( \text{RVD}_i \) = present value of expected real income difference between Australia and country \( i \)

\( i \) = running subscript covering alternative countries to Australia

Other symbols as previously defined.

Three points may be made with regard to the comparisons outlined above. First, the equation does not imply that all decision makers in the reservoir, \( n_t \), energetically evaluated the prospect of residence in alternative countries. On the contrary, for some, the combination of liquidity problems, poor information flows on conditions overseas, and psychic attachment to 'remaining put', meant emigration was not an alternative, at least at the

\(^1\) viz., UK household heads in the 20–44 years cohort.
(which cannot be observed), I have not been able to explore these considerations. To the extent that these theoretical effects of risk counterbalanced one another, the omission is perhaps not so great.

Lags and information flows

In addition to lags resulting from the way expectations were formed about income differences, RYD, it is likely that there were also lags in migrants' responses to both income differences and the costs of relocation arising from delays in the receipt of information concerning Australia and likely passage assistance, from habit persistence\(^1\), and the time absorbed in transferring residence.\(^2\) A priori, it is not feasible to specify the average lag structure of RYD or of the relocation costs. In the empirical chapter an attempt is made to directly estimate these. One problem might however be noted here. It is only feasible to estimate the average lags. But in practice information lags, for instance, may have varied from one year to the next. Regrettably little can be done to overcome this difficulty. To the extent that information was transmitted by friends and relatives then, the speed of the information flow is perhaps partly captured by the friends and relatives variable in the model, \(F\).\(^3\) Another and more direct measure of information flows, which could be incorporated as a separate supply variable, is government outlays on advertising. But unfortunately it has not proved feasible to construct a series on advertising outlays because for some states and in the postwar period, for the Commonwealth government, the advertising account was merged with other accounts associated with the migration programme.\(^4\)

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\(^1\) The lag due to habit persistence is the delay between receipt of information and making the decision on whether to emigrate. See J. Kmenta, *Elements of Econometrics*, New York, 1971, Section 11-4 'Distributed Lag Models', for a survey of some of the attempts to model adaptive expectations and habit persistence lags.

\(^2\) This is the delay between the decision to immigrate and disembarkation due to the time required to dispose of assets not being transferred, to pack belongings, and to make the oceanic voyage.

\(^3\) If this is so then \(F\) cannot strictly be interpreted as a psychic costs variable.

\(^4\) Principally they were merged with administrative charges associated with passage subsidies.
An option which conserves degrees of freedom is to treat UK emigration to the whole set of rival countries as an index of their attractiveness,

\[ M^{AL}_t = E^{UK}_t - M_t \]  \hspace{1cm} (11^B)

where,

- \( M^{AL}_t \) = competition for migrants
- \( E^{UK}_t \) = UK gross outflow to all destinations
- \( M_t \) = UK gross outflow to Australia
- \( t \) = time, measured in years

At least two problems are encountered with this specification. First, this formulation, in which migrations to alternative destinations are unweighted, suggests that immigrants to the US, Canada, NZ and other destinations were equally partial to Australia as an alternative destination. Second, this method involves a simultaneity problem in that migration to Australia did indeed reduce numbers going to the alternative destinations.

Risk and the dispersion of job offers

Another aspect of population transfers is risk. In a recent paper, Paul David has suggested countervailing impacts on utility from the 'riskiness of labour markets', as measured by the dispersion of job offers. For a given level of net benefits, greater risk reduces utility of the typical risk averting household. But, for a given mean of the distribution of job offers, greater risk raises net benefits by increasing the expected maximum wage offer received by job searchers who sample more than one offer.\(^1\) In the absence of data on the spread of job offers for each category of employment in Australia and the UK, and on the shape of searchers' utility functions

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\(^1\) See Paul David, op.cit. for assumptions behind his arguments. It is the latter favourable effect of risk on utility, even for risk averters, that had been overlooked prior to David's important study of the theoretical considerations.
Supply conjectures summarised

Before turning to the other blade of the scissors, Australian demand for population transfers, my conjectures on the supply of UK migrants might be summarised. I have suggested that the supply of UK population was a function of the present value of net gains to human capital as viewed by decision makers in the reservoir of potential movers. The gain from moving may be gauged by a real income difference that takes into account wage rates and years to retirement, hours worked and employment likelihoods. The losses from moving consist of psychic and pecuniary costs. The number of past friends and relatives who have previously migrated is an indication of the extent to which psychic costs were alleviated. There are three components of the pecuniary relocation costs - transport costs, search costs, and forgone earnings. The empirical enquiry of Chapter 9 concentrates on the first two pecuniary costs.

The pecuniary gains and losses associated with moving, should, I have suggested be deflated - that is the gains and costs should be expressed in real terms. The gain from moving, I have hypothesised, involved expected earnings which can best be converted to real terms via consumer price indices.¹ But, bearing in mind the liquidity constraint on moving, the most useful deflater of the two pecuniary costs (which involved cash outlays), is not price levels but the ability (liquidity) to meet these outlays. For this reason the relocation costs have been deflated by a proxy for the ability to save - viz. the sum of earnings during the current and preceding year.

Finally, in order to take account of changes in the number of potential movers in the UK, and as a method aggregating their behaviour, I have suggested that there was an n-fold response (n being the

¹ Nor is there any need to adjust further by the exchange rate given the prevailing parity of UK and Australian currencies prior to 1931.

ERRATUM

Footnote 1a. The reader is reminded that the formula used to compute the real income difference is a proxy for the 'correct' unrecordable income difference.
number of household decision makers), to changes in the gain and in each of the costs of moving. There is, however, one change in the reservoir of potential movers to Australia that is not allowed for by this method. That is the attractions of other countries. In a rather rough and ad hoc fashion, it is hoped to incorporate some of these rivalries by using the UK exodus to countries outside Europe other than Australia as a general competitiveness index.

b) The migrant demand function, $M^d$

It might be recalled from the survey of the literature in Chapter 7 that the few researchers who have explicitly delineated demand functions for migrants have derived the relations, mostly or wholly, from 'free-market' labour economics. But a central theme of my story in Part 1 was that Australian governments intervened to attract population. Governments did many things which both directly and indirectly affected the inflow. They directly influenced the cost of transport, and by actions designed to prop up living standards and employment, governments also indirectly influenced wage gains and search costs to migrants. In this section an attempt is made to specify the set of factors and relations behind the demand for UK population transfers.

I suggested at the outset to this chapter, that the demand for migrants was an 'excess' demand for population. Thus the demand for UK arrivals, $M^d$, may be stated as Australia's total demand for population, $D_p^A$, minus Australia's total supply net of current UK immigrants, $S_p^A$,

$$M^d = (D_p^A - S_p^A)$$

1 It might be noted that the same aggregation hypothesis could alternatively be incorporated using $M^G/n$ as the dependent variable - simply divide both sides of my $M^G$ equation by n. Though mathematically identical, the two alternative formulations could still give somewhat different econometric estimates. For n is a proxy for household decision makers in the reservoir of potential movers and as such n could embody measurement error. In my case any such error is restricted to RHS variables, whereas the division of both sides of the equation by n would transfer any such error to the LHS, but as not all my supply variables have been adjusted by n ($M_{AL}^G$ has not), then some would remain too on the RHS. It cannot be determined, a priori, which formulation would minimise estimation errors associated with any measurement error in n.
where,

\[
\begin{align*}
M^d & = \text{demand for UK immigrants} \\
D_p^A & = \text{Australia's total demand for population} \\
S_p^A & = \text{Australia's total supply of population, net of current UK immigrants}
\end{align*}
\]

Demand for UK migrants, \( M^d \) could therefore vary either because of changes in \( D_p^A \) or because of changes in \( S_p^A \). Some simplification is necessary in formulating a hypothesis on the demand for migrants which conserves sufficient 'degrees of freedom' to enable reliable testing. Only those most important determinants of changes in \( M^d \) should be included.

Consider first \( S_p^A \). This comprises three elements, natural increase, the net inflow from non UK ports, and the outflow to the UK. It is my judgement that none of these elements had a major impact on changes in \( M^d \) during the period. The outflow to the UK was small and comparatively constant. Thus a priori one would not expect this factor to critically influence changes in demand for UK arrivals. Furthermore, a substantial proportion of those who departed were tourists and Australians visiting 'Home', most of whom were expected to return sooner or later to Australia. The second element mentioned above, the net inflows from non UK countries, showed some variability but the numbers involved were extremely small. For example, while movements to and from New Zealand were substantial, the actual inflow was more often than not cancelled by the outflow. The net inflow of Southern Europeans in the twenties did rise substantially and was indeed the cause of alarm. However, as I argued in Chapter 3, Bruce found the means (visas and landing money requirements), to control this inflow at its source. Finally, with regard to the first element, the rate of natural increase specifically the birth rate stirred the emotions of a vocal fringe at the beginning of the century. Nonetheless the secular trend was

1 For its constancy see Table 28 of Chapter 3, and accompanying text.
2 This is based on post 1925 data, see Chapter 3.
3 See Chapter 3. Given that this was the typical pattern it is presumed that policy makers thought that it would continue.
accepted by the public at large, and the literary evidence does not suggest any sensitivity in demand for UK immigrants to marginal (annual) changes in Australian birth rates. This is not to say that these factors can be lightly dismissed, rather it is to hint that in practice the emphasis in $M^d$ ('excess' demand) might be placed on $D^A$, Australian demand for population.

A number of difficulties surround the clarification and estimation of this function. What did the demand for population mean, how was it arrived at, and how was it expressed? In this regard governments provided the corporate machinery of the state (the stage and corridors of parliament) by which community, group and individual claims (including those of members), could be resolved. And by legislative enactments and ministerial actions, governments also provided much of the machinery to implement such resolutions. Bearing this in mind, the demand for population was not simply the separate demand of the 'public sector', but a 'public' demand reflecting the course of wants and pressures, and the resolution of these.

The formulation of public policy was complex. Groups and group claims were diverse; some were more cooperating than competing in nature\(^\text{1}\), and some were constantly voiced rather than variable forces behind 'policy'. The weights assigned to arguments in debate and the resolution of differing claims partly varied in accord with the political complexion of governments and of ministers, and varied too with the strength with which claims were pressed - which partly reflected the changing net gains of groups resulting from past resolutions and decisions.\(^\text{2}\) It is extremely difficult to quantify this decision making process, and hence the group valuation placed on UK immigrants, $V^M$. Nevertheless, my study of Australia's immigration and development policy in Chapters 5 and 6, distills the following, albeit extremely crude, valuation,

\(^{1}\) Few people, for instance, took exception to the argument that a larger population was needed if Australia was to be kept 'safe and white'.

\(^{2}\) An example of this is the willingness of 'labour' to support UK immigration in 1911-12, but its increasingly fierce opposition to migration programmes as unemployment, which it related to the migrant intake, subsequently rose.
\[ V^M = V^M(\alpha, \text{DEF}, \text{EMC}, \text{AQ}, I^G, T) \] (13)

where,

- \[ V^M \] valuation of the net benefits of \( M \), the number of UK immigrants
- \( \alpha \) factors which themselves did not change greatly from year to year; these include anticipated trends in natural increase, expected scale economies.
- \( \text{DEF} \) = defence and the threat of invasion
- \( I^G \) = public investment
- \( \text{EMC} \) = employment constraint, an index of trade union pressure to restrict the import of labour relative to employers' pressure on governments to relieve labour market tightness
- \( \text{AQ} \) = demand for rural labour (and infiltrators) by the farm sector
- \( T \) = concern with markets for output produced by the greater numbers.

The theoretical underpinnings of this valuation function, viz., its relation to the non observable social utility function, is explored in Appendix 8.A.1. Since detailed analysis of the factors behind Australian attitudes to UK immigrants has already been given in Chapters 5 and 6, those singled out for inclusion in the valuation are only briefly discussed below.

In time series analysis, it is not feasible to gauge the impact of those determinants which were relatively constant during my period. In this regard, Chapter 5 suggests that throughout these years, Australians saw little prospect of rapid growth in population from natural increase. Further, it was generally thought that a larger population fed by immigration would lead to scale economies in the provision of private and public goods, and that a larger population spelt too, a larger tax base. But such considerations, though positively influencing demand, were not volatile; they are grouped together in the constant term, \( \alpha \), the sign of which is postulated as positive.

Fears for the security of Australia - the maintenance of a safe and white Australia - were also persistently voiced throughout the period, UK immigrants being valued as defence assets. The evidence sifted in Chapter 5 did not however allow me to detect whether there were fluctuations in the defence need for migrants. To investigate this further an attempt has been made to quantify this need. Attitudes towards defence have been measured by current and past expenditure on
defence as a proportion of GNP.\(^1\) This measure, DEF, however, has two defects. First, the fear of invasion may not have been mirrored by actual outlays on defence. Second, it is uncertain whether defence expenditures and migrants were regarded as complements or substitutes. To the extent that they were seen as substitutes, defence outlays reflected two partially countervailing influences, and this would have diminished the extent to which the demand for immigrants rose in periods of higher defence outlays.\(^2\) In short, if there was some substitution effect, then using DEF as a proxy for the threat of invasion will probably lead to an underestimate of the extent to which defence fears augmented the demand for migrants.

The next three factors that have been included, government investment, the employment constraint, and harvest conditions, partly indicate the role of labour market conditions in moulding Australian attitudes to population increments. Consider first public projects, \(I^G\). Government construction constituted predictable and assured jobs for a growing workforce\(^3\), while the resultant infrastructure met the needs of a growing population. Hence it is conjectured that the more public works in progress, the happier governments and the public at large were to receive migrants. This relation is amplified a little later.

In the instance of group pressure to quicken or slow the import of labour, EMC, pressure from employers fell and that of employees strengthened as the labour market slackened, thus it is hypothesised that there was a negative relation between the desirability of UK transfers and Australian unemployment levels. Governments, however, did not act smoothly to marginal changes in the labour market. For instance, in terms of encouragement offered to immigrants, the doors were flung open following public enquiries into the shortage of labour in 1911/12, but slammed tight in 1929 by the Scullin government facing the opposite circumstances. It is hypothesised, therefore, that the impact of unemployment was disproportionately large when labour shortages or surpluses were acute. To reflect this response to extreme situations, the unemployment series should be stretched at both ends. This can be effected by a signed quadratic function

\(^1\) These outlays have been summed over a five year period and netted of expenditures incurred during WWI and as a result of it (repatriation payments, war service homes, soldier settlement and so forth).

\(^2\) Insofar as migrants and defence outlays were substitutes, although rises in defence outlays heralded heightened defence fears and therefore demand for migrants, rising defence outlays also meant more of the substitute input (armaments etc.), and hence less defence need for immigrants.

\(^3\) Private enterprise employment requirements by contrast, could not be so readily gauged in advance.
(see the discussion above of equation 8). Accordingly, this functional form was chosen to represent the employment constraint, EMC.

My hypothesis with regard to conditions in the farm sector is that the demand for rural labour (and indirectly land infiltrators), was positively related to harvest prospects as measured by AQ, a combination of agricultural output in years t and t-1.

The final factor, 'concern with markets', T, has been measured by a binary variable, for from the beginning of the twenties, concern was voiced that might be likened to a descending cloud, the descent occurring after WWI. A binary or dummy variable might capture this change in attitudes, and, if so, the sign of its coefficient would be negative. Unfortunately the estimated coefficient of such a variable may reflect shifts due to other factors, and in this sense the binary variable is a measure of the researcher's own ignorance. Some readers might choose to interpret the factor T more generally as an 'attitudes-time', rather than as an 'attitudes-trade' dummy.

Demand also depended on the ability of governments to finance immigration. The exploration of government financing arrangements in Appendix 4.A.1 and Chapter 6 revealed that each government used a customary source - typically Consolidated revenue or general loan funds. However, because many public projects could be switched between consolidated revenue and loan funding if the need arose, the effective financial constraint on migration spending was the magnitude of all sources of funds. Thus the overall financing identity of the Australian state and Commonwealth governments might be written as

\[ p_M M + \sum p_i R_i = T + \Delta E \quad (14) \]

where,

- \( p_M \) = net monetary cost to government per UK immigrant attracted
- \( M \) = immigration
- \( p_i \) = net unit monetary cost to government of the \( i^{th} \) project

1 State budgets contain an additional revenue source, grants from the Commonwealth. However, such grants are negative revenue to the Commonwealth government, and hence cancel out if the overall revenue of the states plus the Commonwealth is being computed.
\[ R_i = \text{\textsuperscript{i}th non migrant public project} \]
\[ \bar{T} = \text{net taxes, viz., gross taxes minus transfer payments} \]
\[ \Delta E = \text{value of new government bond issues} \]

To see more clearly the impact of this constraint on demand for UK population additions, equation 14 may be re-expressed as,

\[
M = \left( \bar{T} + \Delta E - \Sigma p_i R_i \right) / p_m \tag{15}
\]

The financing identity indicates then that demand depended on available funds relative to the unit price or cost of a UK migrant. Funds available in turn depended on total funds less expenditures on 'non migrant' projects. In practice the distinction between migrant and 'non migrant' projects was never clear cut.

Concerning total funds available, it might be thought that Consolidated Revenue or Consolidated Revenue plus loan funds depict directly governments' financial constraint. However it must be borne in mind that these funds depended partly on the tax rates and loan arrangements consciously chosen by governments; the magnitude of funds was partly determined by governments.\(^1\) To this extent the total size of revenue and loan funds is a somewhat inadequate measure of a 'brick wall' budget constraint which cannot be gotten around. More akin to the economist's concept of a constraint are those elements shaping the size of governments' spending potential but which were, by and large, externally imposed, i.e., exogenous.\(^2\)

---

\(^1\) Governments could change the sales tax rates on goods and services, rate of levies on imports, rate of tax on incomes etc. They were also free (though typically they took the advice of their London advisors), to vary interest rates and the term structure of bonds.

\(^2\) Ideally it is only these exogenous aspects that enter the public demand for UK migrants. Analogously, an individual's demand function is expressed exclusively in terms of variables outside his control (exogenous factors) For the demand function is a behavioural or causal statement indicating how that individual's planned purchases will change as forces in the outside world change. Thus if some of the prices or income are controlled by the individual (endogenous factors), these variables will not appear in his demand function. See, for instance, J.M. Henderson and R.E. Quandt, Microeconomic Theory - A Mathematical Approach 1971, (eqns.6-10), p.170, and the Coldwell Daniell, Mathematical Models in Microeconomics, 1970, pp.18-26. There is no dispute that only exogenous aspects of income constraints should enter demand functions. In practice the issue, it seems to me, is whether using proxies for the purely exogenous components leads to more errors than the simultaneity bias inherent in treating total funds as the constraint.
Now in this regard governments' financial ability to levy taxes was very largely influenced by changes in real and nominal income (see Table 42, Chapter 6)\(^1\), and a case might also be made for thinking that ease of borrowing was also influenced by income performance.\(^2\) As a crude first step toward quantifying the exogenous determinants of funds available to promote UK immigration, an unweighted sum of real and nominal income may be used as a measure of the budget constraint, BC. It must be immediately acknowledged that the distinction between those elements in the spending capabilities of governments externally imposed and those which were endogenous, is a thin one. Governments did not see the level of incomes as completely exogenously determined. Rather it is a matter of degree. They perceived fluctuations in income (hence indirectly spending abilities) very much more as being outside their control than say, the scope for raising the rate of customs or land duties; in this sense the BC variable might be expected to capture governments' reactions to changed budgetary circumstances outside their realm of influence. Nonetheless, for those readers who find these points tenuous, the BC variable might also be interpreted more generally as a 'wealth' factor operating on the rate at which population additions could be financed and absorbed.

The second element in the finance identity, equation 15, is the average cost or price per arrival and at first glance this term seems more difficult to quantify than the budget constraint. I focus upon the most direct price paid, passage outlays per migrant, \(SP^A_t\). Past writers have speculated on the significance of these outlays. But their importance has never been quantitatively investigated, because

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\(^1\) Some components of the aggregate nominal tax base depended chiefly on the level of nominal income, e.g., income tax, and ad valorem custom duties; others depended more upon real income levels, e.g., indirect taxes and specific (per item) custom duties.

\(^2\) Rising income increased the supply of domestic savings, and output performance influenced the attractiveness of Australia in the eyes of UK and US investors. Other factors, such as inflation and competition (in Australia from private borrowers, and in the UK and US, from rival government borrowers) may also have caused shifts in the savings schedules for loans issued by Australian governments. However, with my short data series, only the principal exogenous determinants of the budget constraint could be included.
Cat least in the case of Pope, 1968), a series has not been readily available. Appendix 4.A.1 now provides the necessary data. My focus on $S^{P^A}$ as the bid can be questioned. For many other actions were also intended to achieve population goals, most prominently the tariff and public works. Hence the price paid for migrants might be viewed as a vector of all the costs of programmes relating to population objectives. Such costs could be described as a submerged iceberg of payments for migrants, passage subsidies being the exposed tip. As such the tip gives a misleading impression of the bulk and scale of the venture to people Australia.

Yet there are certain subtle differences which I think should be pointed out. Remember that in speaking of the price paid I am talking of outlays consciously recognised by those of the times as prices which influenced variation in the annual demand for UK migrants. Take first the Australian Tariff. Did annual changes in the tariff consciously influence the numbers of new settlers 'wanted'? Further, in the context of 'costs' or 'prices', did the implicit cost of the tariff, that is its misallocative effects, influence annual variation in the demand for UK immigrants? The tariff, I suggest was part of an overall longer term strategy of development and population growth (albeit it also supported jobs of residents and generated government revenue). But it was not something which consciously influenced year-to-year changes in the quantity or number of new settlers 'wanted'. Further, it was not until the late twenties and the release of the Brigden Report and that of the British Economic Mission (both in 1929) that Australians were even aware of the 'price' of the tariff in fostering population growth; the Report marked a turning point in longer term attitudes towards immigration. On the side of demand, the tariff and attitudes towards its associated benefits and costs, influenced more the secular trend in the demand for immigrants - not the short term quivers in demand. And it is with the quivers or the annual variation in demand that the model and regression analysis are concerned. This of course, is not to suggest that the tariff did not influence short term variation in the supply of immigrants, or that the secular demand for immigrants is unimportant to my story of the peopling of Australia. Both these points are taken up in
subsequent pages, particularly in Chapter 10 where the regression estimates and literary evidence are brought together.

In the instance of public investment there is a stronger case for thinking that short term or annual variation in this variable influenced demand from one year to the next. The direction of influence, however, is critical. I have postulated that this direction was positive not negative which is to say that investment did not belong to the domain of things which decision makers of the day construed as 'prices' or costs of the migration programme. Investment instead was a positive influence on the demand for people - the higher the level the happier and easier it was for Australia to absorb more people. Rationale took the form of a simple argument 'if we have a big house then we are happy, indeed anxious, to adopt more children'. But the cost or price per room received scant attention. In general, governments were somewhat cavalier about the costs of schemes. Moreover investment programmes were broader in purpose than the direct outlays (assisted passages) on encouraging immigration; this obscured the marginal costs attributed to migrants per se. Thus while investment should be included as a determinant of short term variation in demand, it should be entered as a positive influence not as a negative one.

$SP_A$, then, as the short term conscious price more closely matches the concept of 'price' in a demand study than at first appeared to be the case. One final point might be made. Although passage subsidies were the main component of direct outlays, representing on average about two thirds to three quarters of the total outlays$^1$, a case could be made for taking the latter as the 'price'. My reason for not doing so is that the remainder mostly comprised lumpy administrative costs of staff and office space which

$^1$ These are total outlays exclusive of development schemes under the Empire Settlement Act which are treated in the genre of investment. For a discussion of the extremely ad hoc method of financing these (there was certainly no conscious annual price bid), see notes accompanying Tables 4 and 5 of Appendix 4.A.1.
reflected more the longer term expectations of the number of migrants wanted than an annual bid.\(^2\)

Accordingly, it is hypothesised that 'public demand' expressed by governments reflected three components,
- the factors outlined in the valuation function (equation 13)
- the budget or wealth constraint
- the direct price paid per migrant in the form of passage subsidies.\(^2\)

The postulated demand relation is thus,
\[
M^d = M^d(\alpha, DEF, EMC, AQ, I^G, T, BC, SP^A) \tag{16}
\]

where,
- BC = budget constraint
- SP^A = Australian subsidies per migrant
- Other symbols as previously defined.

As I am particularly interested in SP^A, the demand relation might also be written and estimated in its inverse form - that is, with SP^A isolated on the left hand side,
\[
SP^{Aid} = SP^{Aid}(B^j, M) \tag{17}
\]

where,
- B^j = other terms on the RHS of equation 16
- id = inverse demand
- M = immigration

---

1 For instance, Percy Hunter cabled the following dispatch to the Prime Minister's Department in February, 1922

In try out organisation since the beginning of the year have approved over 1,000 souls nominated and selected weekly thus covering rate 50,000 yearly. Same machine could handle 100,000 comfortably. No intention of course of doing anything beyond requisitions of the states but thought figures would be of interest. You inform Prime Minister

Prime Minister's Department, Correspondence file, multi number series (Second system): 'Immigration encouragement policy. Nominated and assisted passages', 1919-1926 Commonwealth Archives Office: CRS A458, item A154/6.

2 Some readers may prefer to label SP^A as an average cost. I prefer the term 'price' to stress the institutional decision making process behind the parliamentary estimates of outlays and the changes in these during the year (see Chapter 4). Officers of the immigration bureaus and of Treasury did draw up, albeit roughly, 'demand relations'.
In other words, the proposition 'quantity demanded is a function of price and other variables', has been stated in the alternative form, 'price is a function of quantity and other variables'. Certain other aspects of price determination, specifically governments' oligopsony power in bidding for UK immigrants and their control of subsidies per migrant, as distinct from subsidy per assisted migrant, are discussed in Appendix 8.A.2.

Demand conjectures summarised

My conjectures on the determinants of demand for UK population transfers might now be summarised. These are entertained within the context of an 'inverse demand function', $SP^A_t$ being taken as the 'price' and the dependent variable (on the left hand side) of the equation. There are many problems in conceptualising and quantifying such a concept as 'Australian demand' and many simplifications have been necessary in formulating a hypothesis capable of being tested. Some readers for these reasons may wish to view equation 17 as nothing more than an 'explanation' of why $SP^A_t$ changed rather than as an 'explanation' of changes in demand. The intention of this writer, however, is to advance it as a hypothesis of the determinants of the desire to people Australia.

Some of the forces behind demand were fairly constant and their influence can only be assessed crudely by the significance of the constant term, $\alpha$, in the regression equation. The variable influences are the focus of the empirical analysis. It is conjectured that short term variation in the demand was determined by:

- the threat of invasion
- the pace of public investment
- employee-employer group pressures regarding immigration
- the requirements of the farm sector for rural labour
- the budget capabilities of governments, and
- concern with markets

The particular series chosen to represent government budget considerations, BC, and markets, T, might be more broadly interpreted as a general wealth constraint and a time trend effect, respectively.
Two questions remain. It should be remembered that the supply and demand functions of population offered in the preceding pages of this chapter are ex ante theoretic concepts. They relate to the intentions or plans of suppliers and demanders. The first question then is whether intentions were realised. If they were, then the observed flow of migrants and observed average passage subsidies paid may be taken as accurately gauging the ex ante concepts. On the other hand if they were not, then the actual historical data does not lie on the theoretic supply/demand curves, hence one cannot estimate these functions at all accurately. The second question is how the supply and demand functions for UK population transfers related to the market for UK migrant labour. Although my focus is on people, not simply labour, the two should still be tied together; the interrelations are in fact important in deriving and estimating the reduced form equation of which more is said in Chapter 9.

Returning to the first question, did the market enable those planning to migrate to do so, and did it operate so that demand for migrants was also satisfied?

The ex ante/ex post translations for \( M^S \) and \( S^Aid \)

In the case of the supply of migrant people, \( M^S \), since emigration was not compulsory, the ex post \( M \) series cannot exceed supply, but it may have fallen short. This latter situation would have occurred if people had been willing but were physically prevented from emigrating. No quotas or other restrictions were imposed on UK migrants. However, immediately before the war, especially in 1911 and 1912, there is some evidence of shipping shortages.\(^1\) Exactly how severe this problem was cannot be gauged very precisely, but it is likely that in these years planned supply exceeded those actually arriving. Using observed arrivals to measure ex ante supply a priori is likely

to lead the model to overpredict numbers of immigrants at this time. But these years are exceptions rather than the rule. Overall those who opted to come did come; supply intentions were realised.

What of population demand? Did the 'desired' numbers arrive? It was argued in Chapter 4 that governments had targets, but that there was little fine tuning in numbers of migrants wanted, or in desired expenditure per migrant. Rather, demand was more in terms of a 'band': but that this was so in fact increases the likelihood that the *ex ante* targets were indeed satisfied by the numbers annually arriving and the subsidies received. For certain small subclasses of migrants - mainly lads for farm work and domestics - it does appear that targets were not met. However as discussed in Chapter 4, as price setters in this market, governments were free to increase their price bid for these classes if they genuinely considered that demand was not being met. But they did not raise their bids; hence these particular so called targets are spurious measures of demand. By and large, the aggregate demand for annual migrant additions to population was not, I think, much out of phase with the numbers arriving. Nor were subsidies out of phase with planned passage outlays. The Budget Estimates were not of course regularly met. But as I indicated in Chapter 4, this more often than not reflected changing intentions within the year; for instance, if unemployment increased, some applications were pigeon-holed or simply rejected. And by varying the numbers and classes to whom assistance was offered, governments could and did control total arrivals within the rough 'band' of numbers and expenditures 'desired'. In moving toward a longer term and more optimal distribution of population between Australia and the UK this writer's reading of the period is that there were not major discrepancies between plans and what eventuated - at least taking Australian demand as a whole.

It remains to ask how the market for UK migrant people related to the market for UK migrant labour.
Supply/demand functions for
UK migrant labour

a) The supply function of
UK workers

By definition, those migrants offering for work in Australia
were a proportion of the total supply of UK population arrivals. This
proportion, $\lambda$, reflected the workforce participation rates amongst
the UK population inflow. Thus,

$$ML_t^s = \lambda_t^M \cdot ML_t$$ (18)

where,
- $ML_t^s$ = supply function of UK migrant labour
- $\lambda_t^M$ = proportion of working arrivals in total
  UK arrivals
- $ML_t$ = supply function of total UK migrants

b) The demand function for
UK migrant labour

The demand for UK immigrant labour was, I argued at the outset
of this chapter, an excess demand, since UK and Australian workers were
very close substitutes. Thus, such demand reflected the total demand
for labour in Australia minus the supply of non UK labour offering
for work in Australia as expressed in equation 19 below,

$$ML_t^d = D_t^A - S_t^A$$ (19)

where,
- $ML_t^d$ = demand for UK labour
- $D_t^A$ = total demand for labour in Australia
- $S_t^A$ = total supply of labour in Australia exclusive
  of UK migrant labour entrants

In this expression, the supply of labour exclusive of UK entrants,
$S_t^A$, was drawn from the population comprising Australian residents and
net non UK arrivals, minus departures to the UK.\(^1\)

---

\(^1\) Remember this model, for reasons outlined in Chapter 3, deals
with UK gross inflows.
where, 

\[ P^A = \text{Australian population exclusive of this year's UK immigrants, viz., residents plus net non UK arrivals less the UK outflow} \]

\[ \lambda^A = \text{Australian participation rate in the workforce} \]

To simplify notation, for \( S^A \), the symbol \( W \) is henceforth substituted. The remaining term in the excess demand for labour is \( D^A_L \), the total demand for labour in Australia which can be decomposed into government demand and private demand. Government demand was mainly a function of public investment. In the case of private demand, it is posited that input and output prices and planned output were the general determinants; the particular private demand function for labour that I have used is a modification of Jorgenson's. 

Equation 21 summarises these conjectures,

\[ D^A_L = \beta_0 + \beta_1 I^G + \beta_2 \left( \frac{\Delta \text{GNP}^A}{\text{NW}^A} \right)_t \cdot \text{RGNP}_t + \varepsilon^M_L \]  

1 This supply has been measured by an Australian workforce series netted of current UK additions. After 1911, such a series could be constructed from Keating's work, see M. Keating, The Australian Workforce, 1910-11 to 1960-61, Canberra, 1973. For the period 1900-1910, I constructed a series. See Appendix 9.A.1 for details.

2 Recent developments in theory, supported by empirical studies suggest that employers' expectations of output depend too on what they have produced and sold in the immediate past. The evidence suggests that the past period over which expectations are formed is very short - less than four quarters, with expectations being principally based on the immediately preceding quarter. As only annual data of output are available for my period, the price ratio was adjusted by contemporaneous output. The classic study is F.P.R. Brechling, 'The Relationship Between Output and Employment in British Manufacturing Industries', Review of Economic Studies (July 1965, pp.187-216); for an Australian study, see R.G. Gregory, P.J. Sheehan, 'The Cyclical Behaviour of the Australian Labour Market', Third Conference of Economists, Adelaide, May 1973. Lagged output is also used in the Brookings Institute and Wharton School macro models.

where,

\[ \begin{align*} 
DGNP &= \text{GNP deflator, viz., output prices} \\
NW &= \text{nominal wages} \\
RGNP &= \text{real output} \\
\lambda &= \text{prices sensitivity parameter}^1 
\end{align*} \]

Finally, just as the question of 'intentions' as opposed to 'actualities' needed to be asked of the supply and demand for population transfers, a similar question must also be posed with regard to the transfer of UK labour inputs.

**Ex ante/ex post translations for UK migrant labour transfers**

In the case of the suppliers and demanders of population additions, I concluded that by and large intentions were indeed realised. But this is not so with regard to labour transfers - at least on the supply side.

On the demand side, Australian employers could not be forced to hire workers in excess of their requirements, and except perhaps at the peak of the prewar boom, Chapter 2 indicates that my period was not characterised by labour shortages. Thus the *ex post* numbers hired (with the possible exception of the peak of the prewar boom), did represent numbers demanded *ex ante*. But on the supply side there is a discrepancy between plans and outcomes; *ex ante* plans are not reflected, *ex post* in the actual number of workers hired.

In Jeffrey Williamson's labour migration model the assumption which is implicit is either there was no unemployment or all unemployment was 'voluntary' - changes in wages cleared the market. Whatever may have been true of the US labour market, such a theory is not apposite for Australia. Residents along with UK job entrants encountered a degree of involuntary unemployment. Thus some proportion of UK migrants offering for work in Australia (the supply being measured by workforce data of entrants) were not actually hired; plans were not realised. Wage rates did not fluctuate so freely as

---

1 Regrettably, it was not possible in the time available to empirically estimate this coefficient. \( \lambda \) was assumed to take on a value of .5. This was suggested from the findings of recent research into the Australian labour market by Norton and Henderson, 'A Model of the Australian Economy', *ibid.*
to equilibrate the labour market. The main conclusion to be drawn is that neo classical theory (of the sort employed by Williamson) is inappropriate in the case of Australia and that to complete my theoretical model a wage equation should be added.

Nominal wages in Australia were set by wage boards, tribunals and courts. As we saw in Chapter 2, awards were largely determined by two economic variables, unemployment and the rate of inflation - with a switch in emphasis from the former to the latter after WWI; from 1922 the basic wages was indexed to prices, though there were some claims made for secondary wages which were still largely assessed in terms of unemployment. Thus the 'price' in the labour market may be postulated as,

\[ NW_t^A = \phi_0 + \phi_1 U_t^A + \phi_2 U^A \cdot D + \phi_3 CPI_t^A + \phi_4 CPI^{A \cdot D} + \epsilon^{NW} \] (22)

where,

- \( NW \) = nominal wages
- \( CPI \) = consumer price index
- \( U \) = unemployment
- \( D = 0 \) pre WWI
- \( D = 1 \) after WWI

That the market did not clear indicates the presence of rigidities and the insufficient weighting of unemployment by wage fixing bodies.

Conclusions

The purpose of this chapter has been to present a model of the supply/demand relations behind UK immigration cognisant of the institutional framework and background conditions of Australia in the early twentieth century. The underlying issues are why immigrants came, why they were wanted and the role of government intervention in this process.

The list of omissions and simplifications is long, and the model does not capture all aspects of the canvas. Yet it is considerably easier to speculate on the determinants than it is to test them, and the object of this chapter has been to offer a set of hypotheses which are capable of test.

The starting point of the model has been the 'excess' or migrant demand/supply curves; migrant demand being the 'excess' or difference between Australian demand and supply of population and migrant supply.
being the 'excess' or difference between UK supply and demand for population. Such an approach is apposite to analysis and enquiry of migration in a period of close national affinities and of Empire Settlement. Also attention to the particular Australian institutional framework and to public policy goals have led me to distinguish between 'population' and 'labour'. The two were closely related - more population implied more labour - but the determinants of demand were not identical. The goal of public policy was not just to boost the contemporaneous supply of labour, nor were the 'price' and contractual arrangements in attracting population the same as in a demand schedule for hiring contemporaneous labour. In the following chapter my focus is on the population market and the peopling of Australia; the labour functions are, however, integrated into this study when deriving the reduced form equations for the final tier of my empirical enquiry of the population transfers.

Some adaptation of the theory of 'excess' supply/demand has been necessary. Points of equilibrium shown in Figures 21 and 24 were long term ones; when achieved migration would tend to cease. In the period from Federation to the Great Depression immigrants continued to arrive, although by the last years only at a trickle, and an implication of the Brigden Report was that Australia had reached her optimal population stock level. In dealing with annual data, my supply/demand functions, although based on the concept of 'excess' curves, describe more the speed of adjustment towards long term equilibrium.

Within this context, the model to be estimated casts its light on the determinants of annual change in the demand and supply of UK population transfers. It also probes further the role of government intervention. On the side of demand the links should already be clear; the dependent variable is subsidies offered by governments, \( SP^A \), the independent variables reflect the instruments and forces behind 'public policy' and the demand for more people. On the supply side, direct intervention is captured by passage subsidies, \( SP^A \), which altered the real costs of transport, \( TC \). Governments by their direct and indirect influence on wages, employment, hours of work and so on also affected the net gain to movers by raising the present value of the differential in real incomes, \( RYD \), and by lowering search
costs, RSC. Although the impact of this sort of intervention cannot be measured directly, the extent to which such variables prove to be significant determinants of supply hints at the impact of government intervention.

The conjectures I have advanced in these pages might finally be brought together and expressed more succinctly. The structural (or behavioural) equations, together with their ex ante/ex post translations and a list of the symbols used, are summarised in the following three pages. As the model is rather large and some of the variables complex, I have tried to summarise the literal meaning of the terms and these appear immediately below the equations.

Discussion and derivation of the reduced form equations of the model has been left to the next chapter.
A. Market for migrant people

Supply:

$M_t = a_0 + a_1 RVD_t + a_2 F_{t-1} + a_3 TC_t + a_4 RSC_t + a_5 AL + e_t$

$= a_0 + a_1 \left( \sum_{j=t-1}^{t-2} \omega_j \left( \frac{(1-U_j^A)(SP_j^A/SP_j^U)}{1/H} - (1-U_j^A)(SP_j^I/SP_j^U) \right) \right)$

benefits of migrating

relatives

$+ a_2 \left( \sum_{j=t-1}^{t-2} \omega_j \left( \omega_j^A - \omega_j^C \right) \right)$

(average contract rate - subsidy per migrant)

$+ a_3 \left( \frac{1}{1-U_j^A} \right)$

(nominal search costs)

$+ a_4 (EN^U - M_t) + e_t$

Inverse Demand:

$SP_{id} = a_0 + a_1 DEF_t + a_2 C_t + a_3 A_t + a_4 AO_t + a_5 BC_t + a_6 M_t + e_t$

$= a_0 + a_1 \left( \sum_{j=t-1}^{t-2} DEF_t \right) + a_2 \left( \sum_{j=t-1}^{t-2} \omega_j (U_j^A - U_j^C)^2 \right)$

(defence public works employment constraint)

$+ a_3 \left( \sum_{j=t-1}^{t-2} \omega_j AO_t \right)$

(agricultural output)

$+ a_4 \left( \sum_{j=t-1}^{t-2} M_t \right)$

(budget constraint)

$+ a_5 \left( \sum_{j=t-1}^{t-2} (w_j RGNP_j + w_j NGNP_j) \right)$

Number of error markets Migrants

B. Market for migrant labour

Supply:

$ML_t = B_0 + B_1 RGNP_t + B_2 A_t + e_t$

Participation rate arrivals

Demand:

$ML_t = B_0 + B_1 (RGNP_t)^G + B_2 A_t - e_t$

Private demand government demand Australian error
C. Market Forces

Institutional Intervention in Wage-Fixing:

(5) \[ NW^A = \phi_0 + \phi_1 U^A + \phi_2 U^A D1 + \phi_3 CPI^A + \phi_4 CPI^A D1 + \epsilon^NW \]

Ex Ante/Ex Post Translations:

(6) \[ M^S = M \]

(7) \[ SP^Aid = SP^A \]

(8) \[ ML^d = ML^S - U^A [\lambda^M \cdot M + W] \]
**SYMBOLS**

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- variables whose values are determined within the model.
- ** weighted sums of the above endogenous variables and their values in previous time periods.
- *** variables whose values are regarded as determined outside the model.
Appendix 8.A.1

The Derivation of a Utility Function
from Valuation Functions

The demand for UK arrivals varied with governments' revenue, and also with the group utility attached to UK immigrants. This appendix elaborates how valuation functions such as $V^M$ relate to the textbook examples of a utility function. The following appendix explores an aspect of governments' revenue constraint.

Equation 13 of Chapter 8 summarised the elements which influenced the Australian community's valuation of UK immigrants, $V^M$. The community's interests likewise included other goals, $R_i$, such as postal facilities, crime prevention, social security, and so forth. Hence analogous to $V^M$, there is $V^{NM}$, a function which summarises the set of determinants of the value attached to these other projects. Real per capita income and population growth might, for the sake of illustration, be taken as the principal factors, i.e.,

$$V^{NM} = V^{NM}(\frac{GNP}{P}, PG)$$  \hspace{1cm} (A1)

where,

$\frac{GNP}{P}$ = real gross national product per capita

PG = population growth

Such valuation functions are therefore simply equations indicating how parameters in the utility function change over time. For instance, suppose governments have interpreted the mix of pressures in the community as a simple quadratic function,

$$GU = c_1M + c_2M^2 + \sum c_3 R_i + \sum c_4 R_i^2$$  \hspace{1cm} (A2)

where,

GU = group utility

M = number of UK immigrants

$R_i$ = number of units of the $i$th project undertaken by the government.
$i =$ running subscript covering all government projects except UK immigration

$c_j =$ parameters such that,

$c_1, c_3 > 0$ (migrants and non-migrants projects are desirable)

$c_2, c_4 < 0$ (diminishing marginal returns viz., a downward sloping demand function for migrants and non-migrant projects)

Now the parameters $c_j$ are themselves functions of $V^M$ and $V^{NM}$. Thus changes in the group utility function, $GU$, are generated by movements in any of the determinants of $V^M$ and $V^{NM}$, as listed in equations (13) and A1.

It might be thought that if the determinants of $V^M$ and $V^{NM}$ are directly incorporated into the group utility function, $GU$, as shift factors, rather than indirectly – by making the parameters of $GU$ dependent on $V^M$ and $V^{NM}$, then different cross-partial will result. This however is incorrect. These are but two alternative ways of expressing exactly the same information. For example, consider the specification given for the government's utility, $GU$, in equation A2 above. Further, assume that

$$V^M = \gamma_1\text{DEF} + \gamma_2\text{EMC}$$  \hspace{1cm} (A3)

where

$\text{DEF} =$ threat of invasion

$\text{EMC} =$ employment constraint

and that there is only one alternative government project $R$ (i.e. that $i = 1$) for which,

$$V^{NM} = \gamma_4\text{GNP/P} + \gamma_5\text{PG}$$  \hspace{1cm} (A4)

where

$$c_1 = \gamma_0 + V^M, \quad \gamma_0 > 0$$  \hspace{1cm} (A5)

$$c_2 = \gamma_3 + V^M, \quad \gamma_3 < 0$$  \hspace{1cm} (A6)

$$c_3 = \gamma_6 + V^{NM}, \quad \gamma_6 > 0$$  \hspace{1cm} (A7)

$$c_4 = \gamma_7 + V^{NM}, \quad \gamma_7 < 0$$  \hspace{1cm} (A8)

But substituting A3 into A5 and A6 yields,
c_1 = \gamma_0 + \gamma_1 \text{DEF} + \gamma_2 \text{EMC} \quad \text{(A9)}

c_2 = \gamma_3 + \gamma_1 \text{DEF} + \gamma_2 \text{EMC} \quad \text{(A10)}

And substituting \(A4\) into \(A7\) and \(A8\) yields,

\begin{align*}
c_3 &= \gamma_6 + \gamma_4 \text{GNP}/P + \gamma_5 \text{PG} \\(\text{A11)}

c_4 &= \gamma_7 + \gamma_6 \text{GNP}/P + \gamma_5 \text{PG} \\(\text{A12)}
\end{align*}

When into equation \(A2\) the substitutions for \(c_1, c_2, c_3\) and \(c_4\) indicated by equations \(A9-A12\) are made, the government utility function, \(GU\), of equation \(A2\) can be expressed as

\[GU = \gamma_0 M + \gamma_3 M^2 + \gamma_6 R + \gamma_7 R^2 + \gamma_1 \text{DEF}(M+M^2) + \gamma_2 \text{EMC}(M+M^2)
+ \gamma_4 \text{GNP}/P(R+R^2) + \gamma_5 \text{PG}(R+R^2)\] \(\text{(A13)}\)

Thus whether one starts with equation \((A13)\) using shift factors or with equation \(A2\) as the initial \(GU\), describing the parameters as functions of \(V^M, V^N\), one will reach the identical solution in maximizing utility subject to the budget constraint. If the explicit \(V^M, V^N\) formulation is used, the \(V^M, V^N\) functions may be substituted directly into \(A2\) and thus eliminated (yielding \(A13\)), or they can be added to \(A2\) in the form of constraints attached with extra lagrangian multipliers. In either case the solutions, and consequently, the cross-partial derivatives calculated from the demand curves, will be identical to those obtained by starting with \(A13\) as the social utility function.
Appendix 8.A.2

The Specification of an Oligopsonist's Demand Function

The role of governments in population transfers via passage subsidies - 'price' narrowly defined - was historically one of price setter not price taker. In setting subsidies, Australian governments acted with a good deal of awareness of their oligopsonistic power; indeed from 1912, they collectively agreed upon rates. It might be objected that as 'price' was total subsidies divided by total arrivals, then 'price' was largely a product of the numbers who happened to turn up. However as we saw in Chapter 4, total subsidies were varied between and even within years in accord with wants. For instance when total arrivals looked to be adequate or perhaps excessive in light of, say, rising unemployment, then the processing of subsidy applications slowed down and the criteria for receiving assistance were more vigorously enforced. Hence by varying the numerator of $SP^A$, governments set the 'price bid'. But this raises another question.

In Chapter 8 I have indicated that factors directly controlled by governments i.e., endogenous variables, in theory do not enter the demand curve; hence $SP^A$ should not be included as a RHS variable in equation 16, nor $M$ appear in equation 17. This conclusion derived from simple micro economic theory which tells us that for oligopsonists, the demand function cannot be mapped in the own price quantity plane. The case in point is completely analogous to the oligopolist for whom the supply function cannot be mapped in the own price quantity plane. Yet the issue is not quite so clear cut. We need to consider pure theory in conjunction with the econometric problem of an omitted variable.

Consider Figure 1. The anticipated imputed dollar benefits from additional UK transfers can be designated as $MB$, the expected marginal passage subsidy costs as $MC$. It may be proposed that governments in expressing 'public demand', planned to elicit UK population transfers up to the point where these additional costs, $MC$, approximately equalled the benefits derived, $MB$. They then offered
Figure 1: Subsidies and the price-quantity plane of Australian demand

Symbols:

- \( MC \) = expected cost of an additional UK migrant
- \( MB \) = expected imputed dollar value of benefits from an additional UK migrant
- \( SP^A \) = 'price' or passage subsidy paid by Australian governments per UK migrant
- \( M \) = number of UK immigrant arrivals
- \( M^S \) = supply function of UK immigrants

key:

- Observed demand function in the price-quantity plane
the subsidies necessary to attract that number of transfers. In reality, of course, governments had only rough impressions of the marginal benefits of UK arrivals. Hence it would be more accurate to show MB as a band rather than a line. However, as this would in no way alter the conclusions reached, in order to keep the diagrams as simple as possible, MB is shown as a line. Now, the UK migrant supply curve, $M^S$, indicates the subsidy required to stimulate various levels of migration, ceteris paribus. As the ceteris paribus conditions changed, supply shifted from $M^S_0$ to $M^S_1$ to $M^S_2$, and subsidies offered and total numbers wanted, shifted from $(SP^A_0, M_0)$ to $(SP^A_1, M_1)$ to $(SP^A_2, M_2)$. The line joining these points cannot be described as a conventional demand curve in the price quantity plane. Nevertheless, where MB has a negative slope, as in the upper diagram of Figure 1, the demand function still exhibits a negative price quantity correlation (the heavy line) - because $M$ and $SP^A$ are correlated with the effects on demand of the exogenous elements in MC which should be in the demand equation. However I have no series on those. Thus to avoid bias in the econometric estimation, in empirical tests of demand equation 16 or 17, $SP^A$ and $M$ should be respectively included on the RHS as proxies for the effects of the exogenous elements in MC.

However an important qualification must be added to the foregoing. Although one expects a negative correlation in the own price quantity plane, that relationship might be insignificant. Economic theory tells us that the relationship between own price and quantity will be weak in instances where there are no close substitutes for the good demanded and where expenditure on that good absorbs only a small part of the demander's budget. And historically both these conditions appear to have held. It was pointed out in Chapter 5 that Australian governments did not see any close substitutes for UK migrants: it was not until after the Second World War that Australia turned her eyes to Southern Europe as a source of additional population. In my period Hughes and later Bruce were busy devising ways of curbing the inflow; indeed Bruce would have prohibited migration from Southern Europe altogether had it not been for his fear of adverse world opinion. The second condition also appears to have been met insofar as direct outlays on passage subsidies and passage loans were only a very small part of the governments' budget (see Chapter 6, Table 43).
The lower diagram of Figure 1 indicates the situation which a priori reasoning strongly suggests – a negative relation between own price and quantity, though one in which there is very little sensitivity between price and quantity changes. If my reasoning is correct, then the empirical tests of Chapter 9 should display a negative sign attached to the partial regression coefficient. But the estimated multiplier might only be weakly significant or even insignificant.

Three related points should be noted. First a zero price quantity relation does not imply that buyers (in this case governments on behalf of the public) are happy to pay more than the market price. On the contrary, because of their budget constraint, these buyers will still attempt to purchase their selected quantity at the lowest possible price.

Second, the existence of the inverse demand function, equation 17, is completely independent of the discussion in this appendix on the omitted MC effects. Although equation 17 can often be obtained, as the name suggests, by inverting a demand function such as equation 16 where price occurs on the RHS, inverse demand functions exist even where price is not a determinant of the quantity demanded. This is because the price bid (the inverse demand), is still the minimum necessary to elicit the (separately determined) quantity desired – a price bid that varies with the utility attached (to migrants) vis-à-vis the wealth constraint (governments' access to funds). In short, inverse demand stems directly from the utility function and budget constraint; it exists for any demander whose funds are less than infinite. If governments' funds were infinite, their inverse demand function would be indeterminate [meaningless], since governments would be indifferent whether they offered migrants the minimum necessary to elicit the arrival of the desired numbers or one hundred fold this amount. From the archives evidence discussion in Chapter 4, it is quite clear that with respect to adjustments to passage subsidy rates, Farrands and others considered quite explicitly the minimum (or thereabouts) adjustment to obtain increased numbers.
Finally, the reader may feel that he detects an inconsistency, viz. the portrayal of somewhat reckless expenditure of governments (Chapter 5-6) vis-à-vis their careful assessment of costs of passage subsidies in roughly seeking the minimum price bids to elicit the number of migrants desired (Chapter 4). But there was (and is) a difference between attempting to minimise the costs of a project and selecting in the first instance financially worthwhile projects. For instance, while governments acquired brickworks (at least in NSW) and metal quarries etc. in order to reduce construction costs¹, they paid little attention to the viability and return on construction ventures.

Chapter 9

SOME EMPIRICAL FINDINGS ON THE DETERMINANTS
OF UK IMMIGRATION

'That's very important' the King said, turning
to the jury. They were just beginning to write
this down on their slates when the White Rabbit
interrupted: 'Unimportant, your Majesty means,
of course', he said in a very respectful tone....'
'Unimportant, of course, I meant' the King
hastily said, and went on to himself in an
undertone, 'important - unimportant - unimportant -
important -' as if he were trying which word
sounded best.

Alice's Adventures
in Wonderland

Introduction

The purpose of this chapter is to test the hypotheses entertained
in the preceding chapter. An 'appeal to the evidence', one of the
tenets of 'positive economics', cannot, however settle all questions
Hypotheses can only be tentatively confirmed/disconfirmed, not
positively proven. Nor are there mechanical rules for use in testing
hypotheses. Different techniques often embody different errors.
Short time series also mean, in my case, that not all the variables
can be included at one time in the model to be estimated. Different
combinations of variables, and different time lags and functional
forms, provide somewhat different answers and for this reason, as in
the instance of the King, the question of significance or 'importance'
of things is not always clear cut. Nonetheless some overall
assessment of the hypotheses must be made; that a good deal of
interpretation is required in this assessment only shows that
statistical analysis is not mechanical.

The principal method used in estimating the model is ordinary
least squares (OLS) regression analysis of the separate supply and
demand functions for UK population transfers. These findings are
supplemented with a two stage regression analysis of the two functions,
and also by an OLS analysis of a single supply/demand function. Thus the behavioural relations behind UK immigration are to be explored in three tiers.

The first tier of the investigation concerns the simplest of equations and of methods, whereby certain aspects of supply and demand for population transfers are estimated together in a single equation.

In the second tier, the supply/demand relations of population transfers are delineated, and the two equations are estimated with different lags using ordinary least squares. To the extent that these two equations were simultaneously determined, the results may be somewhat biased.

Finally in the third tier of the enquiry, the two population supply/demand equations are estimated by an instrumental variables method to reduce the simultaneity biases. This involves two stage estimation of the functions of interest, $M_t$ and $SP^A_t$.

**Presentation of the regression results**

Below the results of the three tier investigations are discussed in order. For ease of presentation and reference these results are presented in tabular form and the column headings, with the exception of the last four, are the symbols for variables as defined on the last page of Chapter 8. The last four columns report related statistical measures and tests.

Immediately under the estimated regression coefficients of these variables are their associated standard errors, in brackets. To indicate the statistical significance or reliability of the estimated regression coefficients, a system of stars has been used: three stars convey the highest degree of reliability, two stars less and so on.

To reduce rounding errors in the computation of the least squares estimates, all variables were standardised (to zero mean and unit variance), and it is in terms of these standardised units that the regression coefficients in the tables are expressed.
R² is the 'goodness of fit', a measure of the extent to which all the variables included in a particular equation 'explain' the total variation in the LHS variable. \( \bar{R}^2 \) is this measure adjusted by the number of explanators included — for the more variables included in the equation the easier it is to 'explain' the total variation in the LHS variable.

DW is the standard test statistic for rejecting the hypothesis of the presence of first order serial correlation in the residuals.¹ Further, I have used a scanning technique to generate maximum likelihood estimates of \( \hat{\rho} \), the first order serial correlation coefficient.² Small sample Monte Carlo studies suggest that DW is not powerful in detecting a positive \( \rho \), and that corrections based on \( \hat{\rho} \) reduce the mean square error of regression parameter estimates.³ Therefore regardless of whether the DW statistic indicated \( \rho > 0 \), for each equation generalised differences, based on the maximum likelihood \( \hat{\rho} \) were computed. The superscript A to an equation number, denotes regression estimates without a correction for serial correlation. The superscript B denotes regression estimates corrected for first order serial correlation using the maximum likelihood \( \hat{\rho} \) to generate the generalised differences.

**The first tier: a simple single equation**

The models discussed in the following sections are quite complex, and so the question naturally arises as to whether a simpler approach could not be taken, in particular, whether a single equation could not serve as well as a system of equations. In Chapter 7 it was argued that not much reliance should be placed on single equations because they are necessarily amalgams of supply and demand and not able to be interpreted unambiguously. However, a simple equation, regarded as the reduced form of an unspecified equation system, may still offer some insights. Such a model, reported in Table 45, was estimated after I had completed the body of my empirical enquiry. For this reason some of the variables have

1. See Chapter 7 for the relevance of this.
2. Programmes are those of A. Pagan, Statistics Department, ANU.
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Symbols:  
$\alpha^*$ = constant term  
NPE$_t$ = net public expenditure  
P$_{RE_t+(M-X)}$ = net private expenditure  
$\frac{u(\text{RYD})_t}{\omega_a}$ = difference in real income streams unweighted by employment likelihood or n  
$\omega_a$ = distributed lag weights; $\omega_2 = .25$, $\omega_1 = .50$, $\omega_0 = .25$  
n$_t$ = number of household decision makers, aged 20-44 years in the United Kingdom  
SP$_t$ = passage subsidies offered by Australian governments  
(1-U)$_{UK}$ = UK employment rate  
$*$ = significant at ten per cent level  
** = significant at five per cent level  
*** = significant at one per cent level  
$^+$ = coefficient has wrong sign  
$t$ statistics in brackets under coefficients.

Source for series: Appendix 9.A.2. For $u(\text{RYD})_t/\omega_a$ see column 1, Table 2, Appendix 2.A.1.
not hitherto been discussed nor did time permit the inclusion of these variables in the model defined in Chapter 8. The 'new' variables are net public expenditure, net private expenditure and the ratio of customs duties to Australian imports; these data are discussed in Appendix 9.A.2. The first and the last of these three variables may be taken as measures of government activity and intervention.

Equations $1^A$ and $1^B$ of Table 45 explore these three variables plus two others, the number of household decision makers in the UK and an income differential. After correcting for serial correlation only the last variable appeared weakly significant, and both public expenditure and the ratio of customs duties to imports possessed the wrong sign. To test the possibility that too many variables are included in 1 the model was respecified as in 2, which retains the three 'new' explanators and the remaining one of promise. After correcting for the presence of serial correlation $2^B$, none of the postulated determinants of UK immigration were statistically significant.

The picture is changed in important respects if account is taken of Australian passage subsidies, $SP^A_t$. Indeed, equations 3 and 4 of Table 45 suggest that Australian passage subsidies were the most highly significant determinant of annual changes in UK immigration and the only significant determinant when an effort is made to reduce the mean square error of the regression parameter estimates $4^B$; in $4^A$ when Australian subsidies per migrant are taken into account alongside UK employment rates, government expenditure is also mildly significant as too is the customs ratio, though neither of these are in $4^B$.

Not much reliance should be placed on the results of single equation amalgams of supply and demand forces. Yet the models 1-4 are a useful starting point in as much as they hint at the 'importance' of passage subsidies as a variable deserving closer examination.

The second tier: explicit supply and demand functions of UK population transfers

Tables 46 and 47 report the econometric results for the migrant population supply and demand functions - the latter in inverse form. These two functions were estimated separately by ordinary least squares. The basic theoretical determinants of functions are given in equations 1 and 2 of the summary of the model in the concluding pages of Chapter 8. As 'degrees of freedom' limit the number of variables included at one time, and as I am also interested in how different lag structures alter the 'explanatory power' and significance of some variables, the particular equations reported in the tables represent different combinations of
Table 46: The Migrant Population Supply Function

| Equation | a | a_R | a_R* | u(a_R* | u(a_R* | u(a_R* | u(a_R* | u(a_R* | u(a_R* | u(a_R* | u(a_R* | u(a_R* | u(a_R* | u(a_R* | u(a_R* | u(a_R* | u(a_R* | u(a_R* | u(a_R* | u(a_R* | W | a^2 | e | DW | p |
|----------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------|-----------|-----------|
| 1A       | .00           | -.56           | -.49           | -.01           | .36            | (.00)          | (4.30)**       | (-3.15)***     | (-.07)         | (2.61)         | .75            | .69            | 1.30           | .79            | .24            | 1.44           | .60           |
| 1B       | .02           | .42            | -.37           | -.07           | .17            | (-.09)         | (1.67)**       | (-1.81)**      | (1.37)         | (1.27)         | .66            | .59            | .97            | .66            | .59            | .97            |
| 2A       | .00           | .44            | -.52           | -.04           | .33            | (3.17)***      | (-2.66)**      | (-.20)         | (2.10)         | .37            | .25            | 1.34           | .63            | .00            | .98            |
| 2B       | .06           | .29            | -.34           | -.06           | .16            | (-1.19)        | (1.46)***      | (-1.92)**      | (1.18)         |               |               |               |               |               |               |               |
| 3A       | .31           | .53            | -.45           | -1.33          | .61            | (1.90)         | (4.38)***      | (-2.87)***     | (-3.94)**      | (3.51)         | .63            | .00            | .98            | .63            | .00            | .98            |
| 3B       | .24           | .42            | -.31           | -1.63          | .26            | (1.09)         | (2.47)***      | (-1.56)        | (-2.29)**      | (2.60)         | .70            | .64            | 1.40           | .63            | .00            | .98            |

Note: For symbols refer to the text and the Symbols Key, p. 437

For the data used see Appendix 9.A.2
variables and different combinations of lag structures; it is not feasible to run all these considerations together in one regression equation.

a) The migrant supply function

The main determinants of supply, it was postulated in Chapter 8, were the expected income gains RYD\(^1\), and the costs of migrating—the psychic costs, \(F\), and the pecuniary relocation outlays, viz transport costs, \(TC\), and search costs, \(RSC\). The aggregate response to changes in these I have suggested reflected the current size of the pool of household decision makers, \(n\). And, finally, I have conjectured that the greater the UK outflow to alternative destinations, \(M^\text{AL}\), then the smaller the pool of potential movers to Australia.

Equations 1 and 2 provide evidence in support of the significance of the expected income gains, RYD, as measured by past differences in wages between Australia and the UK, and the presence of friends and relations who had previously migrated, \(F\). These equations also

1 RYD, readers may recall from Chapter 8, is the present value of the income gains from migrating to Australia as perceived by the individual UK decision maker in the 20-45 years cohort. This has been measured by the difference between the aggregate earnings to retirement of UK household heads aged 20 to 45 years at UK real hourly wage rates, and aggregate earnings at Australian rates, where both wage rates are averaged over a period of years to allow for the gradual formation of expectations about income differences. See Chapter 8 for detailed discussion on the rationale of each of these series, and Appendix 9.A.2.

2 \(F\) is an index of the number of friends and relatives who alleviate the psychic costs of moving measured by the stock of past UK arrivals.

3 \(TC\) is an index of the expected transoceanic passage outlay paid by the UK migrant. It has been calculated from the actual average fare paid by migrants, taking into account the proportion of women and children, prevailing contract rates offered by shipping lines and subsidies offered by all governments, i.e. inclusive of the UK, taken as a ratio of recent UK earnings.

4 \(RSC\) is an index of the nominal outlays a migrant would expect to make in Australia before obtaining a job, taken as a ratio of his recent UK earnings. The division by UK earnings is an attempt to measure the difficulties of financing the job search period in Australia—recent UK earnings are regarded as a proxy for this financial ability.

ERRATUM

Footnote 6, page 452: \(M^\text{AL}\) is the UK outflow to destinations other than Australia.
furnish evidence in support of the role of transport costs, TC. However, the other pecuniary relocation outlay, search costs, RSC, though possessing the correct a priori sign, failed to appear as a significant explainer of immigration in these equations. Another feature of these results, is that the variable intended to capture the relevance of competition for migrants, \(M^L\), although significant, possesses the wrong sign.\(^1\)

Equation 3 considers further how RSC might enter the migration process. Given the lags arising from delays in the receipt of information concerning Australia and likely passage assistance, from habit persistence, and the time absorbed in transferring residency, it may well be that past, not current, levels of the pecuniary relocation costs better represent these costs as perceived by potential movers at the time of taking their decisions.\(^2\) And when lagged values of these two costs were used, as in equation 3, they were significant both in the case of search costs and transport costs. The remaining equations, 4-7, summarise the results of exploring the perverse sign for the competition proxy and also other alternative specifications of the relocation costs and the income gain. In the world of the 'King and the White Rabbit', which among the set of postulated determinants of the UK immigration were consistently 'important'?

Consider first, the real income difference, RYD. In the initial specification of how potential migrants formed their impression of the likely income gains from migrating, it was postulated that they took into account the risk of unemployment. Accordingly hourly wage rates were adjusted by the probability of unemployment in each country. However, as discussed in Chapter 8, it is also plausible that migrants viewed their future jobs as tenured positions.

\(^1\) The stronger the competition, at least as measured, the more, not the fewer, Britons migrated to Australia.

\(^2\) Further, in a study of annual series if, as it appears likely, the flow throughout the year was not greatly uneven, then one half of the immigrants disembarked in the first half of the year. In this sense what happened over the remaining part of the year was irrelevant to a large body of decision makers.
(that is, they gave no weight to the prospect of unemployment in assessing expected income streams). This alternative specification of RYD is distinguished by the prefix $u$ in Table 46. An effort has also been made to check on the lag structure of RYD. Two lag structures have been explored, a set of declining weights for the past year and the year immediately preceding it, denoted as $\omega_a$ in Table 46, and an inverted V system of weights peaking in year $(t-1)^1$, denoted as $\omega_b$. The combination of these extensions to the RYD hypothesis (plus their combination with other variables in the multiple regression equations) generated many equations. Table 46 summarises the main conclusions. Within the bounds set by 'degrees of freedom' it has not been possible to distinguish between alternative specifications of RYD. Thus although in equation 4 (and in equations 2 and 3), differences in real income as adjusted by the likelihood of employment were significant, substituting unadjusted values of RYD into these equations, though not reported, yielded similar results. Nor over the range of equations estimated has it been possible to distinguish between the two lag structures for RYD, $\omega_a$, $\omega_b$. Although not reported in the table however, current (unlagged) differences in income were also tested, and in this case RYD performed poorly, indicating clearly that some lag was indeed involved. In general then, over the range of equations estimated, lagged income differences proved to be a consistently significant explanator of UK immigration - although my two subhypotheses could not be distinguished.

1 See Figure 26 in Chapter 8 for a visual picture of these lag structures. It might be thought that the Koyck transform was another possibility, i.e. include $M(t-1)$ as a RHS variable. However as discussed in Chapter 7, there are many difficulties in interpreting what this variable measures. Further, when there are other determinants of migration, the Koyck transform, supposed to be economical on degrees of freedom, is in fact impractical because it absorbs too many degrees of freedom. For instance, J.Kmenta demonstrates that even if there were only one other determinant and both determinants were subject to the Koyck transform, then the estimating equation involves three times as many RHS variables as would have been the case if each determinant had been entered as a pre weighted sum of past values - the procedure adopted here. See J. Kmenta, Elements of Econometrica, New York, 1971, p.478. To overcome this problem it is necessary to assume that the identical set of geometrically declining weights apply to every RHS variable. But as I argue in the text the nature of the lags were different.
What of relocation costs? The set of equations in Table 46 confirm both the pecuniary relocation costs to be important. Consider first expected search costs, RSC. The fact that lagged values of this series were highly statistically significant in every equation, while current RSC whether or not incorporated in conjunction with RSC were insignificant, is relatively clear evidence that the lag did occur. The second pecuniary relocation cost, the expected cost of the ocean passage, TC, was also a major influence on the decision to migrate. Here the evidence is less decisive on the lag structure: either lagged or unlagged, the transport cost variable was generally statistically significant. However the 'free form' estimates of the impact of both current and past transport costs on the supply of UK population to Australia, equation 6, do suggest that as with search costs, there was an information time lag in the decision to migrate. UK transfers in year t represented a response to changes in costs in (t-1).\(^1\) In summary, although the regression results strongly confirm the hypothesis that transport costs were an 'important' determinant of UK immigration there is an element of doubt as to whether lagged or current costs were the more relevant in the decision to migrate. A priori reasoning and the bulk of the regression estimates tend to support the former, In the instance of search costs, however, the results are unambiguous. Unlagged values were never significant, lagged ones were consistently so.

Turning now to the third relocation cost investigated, psychic costs or the 'friends and relatives' variable, \(F_t\), this variable appeared a highly significant determinant in equation 1. Prima facie, the results are not too surprising, for particularly in light of the nomination system for assisted passages, it captures the chain effects of migration. Yet as pointed out in Chapter 7, both the

\(^1\) The final equation, however, suggests that these conclusions about the time lag derived from equation 6, are not quite so conclusive as they seem. In equation 7, \(M^AL\) has been omitted from all consideration and contemporaneous transport costs substituted for \(TC(t-1)\). Estimation of the model in this form indicated that the current costs of transport, \(TC\), were in fact a significant determinant. And although the results are not reported, rerunning equation 7 with lagged transport costs, suggested that \(TC(t-1)\) was not a significant determinant; when \(M^AL\) is omitted from the model current transport costs have greater explanatory power than lagged transport costs but when \(M^AL\) is retained the reverse is true.
concept and its measurement contain 'thorns' and these should be recognised. For one thing, F may measure not so much the impact of reductions in the psychic costs of moving but more the fall in expenses incurred by movers via relations alleviating the search costs.¹ The collinearity between these terms was not, however, a major problem. A more serious one is defining, in the first instance, the stock of 'friends and relatives' who had previously migrated to Australia. The regressions reported in Table 46 took the stock over the preceding 15 years.² But when F was defined over a ten year period and these same regression equations rerun, it was not found to be a significant determinant. The likely reason for this is that the numbers on the stock - looking at the period as a whole - were greatly influenced by the 1890s depression, the prewar boom and the war, and the 10 year stock captures these in quite a different way to the 15 year stock. Yet that the size and significance of the stock of 'friends and relatives' is so sensitive to the period of years over which it is defined suggests the need for very great caution, indeed scepticism, in interpreting its influence on immigration. An alternative method of assessing the 'importance' of 'friends and relatives' is to include Australian immigration lagged by one year, M_{t-1}; this is claimed to be a transform of the stock. However, as I argued in Chapter 7, this variable is subject to innumerable interpretations, from the impact of the stock of past movers, to a model of adjustment towards equilibrium by current decision makers and it is not pursued here.

Finally, what can be inferred about the impact of competition from other migrant receiving countries? What reasons might account for the perverse sign noted in the introductory equations 1 and 2?

¹ In the instance of transport costs, government subsidies relieved the need for friends and relatives to subsidise passage costs but it was normal, at least for nominees, to assist migrants in finding accommodation (usually accommodating arrivals themselves, initially) and it was mandatory for the nominator to assist in job search.

² Commencing at (t-1).
As observed in Chapter 8, Australia accounted for between 10 to 20 per cent of total outflow, hence $M^A_L$ itself was partly determined by emigration to Australia and as a result the estimated coefficient of $M^A_L$ contains some simultaneity bias.\(^1\) This can be expected to be an upward bias,\(^2\) as the relations postulated in the two propositions 'increased migration to other countries decreased migration to Australia', and 'increased migration to Australia decreased migration to other countries' are both negative ones. However, although there may be some bias in $M^A_L$, it follows from the two propositions immediately above that the sign attached to $M^A_L$ could not be altered by such bias - both influences worked in the same direction. Of immediate concern here is not the size of any such bias but the perverse sign.

Examination of the residuals\(^3\) showed that the overwhelming 'errors' of prediction in the model were underpredictions in the years 1910-12 - the very years in which shipping shortages had led me, readers will recall, to the expectation that the model would overpredict the number of arrivals. What was special about the years 1910-12 was that they were ones of record low unemployment in Australia, and for this reason it is possible that the positive residuals may be due to misspecifying and under-representing the import of $U^A$. The variable in the model suspect in this regard is search costs, RSC. The form in which $U^A$ enters RSC was specified as a signed quadratic, deliberately to emphasise greater than proportional responses by migrants to exceptionally high and exceptionally low unemployment levels. However, it is possible that even in this form, RSC fails to reveal the full ease of job location in years of very low unemployment. If this were so, then $M^A_L$, which also peaked in these years, 1910-12, might be partly capturing this omitted job search effect. Accordingly the unemployment term in search costs was taken in its inverse squared form $(U^A_t)^{-2}$, which yields the new series $RSC^\_t$.

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\(^1\) How much depends on one's view as to whether 10-20 per cent is a 'large' proportion of the total outflow.

\(^2\) It will look larger than in fact it was, hence the t statistic will appear larger and thus we might treat the result as significant (accredit it with a star) when it really is not (deserves no stars).

\(^3\) These being the difference between the actual (historical) values of $M_t$ and those predicted by the model.
Equation 4 suggests that after adjustment for serial correlation \( RSC_{t-1} \) was a significant determinant of arrivals as too were lagged transport costs and differences in expected income streams. However, the inclusion of search costs in this new form still did not influence the sign attached to the coefficient of \( M^{AL} \); on a priori reasoning it is still perverse. Nor were the underpredictions around 1911 greatly reduced.

Another possibility is that \( M^{AL} \) captures some positive force in the UK which my model neglects or includes in the wrong form. One likely candidate is unemployment in the UK which was also very low in the years immediately before the war; migrants' response to further reductions in \( U^{UK} \), hence changes in their liquidity or ability constraint, may have been extremely strong at very low levels of unemployment. This suggests that changing the form in which \( U^{UK} \) entered the ability constraint might be a valuable step to take in the future - but time has not permitted that step to be taken here.

A third possibility is that \( M^{AL} \) captures the impact on supply of government advertising outlays. Unfortunately it has not proved possible to construct a separate series of these outlays distinct from administrative charges. Nevertheless there is some evidence (see Table 1, A.4.1) that at least before the war, government advertising grew briskly and along the lines of \( M^{AL} \) - both sharply rising from low levels in the early 1900's to a peak just before WWI. Thus \( M^{AL} \) might be capturing the effects of the omitted influence of advertising.

The results of my statistical enquiry into the determinants of the supply function might now be summarised.

The supply equation summarised

The evidence suggests the following,

- the flow of UK population into Australia was influenced by the difference in the stream of real income expected in the UK and Australia. Expectations were formed over a period of years (they did not just reflect the current difference) although I have not been able to distinguish between lags of \( \omega_a \) and \( \omega_b \), nor is it clear whether migrants in assessing expected income gains, took the likelihood of being unemployed in the future into account.
the stock of 'relatives and friends' who had previously migrated to Australia exerted a positive and significant influence on UK immigration. However, the results are sensitive to the years over which this stock is defined.

search costs (lagged by one year) were a significant negative influence on UK immigration.

transport costs were also a consistently significant negative determinant of UK population transfers to Australia. Generally, the results suggest that there was a time-information lag in migrants' response to this cost. However there is an element of doubt.

\( M^{AL} \), a measure of external competition for UK migrants behaved contrary to a priori considerations. The perverse sign attached to its impact on UK immigration cannot be ascribed to simultaneity bias. Further the perverse sign persists when a range of variables are included and excluded from the model. And the sign remained unchanged too, when the functional form of one variable, RSC, was altered in an effort to disentangle certain effects which it was thought \( M^{AL} \) might have spuriously captured.

Taking all these points together, most of the conjectures of Chapter 8 as to the determinants of population transfers have been confirmed. Certain aspects, however, have not, specifically \( M^{AL} \), and some doubt still surrounds the lag structure behind the time lapse in migrant response to changes in transport costs. On the positive side, nearly all the variables have been explicitly derived from human capital theory and this more careful specification may account for why, for instance, income differences, hitherto found to be insignificant in Australia's case by past researchers, are confirmed here as a significant force. Furthermore, one novel variable, TC, has been both quantified and tested, and found to be a significant influence on UK transfers to Australia. This last conclusion is also reinforced by the results of the quite different model reported in Table 45. The range of 'important' explanators of migration has thus been extended beyond the bounds of past research on UK immigration - which concluded little more than that unemployment in Australia was somehow important.
In fact, via RSC it was, but other variables too were significant. Furthermore unemployment in the UK exercised an influence on supply. However, the argument advanced earlier (Pope, 1968) still holds, namely that unemployment in the UK had countervailing effects on supply. For this reason it makes little sense to attempt to estimate its impact directly as an additive variable (the approach adopted in push-pull models), rather it entered the decision to migrate via the ability of potential movers to meet transport and search costs, and probably too in their assessment of expected income gains.

The demand function for peopling Australia

It may perhaps be recalled again that this concept, as it applies to population transfers, relates to the 'public demand' not simply 'public sector' demand and that the 'demand' function has been specified in its inverse form where, albeit simplistically, the 'price' has been taken as $SP^A$. The determinants of demand, it has been hypothesised, were a set of factors not themselves greatly variable, $\alpha^{id}$, and other factors which were. Among the latter were trade union and employer group pressures, $\text{EMC}^2$, defence needs, $\text{DEF}^3$, the demand by the farm sector for rural workers and land 'infiltrators', $\text{AQ}^4$, demands and objectives associated with public investment, $I^G_5$, and the constraints imposed by budgetary capabilities, $\text{BC}^6$, and concern, after the war, with market prospects, $T^7$. These last two variables, as I suggested in Chapter 8, may be interpreted more generally, the former as a budget-cum-wealth constraint, and the latter as a 'time' dummy inclusive of trade effects.

1 See Chapter 8.
2 EMC, it may be recalled from Chapter 8, has been measured by an unemployment variable. For further details on its functional form and the rationale for this, see Chapter 8.
3 DEF, it may be recalled from Chapter 8, has been measured by defence expenditures incurred over the preceding five years, net of direct war outlays and repatriation, and expressed as a proportion of GDP.
4 AQ has been measured by agricultural output during the current and preceding year.
5 I^G has been measured by current outlays on capital works programmes.
6 BC has been measured by governments' financial capacity to raise taxes and loans, as measured by an unweighted average of nominal and real GNP.
7 T has been measured by a binary variable, 0 prior to WW1, 1 thereafter.
As this demand function is written and estimated in its inverse form, immigration, M, might also be included as a RHS variable - although certain reasons were advanced in Appendix 8.A.2 for not expecting this variable to be very significant.

The direction of impact (or signs) of these variables on 'demand' require some elaboration. The intensity of union-employer pressure to decrease/increase immigration was related to labour market conditions. As the market slackened, i.e. as unemployment rose, union demands that the brake be applied to the inflow were more frequent and urgent, whilst calls from employers for immigration, diminished at such times. As the market tightened the converse was true.¹ From these considerations a negative relation was postulated between EMC (measured by unemployment) and 'demand'. In the case of 'defence need' and the threat of invasion, the relation between DEF and 'demand' for immigrants could be expected to be positive. However to the extent that guns and people were partly seen as substitutes, this would tend to cancel the positive impact of DEF on the demand for UK immigrants. The relationship between pressure by the farm sector for rural labour and 'demand' for immigrants is more clear - we would expect the estimated partial derivative to possess a positive sign, for good harvests spelt a greater demand for immigrant labour.

The relation between public investment and the willingness to subsidise migrants (as indicated by SP) has been postulated as positive too. As public investment involved capital outlays, this a priori specification may seem a little strange. If public works were a 'cost' of the immigration programme then should not one expect a negative sign? The expectation of a positive relationship follows from my discussion of Australia's population strategy in Chapters 5 and 6. For the dominant line of reasoning was not that the building of dams or electrifying urban transit systems which happened to absorb migrants involved a cost of 'x pounds per

¹ See discussion in Chapter 6. The classic example of the converse was union-employer cooperation and joint support for immigration in 1911/12.
migrant'. Rather, Australia wanted a larger population and wanted too, to assure high employment and living standards for all. The argument was that so long as investment could be accelerated - and much of it was needed in its own right\(^1\) - then the happier and easier it was for Australia to take larger numbers of immigrants. The more investment, the greater the demand. Related to this, higher levels of public investment meant a greater total demand for labour in general, which could be met by both new arrivals and from the resident workforce.\(^2\) These considerations have therefore led me to expect a positive and not a negative sign to be attached to the estimated coefficient of \(I^G\). One final point might be made. Part of the relationship between immigration and public investment was probably circular; more migrants were wanted as investment rose, but as more arrived the need for investment also rose. This simultaneity problem does not alter the a priori sign attached to the coefficient of \(I^G\). It can still be expected, if my reasoning is correct, to be positive.\(^3\) However as \(I^G\) is measuring both these relations together, whereas I am only attempting to estimate the impact of investment on immigration, not vice versa, the coefficient will be upward biased. This simultaneity bias will cause \(I^G\) to appear more significant as an explanator in my model than it really was. Put simply, if the regression results suggest \(I^G\) to be of 'three star importance' this may not strictly be so. The way to clarify the issue of whether the variable was, in fact, highly significant or less significant than it might appear, is to build a model around all the determinants of \(I^G\) (including immigration) and then reinsert it back into our migration model. However, this enormously compounds the complexity of the original migration model. Further, the associated difficulties in empirically estimating the equations of critical interest are also greatly compounded. Thus in the equations reported it has only been possible to explore, albeit crudely, the impact of investment on immigration rather than the more complex feedback effects.

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\(^1\) For instance to meet backlogs in demand for urban infrastructure.

\(^2\) For the distinction between total demand for labour and excess demand for migrants, readers are referred back to the pertinent sections of Chapter 8 - particularly equations 1 and 2

\(^3\) For the two propositions, both involve positive relationships.
The a priori signs attached to the three remaining variables in the model are respectively, positive for BC the budget or wealth constraint and negative for the variables T and M. The larger the budgetary capabilities (and wealth) of Australia, the greater was the 'demand'. Finally, as M rose we would expect the average 'price' (subsidy) offered to migrants to fall—on the basis of the theory of downward sloping demand curves.

Table 47 reports the results of testing these conjectures. As was the case in estimating the supply function of UK population transfers, 'degrees of freedom' prohibit the estimation of all the variables mentioned above at one time.

Which forces were the prime determinants of demand? Turning the question on its head, we might begin with those which appear (as measured) to be consistently 'unimportant'. These are DEF or the threat of invasion, the pressure of the farm sector for rural labour, AQ, and M, numbers arriving. The constant term which I expected to be important has not, on the basis of the basis of these tests, proved so.

Although not reported in Table 47, the variable measuring the threat of invasion was always insignificant. This was so for the whole range and combination of regressions. The points might be made. First, the 'threat' was gauged by the ratio of Australia's net defence expenditure to GDP, and it may be that this measure is far too crude to capture changes in the perceived 'threat'—hence the inconclusive findings. The second interpretation to put on the results is that the community's attitude to the "Yellow Peril" was not really something that changed greatly from year to year (except perhaps during the WWI years excluded from my study); it was felt about as strongly in 1905 as in 1925. If this was the case, and I suspect it was, then the 'threat of invasion is not amenable to time series analysis of the sort conducted here. The third interpretation is that the negative substitution effects between migration and armaments offset the positive effects of the threat of invasion as measured by defence outlays.

That my measure of the farm sector's demand for rural workers, AQ, was insignificant might be due to two things. The drive to people Australia was not directly related, as some past writers have suggested, to filling the 'open spaces' with UK immigrants. That rural "demand" is insignificant in equation 3, may reflect the fairly light weighting given to the short term demand for rural labour in Australia's overall strategy of population growth. The

1 And consistently so in combinations of equations not shown.
Table 47: Inverse Demand Function (SP is the dependent variable)

<table>
<thead>
<tr>
<th>Equation</th>
<th>$\alpha_o$</th>
<th>$I_t^G$</th>
<th>$EMC_t$</th>
<th>$AQ_t$</th>
<th>$BC_t$</th>
<th>$T_t$</th>
<th>$M_t$</th>
<th>$R^2$</th>
<th>$R^2$</th>
<th>DW</th>
<th>$\rho$</th>
</tr>
</thead>
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<tr>
<td>1A</td>
<td>.00</td>
<td>1.06</td>
<td>- .30</td>
<td>- .30</td>
<td>(-1.71)*</td>
<td>.76</td>
<td>.73</td>
<td>.88</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.00)</td>
<td>(6.25)**</td>
<td>(-2.62)**</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1B</td>
<td>-.08</td>
<td>1.04</td>
<td>- .21</td>
<td>- .54</td>
<td>(-2.67)**</td>
<td>.63</td>
<td>.57</td>
<td>1.90</td>
<td>.70</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(-.27)</td>
<td>(4.13)**</td>
<td>(-2.13)**</td>
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<td></td>
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</tr>
<tr>
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<td>-.00</td>
<td>- .38</td>
<td>1.87</td>
<td>-1.17</td>
<td></td>
<td>.88</td>
<td>.86</td>
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<tr>
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<td>- .32</td>
<td>1.97</td>
<td>-1.27</td>
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<td>.80</td>
<td>.77</td>
<td>1.95</td>
<td>.40</td>
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<tr>
<td></td>
<td>(.23)</td>
<td>(-4.00)**</td>
<td>(7.83)**</td>
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<tr>
<td>3A</td>
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<td>1.05</td>
<td>- .30</td>
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<td>.76</td>
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<td>.89</td>
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<td></td>
<td>(-.17)</td>
<td>(5.98)**</td>
<td>(-2.55)**</td>
<td>(.17)</td>
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<td>- .19</td>
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<td>.64</td>
<td>.57</td>
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<td>(.05)</td>
<td>(4.31)**</td>
<td>(-2.28)**</td>
<td>(-.83)</td>
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<td></td>
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<td>(3.60)**</td>
<td>(-2.28)**</td>
<td></td>
<td>(1.33)*</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>4B</td>
<td>-.05</td>
<td>1.09</td>
<td>- .23</td>
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<td></td>
<td>.63</td>
<td>.56</td>
<td>1.80</td>
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<tr>
<td></td>
<td>(-.23)</td>
<td>(3.97)**</td>
<td>(-2.11)**</td>
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</tr>
</tbody>
</table>

$t$ statistics are shown in parentheses below estimated regression coefficients.

* significant at 10 per cent level (one-tail test)
** significant at 5 per cent level (one-tail test)
*** significant at 1 per cent level (one-tail test)

Note: For symbols refer to text and Symbols Key, page 437.

For data see Appendices 9.A.2, 2.A.1. For series used in the construction of $I_t$, $AQ_t$ and $BC_t$ see N G Batlin, Australian Domestic Product Investment and Foreign Borrowing, Cambridge, 1961. Tables 270B (for $I_t$); 269 (for $AQ_t$); 269 and 2 (for $BC_t$). Finally for $M_t$ see Chapter 2 page 108.
other possible reason why farm sector demand, as measured, was not significant is that among the arrivals were lads brought out to be trained as farmers at state and private farm schools. And the 'demand' for these was not so immediately tied to harvest prospects and the short term labour requirements of the farm sector; the training period was on average about 2 years. Hence AQ might not very accurately, if at all, measure the demand for farm trainees.¹

With regard to M, equation 4 and other combinations not reported, indicated that although its coefficient possessed the correct sign—a negative relation between 'price' and quantity—the relation was insignificant, i.e. the price quantity plane was almost perfectly vertical.² The implication of this result should perhaps be elaborated. It was argued in Chapter 4 that governments were concerned with the effects of and constraints on reducing passage costs. Farrands, Secretary to the Development and Migration Commission, was quite emphatic that this question was one of great importance in 'policy' formation and that in his opinion 'reduced rates will result in an increased flow of nominated migrants and domestics'. But what my results indicate is that over the range of offer 'prices' necessary to acquire the approximate numbers wanted, planners were not very sensitive to the marginal costs (defined here with regard to subsidies), of obtaining extra migrants. It is important to stress that this result is only for the range of values of 'price' relevant to this period of history. It is not to suggest, for instance, that if a thousand rather than ten pounds had needed to be offered as a subsidy to attract extra migrants, then the same statistically insignificant relation between 'price' and quantity or numbers wanted would have prevailed.

¹ On the other hand, as trainees were only a small proportion of arrivals destined for the farm sector (see Chapter 4 and Appendix 4.A.1) this element would have not greatly distorted AQ as a measure of the farm sector's demand.

² This conclusion follows from the negative sign but the almost zero t statistic.

³ Prime Minister's Department, Correspondence file, multi number series, Third system: 'Passage Money Policy', Commonwealth Archives Office: CRS A46], items A349/1/4.
Economic theory suggests two reasons for a negative but insignificant or insensitive relation (viz. a vertical curve) in the own price-quantity plane. First that there is no close substitute for what is immediately 'wanted', second that the cost of acquiring an extra unit of what is wanted is not large relative to the purchaser's base of wealth. Both of these are roughly met in the case of assisted passages. For there were no immediate substitutes (in year t) for UK population transfers in the sense that natural increase in the resident Australian population stock took time and that, historically, the net increase via non UK transfers was small, and in the case of Southern Europeans, where it could have been larger, was not wanted. The second point of the 'theory' is also met. For the price or cost involved in offering subsidies (remembering that the average subsidy is taken as the 'price'), was small relative to Australia's total budget or wealth (see Table 43 of Chapter 6).

This last point, however, does not mean that the budget constraint, BC, can also be expected to be insignificant, for although outlays on subsidies were a small part of Australia's 'ability to spend', when funds for ventures were pruned back by officials of state and Commonwealth treasuries, the edge of the blade could and did fall on both big and small outlays.

The other insignificant component in the demand equations was the constant term. Here regression analysis of variation in time series cannot tell us very much about the import of factors which were not themselves changing. Further, the constant term is itself a conglomerate or aggregate expression. Thus, that the term was insignificant might not necessarily mean that there were no 'steady' factors of importance, rather it might be interpreted as meaning that there were both positive and negative ones which on balance tended to countervail one another. Regrettably, the statistical enquiry cannot be pressed further to resolve this issue.

Four variables were consistently found to be 'important'.¹ Not all of these four, however, could be estimated together. It

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¹ Whilst there appears to have been little sensitivity between 'price' and quantity, this still does not preclude the analysis and estimation of a demand function. For the latter, rather than the two dimensional demand curve (mapping price against quantity), focusses on the range of influences behind demand; the 'price' of candlesticks is not only a function of their 'price' but of incomes, tastes and other likings and wants which determine the number of candles demanded.
transpired that the budget-cum-wealth constraint was highly collinear with public investment\(^1\), and for this reason the two have not been included in the same equations (Table 46). When run separately, both performed equally well and both possessed the predicted sign of influence. To avoid indigestion, Table 46 primarily reports the results of combinations of variables retaining the investment term, \(I^G\). As previously indicated, simultaneity bias makes it probable that this term (and for that matter the wealth constraint) has been assigned more stars than rightly deserved. Even so, it is unlikely that the bias involved would be so great as to alter the general conclusion that investment was a positive and significant determinant of the demand for immigrants.\(^2\)

Equations 1-4 also suggest that pressure from union and capital groups, ENC, was highly significant in shaping demand for UK immigrants.

Finally, the binary variable, \(T\), was also found to be a consistent powerful (negative) explanator of Australia's demand for UK population. Whether or not this variable captures the force that I have suggested - that is, concern with markets after the war - must remain in some doubt. Yet it is highly improbable that the significance of \(T\) can be attributed to such things as higher unemployment or considerations of Australia's wealth and output performance after the war, for these have already been directly assessed in the model.\(^3\) Thus, if \(T\) is not only capturing 'concern with markets' but other factors too, then these other factors are most likely ones which have not already been assessed in the model. In this regard there are two possibilities.

First, \(T\) might be partly capturing an increased concern in the twenties with the quantity (and quality) of land available for closer

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\(^1\) The collinearity between the two was .95.

\(^2\) Multicollinearity between \((I^G, BC)\) also means that when BC is omitted or vice versa, the included variable picks up some of the influence of the omitted variable.

\(^3\) I say highly improbable, for the only way in which such influences could generate the negative coefficient of the dummy, \(T\), since they have already been included, is that these forces should have been included in an entirely different mathematical form. Other mathematical forms were tried, but still the estimated coefficient attached to \(T\) was both negative and significant. And as the reader will see later, estimating the model as a two-stage simultaneous equations system did not disconfirm the relevance of \(T\).
settlement. Hughes, of course, recognised no such constraint on settlement. But as we saw in Chapter 5, the state premiers did. In most states, land was scarce and state premiers, with the exception of Sir James Mitchell, Premier of Western Australia, never seriously entertained the idea of directly settling UK immigrants on the land—their policy was one of infiltration, viz. migrants could first gain experience and accumulate funds and then apply for land via the ballot system. But even in this context the 'land constraint' was far more severe in the twenties because of the commitment by governments to settle returned soldiers on the land. T might be partly capturing this effect. Second, T might be capturing the entry of the Imperial government into the field of assisted migration. T can be interpreted in the following way: the negative sign means that there was some force from the beginning of the twenties which acted to reduce, ceteris paribus, Australia's offer 'price' defined in terms of average subsidies. This, in turn, can be interpreted as meaning that, abstracting from all other forces (the ceteris paribus assumption again), the 'price' offered by Australia would have in fact been higher from the beginning of the twenties, if not for this force, T. Now, if it had not been known that the Imperial government was going to offer passage subsidies (under the ex-servicemen's scheme and the Empire Settlement Act), Australia would have outlayed more; how much more is not the point at issue. These considerations suggest a negative relation between the time dummy, T, and $S_{PA}$ —before the war the UK government offered no assistance but from immediately after the war it did, which lowered, ceteris paribus, $S_{PA}$.

The demand equation summarised

The results of the empirical enquiry into the determinants of the demand for immigrants may be summarised as follows:

- the threat of invasion, DEF, the immediate demands of the farm sector for rural labour, AQ, and the quantity of immigrants, M, were not significant determinants of changes in demand as defined by $S_{PA}$.
the dominant and consistently significant positive forces determining 'demand' were changes in public investment, $I^G$, and the wealth or spending power of Australia, BC.

the negative forces checking the drive to people Australia were trade union and employer group pressures, as measured by unemployment rates, EMC, and another factor, $T$. This last determinant can be taken as representing postwar concern with market prospects and with land as a constraint on the inflow. It may also be seen as a measure of the reduced need by Australian governments to offer subsidies fully commensurate to meeting their demands for UK population transfers, in light of the UK government's willingness to share in the costs of transfer.

The third tier: Simultaneous equation estimates of supply and demand

In the preceding pages I have endeavoured to explore and isolate the consistently significant determinants of the supply of and demand for UK migrants. However it is possible that the impression of 'important' variables is distorted by errors arising from simultaneity biases. Such errors occur where the chain of causation runs simultaneously in both directions, for instance, A affects B, but B affects A. In this third and final tier, the supply/demand equations are estimated by a method which takes into account the effects of two way causation; this involves two stage estimation of the equations of interest, $M^S_t$ and $S^A_{t1}$.

Such an approach may seem to readers to be the most suitable. However this is not necessarily so, for the two stage method can involve explanators - typically all the exogenous variables from the limited degrees of freedom, this ments of the reduced form equations, mated from these reduced form equations, But in the second stage of the

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**ERRATUM**

Page 469: five lines from the bottom, 'involve explanators' should read, 'involve too many explanators'.

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1 In the first stage, the reduced forms are derived. For each endogenous variable this is obtained by substituting until an equation is obtained expressing that endogenous variable solely in terms of exogenous variables. This equation is then estimated to furnish a 'predicted' series for that endogenous variable. In the second stage, the structural equations are estimated, substituting predicted series for each endogenous RHS variable.
method these inaccurate predicted values which are fed back into the original equation of interest — which is re-estimated on the basis of them. Second, if there are nonlinearities in the system then the reduced form equation is difficult to estimate. The structural equations can be simplified to remove these nonlinear terms. However, this is not very helpful if the original specification is the one believed in by the researcher. Alternatively, some iterative technique can be used to estimate the reduced form equation, but here again inaccuracies and errors will be generated.

The point at issue then is whether the biases in estimating the pair of equations $M^*, S^A_1$, by the ordinary least squares method are greater or less than the errors and inaccuracies involved in two stage estimation procedures.\(^1\) Regrettably there is no 'golden rule' to guide the choice. For instance the reliability or accuracy of the estimates of the first stage cannot be known until the reduced form equation is derived and estimated. However, if it transpires that these are unreliable (the estimated coefficients of the reduced form equation are insignificant) then the degree of confidence the researcher holds in the results of the second stage of estimation greatly diminishes.

Some necessary simplifications

In deriving the reduced form equations (i.e., the first stage) certain simplifications are necessary. I have already made the obvious point that there are few variables in economic systems which are strictly exogenous, that is, determined completely outside the system. In this regard immigration most probably had some contemporaneous impact, for instance on public investment and the budget or wealth constraint. Yet rather than expand the number of equations in the model, and hence its complexity, the more immediate task, and the one tackled below, is to explore the basic interrelations or two way

\(^1\) If the question is widened to include other methods of reducing simultaneity bias such as Three Stage Least Squares, the shortcomings mentioned above in connection with the Two Stage methods apply. These simultaneous methods have not been canvassed here, since inter alia, they introduce errors in the specification of one structural equation into the other equations being estimated.
causation between the four endogenous variables, \( M, SP^A, NW^A, U^A \).

Even here four simplifications were necessary in order to derive and estimate the reduced form equations.

First, I have presumed that migrant arrivals had a much bigger and more immediate impact on \( U^A \), unemployment, than on \( NW^A \), nominal wage rates. This assumption may not be greatly amiss. For as we saw in Chapter 2, wage fixing bodies took their guidelines from labour market conditions and price movements and then fixed wages accordingly. Usually some time lag was involved too. Hence these points, taken separately or combined, suggest a sequence in the impact of migration on \( NW^A \); migration affected unemployment and price movements which then influenced wage determinations coming before the courts and tribunals. In this way then, \( NW^A \) was not strictly simultaneously determined but set in a (Wold) recursive fashion. Under these circumstances, we need not derive nor estimate the reduced form equation of \( NW^A \) - which greatly simplifies the mathematics and difficulties of estimating the model. It perhaps needs be stressed that I am not saying that migration did not influence \( NW^A \), only that if it influenced wages in a sequential fashion, then the model can be simplified in the above ways.

Second, \( U^A \) has only been treated as an endogenous variable in the instance of the demand relation. On the supply side, \( U^A \) has been treated as a 'predetermined', that is, a lagged influence on immigration. It will be recalled that \( U^A \) enters the model in three ways. In the supply equation it is an integral part of the search costs variable, \( RSC \), and in some specifications, a part of the income variable, \( RYD \). And in the demand equation, \( U^A \) has been taken, via EMC, as a direct measure of capital and labour group pressures on the corporate body of the state to change the pace of the inflow. Simultaneity bias seems far more likely in this last case. For in the supply function, both \textit{a priori} reasoning and the statistical results, strongly indicated that migrants responded to \( RSC \) with a time information lag. Thus although migrants may have influenced \( U^A \) on their arrival, their decision to migrate was based on past levels and trends. Similarly \textit{a priori} reasoning and the evidence suggested that migrants' expectations of income gains, even if these were weighted by the likelihood of employment, were basically
determined by longer term considerations; contemporaneous conditions received little if any weight in their decisions. On the demand side there is, however, a much clearer case for thinking that information time lags were shorter and contemporary conditions more important. Unions, for instance were very sensitive to anything, including immigration, which threatened jobs, and were quick to respond to changes (rises) in unemployment among their members. And the empirical results very strongly suggested that group pressure on government, EMC, substantially reflected current labour conditions. Intuitively these results are highly plausible. Put simply, one would expect Australian unionists and employers to respond to contemporary changes in local unemployment far more briskly than a household decision maker in Birmingham or Manchester. For these reasons, and in order to contain the complexity of the model, RYD and RSC are treated as lagged or predetermined variables; only EMC has been taken as determined by contemporary or current year conditions.

Third, it has been necessary to simplify the functional form EMC. In the (inverse) demand function for migrant people previously investigated, it was tentatively confirmed that the response was not simply a linear one. Yet the functional form previously used is far too complex if the model is to be estimated by a two stage method that corrects for bias due to reverse causation. A simple linear relation has therefore been postulated.

Fourth, and finally, it has been necessary to simplify the equation describing Australia's demand for migrant labour. The parameter in that equation measuring sensitivity to the relative price of labour has been set at zero, implying that private entrepreneurs were insensitive to changes in the ratio of output to labour input prices.

1 Lagged responses to RSC and RYD of course, do not merely stem from slow information channels. They also arise because of inertia on the part of decision makers in making a choice after the information becomes available, and because of the time required to organise embarkation after a decision to migrate has been taken. Finally, lags arise from the way some expectations are formed.

2 In forming EMC, current unemployment received equal weight with employment lagged by one year.

3 That is, for example, a one per cent rise in unemployment, if unemployment was only 3 or 4 per cent, occasioned a different response to a one per cent rise if unemployment was 10 or 20 per cent; the curve relating unemployment to the demand for migrants was not simply linear, i.e. a straight line.

4 Equation 4 of the summary of the model in the concluding pages of Chapter 8.
The following two pages summarise the derivation of the reduced from equations for $SFA$, $M$ and $U^A$. Some readers may wish to return to these at their leisure. As there was still one intractable nonlinearity in the system\(^1\), it was not possible to estimate the model using two stage (linear) regression packages. What I have done is to derive the reduced form equations from the basic model, then use these resultant 'predicted' values of the endogenous variables as 'instrumental variables' in the second stage of estimating the supply/demand equations.\(^2\)

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Equation numbers in round brackets refer to the model delineated at the end of Chapter 8.

Symbols when not otherwise defined, as on the symbols sheet at the end of Chapter 8.

Market for Migrant People

\[ M^* = c_t - a_t SFA c_t + \sum_n P_a^{nT} + \sum_n P_a^{nR} RYO + a_t^{nF} F + a_t^{nB} RSL + a_t^{nH} M^* + c_t \]

where:

- $RYO$: has weights, $o_{ij} = 0$, $o_{it} = .67$, $o_{it} = .33$
- $F$: previous 15 years immigration
- $T^*: has weights, o_{ij} = 0$, $o_{it} = 1$, $o_{it} = 0$
- $RSL^*: has weights, w_j = 0$, $w_t = 0$
- $\sum_n P_a^{nT}$

Thus in [I]$, responses to all variables are lagged reactions except $TC$, the variable which the single equation estimates suggested as most likely to contain a contemporaneous element. $TC$ is entered lagged and unlagged. Note that $TC$ is a function of $SFA$-average cost or price paid by the Australian government.)

The nonlinearity enters via the term $(U^A, M)$. It will be recalled that in the labour market the ex ante/ex post translation of excess demand for migrant labour implied $ML^D < ML^E$ by the total numbers unemployed i.e., $U^A (W + \lambda^M, M)$. Taking $U^A$ through the brackets yields the term $U^A (\lambda^M, M)$. But $U^A$ and $M$ are endogenous variables which creates a nonlinearity.

As in estimating the supply/demand structural equations, some variables have been sequentially added and others, at times, omitted then 'new' reduced form equations should have strictly been derived and estimated on every separate occasion. This was not practical as perusal of the following two pages should indicate. I have therefore used the one set of reduced form equations more generally as instrumental variables.
ERRATA

In the line below equation \([4]^{'}\), \(L^S\) should be \(W\).

Equation numbers mentioned in the paragraph immediately following \([4]^{'}\) should respectively be, (4) not \([6]^{'}\), (4) not (6), (5) not (7).
Note that from equation [1],

$$TC_t = TC + \hat{SP}^A_{\xi_1}$$

Thus $\hat{SP}^A$ of equation [12] is used to derive the reduced form options.
Inverse Demand:

\[ y_{id} = \frac{1}{k_{id}} x_{id} \]

where:

\[ y_{id} : \text{RHS variables in (4).} \]

(Thus [2] represents a simplification of the modulus employment constraint.)

Market for Migrant Labour

Supply:

\[ M^e = x^e \]

Demand:

\[ M^d = x + e^d \]

Thus, \( y \), the prices sensitivity parameter of (6), has been set at zero: ordinary least squares testing resulted in indistinguishable t statistics and \( R^2 \) for (6) under alternative values of \( y \), between 0 and 1; the treatment of \( y \) as zero implies that (7) bears a Wald recursive relation to the above supply demand relations and hence is not relevant to this reduced form derivation.

Market Force

(as outlined in equations (6) to (8) at the end of Chapter 8).

Substituting in the market force equations and eliminating \( S^d \) in the migrant people market, and deleting the error terms.

\[ M = c^e + c^d x + a^d x_{id} + a^d x_{id} \]

Simplifying:

\[ M = c^e + c^d x + a^d x_{id} \]

where primes denote variables denominated by \( [1 - a^d x_{id}] \). Isolating \( M \) in the labour market,

\[ M = \left[ x + u^d \right] / \left[ x_{id} + u^d \right] \]

Eliminating \( M \) from (5) and (7), and rearranging terms

\[ \left[ x_{id} + u^d \right] \left[ x_{id} + u^d \right] \left[ x_{id} + u^d \right] = 0 \]

This quadratic in \( u^d \) has solutions,

\[ u^d = \frac{1}{2} \left( x_{id} + u^d \right) \]

and hence entails the reduced form estimating equation for \( u^d \):

\[ \hat{u} = P_x + P_{x_{id}} x_{id} + P_{x_{id}} x_{id} + P_{W} W + P_{s} \]

where:

\( \hat{u} \) : reduced form regression parameters.

By substituting (9) into (6) and rearranging terms in regression format the reduced form estimating equation for \( M \) is obtained.

\[ \hat{M} = \frac{1}{2} \left( x_{id} + u^d \right) \left( x_{id} + u^d \right) \left( x_{id} + u^d \right) \]

By substituting (11) into (1), and rearranging terms in regression format, the reduced form estimating equation for \( S^d \) is obtained.

\[ \hat{S^d} = \frac{1}{2} \left( x_{id} + u^d \right) \left( x_{id} + u^d \right) \left( x_{id} + u^d \right) \]

Equations (10) and (11) are intrinsically nonlinear from the estimation viewpoint if the parameters in \( \xi \) and \( x \) are unknown; accordingly the common practice of using O.L.S. estimates of these parameters was adopted, setting at zero those with perverse signs. Further, in the reduced form estimate of \( S^d \), equation (12), the term \( c^d x_{id} \) was deleted in view of the limited time series and the collinearity of this term with \( c^d x_{id} \).

1 In more elaborate estimations these O.L.S. estimates may be the starting point of an iterative procedure, see, e.g. A.R. Pagan, 'Non-linear Regression Programs', A.N.U., 1975, p.3.
ERRATUM

Page 475: second line, 'These as the following two' should read, 'These as the preceding two'. 
The results

These are set out in Tables 48 and 49. The reduced form coefficients have not been reported. These, as the following two pages indicate, are conglomerate terms which cannot in my case be unscrambled and interpreted with much meaning. In every instance they were statically insignificant.

The results for the UK supply function of migrant people are chronicled in Table 48. Anticipated income gains and the expected costs of job search were consistently significant explanators after correcting for first order serial correlation. Both possessed the expected sign. At the other end of the scale, $M^A$, the variable intended to reflect the impact of competition for UK migrants consistently possessed the wrong sign. The third tier of estimation thus casts no new or additional light on the perverse direction of influence of this variable on the supply of UK migrant

---

1 Because of collinearity problems previously mentioned, the friends and relatives variable (F) could not be included in the same equation as the anticipated income gains variable. It performed similarly. Bearing in mind my previous doubts about the measurement of F, the results focus on RYD. Anticipated income gains were weighted by unemployment. Time did not permit the inclusion of expected income gains unweighted by unemployment, although past regression results, albeit not using the identical technique, suggest that the distinction is probably a critical one.
<table>
<thead>
<tr>
<th>Equation</th>
<th>$n_{R}^{RYD}<em>{t} / \omega</em>{b}$</th>
<th>$n_{T}^{TC}_{t}$</th>
<th>$n_{T}^{TC}_{t-1}$</th>
<th>$n_{R}^{RSC}_{t-1}$</th>
<th>$M_{t}^{AL}$</th>
<th>$R^2$</th>
<th>$\bar{R}^2$</th>
<th>$DW$</th>
<th>$\rho$</th>
</tr>
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<tbody>
<tr>
<td>1A</td>
<td>-.01</td>
<td>-.67</td>
<td>-.05</td>
<td>1.19†</td>
<td>.65</td>
<td>.57</td>
<td>.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-.04)</td>
<td>(-.36)***</td>
<td>(-.26)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1B</td>
<td>-.07</td>
<td>-.10</td>
<td>-.33</td>
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<td>.57</td>
<td>.44</td>
<td>1.54</td>
<td>.80</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-1.21)</td>
<td>(-.38)</td>
<td>(-2.18)**</td>
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<tr>
<td>2A</td>
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<td>-.57</td>
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<td>1.21</td>
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<tr>
<td></td>
<td>(6.63)***</td>
<td>(-1.39)*</td>
<td>(-5.68)***</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2B</td>
<td>.40</td>
<td>-.06</td>
<td>-.43</td>
<td>.19†</td>
<td>.61</td>
<td>.47</td>
<td>1.54</td>
<td>.70</td>
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<tr>
<td></td>
<td>(1.58)*</td>
<td>(-.96)</td>
<td>(-4.01)***</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3A</td>
<td>.54</td>
<td>-.05</td>
<td>-.25</td>
<td>-.53</td>
<td>.80</td>
<td>.62</td>
<td>1.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.79)***</td>
<td>(-.47)</td>
<td>(-1.34)*</td>
<td>(-3.24)***</td>
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</tr>
<tr>
<td>3B</td>
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<td>-.04</td>
<td>.05</td>
<td>-.49</td>
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<td>.40</td>
<td>1.40</td>
<td>.70</td>
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<td>(.21)</td>
<td>(-3.17)***</td>
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<td></td>
</tr>
</tbody>
</table>

Notes: (i) All regression equations were run with and without a constant term. As in no instance was the constant term remotely significant, only equations omitting the constant are reported above. However, in order to avoid bias in the 'goodness of fit' statistic, the reported $R^2$ and $\bar{R}^2$ were computed for the regressions inclusive of the constant term.

(ii) $t$ statistics are in brackets.

* denotes coefficient significant at 10% level (one tail test)
** denotes coefficient significant at 5% level (one tail test)
*** denotes coefficient significant at 1% level (one tail test)
† denotes coefficient has wrong sign
$h$ denotes lag weights; $\omega_0 = 0$, $\omega_{-1} = .67$, $\omega_{-2} = .33$

(iii) For symbols see text and Symbols Key, page 437
For data see Appendices 9A.2, 9A.1

(iv) $\hat{TC}_t$ is the reduced form estimate of $TC_t$
see equation [143], p 474
people to Australia. Finally the results are unclear as to the impact of current transport costs on UK population supply when the simultaneous effects of SP^A on TC (and hence on M) are taken into account. The variable incorporating this interaction is designated TC in Table 48. Nor did lagged transport TC_{t-1} prove to be significant when included alongside TC. The apparent insignificance of transport costs neither meets with a priori reasoning nor with the thrust of my earlier results. The most likely answer and plausible interpretation for this is that in accommodating simultaneous interaction in the model, other errors arising from the simplifications and the statistically unreliable reduced form coefficients distort the basic behavioural responses; more is lost than gained in accuracy.

This last point should perhaps also be borne in mind in interpreting the results reported in Table 49. Here the inverse demand function^{1} includes the effects of M on EMC and hence on SP^A, this being designated as U^A and the effects of M on SP^A designated, M. The other variables jointly included are public investment, I^G, the budget-cum-wealth constraint, BC, and the time dummy, T.

My previous conclusions with regard to the impact of the last three generally hold and need not be elaborated again - they retain their importance as determinants. Nor in light of my past comments and findings on the significance of the own price quantity plane is the insignificance of M (now M) greatly surprising. It indicates that planners were aware that subsidies per migrant had to be increased if more were to be obtained but within the range of average subsidies offered to attract the extra numbers they were not greatly sensitive to the marginal cost of subsidies.\(^2\) The results for the variable describing the impact of labour capital group pressures are by contrast, difficult to explain in purely economic terms. For the coefficient attached to EMC (now designated U^A) was insignificant, indeed possessed the wrong sign - suggesting, if

1 Readers are still free, of course, to view this function more narrowly as a description of the determinants of SPA rather than as a description of 'price'.

2 Although as a separate consideration (viz., partial derivative) if budget or spending powers shrunk (BC), then fewer wants including more immigrants, could be met.
Table 49: Inverse Demand for Migrant People

(Estimated by a Two-Stage Regression Technique)

<table>
<thead>
<tr>
<th>Equation</th>
<th>( I_t^G )</th>
<th>( \hat{U}_t^A )</th>
<th>( BC_t )</th>
<th>( T_t )</th>
<th>( \hat{M}_t )</th>
<th>( R^2 )</th>
<th>( R^2 )</th>
<th>DW</th>
<th>( \rho )</th>
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<td>.38†</td>
<td>2.18</td>
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<td>.81</td>
<td>.64</td>
<td>.92</td>
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<tr>
<td></td>
<td>(6.80)**</td>
<td>(2.40)</td>
<td>(6.41)***</td>
<td>(-4.63)***</td>
<td>(-.88)</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>1B</td>
<td>.07†</td>
<td>2.15</td>
<td>-1.06</td>
<td>-1.06</td>
<td>-04</td>
<td>.54</td>
<td>.43</td>
<td>1.32</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(.80)</td>
<td>(3.50)***</td>
<td>(-2.54)***</td>
<td>(-.72)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2A</td>
<td>.25†</td>
<td>1.22</td>
<td>.64</td>
<td>-04</td>
<td>-02</td>
<td>.56</td>
<td>.43</td>
<td>1.62</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(1.66)</td>
<td>(3.80)**</td>
<td>(-3.10)***</td>
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<td>-04</td>
<td>.56</td>
<td>.43</td>
<td>1.62</td>
<td>1.00</td>
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<td>(1.01)</td>
<td>(1.01)</td>
<td>(-1.4)</td>
<td>(-.35)</td>
<td></td>
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</tr>
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</table>

Notes: (i) All regression equations were run with and without a constant term. As in no instance was the term remotely significant only equations omitting the term are reported above. However in order to avoid bias in the 'goodness of fit' statistic, the reported \( R^2 \) and \( R^2 \) were computed for the regressions inclusive of the constant term.

(ii) \( t \) statistics are in brackets

† denotes coefficient has wrong sign

* denotes coefficient significant at 10% level (one tail test)

** denotes coefficient significant at 5% level (one tail test)

*** denotes coefficient significant at 1% level (one tail test)

(iii) \( \hat{U}_t^A \) and \( \hat{M}_t \) are the reduced form estimates of \( U_t^A \) (equation [10]) and \( M_t \) (equation [11]) respectively - see p 474. For other symbols see the Symbols Key - page 437. For the data see Appendices 9.A.2, 2.A.1 and Note to Table 47, page 464.
anything, that the demand to people Australia quickened as local unemployment rose. Again the reason for this strange result is most probably due to the simplifications necessary in deriving the reduced form equation in the first instance (particularly the functional form) and the encumbent errors embodied in the second stage of estimating the demand equations.

Conclusions

In this chapter I have attempted to estimate the determinants of both the supply and demand for UK migrants. This has been done by testing a wide range of hypotheses using three econometric approaches – the three tiers.

The results must remain tentative – for no hypothesis is proven, only temporarily confirmed or disconfirmed. Further, the three econometric approaches are subject to different sets of error and produce somewhat different results allowing differing interpretations – the White Rabbit can see the importance of things differently from the King, and neither, in any event, are omniscient. The first tier of estimates, inter alia, is subject to 'identification' and 'simultaneity' errors, the second tier to 'simultaneity' biases, while the third, having been partially freed of some of the latter mentioned biases incorporates new inaccuracies – the result of simplifications and the use of statistically unreliable reduced form estimates in the structural equations. Of the three, I suggest that the most weight should be given to the second – the simple OLS estimates of the supply and demand functions.

On the supply side the important determinants were the expected income gains and the job search and transport costs incurred in relocating. Migrants responded to changes in real income gains and search costs with lags that reflected delays in the receipt and digestion of information, and delays in arriving in Australia once the decision had been taken. In the case of expected income gains the lag probably also reflected the way in which expectations were formed, viz., based on the sweep of events of the last few years, not simply or solely current differences in income. Of the two costs the information time lapse was probably shorter in the instance of
transport costs than for search costs (where a year lag is indicated): information concerning transport and subsidy rates were readily available in the UK. The number of friends and relatives who had previously emigrated possibly also played a role in attracting UK population to Australia. But there is some doubt since if the members in the stock are defined over slightly different periods (10 years versus 15 years), then their influence on the movement cannot be detected. Nor has the influence of competition for UK emigrants been clarified.

With regard to annual variation in demand for migrants, higher levels of public investment and of the budget-cum-spending power of Australia significantly lifted demand, while capital and labour group pressures damped it as unemployment rose. There was also an important negative element in the demand for migrants after the war, which was probably due to a mixture of things – concern with markets and land available for closer settlement – although it might simply reflect Australia's response to Britain's willingness after the war to share in the costs of subsidising passages to Australia.

Given the short time series and restrictive 'degrees of freedom', that so many variables hitherto not tested nor even explored have been found important suggests that the exercise has not been an unfruitful one. That some advance has been made might perhaps be gauged by the fact that past empirical studies of Australian migration have detected little more than that Australian unemployment rates were important somehow in determining the inflow.

Finally, what can we conclude from the results about the impact of government intervention on migration? On the supply side, governments influenced, to some extent, all the factors identified as important. The most obvious influence was on transport costs, lowered by contract rates and passage subsidies. Governments would have also influenced the real income gain anticipated by potential movers and the expected search costs: for government intervention in economic matters, on balance, supported wages and employment at levels higher than they would have otherwise been. Thus directly and indirectly government intervention improved ceteris paribus the potential income
gains of migrating, and by increasing job opportunities lowered the costs of job search - by raising vacancies higher than they would have otherwise been.

Yet the strategy of development and of peopling Australia contained inherent weaknesses for governments engaged in employment and income 'supports' without much reference to the costs of these props. The outlays were executed in part to attract larger numbers without much, if any, sounding of the costs involved. But the lack of economic criteria in public decision making cast a dark and dangerous shadow over economic stability in the longer run.
Appendix 9.A.1
Australian Workforce Estimates

For the years after 1910 Keating furnishes two series of the Australian male and female workforce. His 'A' series is estimated on an industry basis, his 'B' series estimated by applying census participation rates to the population, (differentiated by age, sex and marital status). Both series give similar estimates, and the latter was adopted here. For the years 1901-10, it has been necessary to construct series. The relevant data is available for April 11 1901 and 1911 in the censuses, and the task has been to interpolate in order to obtain June centered estimates of these earlier years.

Persons in age cohorts: The intercensal changes arise from 'natural progression', deaths and migration. By 'natural progression' I mean the dynamic process of entrants coming up from younger cohorts whilst others exist to older cohorts. One option, followed by Keating, is to compute the annual age distributions by projecting forward from censal results in accord with intercensal data on deaths, 'natural progression' and migration. The method continued forward to the next census revealed discrepancies of up to 10 per cent of the age cohort, probably because of inaccurate data on outward migration and on the age distribution of both the outward and inward flows - the latter data only became available from 1925. Here an alternative approach is adopted of treating the intercensal change as composed of a linear trend and recorded annual net migration.

The population was divided into three working age cohorts 10-14, 15-64, 65 and over, selected because of the significantly different participation rates evident at these age cohorts. By sex, for each age cohort, intercensal numbers were computed as follows:

2 The 'B' series is available from June 1910.
\[ P_t = P_{CI} + T_{NM_{t-C1}} + \alpha t \]  \hspace{1cm} (1)

where,

- \( P \) = number in age sex cohort
- \( t \) = time subscript in years
- \( C1 \) = April 1901 census
- \( T_{NM_{t-C1}} \) = recorded total net migration flow between 1901 and \( t \) as recorded in the Demography Bulletins
- \( \alpha \) = constant trend factor

The trend was computed from the total intercensal population change since,

\[ P_{C2} = P_{C1} + T_{NM_{C2-C1}} + \alpha 10 \]  \hspace{1cm} (2)

or,

\[ \alpha = (P_{C2} - P_{C1} - T_{NM_{C2-C1}})/10 \]  \hspace{1cm} (3)

where,

- \( C2 \) = April 1911 census
- \( T_{NM_{C2-C1}} \) = intercensal migration

This was computed assuming an even flow of migrants in the censal years, 1901 and 1911, viz

\[ T_{NM_{C2-C1}} = \sum_{t=1901}^{1910} T_{NM_t} - \frac{1}{12} T_{NM_{1901}} + \frac{1}{12} T_{NM_{1911}} \]  \hspace{1cm} (4)
Since average annual calendar year workforce series are required for my purposes the observations should be centred mid year, and the TNM calendar year series were converted to June 30 ended. The final problem was to distribute total TNM between the age/sex cohorts. The sex subdivision is available in the Demography Bulletins.

The earliest available information of age from this source is 1925, and refers to males only. Averaged over the period 1925-30, this age composition for inflows was used to impute the age subdivisions in TNM 1901-10. Tables 1 and 2 indicate the resultant series.

**Participation rates:** Sampling age sex/cohorts indicated that participation rates were relatively constant between 1901 and 1911. Accordingly Keating's 1911 rates have been used for the whole period. Tables 3 and 4 show the resultant male/female workforce estimates.

Although the male/female series to which the participation rates apply were estimated in a rather different fashion from those of Keating, my series of the male and female workforce in June 1910 are within 1 per cent of Keating's. Column 5 of Tables 3 and 4 chronicle my series adjusted upwards by 1 per cent in order to link perfectly with Keating's 'B' series.

**Weighting:**

My earlier research reported in Chapter 2 on average earnings for males and females in N.S.W. and Victorian manufacturing indicates that females on average received one-third of the male wage, in part reflecting their average lower productivity. As a step towards a homogenous labour input series, females were therefore given a weight of one-third in the combined male plus female series.
Table 1
Estimated Male Population in Working Age Groups, 1901 - 1910

<table>
<thead>
<tr>
<th></th>
<th>Trend</th>
<th>Total Net Migration</th>
<th>Total Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-14 Years</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1901</td>
<td>-101</td>
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<td>+16</td>
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</tr>
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<td>-403</td>
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<td>9</td>
<td>-403</td>
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</tr>
<tr>
<td>10</td>
<td>-403</td>
<td>646</td>
<td>215,319</td>
</tr>
</tbody>
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| 15 - 64 Years |        |                     |               |
| 1901          | + 6,045| 521                 | 1,228,866     |
| 2             | +24,179| 382                 | 1,253,427     |
| 3             | +24,179| -3203                | 1,274,403     |
| 4             | +24,179| -2872                | 1,295,710     |
| 5             | +24,179| -852                 | 1,319,037     |
| 6             | +24,179| -2007                | 1,341,209     |
| 7             | +24,179| -250                 | 1,365,138     |
| 8             | +24,179| 2612                 | 1,391,929     |
| 9             | +24,179| 7793                 | 1,423,901     |
| 10            | +24,179| 14,829               | 1,462,909     |

65 and Over

|         |        |                     |               |
| 1901    | 340    | 23                  | 85,641        |
| 2       | 340    | 16                  | 87,015        |
| 3       | 340    | -140                | 88,233        |
| 4       | 340    | -125                | 89,466        |
| 5       | 340    | -37                 | 90,787        |
| 6       | 340    | -87                 | 92,058        |
| 7       | 340    | -11                 | 93,405        |
| 8       | 340    | 114                 | 94,877        |
| 9       | 340    | 340                 | 96,575        |
| 10      | 340    | 646                 | 98,579        |
Table 2

ESTIMATED FEMALE POPULATION

IN

WORKING AGE GROUPS

1901 - 1910

<table>
<thead>
<tr>
<th>TEND</th>
<th>TOTAL NET MIGRATION</th>
<th>TOTAL NUMBERS</th>
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<tr>
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<td>2,407</td>
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</tr>
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<td>+74</td>
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Source: see text
### Table 3

**Male Workforce Estimates**  
**Australia 1901 - 1910**

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<th>Year</th>
<th>10 - 14</th>
<th>15 - 64</th>
<th>Over 65</th>
<th>Total Indexed</th>
</tr>
</thead>
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*Source: See Text*

### Table 4

**Female Workforce Estimates**  
**Australia 1901 - 1910**

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<th>15 - 64</th>
<th>Over 65</th>
<th>Total Indexed</th>
</tr>
</thead>
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<td>286,930</td>
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<td>10,602</td>
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<td>7,258</td>
<td>360,543</td>
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*Source: See Text*
The total Australian workforce estimates denoting average annual calendar year estimates are thus,

\[ w^A_t = \sum_{i=1}^{3} a^m_{\lambda_{i,t}}^m + \sum_{i=1}^{3} a^f_{\lambda_{i,t}}^f \]  

(5)

where,

- \[ w^A_t \] = weighted Australian Workforce June 30, in year \( t \)
- \( \lambda \) = Keating's participation rates
- \( m,f \) = superscripts denoting male, female
- \( i \) = subscripts running over the age cohorts 10-14; 15-65; 65 and over
- \( P \) = numbers in each age cohort, derived as in equation (1)

The resultant weighted total Australian workforce, \( W \), is column (1) of Table 6. While the adjusted total Australian workforce \( L^A \), viz \( W^A \), netted of contemporaneous U.K. workforce additions, ML, i.e.,

\[ L^A = W^A - ML \]  

(6)

is shown in column (2) of Table 5.

The ML series of U.K. additions to the Australian workforce was derived by a similar procedure to that used in equation (5), viz,

\[ ML = \sum_{i=m}^{f} a^m_{\lambda_{i,t}}^m \]  

(7)

where,

- \( ML \) = estimated contribution of contemporaneous U.K. gross arrivals to the Australian workforce
- \( \lambda \) = U.K. immigrant's worker participation rate
- \( \gamma \) = proportion of U.K. immigrants in the working age cohort, 15-65 years
- \( a \) = productivity weights
- \( m,f \) = subscripts denoting male, female
- \( M \) = gross UK migration
The worker participation parameter for UK female migrants was taken as 0.50. This was based on British Board of Trade data of female occupations for the years 1913-14 and 1921-29 which suggested that about one half of females 18 years and older had occupations other than housewives. The male migrant participation ratio was taken as unity. The parameter $a^f$ was taken as one-third of $a^m$, i.e. the same weighting as that used in aggregating the Australian workforce. The parametric value of $\alpha$ was taken as .8, this value being suggested by the age structure of migrants described in Chapter 3. Finally the resulting expression $\sum_{i=m}^{f} a_i \lambda_i M_i$, was scaled down by a factor of one half. The detailed argument for so doing is to be found in my paper 'The Contribution of United Kingdom Migrants to Australia's Population, Employment and Economic Growth: Federation to the Great Depression' forthcoming in Australian Economic Papers. The argument may be put briefly as follows. Consider the question of using stocks to approximate input flows. As a proxy for the annual flow of services, the most appropriate stock concept is that of the average stock during the year, not the end of year stock. This average stock associated with the current U.K. inflow clearly depends on the timing distribution of arrivals during the year. If, for instance, all arrivals occurred on the first day of the year, then the end of year stock of migrant workers corresponds perfectly with annual average migrant workers since, in essence, all changes took place before the year commenced. Vice-versa, if all U.K. arrivals took place on the last day of the year, then the end of year stock estimates overstate average annual migrant workers by a full 100 per cent - since the changes essentially occurred after the year was over. In the absence of detailed data on the seasonal variation in UK migrant flows, it seemed most reasonable to assume that the flow was evenly spread through the year. In this case, half the end of year stock of migrant workers indicates the average stock of labour furnished by U.K. migrants arriving during the current year.

---

Board of Trade, Journals and Annual Reports
These basic points may be summarised in terms of the following calculus. At the end of each year, $S^M_{t,UK}$, male equivalent units have been added to the workforce via gross U.K. arrivals. Assume that the inflow is uniformly distributed through the year, then $1/12$th of the total stock, $S^M_{t,UK}$, is added by the end of each month. Figure 4.A.1 illustrates the situation. Thus at the beginning of the year, the stock due to current migration is zero. At the end of the first month the stock is $1/12 S^M_{t,UK}$, at the end of the second month $2/12 S^M_{t,UK}$. In these circumstances, the average stock of male equivalent workforce inputs due to U.K. gross migration, $W^M_{t,UK}$, is given by the average height of OB or by summing the stock at the beginning of the year and at the end of each of the subsequent 12 months and dividing by the 13, the number of point observations used, viz:

\[
W^M_{t,UK} = \left\{ 0 + \frac{1}{12} + \frac{2}{12} + \ldots + \frac{11}{12} + \frac{12}{12} \right\}/13 \quad (8a)
\]

\[
= \frac{78}{12} S^M_{t,UK}/13
\]

\[
= \frac{1}{2} S^M_{t,UK}.
\]

Or more simply, by integration:

\[
W^M_{t,UK} = \frac{1}{0} S^M_{t,UK} (t) dt = \left[ S^M_{t,UK} \right]_0^2 \left| \begin{array}{c} 1 \\ 0 \end{array} \right. = \frac{1}{2} S^M_{t,UK} \quad (8b)
\]

Note that since integration is over one unit, there is no need to divide by $t$ in order to estimate the average height of the line $S^M_{t,UK}$. 
Figure 1

AVERAGE ANNUAL STOCK

Male equivalent labour stock due to contemporaneous gross U.K. arrivals

\[ S_{t}^{MUK} \]

Average annual stock in year \( t \), due to gross U.K. migrant arrivals in year \( t \)

0 1 2 3 4 5 6 7 8 9 10 11 12 months

0 \( \frac{1}{12} \) \( \frac{2}{12} \) \( \frac{3}{12} \) years
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<th>Australian workforce netted of U.K. migrant workers in year t</th>
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<td>1903</td>
<td>1425.9</td>
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Sources: See text.
Table 6: Contribution of Contemporaneous UK Gross Arrivals to the Australian Workforce

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<th>( M^f )</th>
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<th>( ML )</th>
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Note: The symbols are defined below equation 7 p. 488. For parameter values see p. 489.
Table 7: Australian Workforce, Numbers Employed and Unemployed

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<th>Employed</th>
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Source: see text for symbols. For data see Appendix 2.A.1 (UA), page 492 (WA)
Appendix 9.A.2
Statistical Tables and Notes

Tables:

1. Public and Private Expenditure Concepts
2. Ratio of Customs Duties to Imports
3. Real Income Differentials between Australia and the United Kingdom
4. Average Real Costs of Transport
5. Australian Governments' Average Expenditure on Passage Subsidies, Advertising and Administration
6. Ratio of Defence (Non-War) Expenditure to Gross Domestic Product
7. UK Gross Passenger Outflow to Extra-European Ports Other Than Australia
8. Stock of UK Migrants Who Arrived in Australia During the Preceding 15 Years
9. Estimated Males in the Migration Decision Making Age Group, 20-44 Years
10. Mean Years to Retirement of Males in the Migration Decision Making Age Group, 20-44 Years
### Table 1: Public and Private Expenditure Concepts

(£m)

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Symbols: M imports, X exports.

Sources: N.G. Butlin, *Australian Domestic Product...*, Cambridge, 1964. The concept of Net Public Expenditure is derived by adding Government Business Undertakings and Government Services, Wages and Salaries (Tables 100,102) and subtracting Construction Materials (Table 72) from this aggregate. Wages and salaries are exclusive of pay and allowances of Expeditionary Forces. Professor Butlin suggested this specification to me.

The GDP series is Butlin's Table 1, column 2. The import (M) and export (X) series are from his Tables 256, 257 and 262.
Table 2: Ratio of Customs Duties to Australian Imports

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Source: Finance Bulletins and N.G. Butlin, Australian Domestic Product..., op.cit., Tables 257, 263B.
## Table 3: Real Income Differentials between Australia and the United Kingdom

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Where:

- RYD_t = \sum_{j=1}^{t} \omega_j \left( (1-U_j) \left( \frac{NW_j}{CPI_j} \right) \left( 1/H_j^t \right) - \left( 1-U_j \right) \left( \frac{NW_j}{CPI_j} \right) \left( 1-H_j^t \right) \right)

- RYD_A, RYD_B, RYD_C are real income differentials.
- 0 represents years to retirement of males in the migration decision making age cohort.
- \left( \frac{NW_j}{CPI_j} \right) \left( 1/H_j^t \right) is effective real wages.
- NW_j is nominal wages.
- CPI_j is consumer price index.
- H_j is index of nominal working hours per week.
- U_j is unemployment, (1-U_j) is the probability of employment at NW_t.
- \omega is weights:
  - \omega_0 = .25, \omega_1 = .50, \omega_2 = .25
  - \omega_3 = .33, \omega_4 = .67, \omega_5 = 0
  - \omega_6 = .25, \omega_7 = .50, \omega_8 = .25
- A = Australia
- UK = United Kingdom
- j,t = time subscripts

For scores and data see Chapter 2 and Appendices 2A.1, 2A.2, 9A.2
Table 4: Average Real Costs of Transport

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<td>22,220</td>
<td>91.9</td>
<td>192</td>
<td>89.5</td>
<td>196</td>
</tr>
<tr>
<td>926</td>
<td>31,260</td>
<td>50,994</td>
<td>30.0</td>
<td>16.3</td>
<td>19,734</td>
<td>89.5</td>
<td>196</td>
<td>87.8</td>
<td>195</td>
</tr>
<tr>
<td>927</td>
<td>30,123</td>
<td>50,900</td>
<td>30.0</td>
<td>16.9</td>
<td>20,777</td>
<td>87.8</td>
<td>195</td>
<td>89.8</td>
<td>196</td>
</tr>
<tr>
<td>928</td>
<td>22,394</td>
<td>40,913</td>
<td>30.2</td>
<td>17.0</td>
<td>18,519</td>
<td>89.9</td>
<td>196</td>
<td>89.2</td>
<td>194</td>
</tr>
<tr>
<td>929</td>
<td>12,943</td>
<td>29,166</td>
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<td>15.0</td>
<td>16,223</td>
<td>89.2</td>
<td>194</td>
<td>89.4</td>
<td>193</td>
</tr>
<tr>
<td>930</td>
<td>2,683</td>
<td>17,881</td>
<td>30.3</td>
<td>13.0</td>
<td>15,198</td>
<td>89.4</td>
<td>193</td>
<td>86.0</td>
<td>191</td>
</tr>
</tbody>
</table>

* or an approximation

\[
TC_t = \left( \frac{\sum_{j=1}^{M} (ω_{PC_{a}} + ω_{PC_{c}}) - GS/N}{(M-N)} \right) / N \sum_{j=t-1}^{t} (1-U)^{NW_{UK}}_{j}^{UK} + \left( \frac{M-N}{M} \right) \frac{ω_{PC_{a}} + ω_{PC_{c}}}{c} \]

Where

- \( TC_t \) = average real costs of transport
- \( N \) = number of migrants assisted
- \( M \) = gross inflow
- \( PC \) = shipping company contract rate
- \( GS/N \) = average subsidy per assisted
- \( M-N \) = number unassisted
- \( (1-U)^{NW_{UK}}_{j}^{UK} \) = summed nominal wages (weighted by probability of employment)
- \( ω \) = weights applied to contract rates
- \( a \) = adults
- \( c \) = child (under 12 years)
Explanatory note to Table 4

Details of the shipping company contract rates \( PC_c \) can be found in Appendix 4.A.1 to Chapter 4. The weights employed are from Table 30 Chapter 3; the weights for years prior to 1912 are averages of 1912 and 1913. Difficulties were encountered in measuring the value of subsidies per assisted migrant in some years. For all but a few years the value was estimated directly as \( GS/N \). However, in the years to 1906 another method had to be employed. In these years, particularly 1901-03, Queensland was most active in encouraging immigration - hence in determining \( GS/N \) (Tables 11 and 5-10, Appendix 3.A.1); on the Commonwealth Statisticians figures the state was responsible for 90 per cent of assisted arrivals in 1901, 84 per cent the following year and its share remained perhaps as high as 40 per cent as late as 1905. However, although there is little doubt that Queensland's share was substantial (New South Wales did not even begin to offer assistance until 1906, Victoria in 1907, South Australia in 1911) there still remains some doubt as to the precise numbers Queensland sponsored. The numbers reported by the Commonwealth Statistician differ markedly from those reported by State officials in the 'Annual Reports of the Agent General' and the 'Immigration Agent' in Queensland Parliamentary Papers. Thus the value of the average subsidy, \( GS/N \), proved sensitive to the value of the denominator chosen - the denominator being largely determined by the assisted inflow to Queensland. It was therefore decided to estimate the mean subsidy in these early years on the basis of the known fare schedules and numbers assisted as reported in the Annual Reports of the (Queensland) Agent General and Immigration Agent, and in the Queensland Year Book (1901). The above sources, indeed, provide sufficiently detailed information - in terms of classes assisted and rates paid - to think the estimates fairly reliable.¹

For the remaining years to WWI the mean subsidy, as I have indicated, was estimated as \( GS/N \). In these years the British government offered no assistance with fares so \( GS \) relates exclusively to Australian

¹ That the subsidy per assisted was so high relative to the contract rate in 1901 is due to Queensland offering 'free passage' to about one-half of its assisted intake.
outlays. The basic data are those compiled and discussed in Appendix 4.A.1 Table 20 (column 1). Certain adjustments were necessary. I desire here a series that abstracts from advertising and other general promotional expenses. I therefore subtracted from column 1, Table 20, Commonwealth outlays on 'Advertising the Resources of Australia', column 6, Table 1. The resulting series still, however, was inclusive of State outlays on advertising. As discussed in the Appendix 4.A.1, most States voted money jointly for passage assistance and advertising. Queensland was an exception and in that State's Public Accounts it is possible to distinguish between the two components (Table 13, 4.A.1). I therefore used the ratios of expenditure on advertising to expenditure on passage money to downward adjust column 1, Table 20 of Appendix 4.A.1.

In the twenties, following the Joint Commonwealth-State Scheme (March 1921), the Commonwealth was responsible for recruiting and subsidising immigrants - the States surrendered these tasks - and the Australian component of GS is as chronicled in Table 1, column 1 of Appendix 4.A.1. The United Kingdom component or contribution following the Empire Settlement Act was one-half of the cost of assisted passages and I have simply derived total GS (Australian plus United Kingdom) as twice the Australian outlay on assisted passages. However, prior to the first Passage Agreement in pursuance of the Empire Settlement Act, the United Kingdom government offered ex-service personnel and their dependants, approved by the States, free passages to Australia. Australia also granted assistance (but not free passages) to some numbers of non-ex-servicemen. Thus for the years 1920-21 the United Kingdom share of passage costs was not simply equal to the total Australian outlay. In these years the mean subsidy per assisted migrant was derived by an alternative method, viz. taking the mean subsidy as the weighted sume of numbers and classes assisted times the amount of assistance granted per class. Data of the numbers despatched

---

1 The years 1907-10 were adjusted down by the average ratio that prevailed in Queensland over those years 1911-14 were adjusted by the average for those years.

2 There was no need to make any adjustment for advertising as these expenditures were recorded as charges against administrative offices are not lumped in with passage money. See discussion in Appendix 4.A.1.
scheme and of the adult/child ratio were obtained from the Annual Reports of the British Oversea Settlement Committee.

This same principle of estimating the mean subsidy was also employed for 1930, for reasons elaborated below. The original data of expenditures on passage subsidies are in financial years. These were then converted to calendar years by averaging the current plus next financial year. Such a conversion, of course, will lead to errors where the distribution of immigration is not fairly even throughout each 12 months period. I do not have sufficient data to determine the size of these biases but on historical grounds it is likely that the bias was substantial in at least the last year of my study, 1930. For one of the first official acts of the Scullin Labor government on attaining office in October 1929 was to effectively cease assisted immigration. Therefore a calendar year estimate of expenditure for 1930 using the average of financial year data (1930 and 1931) will in these circumstances be biased upwards. Thus, instead of accepting the computed value of GS/N, I estimated the mean subsidy per assisted migrant on the basis of known numbers assisted and the rates ruling per class and age cohort of those assisted.

The completed estimate of, \( TC_e \), the average real costs of transport for UK migrants bound for Australia, has been indexed, 1911=1000.
Table 5: Australian Governments' Average Expenditure on Passage Subsidies, Advertising and Administration

<table>
<thead>
<tr>
<th>Year</th>
<th>Passage Subsidy per Assisted Migrant</th>
<th>Ratio of Passage Subsidy to Unassisted Migrant</th>
<th>Passage Subsidy per Current £</th>
<th>Passage Subsidy per Constant £</th>
<th>Total Expenditure per Migrant £</th>
<th>Total Expenditure per Migrant Constant £</th>
</tr>
</thead>
<tbody>
<tr>
<td>1901</td>
<td>10.5</td>
<td>0.076</td>
<td>0.798</td>
<td>0.907</td>
<td>2.0</td>
<td>2.27</td>
</tr>
<tr>
<td>1902</td>
<td>8.0</td>
<td>0.059</td>
<td>0.472</td>
<td>0.509</td>
<td>1.1</td>
<td>1.19</td>
</tr>
<tr>
<td>1903</td>
<td>7.9</td>
<td>0.048</td>
<td>0.379</td>
<td>0.416</td>
<td>1.6</td>
<td>1.76</td>
</tr>
<tr>
<td>1904</td>
<td>8.0</td>
<td>0.038</td>
<td>0.304</td>
<td>0.354</td>
<td>1.5</td>
<td>1.75</td>
</tr>
<tr>
<td>1905</td>
<td>8.1</td>
<td>0.051</td>
<td>0.413</td>
<td>0.453</td>
<td>1.7</td>
<td>1.89</td>
</tr>
<tr>
<td>1906</td>
<td>7.6</td>
<td>0.142</td>
<td>1.079</td>
<td>1.196</td>
<td>2.1</td>
<td>2.33</td>
</tr>
<tr>
<td>1907</td>
<td>5.3</td>
<td>0.296</td>
<td>1.569</td>
<td>1.749</td>
<td>2.6</td>
<td>2.90</td>
</tr>
<tr>
<td>1908</td>
<td>8.7</td>
<td>0.297</td>
<td>2.584</td>
<td>2.717</td>
<td>3.8</td>
<td>3.99</td>
</tr>
<tr>
<td>1909</td>
<td>8.4</td>
<td>0.328</td>
<td>2.755</td>
<td>2.906</td>
<td>4.0</td>
<td>4.20</td>
</tr>
<tr>
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<td>9.3</td>
<td>0.421</td>
<td>3.915</td>
<td>3.798</td>
<td>5.4</td>
<td>5.57</td>
</tr>
<tr>
<td>1911</td>
<td>7.5</td>
<td>0.555</td>
<td>4.162</td>
<td>4.162</td>
<td>5.1</td>
<td>5.10</td>
</tr>
<tr>
<td>1912</td>
<td>7.2</td>
<td>0.514</td>
<td>3.701</td>
<td>3.362</td>
<td>4.6</td>
<td>4.18</td>
</tr>
<tr>
<td>1913</td>
<td>7.3</td>
<td>0.492</td>
<td>3.592</td>
<td>3.254</td>
<td>4.7</td>
<td>4.26</td>
</tr>
<tr>
<td>1914</td>
<td>7.8</td>
<td>0.435</td>
<td>3.510</td>
<td>3.080</td>
<td>5.5</td>
<td>4.82</td>
</tr>
</tbody>
</table>

1920 10.2 0.044* 0.450 0.252 1.6 0.90
1921 10.2 0.096* 0.970 0.572 4.2 2.47
1922 8.0 0.533 4.264 2.665 6.0 5.75
1923 7.5 0.573 4.297 2.527 7.0 4.12
1924 8.2 0.522 4.280 2.545 7.0 4.16
1925 9.4 0.528 4.963 2.882 7.9 4.59
1926 8.2 0.613 5.026 2.852 8.4 4.77
1927 8.5 0.592 5.032 2.893 8.5 4.80
1928 8.8 0.547 4.813 2.759 8.7 4.98
1929 7.5 0.444 3.330 1.836 7.6 4.19
1930 6.5 0.150 0.970 0.557 5.6 3.21

* See accompanying note for elaboration.

** G'/N is identical to SP^A in the symbols key, page 437.
Explanatory Note to Table 5

The basic data presented in the above Table have, for the most part, been discussed in detail elsewhere in the thesis. Data for N/M is from Chapter 3. The original data of government expenditures is from Appendix 4.A.1. The series of GS/N, from which (G^A/N) was mostly derived, is discussed in more detail in Table 4 of this Appendix.

In obtaining (G^A/N) I took GS/N (i.e. combined Australian and United Kingdom passage subsidies), subtracted the United Kingdom's contribution and multiplied by N/M. This simple procedure could not, however, be followed for 1920-21. In these years a very high proportion of assisted migrants (N/M) received free passages under the Exservicemens' Scheme. The Australian governments' (Commonwealth and States) offered some assistance but not on the same level nor to the same group. Therefore, N, or the total numbers assisted, combines two quite different groups in these early years. The UK and Australian governments were assisting mutually exclusive groups at different rates thus the product of (G^A/N) and (N/M) does not furnish (G^A/M). The relevant derivation is (N.g) where g is the specific Australian share of N. In 1920 g = .8, 1921 g = .75. The figures in column 2 for 1920 and 1921 relate to (N.g/M) not N/M. The values of N/M were respectively .220, .382.

G^AT covers passage subsidies, advertising and administration. The disaggregate data is both assessed and chronicled in Appendix 4.A.1.
Table 6: Ratio of Defence (Non-War) Expenditure to Gross Domestic Product

<table>
<thead>
<tr>
<th>Year</th>
<th>NWD_t (£000)</th>
<th>Sum of the adjusted outlays (1911=1000)</th>
<th>Year</th>
<th>NWD_t (£000)</th>
<th>Sum of the adjusted outlays (1911=1000)</th>
</tr>
</thead>
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<tr>
<td>1897</td>
<td>534.8</td>
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<td>1914</td>
<td>4,752.3</td>
<td></td>
</tr>
<tr>
<td>1898</td>
<td>551.9</td>
<td></td>
<td>1915</td>
<td>4,443.4</td>
<td></td>
</tr>
<tr>
<td>1899</td>
<td>613.1</td>
<td></td>
<td>1916</td>
<td>4,759.1</td>
<td></td>
</tr>
<tr>
<td>1900</td>
<td>592.5</td>
<td></td>
<td>1917</td>
<td>4,501.4</td>
<td></td>
</tr>
<tr>
<td>1901</td>
<td>500.9</td>
<td>688</td>
<td>1918</td>
<td>3,721.5</td>
<td>1962</td>
</tr>
<tr>
<td>1902</td>
<td>959.1</td>
<td>694</td>
<td>1919</td>
<td>3,663.5</td>
<td>1789</td>
</tr>
<tr>
<td>1903</td>
<td>750.4</td>
<td>733</td>
<td>1920</td>
<td>3,482.2</td>
<td>1571</td>
</tr>
<tr>
<td>1904</td>
<td>855.8</td>
<td>753</td>
<td>1921</td>
<td>5,684.2</td>
<td>1382</td>
</tr>
<tr>
<td>1905</td>
<td>934.6</td>
<td>782</td>
<td>1922</td>
<td>6,273.4</td>
<td>1317</td>
</tr>
<tr>
<td>1906</td>
<td>970.4</td>
<td>832</td>
<td>1923</td>
<td>4,263.5</td>
<td>1281</td>
</tr>
<tr>
<td>1907</td>
<td>1,035.8</td>
<td>841</td>
<td>1924</td>
<td>6,751.8</td>
<td>1292</td>
</tr>
<tr>
<td>1908</td>
<td>1,334.7</td>
<td>844</td>
<td>1925</td>
<td>5,287.4</td>
<td>1350</td>
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<tr>
<td>1909</td>
<td>1,050.6</td>
<td>865</td>
<td>1926</td>
<td>8,198.9</td>
<td>1529</td>
</tr>
<tr>
<td>1910</td>
<td>1,535.4</td>
<td>878</td>
<td>1927</td>
<td>5,750.6</td>
<td>1700</td>
</tr>
<tr>
<td>1911</td>
<td>3,006.0</td>
<td>1000</td>
<td>1928</td>
<td>8,582.8</td>
<td>1948</td>
</tr>
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<td>4,081.8</td>
<td>1270</td>
<td>1929</td>
<td>5,287.2</td>
<td>2116</td>
</tr>
<tr>
<td>1913</td>
<td>4,346.3</td>
<td>1574</td>
<td>1930</td>
<td>4,761.6</td>
<td>2259</td>
</tr>
</tbody>
</table>

Explanatory note:

\[ t \sum_{j=t-4}^{t} D_j = \frac{NWD_t}{NGDP_t} \]

where

\[ t \sum_{j=t-4}^{t} D_j = \text{sum of the adjusted outlays} \]

\[ NWD_t = \text{non-war defence outlays} \]

\[ NGDP_t = \text{nominal gross domestic product} \]
Explanatory Note to Table 6 (Continued)

The series NWD is exclusive of direct expenditures on the South African War and WWI and of repatriation expenditures, war pensions housing benefits and loans for soldier settlement. The series includes all other expenditures under Ordinary Votes and Appropriations, the Loan Fund, Trust Fund and Special Defence Provision Fund. The latter covered the Development Fund, Naval Construction, Defence Reserve, Equipment for Air Services and Defence Equipment. This was financed from Surplus Revenue held in the Trust Fund.

Defence outlays for 1902 and following years are from the Commonwealth Budget 1940 (Table 19, p.69). T.A. Coghlan in The Seven Colonies of Australasia provides data of outlays for 1895, 1897, 1899 and 1902. I interpolated between these benchmarks using the combined defence expenditures of two States, Victoria and New South Wales. We then used this series to extrapolate the Budget series back to 1897.

The nominal GDP series, NGDP, is from N.G. Butlin, Australian Domestic Product Investment and Foreign Borrowing, Cambridge, 1962, p.33. The original series, both NWD and NGDP, were in financial years. These have been adjusted to calendar years.
Table 7 : UK Gross Passenger Outflow to Extra-European Ports Other than Australia (000's)

<table>
<thead>
<tr>
<th>Year</th>
<th>1901</th>
<th>1902</th>
<th>1903</th>
<th>1904</th>
<th>1905</th>
<th>1906</th>
<th>1907</th>
<th>1908</th>
<th>1909</th>
<th>1910</th>
<th>1911</th>
<th>1912</th>
<th>1913</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>154.2</td>
<td>190.7</td>
<td>251.8</td>
<td>262.2</td>
<td>252.5</td>
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<td>380.6</td>
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<td></td>
<td>1914</td>
<td>1920</td>
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<td>1922</td>
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<td>1924</td>
<td>1925</td>
<td>1926</td>
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<td>1930</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>252.8</td>
</tr>
</tbody>
</table>

Explanatory Note to Table 7:
For most of the period the source is the British Board of Trade Journals and Annual Reports. Prior to 1907 Australia was not recorded separately but combined with New Zealand as 'Australasia'. In these years I extrapolated the Board of Trade series of passengers bound for Australia back (from 1907 to 1901) using my series of the UK inflow into Australia - i.e. column 1, Table 24, Chapter 3.
Table 8: Stock of UK Migrants who Arrived During Preceding 15 Years

<table>
<thead>
<tr>
<th>Year</th>
<th>Stock of Migrants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1901</td>
<td>112,715</td>
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<tr>
<td>1902</td>
<td>87,104</td>
</tr>
<tr>
<td>1903</td>
<td>63,556</td>
</tr>
<tr>
<td>1904</td>
<td>41,691</td>
</tr>
<tr>
<td>1905</td>
<td>22,194</td>
</tr>
<tr>
<td>1906</td>
<td>15,132</td>
</tr>
<tr>
<td>1907</td>
<td>12,605</td>
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<td>1908</td>
<td>17,137</td>
</tr>
<tr>
<td>1909</td>
<td>27,619</td>
</tr>
<tr>
<td>1910</td>
<td>45,620</td>
</tr>
<tr>
<td>1911</td>
<td>70,351</td>
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<td>1912</td>
<td>124,571</td>
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<tr>
<td>1913</td>
<td>194,586</td>
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<td>1914</td>
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<td>1920</td>
<td>261,443</td>
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<tr>
<td>1921</td>
<td>278,193</td>
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<td>293,874</td>
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<td>328,421</td>
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<tr>
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<td>394,756</td>
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<tr>
<td>1926</td>
<td>408,279</td>
</tr>
<tr>
<td>1927</td>
<td>397,450</td>
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<td>1928</td>
<td>377,105</td>
</tr>
<tr>
<td>1929</td>
<td>352,884</td>
</tr>
<tr>
<td>1930</td>
<td>343,717</td>
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</tbody>
</table>

Explanatory Note to Table 8
For the years 1901-30 net UK arrivals are from Table 24, Column 12. For earlier years the figures were derived from data in F.K. Crowley, British Migration to Australia: 1860-1914, Unpublished D.Phil Thesis, Oxford 1951, pp.308-9.
### Table 9: Estimated Males in the Migration Decision Making Age Group, 20-44 years (000s)

<table>
<thead>
<tr>
<th>Year</th>
<th>Pre-war</th>
<th>Post-war</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900</td>
<td>6,640</td>
<td>1913</td>
</tr>
<tr>
<td>1901</td>
<td>6,713</td>
<td>1914</td>
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<tr>
<td>1902</td>
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<td>1903</td>
<td>6,898</td>
<td>1920</td>
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<td>1904</td>
<td>6,949</td>
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<td>7,111</td>
<td>1923</td>
</tr>
<tr>
<td>1907</td>
<td>7,193</td>
<td>1924</td>
</tr>
<tr>
<td>1908</td>
<td>7,204</td>
<td>1925</td>
</tr>
<tr>
<td>1909</td>
<td>7,360</td>
<td>1926</td>
</tr>
<tr>
<td>1910</td>
<td>7,445</td>
<td>1927</td>
</tr>
<tr>
<td>1911</td>
<td>7,523</td>
<td>1928</td>
</tr>
<tr>
<td>1912</td>
<td>7,556</td>
<td>1929</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1930</td>
</tr>
</tbody>
</table>


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**Explanatory Note to Table 9**

The estimates cover Great Britain. Consistent data for Ireland is unavailable. However from Table 31, Chapter 3 the bias is unlikely to greatly alter the results; the overwhelming majority of migrants had also, in fact, come from one country, England.

The method of estimation might briefly be elaborated.

First I estimated the proportion of males 20-44 years in the total population at census bench marks 1901, 1911, 1921, 1931. I assumed that between 1901 to 1911 and 1921 to 1931 the bench mark ratios changed linearly through time. Second between 1912-14 it was assumed that the ratios did not differ from the 1911 census result and similarly that ratio ruling in 1920 approximated the 1921 census result. The figures shown in Table 9 represent the product of the ratios so derived and Mitchell's annual population estimates.
Table 10: Mean Years to Retirement of Males in the Migration Decision-Making Age Cohort, Group, 20-44 years

<table>
<thead>
<tr>
<th>Year</th>
<th>Pre-war</th>
<th>Post-war</th>
</tr>
</thead>
<tbody>
<tr>
<td>1901</td>
<td>34.20</td>
<td>33.30</td>
</tr>
<tr>
<td>1902</td>
<td>34.16</td>
<td>33.35</td>
</tr>
<tr>
<td>1903</td>
<td>34.12</td>
<td>33.40</td>
</tr>
<tr>
<td>1904</td>
<td>34.09</td>
<td>33.46</td>
</tr>
<tr>
<td>1905</td>
<td>34.05</td>
<td>33.52</td>
</tr>
<tr>
<td>1906</td>
<td>34.01</td>
<td>33.57</td>
</tr>
<tr>
<td>1907</td>
<td>33.97</td>
<td>33.63</td>
</tr>
<tr>
<td>1908</td>
<td>33.93</td>
<td>33.68</td>
</tr>
<tr>
<td>1909</td>
<td>33.89</td>
<td>33.72</td>
</tr>
<tr>
<td>1910</td>
<td>33.86</td>
<td>33.79</td>
</tr>
<tr>
<td>1911</td>
<td>33.82</td>
<td>33.84</td>
</tr>
<tr>
<td>1912</td>
<td>33.78</td>
<td></td>
</tr>
<tr>
<td>1913</td>
<td>33.74</td>
<td></td>
</tr>
<tr>
<td>1914</td>
<td>33.71</td>
<td></td>
</tr>
</tbody>
</table>

Explanatory Note: The mean years to retirement of males in the migration decision making age cohort $\Theta$, was estimated as

$$\Theta = R - \sum \frac{m_i C_i}{C_i}$$

where

- $\Theta$ = mean years to retirement
- $R$ = mean retirement age, here taken as 65 years
- $m_i$ = mean age of the $i^{th}$ sub-cohort in the 20-44 age bracket
- $C_i$ = $i^{th}$ cohort's share of the total numbers in the 20-44 age bracket.

The sub-cohorts of the age bracket 20-44 years were as follows - [20-24], [25-29], [30-34], [35-39], [40-44]. $\Theta$ was estimated on the basis of census benchmarks. The methods of interpolation and extrapolation and discussion of the original data are to be found in the explanatory note to Table 9.
Chapter 10

CONCLUSIONS

The first three decades of the twentieth century were characterised by a drive to populate Australia. The secular decline in family formation was accepted, albeit with the exception of a vocal fringe, and in any case the effects of immigration were judged to be far more immediate than those by the natural increase of Australian residents. 'For us', as one proponent of immigration expressed, 'to wait for the country to be populated as fully as it ought to be by Australian born only, would be for us to wait a very long time indeed'. Immigration became the means of augmenting Australia's population, and the United Kingdom or 'Home', as it was more customarily described, was seen as the source of additional population. For the legal, cultural and racial bonds between Australia and the UK were tight; Australia was 'underpopulated' while the UK was considered to be 'overpopulated'. Within this context, this thesis has focussed upon three closely interrelated issues: why were more people wanted, why did migrants come and what role did Australian governments play in this process?

These questions and my treatment of them differ in at least three general respects from earlier writings of econometric historians on immigration. First, earlier writers on Australian immigration (including myself) adopted Jerome's push-pull model which in the guise of supply/demand analysis emphasised the 'expulsive' and 'attractive' forces behind migration. More recent writings and simple econometric theory have pointed to the severe faults of this approach in 'identifying' and accurately estimating the true supply vis-à-vis demand responses. I have focussed on the explicit supply and demand responses, not on push-pull. Second my approach differs from the few writers who have moved towards explicit supply and demand models in that I have interpreted migration in terms of 'excess' supply and demand functions - this seemed appropriate in light of the close affinities and bonds between Australia and the UK and of the era of Empire Settlement. Third, most writers have analysed migration within the framework of 'free' labour markets. The role
of government in influencing or regulating the flows has received
rather scant attention, and in no case has government intervention
been explicitly incorporated into the behavioural equations. I have
attempted to provide a detailed narrative of the development and
migration strategies of Australian governments and to test aspects
of their aggregate behaviour within the framework of the migration
model. Indeed it is around the point of government intervention and
migration that the two parts of this thesis have revolved. To
allay any fear that the reader may harbour as to the orbit of Parts
I and II, the remaining pages of this final chapter are devoted
to crystallising the relation between government intervention in
economic matters and UK immigration. This may be done under three
headings:

- government intervention, development and migration
- intervention and the demand function for migrants
- intervention and the supply function of migrants.

Government intervention,
development and migration

For three decades after 1860, Australia enjoyed high employment,
output and population growth. The depression of the nineties
fractured this pattern and much of what had been taken for granted.
The years following Federation in 1901 saw an effort not only to
re-establish old standards, but to renew and accelerate output and
population growth. The task was to expand and diversify job
opportunities, to roll the wheels of output and population growth
again, and in so doing, secure a prosperous, white and safe
Australia long into the future. This was, and to some extent
remains, the Australian Dream. How was it to be achieved?

If industries and activities could be diversified and jobs
expanded, then greater opportunities existed for absorbing into
employment residents as well as immigrants without threatening the
'standard of living'. And, in this regard, wages could be protected
via the system of awards and job opportunities advanced by public
investment programmes and price props (including the tariff). The
effects of the latter also fed back into the former. Investment
and price props increased the demand for labour and supported wage
rates. Thus, so long as wages could be protected and job
opportunities diversified and expanded, more room could be found for new settlers from the UK. Immigration was then seen to set in motion further growth by its short and particularly long term effects on workforce growth, and by providing a growing army of consumers and taxpayers.

In this plan, Australian governments played a key role in providing initiatives and direction. Yet it is important to stress that the 'demand' for peopling Australia was not simply a demand emanating from the 'public sector'. For governments largely provided an agency service; governments provided the corporate machinery of the state for the resolution of group claims - albeit some were advanced by individuals - and the implementation of decisions and policies which evolved.

In the three decades following Federation, the broad goals of policy remained much the same, viz., the diversification and expansion of output and of job opportunities and the maintenance of high living standards for increasing numbers. In obtaining these broad objectives, governments were happy to press ahead with projects including contractual arrangements which fostered growth in rural and urban-industrial areas. Some writers have, I believe, overstated the extent to which the 'targets' and 'instruments' of policy were directed at closer settlement and rural development. Two points need to be made.

First, the idea that migrant land settlement was seen by policy makers as central to developing Australia is quite wrong. It is true that Hughes strongly espoused this view, but he was never able to force it upon the states. Even before 1914, land was scarce at the 'administered' price, and by and large the view taken by the states was that Australian residents (with some savings and local experience), qualified first. After the war the difficulty of obtaining land was even more acute; the consequence of the governments' commitment to settle Australian (but not UK) ex-servicemen upon farms. Second, even leaving the question of the direct settlement of UK migrants upon the land to one side, I have argued that the states were not merely focussing on rural development; the term development was not simply reserved for closer settlement and the expansion of rural output and employment. Development had
a broad meaning: the diversification and expansion of output and job opportunities across the economy. But there was a change in the gravity of policy after the war. The years after the war, and largely as a result of it (the rise of economic nationalism, changing trade relations and the flood of imports), saw the adoption of high protection of Australian manufacturing. The weight of public investment also continued to swing behind the provision of urban equipment in the twenties, but it was above all the tariff which indicated a stronger awareness and commitment to urban-industrial expansion. This is not to deny the element of expediency in its adoption. To do so would be to misrepresent the process of decision making. Circumstances had changed and the balance of pressure and opinions had shifted in favour of protection. Policy took on a somewhat new slant; it accommodated and reflected these changes. That this was so, however, should not be overemphasised at the expense of the central theme of development - diversification and expansion of output and employment throughout the economy and the absorption of an ever increasing workforce and population.

Intervention and the demand function for migrants

Australia wanted more people. But no one, not even Hughes, thought that a more optimal distribution of population between Australia and the UK could be achieved at short notice. Hughes' own time horizon was of the order of twenty years and with him most, until the late twenties, would have agreed. The demand for population additions which would set a path towards some long term optimum was largely a function of short term economic factors.

The inverse demand functions estimated in Part II provide an insight into what these factors were and their impact on annual variation in demand. The price in the system of equations (and the dependent variable in the demand equation) has been taken as average subsidies, \( SP^A \). Although governments did many things to attract population, the associated outlays were not, I believe, perceived by policy makers of the day as costs to be charged against annual arrivals; it was only in the closing years of the twenties that
policy makers, through economic advisers, became aware of many of the implicit costs of population growth. Rather, I speculate that outlays on such things as infrastructure positively not negatively influenced demand.

The combined variables in the function 'explained' about 80 per cent of the year-to-year variation (64 per cent of the variance) in demand. As public investment $I^c$, and wealth $BC$, rose, so did the demand for populating Australia; as these forces rose, Australian governments progressively stepped up average outlays on assisted passages in order to obtain the extra numbers desired. At the same time, ceteris paribus, governments took into serious account the impact of new arrivals upon the local labour market. The intensity of labour and capital pressure groups were in a sense in tune — the pressure by the former rising and that of the latter diminishing as the job market slackened — and no government it would seem chose to disregard such pressure. As the labour market tightened, average subsidies rose and vice versa.

Governments in stepping up average subsidies were not, however, sensitive to the marginal costs incurred. The results revealed that the mapping of price against quantity was indeed negative (downward sloping) but sensitivity was insignificant. This result was not altogether unexpected, given the lack of close substitutes perceived by contemporaries of the day for UK migrants and the comparatively small outlays involved. That the budget constraint was nonetheless significant is not contradictory for it indicates that when government spending power was reduced, then large projects as well as small ones felt the blade of the Treasury axe. Finally, the regression analysis suggests that the period after the war was characterised by a negative shift in the SPA function. This may have been due to increasing concern after the war with market prospects which damped enthusiasm for immigration. It may also be a reflection of the willingness of the Imperial government to share the costs of passage subsidies after the war which permitted the Australian 'price' (average subsidies) to be lower than it would otherwise have been. Regrettably at this stage these possible effects cannot be untangled.
One factor which could not be included in the regressions, was the level of the Australian Tariff (no continuous time series being available). At first glance this may seem a source of considerable error and complaint. However, the reader should bear in mind that the regression analysis is intended to capture influences on policy makers and implementers which changed from year to year, and accordingly changed annual demand. There can be no doubt that the tariff increased the secular demand for immigrants, but I do not think that it greatly influenced annual changes in demand. On the other hand, this is not to say that the tariff did not affect other economic variables — wages and employment — which in turn influenced variation in the supply of UK migrants.

Intervention and the supply function of migrants

The regression results on the supply function, $M^g$, were in one respect less satisfactory than those on $SP^A$. The combined variables only accounted for about 60-80 per cent of the variation (35-70 per cent of the variance) in supply thus, by and large, a greater part remains unexplained in the case of supply than in the instance of demand. Yet my object has not been to maximise the correlation coefficient and 'goodness of fit' statistic, for the true supply behavioural relations may have been genuinely so stochastic.

The supply model as estimated casts new light on the question of why migrants came to Australia. The second tier estimates of the supply function consistently confirmed three factors as significant explanators of variation in the supply of UK migrants: expected real income gains from human capital, transport costs and the costs of job search. Of these three explanators, one, transport costs, had not been previously investigated at all by researchers, while expected income gains, which in past studies of Australian immigration appeared insignificant, is now tentatively confirmed. Nor had search costs been previously estimated in the form suggested by the model of Chapter 8. That the income difference was found to be significant might be attributed to the more careful specification of the relevant magnitude and the weighting by years to retirement and the number of UK household heads in the ranks of potential movers. (However notwithstanding these improvements in specification the reader is reminded that the income difference used remains very much a proxy for the 'correct' unrecordable variable.)
A fourth variable, the stock of friends and relatives who had previously migrated, also possessed explanatory power although its importance vanished when the stock was redefined over 10 rather than 15 years. A less primitive specification and further empirical work are clearly needed before much confidence can be expressed in this variable. The need for further work is also apparent in the instance of foreign competition for UK emigrants, $M^{AL}$; no satisfactory answer could be found for the perverse sign attached to its coefficient.

What do these results reveal about the role of government intervention on the supply of migrants?

Clearly governments were able to influence supply via transport costs by lowering contract rates and raising passage subsidies. The link between intervention and the promotion of migration via influence on the other two significant variables - expected income gains from moving and search costs - is not however quite so direct or strong. But on balance, my conclusion is that intervention did favourably influence these variables, hence assist in the peopling of Australia.

As public investment was not simply in direct competition with the private sector for profitable outlets, and did not entirely draw on the same sources of funds, public investment supported jobs and real wages. In turn, these influenced, to some extent, the expected income gains to potential movers, and by raising job vacancies higher than they would have been otherwise, lowered search costs. By diverting expenditure which would otherwise have been made on imports, the tariff also promoted higher employment at home. And, in raising the demand for labour relative to the demand for other inputs, the tariff _ceteris paribus_ redistributed income in favour of urban-industrial workers. Finally, taking the period as a whole, although wage determination largely reflected economic conditions, average wages were pushed somewhat higher than market forces alone suggested. While the tariff, investment (backed by capital inflow), and the arbitration system, were the chief means of expanding job opportunities and protecting real wages in the face of population growth, other support schemes, for instance, preference to local manufacturers in government contracts, were also used.
This is not to say that government intervention was solely geared to promoting immigration. Wage fixing and industrial legislation had their roots elsewhere, nor were public investment and the tariff just simply functions of the migration programme. Rather governments intervened in various ways to promote development and protect living standards, and such intervention tended to influence the expected benefits and costs to potential movers. In the case of passage subsidies and transport costs, the link of course was direct; government action was solely designed to influence the inflow.

There is, however, a danger of overstating the importance of government intervention in influencing expected gains and costs to migrants. For the direct effects of intervention were in part neutralised by the indirect effects of government action. For instance, an indirect effect of the tariff and of increased foreign borrowing by governments was the build up of London funds in 1922 which led Australian banks to sell sterling balances at a slight discount which in turn reduced the direct effects of the tariff. Further, the (Stopler-Samuelson) conclusion as to the redistributive effects of the tariff does not follow if the foreign demand for Australia's exports was highly inelastic, (a view held by many Australian economists in 1929). The redistributive effects of the tariff were further neutralised by the act of governments in offering rural producers 'compensating concessions'. In addition to these indirect effects, one Australian economist, E.R. Walker, argued that by encouraging the mushroom growth of small firms - many of which soon failed - the tariff led to greater instability of employment for the average Australian worker. Other examples of the indirect or secondary effects of intervention nullifying in part the primary effects can also be found in wage regulation. For at least one group of workers, the unskilled, wage regulation assured higher real wages,

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1 A.H. Tocher, 'The Monetary Standards of New Zealand and Australia', *Economic Journal*, vol.34, 1924, pp.556-575. Selling sterling at discount meant appreciating the exchange rate. Australian businessmen complained bitterly that the banks were using their big balances in London to nullify the effects of the Tariff and to attack the protected Australian industries. In fact, the banks had no real alternative in light of the tariff.
hence in theory a higher standard of living, but it also led to
greater unemployment - the market failed to clear at the higher wage
rates. Finally there is more than a hint of concern by the close
of the twenties that foreign borrowing and public investment had
gone too far, and that when the bump came it would be deeper and
harder because of this. As early as 1927, the Economist, for
instance, was urging Australian governments and British investors
to think more cautiously about the use to which funds were being put.

Each of these above points are clearly deserving of a separate
thesis. But what they mostly suggest is that the impact of
government intervention on wages and jobs opportunities, and in
turn their impact on migrant supply, was less than an examination
of direct effects alone implies.

Nonetheless, at this stage the presumption that on balance
governments favourably influenced migrant supply is not, I think,
amiss. In this regard, the first three decades of the century,
particularly the twenties, witnessed a conscious drive to people
Australia. The calculations presented in Table 26 suggest that
the contribution of UK migration to Australia's population, though
modest, was not unimportant. If UK migration had not occurred in
prewar years, then Australia's population would have been about
5 per cent smaller on the eve of the war. Similarly, if UK
migration had not resumed after the war then Australia's population
would have been 4 per cent less in 1930 than in fact it was. Some
advance had been made. And from my estimates presented in Table
44, average incomes were roughly kept in tact during this advance
(a finding in sympathy with the tenor of the 1929 Brigden Report).
Annual targets for UK population additions, as discussed in Chapter
4, were approximately met, Australia obtained a larger population
and average incomes seem to have suffered little if at all. Thus
in this sense the strategy of peopling of Australia met with some
success. Yet there were implicit costs and inherent weaknesses in
the strategy, based as it was on along string of price and
employment props. It is not without significance, I think, that
aggregate output performance faltered in the late twenties, in
advance of Wall Street, and that Australian politicians and their
economic advisors were beginning at this time to question the
efficacy of established policy.
In concluding, two questions must be asked. What has been achieved in this thesis? And in which direction should future research proceed?

I have endeavoured to explore in these pages the nature and determinants of UK immigration in relation to Australia's development. The narrative of Part I has been partly tested and extended by the empirical work of the second part of the thesis. That some advance has been made might perhaps be gauged by the fact that empirical studies of Australian migration have hitherto told us little more than that Australian unemployment was somehow important in determining the flow. But the exercise has not been simply to increase the list of significant explanators of migration. What I have tried to do is to fuse the qualitative evidence and records with the econometric tests, in order to unravel a little of the story behind the peopling of Australia in the early twentieth century.

Much still remains to be done to tell the full story. For one thing, my discussion of the role of pressure groups in policy formation has been rather abstract. This skeleton deserves to be far more richly clothed; we know something about the ideologies, motivation, and lobby patterns of the labour movement, but little about those of manufacturers, pro-tariff and other groups, nor the formation of public opinion. Another area deserving of more attention is the impact of government policy on economic variables which influenced migration. As I have said the primary effects overstate the ultimate impact; to what extent did government intervention unwittingly nullify and frustrate the objectives of that intervention? A precise quantitative answer is yet to be given, and behind this question lurks the broad 'counterfactual' - the rate of immigration in the absence of all intervention. Another area, and in some ways the most obvious for further research, is the consequences of peopling Australia at this time. In Chapter 6 an attempt was made to estimate the impact of migrants on employment and output growth. But, the surface has barely been scratched. Furthermore, the role of capital inflows has received only scant attention (indirectly via investment) in my model of the determinants of migration, and none in the production function analysis. Finally, the models estimated in this
thesis still leave some questions unanswered, not the least being the impact of foreign competition for UK emigrants on Australian immigration. And, some variables, for instance defence or the threat of invasion, may have 'failed' empirical tests for no good reason - simply this researcher's inability to adequately quantify such forces.

The list is only a beginning but it is perhaps sufficient to indicate the scope and breadth of the work that still remains to be done. To end on the words of Thomas Macaulay, a century ago, 'Knowledge advances by steps, and not by bounds'. If a step has been taken in these pages, then it is reward enough.
Bibliography

Listed below are the sources cited in footnotes and a small selection of other material which has been helpful in writing the thesis. Owing to the extensive use, but voluminous and scattered nature of government publications, it has not been feasible to cite these references in detail.

(A) Official Publications

1 Commonwealth of Australia

Censuses of the Commonwealth and the Statistician's Reports
Demography Bulletin
Finance Bulletin
Labour (and Industrial) Report
Overseas Trade Bulletin
Production Bulletin
Year Book
Parliamentary Debates
Parliamentary Papers (Some of the most useful have been:
Public Accounts and Estimates - discussion of which is to be found in the Debates; Reports of the Development and Migration Commission (various); Annual Reports of the Tariff Board; Reports of the Interstate Commission; Royal Commissions on National Insurance (Minutes of Evidence published separately) and on the Basic Wage; Conferences of Commonwealth and State Ministers; Report of the British Economic Mission)

2 States

Statistical Register of NSW
A Statistical Account of Australia and New Zealand, 1902-03 and 1903-04
A Statistical Account of the Seven Colonies of Australasia, 1895 to 1901-02
The Wealth and Progress of NSW, 1900-01
NSW Year Book
NSW Parliamentary Debates
Census of Victoria, 1901
Statistical Register of Victoria (these were not published after
1917, but a microfilm of the 'work sheets' of the later
Registers is on file in the H.P. Brown Library, Research
School of Social Sciences, Australian National University)

Victoria, Parliamentary Debates
Statistics of Queensland
Queensland, Parliamentary Debates
Queensland Year Book (1901 and 1902)
Statistical Register of South Australia
South Australia, Parliamentary Debates
Tasmania, Parliamentary Debates
Statistics of Tasmania
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Parliamentary Papers published separately by the several states
(some of the most useful have been: Public Accounts, Estimates
and Financial Statements; Reports by Public Works
Parliamentary Committees; Immigration Report for WA, 1909
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Railway Transit, NSW, 1911; Royal Commission as to Shortage
of Labour, NSW, 1911; Select Committee upon the Causes of
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3 United Kingdom

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House of Commons, Command and Sessional Papers (mainly relating to
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_________ and Wadham, S.M. Land Utilisation in Australia, Melbourne, 1939.

(C) Articles


_________ 'Economic Position of Australia', Nineteenth Century and After, March 1931.

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'...Comment on Mr Benham's Restatement', Economic Record, November 1927.


Butlin, N.G. 'An Index of Engineering Unemployment 1852-1943', Economic Record, December 1946.


__________ 'Australian Unemployment, 1900-1940', Economic Record, September 1965.

__________ 'Australian Manufacturing and the War of 1914-18', Economic Record, November 1953.


Hancock, K. and Moore, K. 'The Occupational Wage Structure in Australia Since 1914', British Journal of Industrial Relations, November 1972.


(D) Newspapers and Periodicals

Argus
Bulletin
Pastoralists Review
Queensland Worker
Sydney Morning Herald
Sydney Daily Telegraph
The Worker


_______ 'A Critique of the Push-Pull Model', forthcoming in Australian Economic History Review.

Archival material has been drawn on heavily but it would serve little purpose to enumerate specific file numbers. The Archives Offices are listed below.

The Commonwealth Archives Office (Canberra Branch) holds the records of nearly all Commonwealth departments, responsible for immigration in the 'twenties' and related departments - Treasury, Railways and Works, Transport etc. The records of one department, Markets and Migration (formed in the mid-twenties and formally the department in charge of immigration at the Commonwealth level until 1929) have not been located - either in Canberra or Melbourne. However, most decisions passed through the Prime Minister's Department and a record of these is on file at the Commonwealth Archives Office in Canberra. Further, the Prime Minister's Department was in charge of immigration matters for all but these few brief years; before the WWI nearly all negotiations with the States occurred through this department.

The records of the State Archives Offices of Victoria and New South Wales are less complete and rather more difficult to work with. There are no modern indexes to current holdings and the numbering system used in the original 'letter books' (by which files were enlarged, split, renumbered and transferred to yet other files) presents an almost impossible maze. The records have also been heavily culled over the years and in some important instances are presumed to have been altogether destroyed.

The principal departments dealing with immigration were the Premier's and Chief Secretary's and the Bureaus of Labour and Immigration (and Tourism). Archivists at the Mitchell Library in Sydney thought that as much as 80 per cent of the records of the two departments had been destroyed by these departments and the officer-in-charge of records at the NSW Premier's Department confirmed this impression. Nor could he locate any records of our period in the Department's own
archives. It is also apparent from the meagre footage of correspondence files of departments held by the State Archives Office of Victoria, that these records have also been severely culled.

Neither State Archives Offices hold any records of the old Labour-Immigration Bureaus. These were the forerunners of Labour Departments and officers-in-charge of records of these departments advised that they held no such records.

Nevertheless some valuable information was obtained from the remaining records of Premiers' Departments - particularly with regard to requisitions and migrant arrivals (Chapter 4).

The ANU Archives (Australian National University) holds the Minute Books and other records of Council and Executive meetings of numerous unions, Trades Hall Councils and one employer's association - the Victorian Employer's Federation. Most useful were the last mentioned, and particularly the records of Melbourne and Sydney Trades Hall Councils (Chapter 5).