

P86

SAVING AND POLICY

Proceedings of a Conference

Edited by

Peter J. Stemp

with the assistance of

Catherine Baird

**Centre for Economic Policy Research
Australian National University**

ABN



© **Centre for Economic Policy Research
Australian National University 1991**

**This book is copyright.
Apart from any fair dealing for the purpose of study,
research, criticism or review, as permitted under the
Copyright Act, no part may be reproduced without
written permission.**

Inquiries should be directed to the publisher.

**Published by
Centre for Economic Policy Research
Australian National University
PO Box 4, Canberra ACT 2601. Australia.**

ISBN: 0 07315 0255 7

**Printed by Central Printery
Australian National University**

Cover design: Catherine Baird

TABLE OF CONTENTS

	Page
The Contributors	iv
Preface	v
Overview of the Papers <i>Peter J. Stemp</i>	vi
SECTION I - PERSPECTIVES	
Australian Saving Since 1861 <i>Ian W. McLean</i>	1
Comment <i>Graeme Snooks</i>	25
The Global Decline in Saving: Some International Comparisons <i>Barry P. Bosworth</i>	30
SECTION II - POLICY ISSUES	
Saving, Policy and Growth <i>Peter J. Stemp</i>	65
Comment <i>Ian Castles</i>	99
Saving Policy Issues Examined With a Macroeconometric Model <i>Chris Murphy</i>	103
SECTION III - SAVING IN AUSTRALIA	
The Consumption Ratio: Theory and Australian Evidence <i>Peter Smith</i>	128
Saving and Taxation <i>Matthew Benge and Robert Albon</i>	161
Demographics, Retirement Saving and Superannuation Policy <i>Hazel Bateman, Jack Frisch, Geoffrey Kingston, John Piggott</i>	193
Comment <i>Jeffrey Carmichael</i>	228
Conference Participants	231

THE CONTRIBUTORS

ROBERT ALBON	Faculty of Economics & Commerce Australian National University
HAZEL BATEMAN	School of Economics University of New South Wales
MATTHEW BENGÉ	Faculty of Economics & Commerce Australian National University
BARRY BOSWORTH	The Brookings Institution Washington DC
JEFFREY CARMICHAEL	School of Business Bond University
IAN CASTLES	Australian Statistician Australian Bureau of Statistics
JACK FRISCH	School of Economics University of New South Wales
GEOFFREY KINGSTON	School of Economics University of New South Wales
IAN MCLEAN	Department of Economics University of Adelaide
CHRIS MURPHY	Faculty of Economics & Commerce Australian National University
JOHN PIGGOTT	School of Economics University of New South Wales
PETER SMITH	Faculty of Economics & Commerce Australian National University
GRAEME SNOOKS	Economic History Program Research School of Social Sciences Australian National University
PETER STEMPE	Economics Program Research School of Social Sciences Australian National University

PREFACE

The Conference *Saving, Policy and Growth* was convened by the Centre for Economic Policy Research, and held on 12-13 July 1990. Seven invited papers were presented. A formal Discussant was assigned to each paper with a brief to provide a commentary and critique.

Those conference papers, revised in the light of Discussant's comments and discussion from the floor, are contained in this volume. The Discussants were also invited to prepare their comments for publication and where available these have been included with the respective paper. It was felt that the volume title, *Saving and Policy*, more accurately reflects the content and general theme of the papers.

Background to the conference and an outline of the papers is given in the Overview.

The Centre gratefully acknowledges the efforts of the authors, the discussants and the conference participants, and the particular contributions made by Professors Adrian Pagan and Barry Bosworth to the conference proceedings.

Special thanks go to Catherine Baird, who having organised the conference with her usual flair and efficiency, undertook production of the volume, including the myriad tasks of copy editor and the formatting of the camera-ready copy. Wayne Naughton and Catherine Baird reproduced the figures for the book.

Finally, I am indebted to Professor Bob Gregory, Director of the Centre for Economic Policy Research, for his encouragement and support.

Peter J. Stemp

BRIEF OVERVIEW OF THE PAPERS

Peter J. Stemp

Throughout the second half of the 1980s, discussions about the Australian economy presented in the popular press emphasised high current account deficits and an associated rapid rise in net overseas indebtedness. Since the current account deficit is closely approximated by domestic investment minus domestic saving, policy concerns quickly became translated into emphasis on a perceived short-fall in domestic saving. While there was considerable debate in the academic community as to whether or not current account deficits and the level of overseas indebtedness should be an issue of concern at all, the thrust of Government rhetoric continued to emphasise the need to increase aggregate saving and remove current account imbalances.

The papers in this volume canvass issues associated with the level of saving and its relationship to past and proposed policy options. Whether the level of national indebtedness should be a cause of concern is not addressed here since that issue has received substantial treatment elsewhere.

Several issues receive repeated emphasis throughout the volume: a major preoccupation is the role of income and demographics in determining saving outcomes; different authors emphasise alternative saving concepts; it is argued that many initiatives purportedly designed to improve saving can also be justified on efficiency grounds.

The papers discuss historical and international perspectives as well as possible future scenarios. There are also assessments of the success of adopted policy initiatives and of likely outcomes from other policy options.

In providing a historical perspective, *McLean* presents time-series data for private, government and aggregate gross saving ratios since 1861 and compares the Australian experience with that of Canada and the United States. He concludes that the long-run trend has been for Australian saving to rise markedly in three steps (the 1870s, the 1920s-1930s, and post-World War 2). The post-War saving ratio has not only been higher on average but has also shown less short-run volatility. Ignoring periods of recession or war, the saving rate in Canada traces out the same (rising) three-step pattern observed for Australia. United States' saving behaviour over the long-run has differed markedly from that of Australia and Canada. *McLean* presents a simple regression model in which changes in saving are attributed to income and demographic influences. This model explains much of the saving behaviour observed for Australia since 1861.

Bosworth presents an international comparison using data on private saving over the past twenty to thirty years for thirteen countries. As did *McLean*, *Bosworth* devotes primary attention to the role of income growth and demographic change. Using both cross-country studies and time-series regressions of saving in different countries, he derives results which suggest that lower rates of income growth are primarily responsible for the pattern of declining rates of private saving. He also demonstrates a strong role for

demographic factors in accounting for saving trends in several countries. Bosworth suggests that the effect of demographic change has been to increase private saving rates over the past two decades by a substantial amount though the magnitude of change differs widely among countries in the sample.

These results are theoretically supported by aggregation of a naive life cycle model assuming static expectations. However, in a novel extension to the results of the earlier part of his paper, *Bosworth* makes use of Japanese data on individual households to refute the assumptions underlying the life cycle model. He also decisively rejects demographic patterns as an important explanation of changes in aggregate Japanese saving rates.

Thus, on the one hand, Bosworth tends to support the empirical results presented by McLean. On the other hand, he resoundingly rejects the theoretical framework underlying the life cycle approach.

The next paper provides an overview of the issues relating saving, policy and growth in Australia. In a broad ranging paper, *Stemp* first surveys alternative saving concepts, discussing the availability and quality of data. He argues that saving data for sub-sectors of the private sector are of particularly poor quality. Secondly, he employs simple models of closed and open economies to show that the saving decision essentially involves a choice between present and future consumption. It is argued that current account imbalances are likely to become more common as an economy removes impediments to international trade and financial flows, thus increasing access to world markets.

The Government policy response in the second half of the 1980s has ostensibly been directed at increasing aggregate saving so as to reduce the current account deficit. This has involved implementing Government policies designed to reduce net public sector borrowing, encouraging saving for retirement and the adoption of a tight monetary policy. *Stemp* uses available saving data to provide an assessment of the success of Government strategies. In concluding, *Stemp* argues that even if the adopted policies have not been successful in eliminating current account imbalances, the Government's policy choices can be justified from an ideological perspective that seeks to achieve a more market-oriented economy in an increasingly competitive world economic environment.

Throughout, *Murphy* emphasises the household saving ratio as the principal measure of saving. The major part of his paper provides forecasts for the next five years derived under a range of scenarios using the *Murphy* model of the Australian economy.

The paper begins with a baseline or best guess scenario for major macroeconomic aggregates over the next five years. This scenario assumes that superannuation policy significantly increases private saving over this period. The baseline scenario is followed by alternative scenarios designed to consider various saving-related issues. These alternative scenarios are: a more lax fiscal policy, the effects of an autonomous increase in private saving and a shift in the tax mix away from taxing income and towards taxing consumption.

Murphy believes that our understanding of the root causes of the uplift in the current account deficit is rather imperfect. He believes that this uncertainty extends to our understanding of what role, if any, was played by private saving. Notwithstanding this, he is able to provide some assessment of the likely impact of different policy options.

In the next paper, employing Australian data, *Smith* also emphasises household behaviour using the household consumption ratio as a major indicator of saving outcomes. The *Smith* study is an exploratory piece which examines the impact of three possible causes for the increase in Australian consumption. He measures the impact of the fall in consumer price inflation, demographic developments and the deregulation of financial markets. His conclusion is that these independent influences are hard to unravel with the role of financial deregulation being hardest to tie down.

The final two papers address two policy issues that have received considerable discussion: saving for retirement and taxation.

The *Benge and Albon* paper provides a review of recent international economic research on taxes and saving interactions. Australia's tax treatment of different forms of saving and related implications for efficiency are also considered.

Two potential problems with the taxation structure as it relates to saving are identified. Firstly, there are distortions between different types of saving which are heightened by inflation. Secondly, there is a distortion of the consumption-saving choice with a bias against saving.

The authors also discuss two policy options, namely indexation of the tax base and the consumption tax. They consider that, in the absence of any clear evidence that the administrative and compliance costs of indexing the tax base are prohibitive, this policy should be back on the political agenda. They also consider that there are persuasive efficiency arguments in favour of a switch to a broad-based consumption tax combined with the removal of Australia's wholesale sales tax and a reduction in marginal income tax rates.

Bateman, Frisch, Kingston and Piggott address the relationship between demographic transition and aggregate saving. They analyse policies already implemented by the Government to influence private retirement saving. A major contribution of their paper involves a consideration of the structure of the superannuation industry in the light of its crucial role in the management of private retirement saving.

The basic thesis of the paper is that demographic transition may indeed dictate that policies to encourage private retirement saving are required if the impact of demographic change is to be managed without undue budgetary stress; that the reforms of the past several years have gone some distance towards rationalising the policy framework for private retirement saving; but that the scale of resource reallocation is such that much more detailed research is required into the economic implications of the policy changes so far observed.

In their assessment of the superannuation industry, the authors conclude that, because the industry is in a rapid growth phase, supernormal profits can be earned by mediocre and even poor performers if they can

mount a strong and effective marketing campaign. With marketing as the cornerstone to earnings, the agent's desire for long-term survival and growth cannot be considered a sufficient condition for ensuring that agents act in investors' long-term interests. The authors also point to problems with annuity markets and indexation, emphasise the need for age-phasing of industry fund investments and question the appropriateness of international portfolio diversification by superannuation investment funds.

SECTION I
PERSPECTIVES

Australian Saving Since 1861

Ian W. Mclean

**The Global Decline in Saving:
Some International Comparisons**

Barry P. Bosworth

AUSTRALIAN SAVING SINCE 1861

Ian W. McLean*

Introduction

Heightened concern with the level of saving in a number of economies has increased the attention recently paid to the study of saving behaviour. In the United States, much of the debate over the reasons for the decline in the level of saving has been conducted either in comparative terms (because it is but one aspect of the broader policy issue of the relative performance of the American economy) or in an historical context (because of the need to distinguish secular trend from short-run variation).¹ In Australia, the debate over savings has also included comparisons with other advanced economies in the postwar period (Stemp 1987; EPAC 1988; Edey and Britten-Jones 1990a). However, historical comparisons with levels of saving in earlier periods have not been in evidence. Likely reasons are that there are no readily available historical time series on Australian saving for years prior to the 1960s, and that limited attention has been given in the economic history literature to aspects of saving behaviour.²

The aim of this paper is to begin to rectify this neglect, first by estimating three gross saving ratios (aggregate, government and private) for Australia since 1861, and then by offering some explanation of the historical trends that are revealed. The interpretation of Australian saving in the long run is assisted by comparisons with the historical experience of Canada and the United States. In addition, the historical analysis includes an assessment of the support for the life-cycle hypothesis.

* I am grateful to Michael Edelstein and Adrian Pagan for helpful suggestions on earlier versions, and also to participants at the conference on Saving, Policy and Growth at the ANU Centre for Economic Policy Research in July 1990. Peter Gibbard and James Giesecke rendered valuable research assistance.

1 For example, Benjamin Friedman notes that 'the United States has always been a low-saving country by international standards', and that its saving rate has been relatively constant across many decades: 'neither the total of net private saving nor the division of that total between individual saving and that of business have shown much variation since World War II. And although the relevant experience before that was clouded by the Great Depression and the two world wars, there is at least some ground for thinking that a rough stability of saving in relation to income has persisted since well before the twentieth century' (1989, pp.xv and 255).

2 Though not the principal focus of their articles, there is some discussion of saving by Bentick (1969) and Kelley (1968). In a comparison of eight countries, Green and Urquhart (1976, Table 9) provide estimates of saving in Australia at decade intervals from 1870 to 1920. As their focus is the international economy of the period, there is only fleeting reference to the Australian evidence on saving. Their study nonetheless represents an early attempt to examine comparative saving rates in the nineteenth century. The most important historical contribution to the analysis of Australian saving is that of Michael Edelstein (1982, chapter 11) in his discussion of British investment in Australia between 1860 and 1914.

1. The Australian Evidence

Official estimates of saving in aggregate and by sector date only from 1959-60. To establish the trends in saving over a longer span of years, it was necessary to adopt an indirect approach using historical estimates of several key macroeconomic aggregates available from the 1860s which may be linked to the official postwar series. An estimate of implied aggregate savings (S_{Agg}) may be obtained from the identity

$$S_{Agg} = Inv + DStock + (Ex - Im)$$

where

Inv	=	gross fixed capital formation, both public and private;
DStock	=	the change in the value of stocks (observing sign); and
(Ex - Im)	=	the deficit (or surplus) on the current account of the balance of payments.

The (gross, aggregate) saving rate is then S_{Agg}/GDP.

Using this indirect approach, it was feasible to obtain annual estimates of S_{Agg} and the saving rate back to 1861.³

It is also desirable to assess the contribution of private sector saving (S_{Priv}) to aggregate saving by deducting government sector saving (S_{Gov}), and also the contribution of household saving (S_{Hous}) to private saving by deducting the saving by the corporate sector (S_{Corp}). That is

$$S_{Priv} = S_{Agg} - S_{Gov} \quad \text{and} \quad S_{Hous} = S_{Priv} - S_{Corp}.$$

No historical series for S_{Corp} exists. However, there is evidence that the two components of private sector saving behave as substitutes, suggesting it may be preferable to examine the savings behaviour of the private sector as a whole.⁴ In the case of S_{Gov}, however, a set of historical estimates have been derived, but their reliability is considered to be less than that of the estimates of S_{Agg}.⁵ Therefore the historical series of S_{Priv}, having been

³ For the period 1861 to 1900, estimates of gross domestic product, the current account balance, and gross domestic capital formation were obtained from N.G. Butlin (1962). For the period 1900-01 to 1959-60, estimates of gross domestic product, the current account balance adjusted for net property income payable abroad, gross fixed capital formation, and the changes in stocks were obtained from M.W. Butlin (1977). From 1960-61 to 1988-89 the required information was obtained from official estimates of the national accounts: see Australian Bureau of Statistics (1989, 1990)

⁴ This view is adopted by Edey and Britten-Jones (1990a) in their survey of Australian saving since 1960.

⁵ Barnard (1986) has recently compiled for the years 1850 to 1968 estimates of several measures of government sector revenue and expenditure, eliminating where possible duplication between federal and state accounts. Because of changes in recording procedures, his series cannot be made consistent with the official national accounts-based estimates of government finances which date from the early 1960s, and attempts to obtain plausible estimates of S_{Gov} directly from these series were unsuccessful. Rather, use was made of Barnard's estimates of the total public debt outstanding and

obtained by deducting SGov from SAgg in each year, are also less reliable than the aggregate savings estimates; this caution applies throughout the discussion that follows. The definitions of SAgg and SPriv employed here are conventional in that no allowance has been made for expenditures on consumer durables or on increasing the stock of human capital.⁶

It is important to stress that the estimates of aggregate saving have been obtained residually. It follows that any systematic bias in the estimates of investment, or in the components of the balance of payments, will impart a bias to the savings estimates. With respect to investment, it has indeed been argued that Butlin's (1962) estimates for the late nineteenth century are understated due to the omission of some development costs in mining and on-farm capital formation (Boehm 1965). In the absence of revised estimates of investment, however, the significance of this omission for the trends in saving reported here remains unclear.⁷

The aggregate and private saving rates are shown in Chart 1, while period averages are given in columns 1 and 2 of Table 1. Several features of the pattern of aggregate saving behaviour stand out. First, the very long run trend has been for the saving rate to rise markedly. To illustrate, if a comparison is made of the three decades after 1861 and the years 1946-1989, the average saving rate rose from 9.6 to 24.0 per cent. Second, the secular rise in the aggregate saving rate occurred in a number of 'steps', if attention is confined to 'normal' periods free of war or depression (see Table 1, Col.1, where the periods are defined either by their savings history or by conventional breaks in wider economic activity levels). The first appears in the 1870s (13 per cent on average) following a very low saving rate in the 1860s (6 per cent); and although there is some falling away in the late 1880s,

historical estimates of public sector capital formation in N.G. Butlin (1962) and M.W. Butlin (1977). An estimate of government saving may be obtained by deducting from the value of public sector investment each year the change in the total public debt outstanding. From 1961-62 the 'gross public saving' estimates reported by Edey and Britten-Jones (1990b, p.80) were employed.

6 An adjustment to allow for the flow of services from consumer durables had only a small quantitative effect on the official estimates of household savings in recent years (Edey and Britten-Jones, 1990a, pp.87-88).

7 Boehm does not provide revised estimates of aggregate investment. He suggests that the effect of correcting for the omission of farm-formed capital might raise total *private* investment by about four per cent between 1861 and 1900 and two per cent between 1901 and 1939 (1965, p.212, footnote 12). Since private investment represented about half aggregate investment (the ratio varied considerably), the extent of understatement of *total* investment is likely to be around two and one per cent respectively for the two periods. Thus the (residually obtained) saving rate reported here is likely to be understated by less than one percentage point (of GDP). It may be noted that a similar problem has arisen in attempts to estimate farm investment in the United States during the nineteenth century. In the view of Davis and Gallman (1973, p.439), on-farm capital formation may have represented about one-ninth of all capital investment in the decade 1869-1878, but fallen rapidly to represent only one percent of investment by the decade 1899-1908.

Chart 1

CHART 1
Australia: Aggregate and Private Saving as Per Cent of GDP
1861-1989

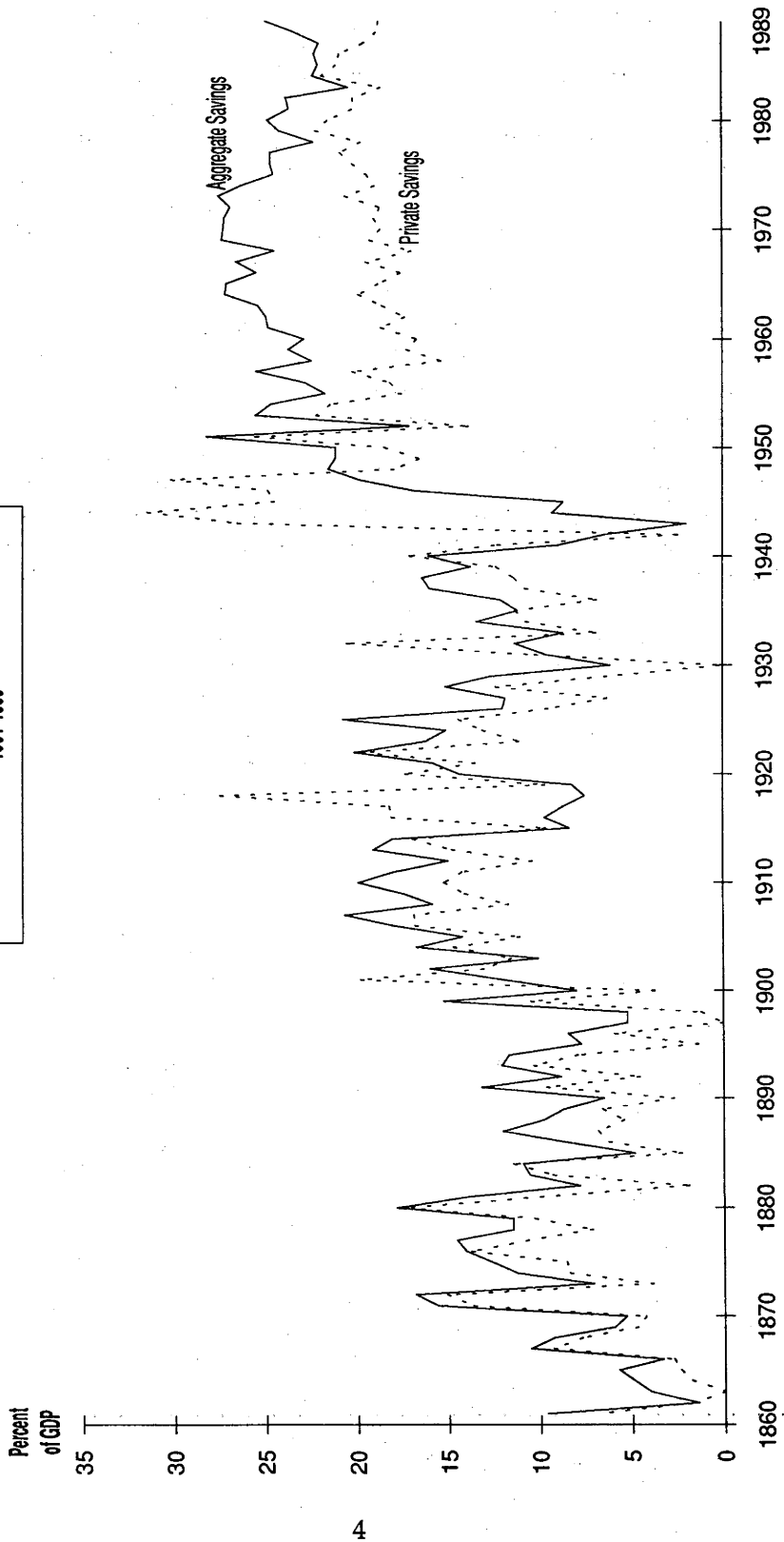


Table 1: Summary Ratios by Period

Period	Years (No.)	$\frac{S_{Agg}}{GDP}$	$\frac{S_{Priv}}{GDP}$	$\frac{S_{For}}{GDP}$	$\frac{S}{I}$
		(1)	(2)	(3)	(4)
1861-1870	10	6.02	4.16	5.68	51.2
1871-1881	11	13.33	10.79	2.18	89.5
1882-1890	9	8.86	5.86	9.77	47.4
1891-1894	4	11.43	8.11	2.02	88.8
1895-1898	4	6.65	2.13	4.48	60.1
1899-1903	5	12.24	11.70	1.32	90.6
1904-1914	11	17.53	14.25	-1.33	110.4
1915-1919	5	8.50	16.61	3.88	70.1
1920-1925	6	17.06	14.84	3.30	86.8
1926-1929	4	12.92	8.61	5.25	71.3
1930-1933	4	8.94	9.46	2.90	77.4
1934-1940	7	14.14	11.50	1.23	92.5
1941-1945	5	7.07	19.45	-0.84	150.0
1946-1950	5	20.10	21.58	-1.18	108.3
1951-1960	10	23.47	18.83	1.78	95.1
1961-1974	14	26.34	18.78	0.27	103.6
1971-1974	4	27.00	19.35	-1.17	107.6
1975-1982	8	24.13	20.57	0.93	99.4
1983-1987	5	21.87	20.45	2.15	91.1
1988-1989	2	24.19	18.84	1.44	96.3
1861-1890	30	9.55	7.10	5.62	64.1
1946-1974	29	24.27	19.28	0.54	101.5
1975-1989	15	23.38	20.30	1.40	96.2
1946-1989	44	23.97	19.63	0.83	99.7

Sources: See text.

the rate remains above that of the 1860s.⁸ The second 'step' occurs when the average saving rate rises to over 17 per cent both in the decade before the first world war and in the first half of the 1920s. Following the second world war, the saving rate again does more than simply recover previous levels: the third 'step' takes it well over 20 per cent, where it has remained for four decades.⁹

The postwar savings ratio has not only been higher on average than at any previous time, but has shown less short-run volatility. Of course, the possibility exists that differences in the methods of estimation of the underlying macroeconomic time series after the war (as suggested for the United States by Romer, 1986), are such as to impart lower variability to the (residually obtained) estimates of saving.

The trends in the ratio of private saving to gross domestic product are also shown in Chart 1, with selected period averages reported in Table 1, Column 2. If periods of war and depression are excepted, there is little difference in the trends in the two saving ratios. (The government saving ratio is shown in Appendix Chart 1.) During the 1980s, this gap narrowed with the decline in government saving, but towards the end of the decade has begun to widen once more. The 'steps' in the private saving rate are also evident: to 11 per cent in the 1870s; to over 14 per cent just before the first world war; and to 19 per cent or higher after 1945.

To conclude this inspection of the trends in saving, attention is drawn to two periods before 1900 exhibiting savings behaviour that do not accord with prior expectations. First, the 1860s look odd, with a saving rate only half that of the 1870s. Economic conditions were surely not that different between the two decades, and post-gold rush recession and employment adjustment problems are generally portrayed as too minor to account for the extremely low savings ratio, even lower than that in the depression of the 1890s. Second, why did saving rates fall during the prosperous 1880s, then partially recover in the first half of the 1890s as the economy moved into recession? These unusual features of the evidence, along with the rising

⁸ Boehm does not provide revised estimates of aggregate investment. He suggests that the effect of correcting for the omission of farm-formed capital might raise total *private* investment by about four per cent between 1861 and 1900 and two per cent between 1901 and 1939 (1965, p.212, footnote 12). Since private investment represented about half aggregate investment (the ratio varied considerably), the extent of understatement of *total* investment is likely to be around two and one per cent respectively for the two periods. Thus the (residually obtained) saving *rate* reported here is likely to be understated by less than one percentage point (of GDP). It may be noted that a similar problem has arisen in attempts to estimate farm investment in the United States during the nineteenth century. In the view of Davis and Gallman (1973, p.439), on-farm capital formation may have represented about one-ninth of all capital investment in the decade 1869-1878, but fell rapidly to represent only one percent of investment by the decade 1899-1908.

⁹ It is unclear whether the adoption of a wider definition of saving, to include an allowance either for expenditures on consumer durables or on human capital formation, would affect the timing or magnitude of the three steps in its secular rise across 'normal' periods.

step-pattern of saving rates over the very long term, require closer analysis. But before addressing that task, some comparisons are made of Australian and North American historical trends in savings.

2. Comparative Evidence: Canada and the USA

By comparison with Australian experience, the long-run trend in the American saving rate has been remarkably steady during this century if periods of war and depression are excepted. For the nineteenth century, the evidence suggests that there was an increase in the American saving rate, but its timing and magnitude is debated. Most likely, saving rose across the middle decades and Civil War (Chart 2).¹⁰

Canadian historical saving trends, by contrast, look much more like those for Australia (Chart 2 and Table 2). The recent estimates of Urquhart (1988) have been obtained by the same approach adopted here for Australia, thus are implied, gross aggregate savings.¹¹ In the three decades before 1900, savings averaged nine per cent of Canadian GNP; this rose to around 16 per cent in the period before and after the first world war; and rose again to over 20 per cent after 1950. Ignoring periods of recession or war, the saving rate in Canada thus traces out the same (rising) three-step pattern observed for Australia. Both the timing of the steps, and the average saving rate at each, are broadly comparable.

Differences in private saving patterns in the United States and Canada between 1961 and 1985 were noted by Carroll and Summers (1987). It appears from the evidence presented here that there is a longer history of divergence between the two countries in their aggregate saving rates. With respect to

¹⁰ Michael Edelstein (1989) has kindly supplied me with his estimates of implied gross savings which begin with 1900. In this paper I have employed the ratio of gross national saving to GNP, where gross national saving covers the household, business and government sectors (Edelstein 1989, Table 1, p.45). The constancy of the *private* saving rate was discussed by David and Scadding (1974). For the nineteenth century, the level of aggregate savings has been estimated by making minor adjustments to the level of domestic capital formation. The most cited published series are the various estimates of Davis and Gallman (1973, 1978) and Gallman (1966). These indirect estimates of the savings rate are sensitive to whether computed in current or constant prices, and for the ante-bellum period, whether investment is defined to include on-farm capital formation. The adjustment for the net claims of foreigners makes only a small difference to the savings rate. For the post-bellum period, the estimates are reported only as averages for overlapping periods of varying numbers of years. Ransom and Sutch (1986b) report gross private savings as a percentage of GNP, in overlapping decade averages, from 1839-49 to 1968, and 'based on the prior work of Gallman and others'.

¹¹ For Canada, historical national accounts estimates begin with 1870, and a major new set of estimates has been published by Urquhart (1986). He has derived aggregate savings for Canada by the same method I've employed: he calls his estimates, appropriately, 'implied' savings. His data end in 1926 when the official series begin, and in a more recent exercise (Urquhart 1988) he has linked the two, providing a continuous set of aggregate annual savings estimates for 1870 to 1985.

Chart 2

CHART 2
Aggregate Savings Rates: Australia, Canada and United States

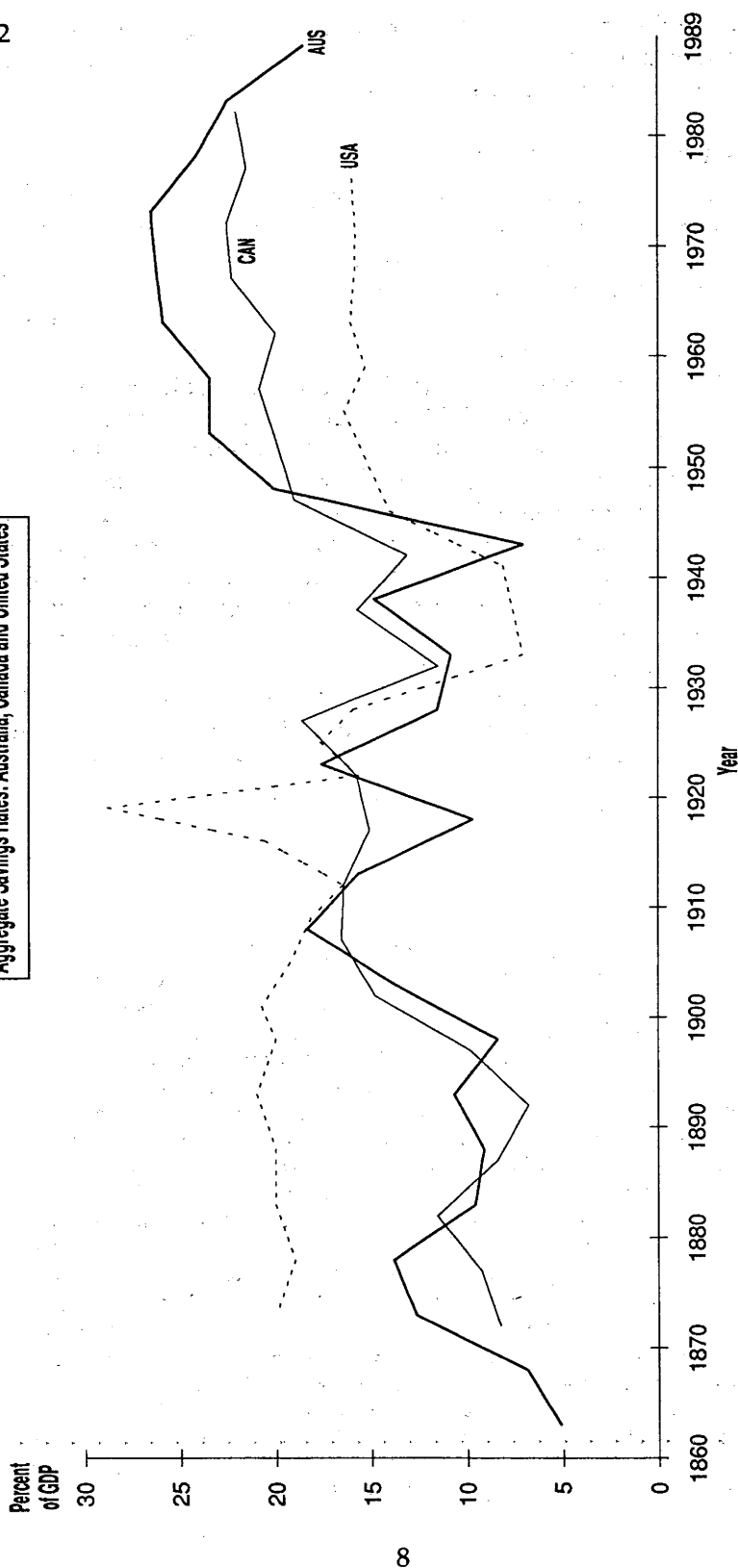


Table 2: Australia and Canada
Aggregate Saving Rate - Selected Period Averages
(per cent of GDP/GNP)

	Australia	Canada
1. 1870 to 1899	10.6	9.0
(a) 1870 to 1889	11.3	9.4
(b) 1890 to 1899	9.4	8.3
2. 1900 to 1914; 1920 to 1929	15.7	16.5
(a) 1900 to 1914	15.9	15.9
(b) 1920 to 1929	15.4	17.3
3. 1950 to 1985	24.5	21.3
(a) 1950 to 1974	25.0	21.1
(b) 1975 to 1985	23.5	21.6

Sources: See text.

the similarity in Australian and Canadian experience, one question is whether the rates of gross saving in the two countries over the very long run is coincidental. Or were the forces operating progressively to raise the Australian rate of saving in 'normal' periods operating also in Canada, at the same times, and with approximately the same result? A benefit from comparative analysis should be that it assists the identification of the factors responsible for saving behaviour in all three countries. Before attempting more formally to account for Australian savings behaviour over the very long run, some general comparative observations are warranted, especially relating to the period before 1914.

Canada and Australia share the characteristic of considerable reliance on foreign capital to supplement domestic savings in the late nineteenth century, continuing, in the case of the former, to 1914. In contrast, the United States in the postbellum period was less dependent on capital inflow, and by the 1890s was moving to the position of a net foreign lender (Edelstein 1982, Table 10.1). If foreign savings serve even in part to lower domestic saving through substitution, one basis for the differing experience of the three countries may have been identified. Canada and Australia also share the characteristics of settler economies in the nineteenth and early twentieth centuries, and saving behaviour may have differed from that observed in more established communities. In this case a mechanism linking lower saving and pioneering conditions may have been the unusual age structure of immigrants to the regions recently settled. Of course, the Great Plains and far west of the United States were undergoing settlement at approximately the same time. However, average or typical American saving

behaviour revealed in national series would primarily reflect that of longer-settled regions.

Finally, it should be noted that the coincident jump in the Canadian and Australian saving rates circa 1900 occurred under rather different economic conditions. Australia was coming out of recession, financial reconstruction and drought, during which the supply of foreign savings had dried up. Prosperity returned only from 1904, and thereafter the Australians were actually repaying overseas debt - negative foreign saving. By contrast, the Canadians were enjoying an economic boom dating from the mid-nineties and associated with the rapid settlement of the prairie provinces and growth in wheat exports. The capital inflow into Canada was positive during this period, and was a much larger proportion of GNP than it had been during the three decades prior to 1900.

3. Demographic Influences

The level of household saving is frequently modelled as a function of the age distribution, the theoretical basis being the life cycle hypothesis of Modigliani and others. Household saving, in this view, will rise (fall) if the age structure of the population changes such that the proportion of the population in age groups associated with positive net saving behaviour rises (falls).¹² As household saving is an important component in total saving, we employ the life-cycle hypothesis in an assessment of the determinants of both aggregate and private saving behaviour.

A striking characteristic of the Australian economy during the late nineteenth century was the peculiar age distribution resulting from the scale and composition of immigration during the gold rushes. A resultant 'kink' in the age structure of the population, which moved through higher age brackets in subsequent decades, and produced an 'echo' effect one generation later, was identified by Hall (1963). Some of the economic consequences of the same demographic shock, including the impact of immigration on saving behaviour, were explored by Kelley (1965, 1968). However, he did not estimate actual saving rates for the period. Rather, he simulated the impact of immigration on a model of the age structure of the population, using age-specific savings ratios obtained from the twentieth century (Kelley 1968, pp.256-260).

Adopting a life-cycle perspective on Australian saving suggests two hypotheses regarding the historical evidence. First, the very-long run rise in the saving rate might be the result of a gradual shift in the age structure

¹² The life-cycle hypothesis has come under attack recently as being inconsistent with evidence from a variety of sources that saving continues at high levels even after retirement. The alternative hypothesis advanced to account to this is the bequest motive—the desire to accumulate wealth for inter-generational transmission and not to sustain consumption after retirement. A useful exchange is reported in Modigliani (1988) and Kotlikoff (1988). The possible importance of the bequest motive in accounting for historical savings trends in Australia is raised below.

towards the age groups more likely to be net savers.¹³ Second, the 'steps' in the saving rate observed in the 1870s, after 1900, and again after the second world war, might be associated with more rapid shifts in the age structure favourable to saving.

The first conjecture receives general support, as shown in Chart 3. The proportion of the population at the censuses between ages 45 and 64 rises over the century following 1860, after which it stabilises. The saving rate naturally shows more short-run variation, but its underlying trend was similar. The second hypothesis is also given some support. The proportion of the 45-64 age group rises in the 1860s and 1870s (as does the saving rate), falls over the 1880s and 1890s (as do savings), then rises sharply before the first world war (ditto saving). Thereafter, the thirty years of wars and depression impact more noticeably on the saving rate than the age structure. With the end of the second world war, the rapid climb in the saving rate seems simply to restore its earlier relationship with the age structure. For at least 25 years after 1950 there was little movement in either series.

Of course, this information on the changing age structure of the population serves only as a proxy for the desired information regarding expected circumstances of retirement. If few workers expected to live to retiring age, or to have (and be able) to find some form of paid employment all their lives, saving must have been undertaken primarily for other motives. Were these typical circumstances in the late nineteenth century? Did the expectation of retirement rise as life expectancy gradually improved? And did employment (or semi-employment) opportunities in old age decline along with the expansion of urban-industrial relative to rural employment? If the answer to each of these questions is affirmative, some better basis might be provided for linking the secular rise in the saving rate with the change in the age distribution through a life cycle perspective. However, systematic historical evidence is not available.¹⁴ In the twentieth century there occurred a slow expansion in the eligibility provisions of the state-funded old age pension system, with the most rapid broadening occurring after the second world war. Insofar as these extensions of coverage were unfunded commitments, a negative effect on private saving might be anticipated, though the opposite effect would result from an expected increase in the length of retirement. The net impact of social security on private saving is thus difficult to predict. The fact is that in the postwar period the aggregate saving rate in Australia takes another upward step.

If the changes in the age structure of the Australian population appear at least broadly consistent with trends in savings behaviour as suggested by the life cycle hypothesis, is there a similar demographic history in Canada, but a different one in the United States, mirroring the contrasting history of saving in the two countries? As shown in Table 3 and Chart 4, the proportion of the Canadian population in the 45-64 age group rises over the

¹³ This is suggested by Edelstein (1982, p.264) for the period to 1914: 'the upward trend in Australian domestic saving was nicely paralleled by the falling dependency rate of the young and the elderly'. On US experience before 1900, see Lewis (1983).

¹⁴ For American evidence on these issues, see Ransom and Sutch (1986a, 1986b).

Chart 3

CHART 3
Australia: Aggregate Savings Rates and
Per Cent of Population Aged 45-64

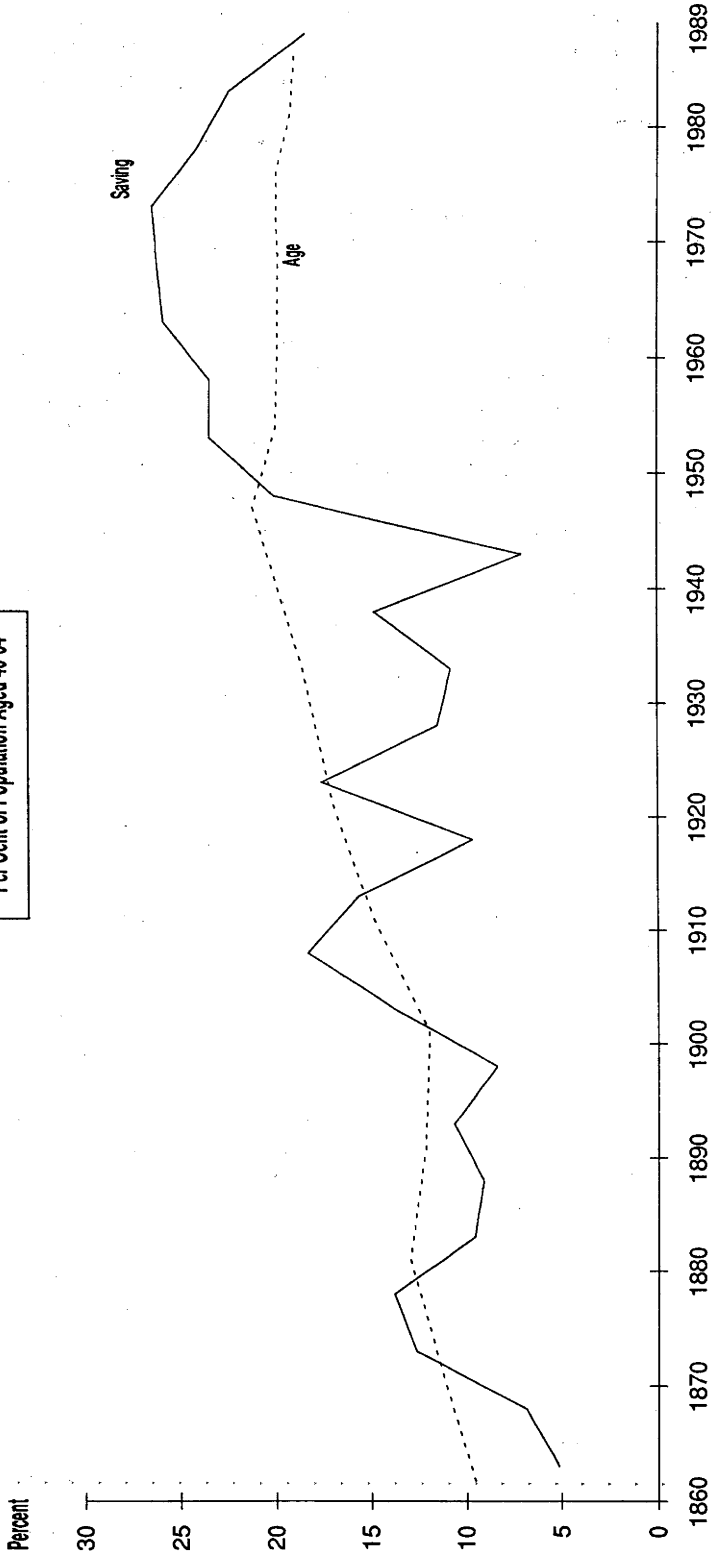


Table 3: Per cent of Population Aged 45-64 Years

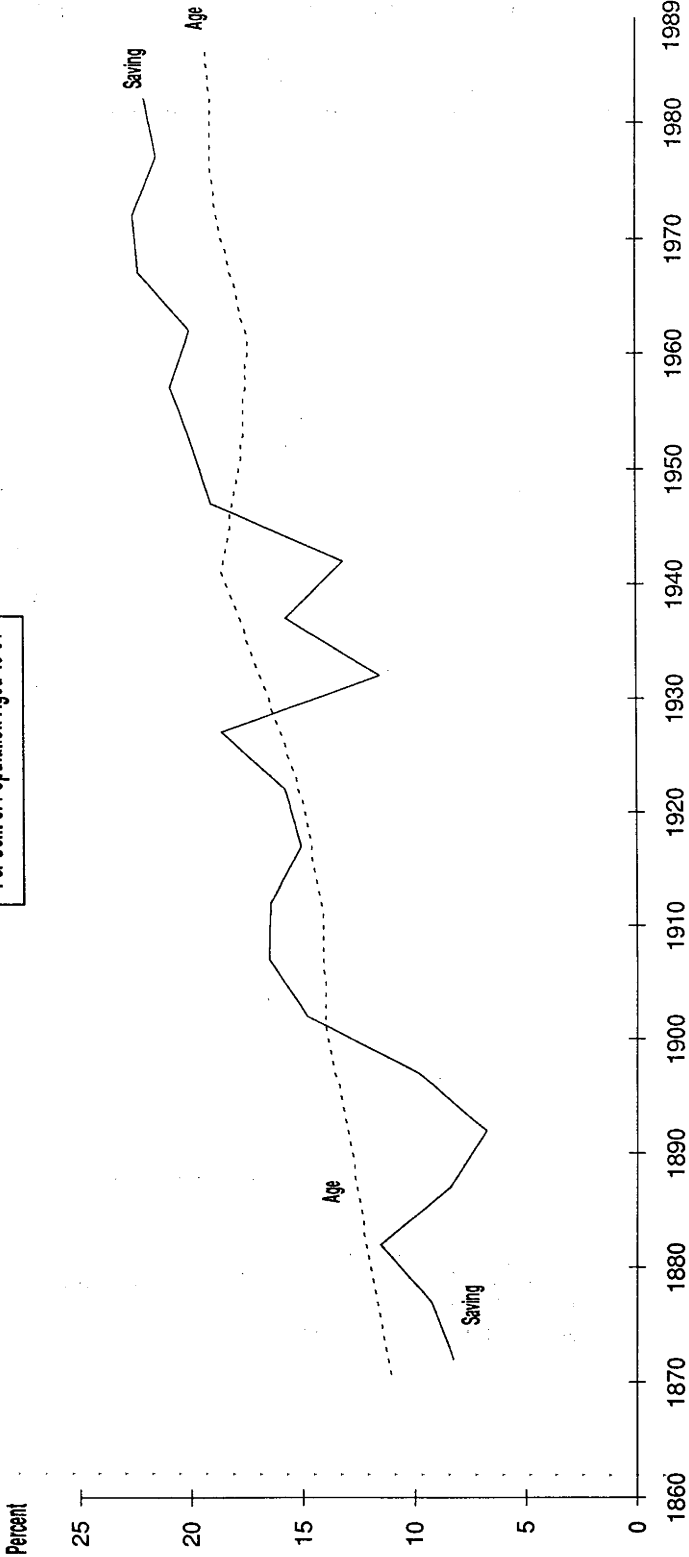
Year	Australia	Canada	U.S.A.
1850-51		9.4	
1860-61	9.4	10.2	
1870-71	11.3	11.1	11.9
1880-81	13.0	12.1	12.6
1890-91	12.2	12.2	13.1
1900-01	12.0	14.0	13.7
1910-11	14.9	14.1	14.6
1920-21	17.0	15.0	16.1
1930-31		16.7	17.4
1933	18.6		
1940-41		18.6	19.8
1947	21.7		
1950-51		17.7	20.3
1954	20.0		
1960-61	19.9	17.4	20.1
1966	19.9		
1970-71	20.0	18.7	20.6
1976	20.0	19.1	
1980-81	19.3	19.1	19.5
1986	19.1	19.3	

Sources:

Australia: Vamplew (1987), p. 40, Australian Bureau of Statistics: Year Book Australia;
Canada: Leacy (1983), Series A78-93, Statistics Canada: Canada Year Book 1988, (Ottawa, 1987), Table 2.11;
USA: United States (1975), Series A119-134.

Chart 4

CHART 4
Canada: Aggregate Savings Rate and
Per Cent of Population Aged 45-64



century after 1870 and by about the same magnitude as the Australian proportion, although the Canadian age structure shows less short-run variation than the Australian.

The comparable age-group data for the United States (Table 3) suggest a demographic history that, at least in the very long run, is similar to that of both Australia and Canada. However, the United States saving rate has been relatively stable since before the turn of the century. This suggests that factors other than shifts in the age distribution have dominated the savings behaviour of Americans, even if life cycle effects have been present in respect to household savings.

Thus, demographic shocks in the nineteenth century appear to have been most marked in Australia, and the possibility that the life cycle hypothesis accounts for saving behaviour may thus be greater than in the other two countries. However, even in Australia the age distribution (at least after the gold rushes) changes much more slowly than the proportion of income saved. Both in the long run and in the short run, other influences on the saving rate must also be at work.

4. Life-Cycle and Income Effects

In an effort to determine more formally the significance of demographic and other factors in accounting for the historical trends in saving, a simple model of saving behaviour, incorporating both life-cycle and consumption-smoothing influences, is first tested against Australian data for the period 1861 to 1988-89. The results are reported in Table 4. The dependent variable is the ratio of gross aggregate saving (S_{Agg}) to gross domestic product in Part A of the Table, while in Part B it is the ratio of gross private saving (S_{Priv}) to gross domestic product, both measured in current prices. The two explanatory variables included in all variants of the model are the annual change in real GDP (to capture short-run variations in real income), and the proportion of the total population aged 45 to 64 (reflecting the assumption in the life cycle hypothesis that this age group will save the highest proportion of income of all age groups).¹⁵ Because of the expected close relationship between the current level of saving and that in the immediate past, the saving rate lagged one period has also been included as an explanator in some variants of the model.

Analysis of the results from this model suggested that there were several relatively short periods within which the gap between the actual and predicted values of the saving rate were most marked. Two of these were the two world wars, and a third was the depression of the early 1930s. Since these may be regarded as exogenous shocks to saving behaviour under more normal conditions, it seemed appropriate to allow for this in the model by including dummy variables for each of these episodes. Where the dependent variable is the aggregate saving rate, the coefficients on all three dummy variables are negative (saving temporarily falls below the predicted level, *ceteris paribus*); and the inclusion of the dummy variable is in each

¹⁵ The intercensal estimates of this variable were obtained by interpolation.

Table 4(a): Australia - Saving Regressions 1862-1989

Dependent Variable: SAgg/GDP				
	1	2	3	4
Constant	-0.0586 (-2.60)	-0.0143 (-0.91)	-0.0846 (-4.85)	-0.0413 (-2.71)
RGDP Growth	0.2163 (2.36)	0.1234 (2.00)	0.1584 (2.27)	0.1165 (2.04)
Age	0.0128 (9.56)	0.0033 (2.82)	0.0154 (14.71)	0.0075 (5.70)
Dum. WW1			-0.0606 (-3.56)	-0.0389 (-2.75)
Dum. WW2			-0.1500 (-8.66)	-0.0794 (-4.76)
Dum. Depr.			-0.1097 (-5.32)	-0.0587 (-3.26)
Lag Dep. Var.		0.7307 (12.52)		0.5184 (7.93)
R ²	0.43	0.74	0.68	0.79
DW or h	0.54	-2.62	1.08	-2.5
F	48.82	120.73	54.66	79.31
RSS	0.365	0.159	0.193	0.127
SE of Reg.	0.054	0.036	0.040	0.032
d.f.	125	124	122	121

Table 4(b): Australia - Saving Regressions 1862-1989

Dependent Variable: SPriv/GDP				
	1	2	3	4
Constant	-0.0642 (-3.02)	-0.0143 (-1.97)	-0.0682 (-3.22)	-0.0467 (-2.16)
RGDP Growth	-0.0157 (-0.18)	0.0068 (0.08)	-0.0179 (-0.21)	-0.0012 (-0.01)
Age	0.0121 (9.60)	0.0079 (4.99)	0.0123 (9.70)	0.0087 (5.18)
Dum. WW1			0.0369 (1.79)	0.0248 (1.22)
			(1.79)	(1.22)
Dum. WW2			0.0097 (0.46)	0.0131 (0.64)
Dum. Depr.			-0.0642 (-2.56)	-0.0455 (-1.82)
Lag Dep. Var.		0.3330 (3.90)		0.2744 (3.08)
$\bar{R}^2$	0.42	0.48	0.45	0.49
DW or h	1.33	-1.45	1.46	-
F	46.13	39.35	21.74	20.97
RSS	0.309	0.275	0.284	0.263
SE of Reg.	0.050	0.047	0.048	0.047
d.f.	125	124	122	121

case warranted (the coefficient is significant). Where the dependent variable is the private saving rate, the results are mixed, indicating that government saving behaviour during the wars may account in part for the over-estimation by the model of aggregate saving during the 'abnormal' periods.

Because of doubts previously noted concerning the quality of the estimates of private saving, greater confidence may be placed in the variants of the model in which the dependent variable is the aggregate saving rate. Here (regressions A1 to A4) the coefficients on the income and age variables have the predicted (positive) signs, and are always significant, whether or not the lagged dependent variable and the war and/or depression dummy variables are included in the model. These results thus give support to the influence of both changes in income and the life-cycle in determining the level of saving in Australia since the 1860s. In some formulations, the model accounts for over two-thirds of the variation of the aggregate saving rate.

These conclusions receive qualified support where the dependent variable is the gross private saving rate (regressions B1 to B4). The coefficient on the age variable remains positive and significant, indicating the robustness of this influence on Australian long-run saving. However, changes in income have no significant impact on the private saving ratio, and at most only half the variation in the ratio is accounted for by the explanatory variables. Only with the derivation of improved historical estimates of government and private saving will it be possible to determine whether the poorer performance of the model when applied to private saving results from the use of less satisfactory data.

Inspection of the plots of actual and fitted values of the aggregate saving rate indicates that many features of the historical record are well tracked by the model that does not include the lagged dependent variable (Appendix Chart 2). However, under-prediction occurs in the decade before 1914, in the late 1930s and after 1960, when other determinants of aggregate saving must have played a relatively important role.¹⁶ Adding the lagged dependent variable to the model substantially reduces the size of the residuals in these years (see Appendix Chart 3) but does not account for them.

The similarities previously observed between historical trends in Australian and Canadian saving behaviour, and in their demographic histories, suggests that the model may also perform well when applied to

¹⁶ One minor concern was that the lift in the saving rate soon after Federation might be associated with a change in the data sources. This possibility was examined by adding a dummy variable to the model to test for a structural break at that time. The results were inconclusive, with a significant (positive) coefficient on the dummy variable not only as hypothesised for the year 1900-01, but also when it was introduced into the model (successively) at 1898, 1899, 1901-02 and 1903-04 but not intervening or subsequent years. There may be an omitted influence on saving which becomes important around this time, but if so it has not clearly been traced to 1900-01, the year in which there exists some changes in the bases of the historical national accounts estimation.

Table 5: Canada - Saving Regressions 1871-1985

Dependent Variable: SAgg/GNP				
	1	2	3	4
Constant	-0.0924 (-4.75)	-0.0204 (-1.50)	-0.1198 (-7.31)	-0.0418 (-2.87)
RGDP Growth	0.0726 (1.31)	0.0488 (1.38)	0.0561 (1.08)	0.0230 (0.60)
Age	0.0156 (12.77)	0.0035 (2.90)	0.0178 (17.13)	0.0064 (4.50)
Dum. WW1			0.0138 (1.19)	0.0014 (0.16)
Dum. WW2			-0.0759 (-6.41)	-0.0272 (-2.69)
Dum. Depr.			-0.0582 (-3.82)	-0.0362 (-3.15)
Lag Dep. Var.		0.7661 (12.90)		0.6430 (9.62)
$\bar{R}^2$	0.60	0.84	0.73	0.85
DW or h	0.49	-1.88	0.87	-2.69
F	85.53	196.61	63.28	112.43
RSS	0.122	0.049	0.079	0.042
SE of Reg.	0.033	0.021	0.027	0.020
d.f.	112	111	109	108

Canada.¹⁷ For the period 1871 to 1985, it appears from the results reported in Table 5 that although the aggregate Canadian saving rate is positively associated with changes in real income, the relationship is never significant for Canada as it was—albeit weakly—for Australia. Further, the first world war appears to have had a rather different impact on the saving behaviour of Canadians than it did on that of Australians. However the life cycle hypothesis receives additional and strong support. As with Australia, it appears that the dominant reason for the secular rise in the saving rate was changes in the age structure. Finally, the degree of overall explanation of aggregate saving by the model (at least as reflected in the adjusted R-squared) is slightly higher for Canada than Australia.

5. Conclusions

This exploratory excursion into the history of saving in Australia may be summarised as follows. Gross aggregate and private savings have risen across the last 125 years in a series of surges, from less than 10 per cent to more than 20 per cent of GDP. This very-long run pattern is surprisingly close in both level and timing to that for Canada, but contrasts with the relative stability of the United States saving rate across 'normal' periods. A simple model in which changes in savings are attributed to income and demographic influences explains much of the observed saving behaviour in Australia.

The time series employed in this paper relate to gross savings, not net, though for many purposes, the latter is the preferred measure. Would the net saving ratio have closely tracked movements in the gross saving ratio, albeit at lower levels? One factor that might contribute to the secular rise in the gross savings rate in Australia is any increase which occurred in the age structure of the capital stock. In the late nineteenth century the average age of capital must have been relatively low. It is worth recalling that the population was only 400,000 at mid-century, but had reached 3.2 million by 1890, and that these forty years witnessed very high levels of (gross) investment. The pause in investment activity in the 1890s, and the lower investment levels during the depression of the 1930s and second world war, must each have led to an increase in the average age of the capital stock. As a consequence, the proportion of gross investment in each year required for replacement purposes would have risen. It follows that to 1890 net saving may not have been much below gross saving, but that this gap may have widened in subsequent periods of economic prosperity, such as the decade before 1914 and the years after the second world war.

Whether one considers the plethora of hypotheses which feature in current debates concerning the determinants of saving, or the period-specific

17 Sources of Canadian data were Urquhart (1988) for gross national product at market prices, the GNP implicit price index (Table 2), and the implied savings ratio (Table 4). The proportion of the population in the 45-64 age group at census dates was calculated from information in Leacy (1983), Series A78-93 for 1871 to 1976, and in *Canada Year Book 1988* (Ottawa: Statistics Canada 1987), Table 2.11 for 1981 and 1986. Intercensal estimates of the 45-64 age group share were linearly interpolated.

institutional influences which historians might point to, scope exists for pursuing lines of inquiry additional to those raised so far. For example, innovations in Australian financial markets may have enhanced the level of household savings. Shifts in income inequality may possibly be important in accounting for changes in saving rates, as Williamson (1989) has suggested for the nineteenth century American economy. The role of inflation and changing levels of household wealth in determining personal saving may be substantial in some periods (Bentick, 1969). Furthermore, the demographic influences on personal saving may not be captured adequately by reference to a single-valued measure of the age distribution; family size is an independent influence examined both in the development and history literatures (Kelley, 1976; Haines, 1985; Lewis, 1983).

REFERENCES

- Australian Bureau of Statistics (1989) *Australian National Accounts: Historical Estimates*, ABS Catalogue Number 5207.0, Canberra.
- Australian Bureau of Statistics (1990) *Australian National Accounts: National Income and Expenditure*, March Quarter 1990, ABS Catalogue Number 5206.0), Canberra.
- Barnard, Alan (1986) 'Commonwealth Government Finances 1901-82: A Handy Compendium', Source Paper in Economic History No. 17, Australian National University.
- Bentick, B.L. (1969) 'Foreign Borrowing, Wealth and Consumption: Victoria 1873-93', *Economic Record*, 45 (September), 415-421.
- Boehm, E.A. (1965) 'Measuring Australian Economic Growth, 1861 to 1938-39', *Economic Record*, 41 (June), 207-239.
- Butlin, N.G. (1962), *Australian Domestic Product, Investment and Foreign Borrowing 1861-1938-39*, Cambridge: Cambridge University Press.
- Butlin, M.W. (1977) 'A Preliminary Annual Database 1900-01 to 1973-74', Reserve Bank of Australia Research Discussion Paper 7701, Sydney (May).
- Carroll, Chris and Lawrence H. Summers (1987) 'Why Have Private Savings Rates in the United States and Canada Diverged?', *Journal of Monetary Economics*, 20 (2) (September), 249-279.
- David, Paul A. and John L. Scadding (1974) 'Private Savings: Ultrarationality, Aggregation, and "Denison's Law"', *Journal of Political Economy*, 82 (2) Part 1 (March/April), 225-249.
- Davis, Lance E. and Robert E. Gallman (1973) 'The Share of Private Savings and Investment in Gross National Product during the Nineteenth Century United States of America', in F.C. Lane (ed), *International Conference of Economic History*, Bloomington, Indiana 1968, (Paris: Mouton), 437-466.
- Davis, Lance E. and Robert E. Gallman (1978) 'Capital Formation in the United States During the Nineteenth Century', in Peter Mathias and M.M. Postan (eds), *The Cambridge Economic History of Europe Vol. 7: The Industrial Economies: Capital, Labour and Enterprise*, Part 2: The United States, Japan and Russia, Cambridge: Cambridge University Press, 1-69.
- Edelstein, Michael (1982) *Overseas Investment in the Age of High Imperialism*, New York: Columbia University Press.
- Edelstein, Michael (1989) 'Were U.S. Rates of Accumulation in the 20th Century Investment or Savings Driven?', *mimeo*, CUNY-Queens College (April).

- Edey, Malcolm, and Mark Britten-Jones (1990a) 'Saving and Investment' in Stephen Grenville (ed.), *The Australian Macro-Economy in the 1980s: Proceedings of a Conference*, Sydney, Reserve Bank of Australia, 79-145.
- Edey, Malcolm, and Mark Britten-Jones (1990b) 'Saving and Investment in the 1980s', Reserve Bank of Australia Research Discussion Paper 9004, Sydney (August).
- EPAC (Economic Planning Advisory Council) (1988) *Trends in Private Saving*, Canberra: Australian Government Publishing Service, (December).
- Friedman, Benjamin M. (1989) *Day of Reckoning: The Consequences of American Economic Policy*, New York: Vintage Books.
- Gallman, Robert E. (1966) 'Gross National Product in the United States, 1834-1909', in Dorothy S. Brady (ed), *Output, Employment and Productivity in the United States After 1800*, NBER Studies in Income and Wealth Vol. 30: New York: Columbia University Press, 3-76.
- Green, Alan, and M.C. Urquhart (1976), 'Factor and Commodity Flows in the International Economy of 1870-1914: A Multi-Country View', *Journal of Economic History*, 36 (1) (March), 217-252.
- Haines, Michael R. (1985) 'The Life Cycle, Savings, and Demographic Adaptation: Some Historical Evidence for the United States and Europe', in Alice S. Rossi (ed), *Gender and the Life Course*, New York, Aldine, 43-63.
- Hall, A.R. (1963), 'Some Long Period Effects of the Kinked Age Distribution of the Population of Australia 1861-1961', *Economic Record*, 39 (March), 43-52.
- Kelley, Allen C. (1965) 'International Migration and Economic Growth: Australia, 1865-1935', *Journal of Economic History*, 25 (3) (September), 333-354.
- Kelley, Allen C. (1968) 'Demographic Change and Economic Growth" Australia, 1861-1911, *Explorations in Entrepreneurial History*, 5, (3), (Spring/Summer), 207-277.
- Kelley, Allen C. (1976) 'Savings, Demographic Change and Economic Development', *Economic Development and Cultural Change*, 24 (3) (April), 683-693.
- Kotlikoff, Laurence J. (1988) 'Intergenerational Transfers and Saving', *Journal of Economic Perspectives*, 2,(2) (Spring), 41-58.
- Leacy, F.H (ed) (1983) *Historical Statistics of Canada*, Ottawa: Statistics Canada, 2nd edn..
- Lewis, Frank D. (1983) 'Fertility and Savings in the United States: 1830-1900', *Journal of Political Economy*, 91 (5) (October), 825-840.

- Modigliani, Franco (1988) 'The Role of Intergenerational Transfers and Life Cycle Saving in the Accumulation of Wealth', *Journal of Economic Perspectives*, 2 (2) (Spring), 15-40.
- Ransom, Roger L. and Richard Sutch (1986a) 'The Labor of Older Americans: Retirement of Men On and Off the Job, 1870-1937', *Journal of Economic History*, 46 (1), (March), 1-30.
- Ransom, Roger L. and Richard Sutch (1986b) 'The Life-Cycle Transition: A Preliminary Report on Wealth Holding in America', paper prepared for the Tenth University of California Conference on Economic History, Laguna Beach, California, (May).
- Romer, Christina D. (1986) 'Is the Stabilization of the Postwar Economy a Figment of the Data?', *American Economic Review*, 76 (3) (June), 314-334.
- Stemp, Peter J. (1987) 'Private Savings in Australia' (Consultant's report prepared for the Office of the Economic Planning Advisory Council).
- United States (1975), *Historical Statistics of the United States: Colonial Times to 1970*, Washington D.C.: Government Printing Office.
- Urquhart, M.C. (1986) 'New Estimates of Gross National Product, Canada, 1870-1926: Some Implications for Canadian Development', in Stanley L. Engerman and Robert E. Gallman (eds), *Long-Term Factors in American Economic Growth*, NBER Studies in Income and Wealth Vol. 51: Chicago: Chicago University Press, 9-88.
- Urquhart, M.C. (1988) 'Canadian Economic Growth 1870-1980', Discussion Paper No. 734, Institute for Economic Research, Queen's University (November).
- Vamplew, Wray (ed) (1987) *Australians: Historical Statistics*, Sydney: Fairfax, Syme and Weldon.
- Williamson, Jeffrey G. (1989) 'Inequality and Modern Economic Growth: What Does History Tell Us?', Harvard Institute for Economic Research, Discussion Paper No. 1448 (September).

ECONOMICS RECYCLED? A WIDER PERSPECTIVE FOR THE SAVING DEBATE

G. D. Snooks

Introduction

The current concern by economists worldwide with the role of saving—in achieving external balance, in contributing to unemployment, in ensuring growth, and in financing a range of national objectives from defence to welfare—is not new. Indeed the issue of saving and growth can be found in Adam Smith¹; the paradox of thrift begins even earlier with Petty and Mandeville and can be traced through Malthus, Gesell, Hobson, and Keynes²; the need for saving to finance defence generated the political arithmetic of Domesday Book in the late eleventh century, of Petty, Davenant, and King in the late seventeenth century, and of modern official national accountants in the 1940s³; and problems of external balance were central to the economic writings of the mercantilists in the seventeenth and early eighteenth centuries.⁴ History is a timely reminder of the eternal recurrence of ideas in economics.

By narrowing our focus to the last half-century, we are faced with a fascinating example of recycling in economics. Just as most of us had become resigned to backgrounding much of the simple but comforting Keynesian macroeconomic concepts and analysis of our youth (the 1950s and early 1960s), they have reappeared in a slightly different guise. In the 1950s our profession, with its urgent concern about the ability of western economies to achieve and maintain stable growth paths, focused upon the critical role of investment. This Keynesian focus, however, gave way in the 'golden age' of the 1960s to a neoclassical concern with technological change and the efficiency of, what was incorrectly assumed to be, the endlessly upward growth path. In the 1980s—after a decade or so of bumpy growth and the re-emergence of unemployment, but this time in the strange company of inflation—the old Keynesian equipment has been dusted off and revamped with an emphasis not on investment but on its *expost* partner, saving. In a sense it is comforting to discover that all the hard-won human capital acquired in the 1950s and early 1960s is not entirely redundant—indeed, that recycling is possible even in economics. The question we need to ask, however, is: have we added much that is new the second time around? Or have only the names been changed? I will not be presumptuous enough to attempt an answer for the whole conference, but will place McLean's paper in this context.

1 Smith, *Wealth*, Vol. I, p.358.

2 Keynes, *General Theory*, pp.358-71; Blaug, *Retrospect*, pp.15-16.

3 Snooks, 'Last millennium', pp.2-4, 8-9.

4 Blaug, *Retrospect*.

The second general point that must be made concerns the relevance of the past to current economic problems. Many of the papers presented at the conference used time-series data to test their hypotheses. Of the five papers I examined (in addition to McLean's), four used data covering the period 1960 to 1990, and one, although it started as late as 1980, compensated by zooming forward to 2040! I originally thought that this remarkably consistent choice of period by the majority of authors must have resulted from the collective experience of things past by our ageing generation (possibly because the fact of growing older makes historians of us all—even of analytical economists), but my illusions were shattered by Peter Stemp who informed me detailed official estimates first became available around 1960. Nevertheless the question we need to ask is: does the last thirty years provide sufficient information on current problems of external and internal balance (or of any other current economic problem)? The answer will depend upon whether or not the 1960s and early 1970s were in any sense historically normal.

My argument at the conference was that the period encompassing the 1950s, 1960s, and early 1970s was historically abnormal and, therefore, a longer time perspective is required. In other words the declining saving rate after the early 1970s may be a return to historically normal levels rather than a new departure from earlier long-term experience. For this very important reason we neglect longrun economic analysis at our peril.

It was for this reason that, in my role as discussant, I welcomed McLean's paper which attempted to provide an overview between 1861 and 1974. But I questioned his wisdom in ending his discussion in 1974, on the grounds that the conclusions drawn would be distorted if the 1960s and early 1970s were used either as the beginning or end point in the data, because they were historically abnormal. I am pleased to see that he has responded in the final version of the paper by bringing the data forward to 1986.

The Paper

My original critique of McLean's paper examined his objectives, methods, estimates, and interpretations. A number of the points I raised have been addressed, not always successfully, in McLean's revised version. I will deal briefly with the main concerns.

1. The objectives of the paper. As I argued earlier the paper has no defined purpose. Is it in response to significant historical issues? Is it aimed at resolving current economic problems (such as the role of saving in achieving external balance or in the growth process)? Or is it merely to supply economists with further data to test highly simplified ahistorical models? We are not told. Even in the revised version it is merely suggested that the saving data are being assembled because it has not been done before.
2. There are three unresolved issues concerning the methods employed by McLean:

- (i) While the method used to compile the statistical estimates of saving over the period 1861 to 1939 is quite conventional, one is forced to ask what has really been added. Essentially what McLean has done is to reorganise N.G. Butlin's estimates of GDP and gross domestic investment. As I suggested in the introduction, this reorganisation of national accounts, produced in the 1950s when there was a concern with the critical role of investment in the growth process,⁵ is an interesting example of recycling in economics. Had Butlin published his statistical volume in 1990 rather 1962, he might have called it *Australian Domestic Product and Domestic and Foreign Saving* rather than *Australian Domestic Product, Investment and Foreign Borrowing*!
 - (ii) What are the implications for the continuity of the series of lumping together the indirect procedures employed before 1960 with the more direct approach after 1960? Will this affect the long term conclusions that McLean draws?
 - (iii) The econometric model used to 'explain' changes in saving—a model that includes only demographic and income variables—is not only ahistorical and highly simplified but also is incomplete. Why were the important explanatory variables of nominal interest rates and inflation not included? What are the implications for the precision of the coefficient estimates of excluding these variables? Where are the diagnostic tests? We are not told.
3. This concerns the long run estimates of saving:
- (i) At the conference I made the point that an attempt should have been made to subdivide the aggregate saving series into private and public because of the interesting analytical possibilities of divergence between them. This has now been done.
 - (ii) Inadequate quantitative or evaluative information is given about the various building blocks (investment, stocks, balance of payments) from which the saving estimates were constructed. Possibly these details would indicate where the error, that so clearly exists in the aggregate saving estimates of the second half of the nineteenth century, lies.
 - (iii) I made the point earlier that a comparison between countries (Australia, USA, and Canada) that possess radically different domestic/foreign saving patterns is a doubtful procedure requiring considerable justification.

⁵ Snooks, 'Australian capitalism', p.4.

4. We need to consider the interpretations arrived at by McLean—and here I hope to show the relevance of my earlier, general remarks about recycling in economics.

Many of McLean's detailed short-term conclusions—such as historical changes in both domestic and foreign saving ratios—have been the standard fare of Australian economic history since N.G. Butlin's national accounting estimates emerged in the late 1950s. Only the names have been changed the second time around, with the present discussion merely being cast in terms of saving rather than investment.

More importantly, McLean's conclusions about long run changes in the saving ratio are distorted by his choice of beginning and end years—the 1860s and 1960s in the original version—neither of which could be regarded as historically normal. Accordingly McLean grossly exaggerated the long run increase in the saving rate over that century (6 per cent to 25 per cent). In the face of my earlier criticism he has revised this from 10 per cent to 24 per cent, but there are still good reasons for thinking that this is a distortion of the real increase in the saving rate. Butlin's figures for the second half of the nineteenth century clearly underestimated the amount of investment that was taking place, particularly in the form of clearing, fencing, and rough-road making. Just a comparison of the relative growth performance for the fifty years either side of Federation, together with the changing role of capital widening across this divide, would suggest the need for an upward revision of saving ratios in the nineteenth century: it is likely that 15 to 20 per cent is nearer the mark in the three decades prior to 1890. In the light of this suggested upward revision, together with the exclusion of years of depression and war between 1890 and 1945 and the realisation that the 'golden age' of the 1950s and 1960s was unique and unrepeatable, McLean's story about a *steep* increase in the saving ratio via 'three steps' over the last century begins to look most unlikely. The decline since the early 1970s, therefore, appears to be a return to levels not far above the historical norm. Also the alleged contrast between Australian and USA saving patterns appears somewhat less than convincing.

REFERENCES

- Blaug, M. (1978) *Economic Theory in Retrospect*, Cambridge: Cambridge University Press.
- Keynes J.M. (1960) *The General Theory of Employment Interest and Money*, London: Macmillan.
- Smith A. (1961) *The Wealth of Nations*, London: Methuen.
- Snooks, G.D. (1990) 'Economic Growth During the Last Millennium: A Quantitative Perspective for the Industrial Revolution', Working Papers in Economic History No. 140 (July), Research School of Social Sciences, Australian National University.
- Snooks, G.D. (1975) 'Orthodox and Radical Interpretations of the Development of Australian Capitalism', *Labour History*, 28 (May), 1-11; 18-21.

THE GLOBAL DECLINE IN SAVING: SOME INTERNATIONAL COMPARISONS

Barry P. Bosworth

Introduction

The adequacy of saving has become an issue of increased international concern. While the growing integration of capital markets among the major industrial countries implies that any one country's saving is less of a constraint on its own investment, integration also means that any domestic imbalances spill over into international markets in the form of both impacts on interest rates in other countries and large current account imbalances. From a global perspective the 1980s were marked by an abnormally high level of real interest rates together with generally rising levels of resource utilization—a combination indicative of a general shortage of saving. In the 1990s economic reconstruction in Eastern Europe and the gradual re-emergence of the Latin American economies as net borrowers in international capital markets both suggest that the global demand for capital will remain high.

The decline of the national saving rate in one country, the United States, has attracted considerable attention. Most of the discussion, however, has focused on the change in the government budget deficit, largely ignoring an equally large decline in an already low rate of private saving. Furthermore, the discussion of the decline of saving in the United States reflects too little appreciation of the generality of the trend toward lower rates of saving in all of the industrial countries. Whatever the cause of a lower rate of saving it would appear to be something that these countries have in common. The purpose of this paper is to examine some potential explanations for the secular decline in private saving rates. They include changes in demographic determinants of saving, the growth of income, measurement problems, and variations in inflation and interest rates. The analysis is based on an under-utilized data source that provides information on international patterns of saving and investment within a common accounting framework. Countries such as the United States and the United Kingdom have systems of national accounts that are quite different from the international standard, and measures of saving drawn from national sources can provide misleading comparisons. The data employed herein allow us to compare changes over time and the similar responses to various economic disturbances in the 1970s and 1980s.

At the same time, much of what we think we know about private saving behaviour and the potential effectiveness of various policies to influence it are dominated by the conclusions of studies that focused on the historical experience of a single country with no attempt to test for the robustness of those results for other countries. Many of the factors in which we are most interested have exhibited very limited historical variation, and the

conclusions have been ambiguous. An international comparison provides a significant expansion in the empirical data that can be used to test a variety of hypotheses about saving behaviour since the historical data of each country can be viewed as representing a separate sample.¹

The following section examines the historical trends in saving behaviour over the 1965-85 period for thirteen countries for which the quality of the data was judged to be quite good, and discusses some of the problems of measurement and interpretation. The second section summarizes the results of an empirical analysis that focuses on the consistency across countries of some of the potential explanations for what appears to be a common pattern of falling rates of private saving. The final section reports on the results from an analysis of some survey data from Japan that provide an additional means of testing some of the hypotheses.

1. International Trends

The basic annual data are drawn from the System of National Accounts (SNA) submitted by the individual member countries to the OECD over the period of 1960 to 1987. The SNA eliminates most of the definitional differences that plague any comparison based on national sources. For example, in contrast to the US national accounts, the SNA submission does include a capital account for the government sector, so it is possible to distinguish between the saving and investment components of the government budget deficit (net lending). A second major adjustment lies in the assignment of formal, funded pension plans of government employees to household saving, matching the treatment of private employees' pensions. In addition, government enterprises are separated from the general budget of government and are included with private business investment.

One major difference that remains is the treatment of capital consumption allowances. The countries differ substantially in their assumptions about the useful lives of capital, and some still use historical costs rather than current replacement cost.² This difference is of reduced significance in the comparison of trends as opposed to absolute levels; in some situations, it can be avoided by emphasising gross saving.

The international data further highlight the limited value of a focus on household as opposed to private saving. Household saving differs from private saving only by the exclusion of retained earnings of incorporated businesses. Thus, household saving still includes all the internal financing of partnership and sole proprietorship businesses. Since the relative

¹ It is possible that the institutional environment differs so dramatically among countries that behaviour can not be viewed as homogeneous across countries.

² An adjustment was made to convert the Japanese estimate of capital consumption allowances from a historical cost basis to the standard current replacement cost basis. That change lowers the reported Japanese private saving rate in the 1970s and 1980s by 3 to 4 percentage points. For the details of that adjustment, see Fumio Hayashi (1986), pp. 201-210.

importance of incorporated businesses differs among countries, and since tax laws and financial structure substantially influence the extent of profit retention, household saving rates are not truly comparable. Only seven of the countries in this sample were able to provide saving rate measures for the household sector.

An accounting framework

The basic trends in saving are best viewed within a simple accounting framework that relates the current account surplus (CA) to the difference between domestic saving (S) and domestic investment (I). Domestic saving and investment are further subdivided into their public and private components,

$$CA = Sp + Sg - Ip - Ig \quad (1)$$

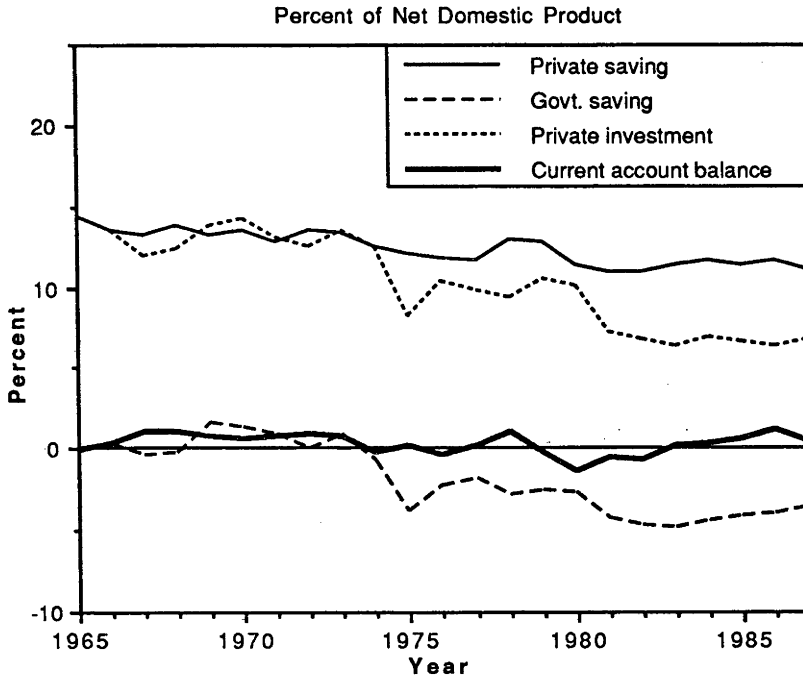
This basic framework is illustrated in Table 1 for two countries, the United States and Japan, that represent the extreme of the distribution.

**Table 1: Saving and Investment Balance for the United States and Japan
1960-1987
(per cent of net domestic product)**

Item	1960-73	1976-79	1984-87
United States			
Private Saving	10.2	10.1	8.1
Government Saving	0.4	-1.1	-4.5
National Saving	10.6	9.0	3.6
Private investment	8.4	8.8	6.6
Government investment	1.5	0.4	0.4
Current account	0.6	-0.1	-3.5
Statistical discrepancy	-0.2	0.0	-0.1
Japan			
Private saving	19.3	15.8	12.1
Government saving	6.9	2.4	5.3
National saving	26.1	18.2	17.4
Private investment	20.9	11.2	8.3
Government investment	4.8	6.2	5.2
Current account	0.6	0.9	4.2
Statistical discrepancy	0.2	0.0	0.3

Source: OECD *Standard National Accounts 1989* (data tape) and author's calculations. The figures for net investment of government in Japan are not fully compatible because of incomplete depreciation accounts. In addition, military expenditures are classified fully as consumption in the SNA.

Figs 1 and 2



Data aggregated using 1980 exchange rates

Figure 1: European Saving and Investment Rates, 1965-1987

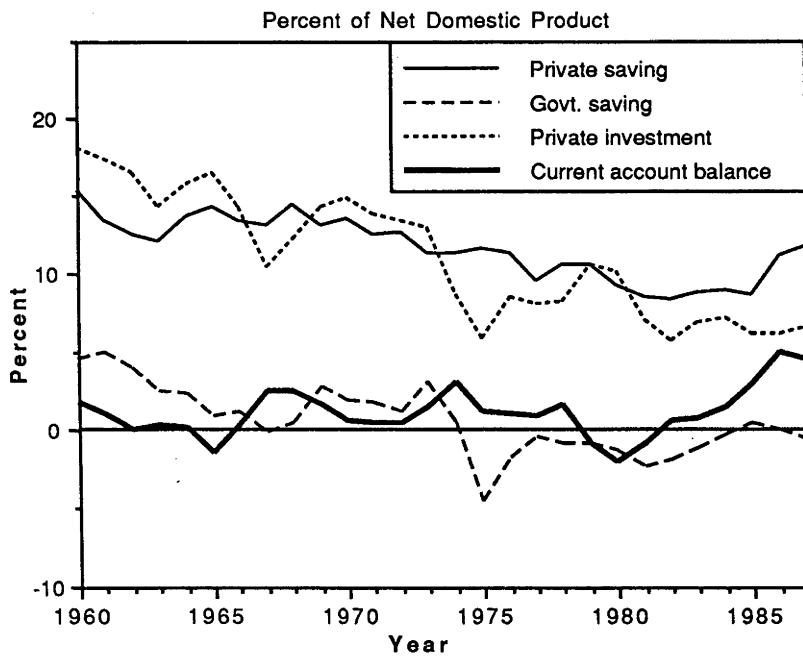


Figure 2: West German Saving and Investment Rates, 1960-1987

Figs 3 and 4

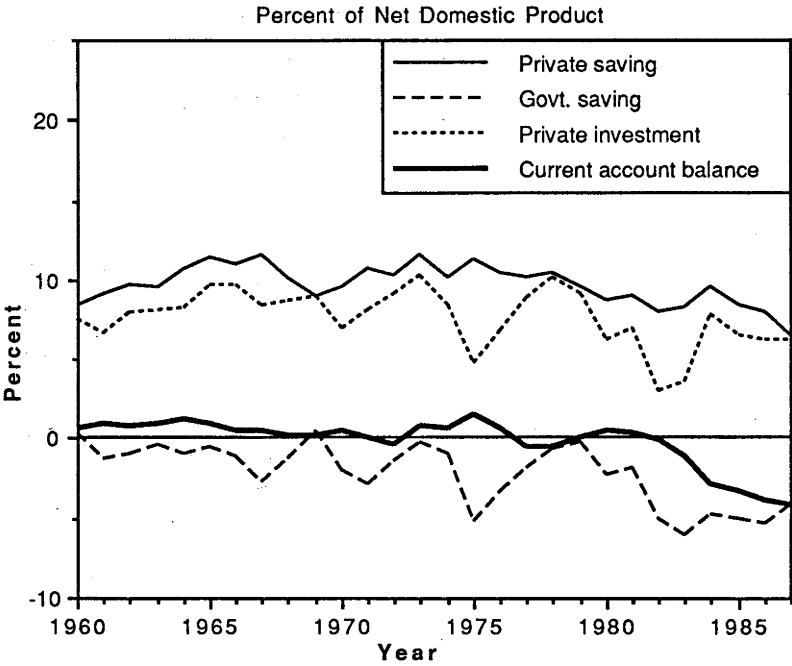


Figure 3: United States Saving and Investment Rates, 1960-1987

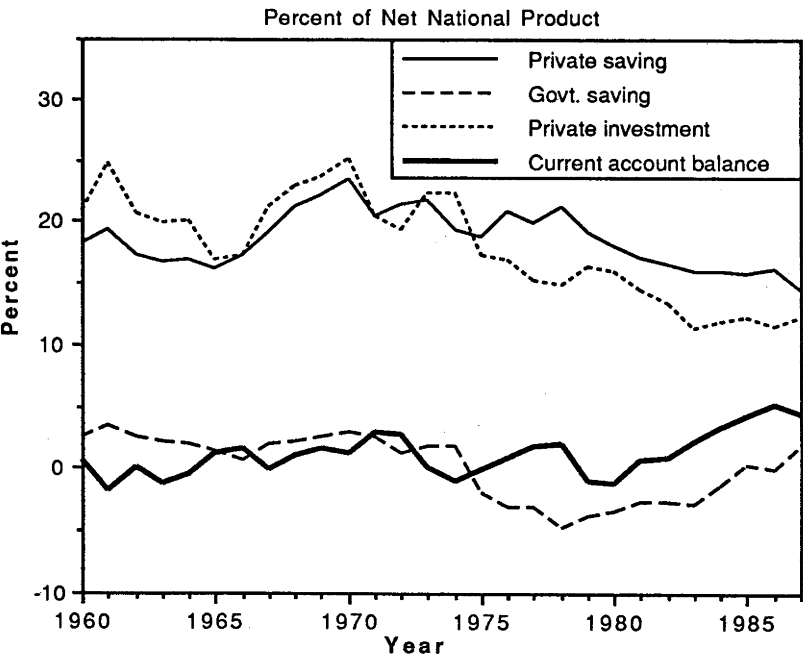


Figure 4: Japanese Saving and Investment Rates, 1960-1987

Figs 5 and 6

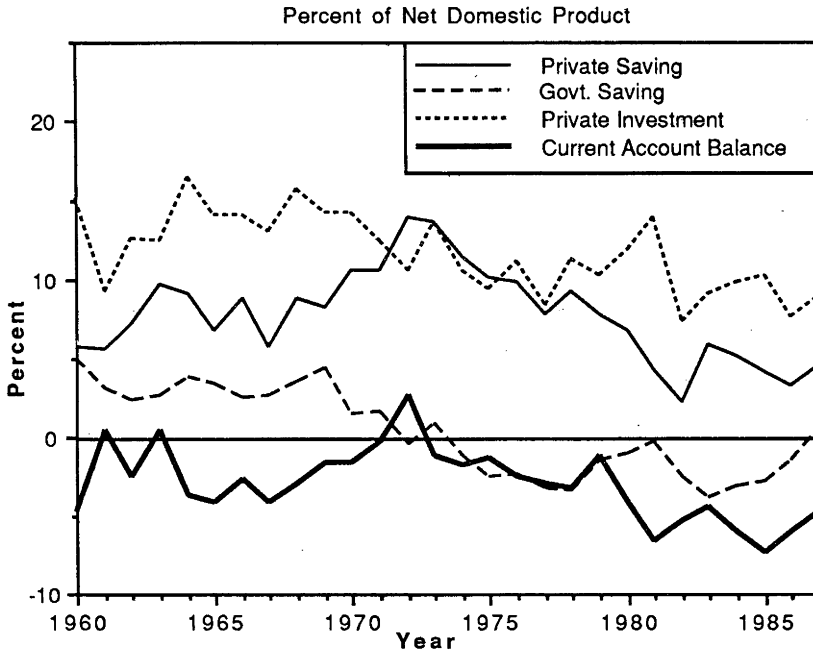


Figure 5: Australian Saving and Investment Rates, 1960-1987

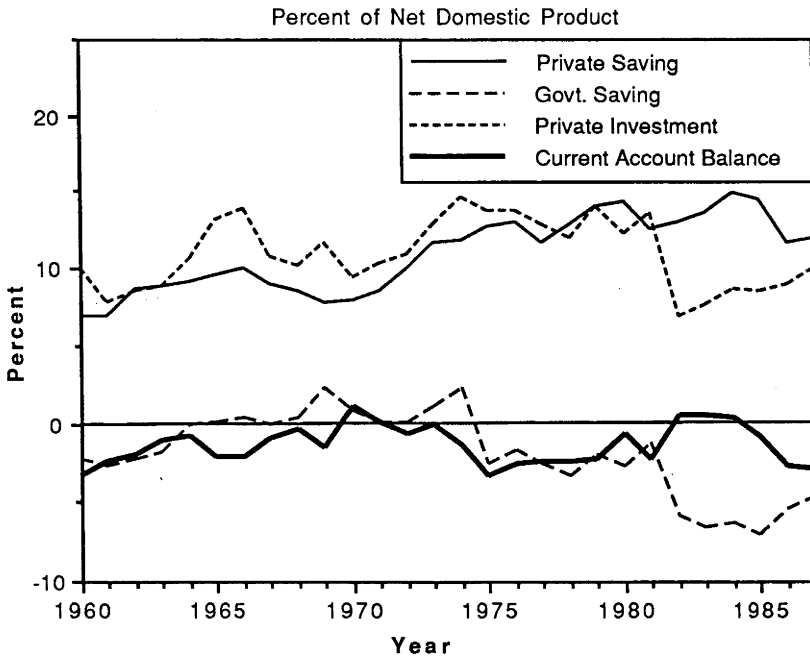


Figure 6: Canadian Saving and Investment Rates, 1960-1987

Figs 7 and 8

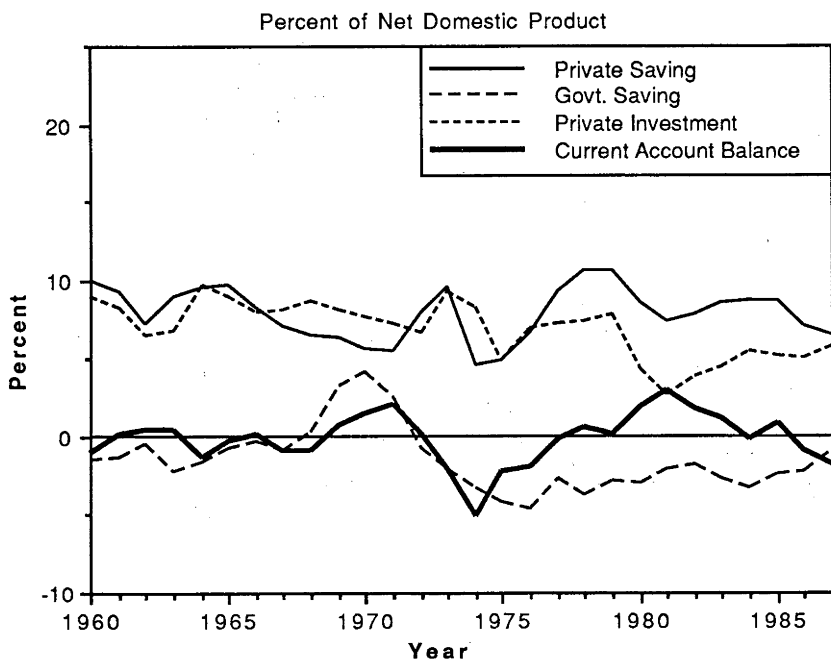


Figure 7: British Saving and Investment Rates, 1960-1987

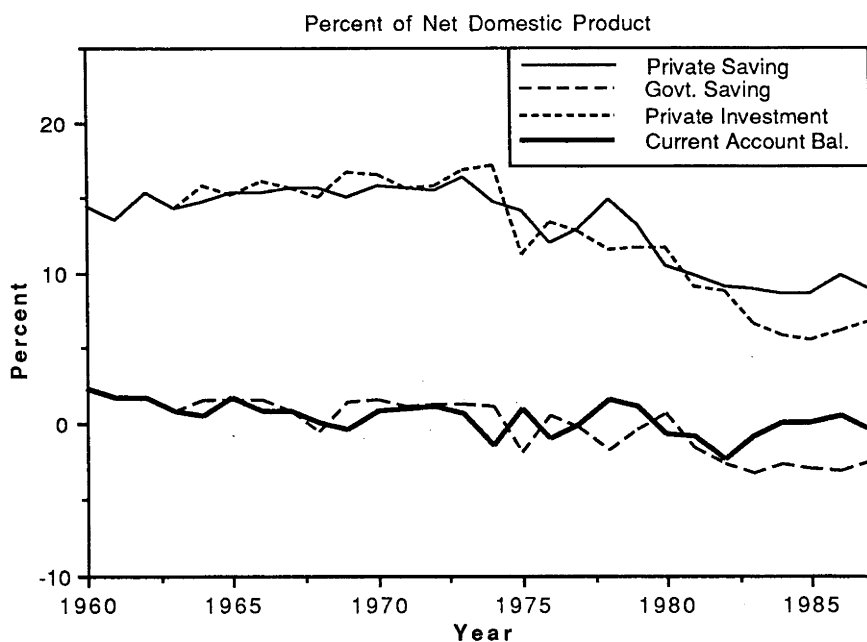


Figure 8: French Saving and Investment Rates, 1960-1987

The use of a standard framework reduces the differences in saving rates between these two countries that seem so dramatic when based on the national accounts data of each country, but the differences are still substantial. The development of a government capital account for the United States actually increases the evidence of a decline in national saving because many of the budget cuts of the 1980s have been concentrated in the public sector.

This accounting framework also highlights the nature of the measurement problem. For all countries private saving is obtained as a residual, given estimates of domestic investment, the current account balance, and the government budget balance. Any errors in the estimate of those three items are automatically reflected in the private saving rate. In addition, a few countries make a second estimate of GDP based on income data and deduct the statistical discrepancy between the expenditure and income-based estimates in presenting a measure of private saving.

The basic data set includes the largest seven nations of the OECD plus a representative set of six smaller countries. Furthermore, because the distinction between government saving and investment is not critical to the present focus on private-sector behaviour, I have followed the U.S. practice of combining the two into an overall measure of the budget deficit, net lending. Thus, the subsequent analysis will use an even simpler framework of

$$CA = Sp - Ip + NLg. \quad (2)$$

The trends in the basic data are highlighted in Figures 1-8 which show the basic components of the identity for the United States, Japan, Germany, an aggregate of the nine European countries, and a selected set of smaller countries.³ Clearly, the decline in the private saving rate is not unique to the United States: private rates of saving within nearly all of the industrial countries have been drifting down for nearly two decades. In fact, the decline within the United States has generally been less than that of other countries.

The second important fact is that, except for the United States and Australia, the decline in private rates of saving has been exceeded by a decline in the rate of domestic investment. While the current account deficit of the United States is often traced to the deficiency of national saving, the other major industrial countries, in general, have been plagued with the opposite problem: a surplus of private saving over private investment.

This tendency for private saving to exceed investment first emerged after the first oil shock in 1973, and it has steadily grown in magnitude. As shown in the figures, the initial response in the 1970s was to absorb the surplus through larger government budget deficits. Efforts to promote an expansion of investment through low, and even negative, real interest rates

³ The aggregation was performed using nominal 1980 exchange rates. It is interesting to note that the German current account surplus is fully offset with Europe as a whole.

were unsuccessful.⁴ The alternative of shipping the excess saving abroad in the form of a current account surplus was severely constrained by the need to find other countries willing to tolerate a current account deficit. At the time the world economy was already under pressure to recycle the surpluses of the oil-producing countries. The common pattern of large budget deficits represented a sharp change from the experience of the 1960s when Japan and the European countries relied on budget surpluses to augment private saving.

In the 1980s there has been a dramatic shift in the United States toward increased consumption, both public and private, and the emergence of a saving shortfall and a large trade deficit. Thus other countries—particularly Japan and Germany—could respond with a shift of their own policies, substituting current account surpluses for budget deficits. It is in this sense that today's imbalances of current accounts are a reflection of underlying changes in saving and investment patterns.

A simple perspective on saving and investment⁵

In attempting to account for the shift of the saving-investment balance of Japan and Europe, attention has focused on the evident decline in rates of investment. Yet, it can be argued that the surprise is that private rates of saving remain so high, not that investment rates are low.

Standard neoclassical growth theory emphasizes the constancy, in the absence of changes in relative prices, of the capital-output ratio. And if investment is interpreted as an adjustment to a desired stock, the share of net investment in output should be proportionate to the rate of output growth:

$$K = \beta Y \quad (3)$$

$$K - K_{-1} = \beta(Y - Y_{-1}) \quad (4)$$

$$I/Y = \beta \Delta Y/Y \quad (5)$$

Similarly, many theories of consumption have emphasized a target wealth-income ratio that depends on demographic and other factors, but is supposed to be invariant to the level of income:⁶

$$W = \alpha Y, \quad (6)$$

$$W - W_{-1} = \alpha(Y - Y_{-1}) \quad (7)$$

$$S/Y = \alpha \Delta Y/Y \quad (8)$$

⁴ The fact that real interest rates were negative or very low and unemployment increased in these countries in the last half of the 1970s argues against an interpretation that the large budget deficits were crowding out private demand.

⁵ The material of this section was previously summarized in Bosworth (1990).

⁶ Modigliani (1966) and (1970).

Thus, by the same logic that relates investment to the change in output, the saving rate is also proportionate to the rate of income growth.

The behaviour of private saving and investment rates from this perspective should be closely linked, and changes in both should be proportionate to changes in the underlying rate of economic growth. Furthermore, it is possible to obtain crude estimates of the desired capital-output and private wealth-income ratios by dividing the average saving and investment rates by the rate of income growth.

The basic relationships are summarized in Table 2 for the sample of thirteen countries. The time span is divided into the period of high growth (pre-1973) and low growth (post-1973). The saving and investment rates (columns 1-4) are averages of years that exclude recessions in order to minimize the influence of short-run factors. The extent of the decline in the private saving and investment rates are shown in columns (5) and (6), and the shift in the balance is shown in column (7). The magnitude of decline in the investment rate is greater than that of saving in every country except the United States and Australia, and generally by a substantial amount.⁷

Second, a major potential explanation of the decline, the slowing of economic growth, is measured in columns (8)-(10), which show the rates of real GDP growth in the pre- and post-1973 periods as well as the magnitude of the slowdown. The slowdown is substantial in all of the countries, but it is largest in percentage terms for Japan and Europe, frequently exceeding 50 per cent of the pre-1973 rate.

Implied target wealth-income and capital-output ratios are calculated for each of the two subperiods by dividing the growth rate into the saving and investment rates, respectively. These calculations are shown in Table 3. One interesting result is that the adjustment for differences in income growth substantially changes the relative rankings of the countries: the United States is no longer particularly low in terms of its rate of wealth accumulation relative to income, and Japan is not high.

Second, in comparing the pre- and post-1973 periods, the decline in the rates of both saving and investment is substantially less than proportionate to the slowing of output growth. Thus, the target wealth-income and capital-output ratios appear to have increased after 1973. The exceptions are Australia for saving and Japan and France for investment. The changes in the estimated capital-output ratios are far smaller than those for the wealth-output ratio, however; and in many cases the estimates come close to the expectation of a constant capital-output ratio.

2. Alternative Explanations of Saving

The above framework is obviously too simple for interpreting saving behaviour because it ignores a large number of factors that are stressed in the literature on saving behaviour. Thus, in this section, I examine the

⁷ The results for Australia are somewhat suspect because of a very large and volatile statistical discrepancy.

Table 2

Table 2: Private Saving and Investment as Shares of Net Domestic Product, 1965-1987 (per cent)

Country	1965-1972		1984-1987		Change In			Output Growth Rate		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Private Saving	Private Invest.	Private Saving	Private Invest.	Private Saving	Private Invest.	Balance ^a	1960-73	1973-87	Change
US	10.5	8.7	8.1	6.6	-2.4	-2.1	-0.3	4.0	2.5	-1.5
Canada	8.9	11.3	13.3	9.1	4.4	-2.2	6.6	5.4	3.4	-2.0
Japan	20.1	20.7	12.1	8.3	-8.0	-12.4	4.4	9.6	3.7	-5.9
Australia	9.2	13.6	4.2	9.2	-5.0	-4.4	-0.6	5.6	2.9	-2.7
Large European Countries:										
France	15.4	15.8	9.0	6.1	-6.4	-9.7	3.3	5.4	2.1	-3.3
Germany	13.4	13.7	10.2	6.5	-3.2	-7.2	4.0	4.4	1.8	-2.6
Italy	23.7	13.6	19.7	8.4	-4.0	-5.2	1.2	5.3	2.8	-2.5
UK	7.1	7.9	7.7	5.3	0.6	-2.6	3.2	3.2	1.7	-1.5
Small European Countries:										
Belgium	14.8	11.3	14.0	4.6	-0.8	-6.7	5.9	5.0	1.8	-3.2
Denmark	9.7	15.4	5.4	10.2	-4.3	-5.2	0.9	4.3	1.9	-2.4
Finland	7.6	13.0	7.1	7.8	-0.5	-5.2	4.7	5.0	2.9	-2.1
N'lands	15.8	15.6	15.6	8.6	-0.2	-7.0	6.8	4.8	1.8	-3.0
Sweden	5.5	10.8	6.0	5.4	0.5	-5.4	5.9	4.1	1.8	-2.3

^a Defined as column (5) minus column (6).

Source: OECD, National Accounts Data Tape, 1989.

Table 3: Implied Wealth-Income and Capital-Output Ratios for Thirteen OECD Countries, 1965-1987

	Implied Wealth Income Ratio		Implied Capital-Output Ratio	
	1965-72	1984-87	1965-72	1984-87
United States	2.6	3.2	2.2	2.6
Canada	1.7	3.9	2.1	2.7
Japan	2.1	3.3	2.2	2.2
Australia	1.6	1.4	2.4	3.2
Large European Countries:				
France	2.8	4.3	2.9	2.9
Germany	3.0	5.7	3.1	3.6
Italy	4.5	7.0	2.6	3.0
United Kingdom	2.2	4.5	2.5	3.1
Small European Countries:				
Belgium	3.0	7.8	2.3	2.6
Denmark	2.2	2.8	3.6	5.4
Finland	1.5	2.4	2.6	2.7
Netherlands	3.3	8.7	3.2	4.8
Sweden	1.3	3.3	2.6	3.0

performance of an expanded empirical model that incorporates some of those factors. They include demographics, income growth, interest rates and inflation, and Ricardo-Barro equivalence between the public and private sectors.

The basic analytical framework is the standard life cycle model, in which the individual maximizes the present value of lifetime utility discounted at the rate of time preference, subject to a budget constraint that is equal to current net worth, A , plus the present value of labour income, Y , over the remaining worklife, T_w , discounted at the market rate of interest. The solution of this system requires the specification of a specific form for the utility function. One convenient and frequently used form is constant relative risk aversion,

$$U(C_t) = (C_t^{1-\tau}) / (1-\tau) \quad (9)$$

where τ = the inverse of the elasticity of substitution. The optimisation yields the familiar formulation, in which today's consumption is a function

of current nonhuman wealth (A) and the present value of expected future labour income (H):

$$C_0 = \gamma_1 [A_0 + H_0] \quad (10)$$

One further simplification is to introduce γ_2 as a function relating expected future labour income to current income:

$$C_0 = \gamma_1 [A_0 + \gamma_2 Y_0] \quad (11)$$

where

$$\gamma_1 = \gamma_1(\rho, T, \tau, r) \quad (12)$$

and

$$\gamma_2 = \gamma_2(g, T_w, r) \quad (13)$$

The γ_2 expression is a negative function of the length of the remaining worklife (T_w) and is positively related to g , which is an index number equal to Y_t/Y_0 . The γ_1 expression relates current consumption to lifetime resources and depends upon the parameters of the utility function, time preference (ρ), the interest rate (r), and the individual's remaining years of life (T). Division of equation (5) through by income yields a relatively simple expression for the saving rate:

$$s_0 = 1 - (C_0/Y_0) = \gamma_1 [A_0/Y_0 + \gamma_2] \quad (14)$$

The process of aggregation, however, introduces additional issues of the age distribution of the overall population and relative incomes:

$$S = \sum w_i \cdot y_i \cdot s_i \quad \text{for } i = 1 \text{ to } 10 \quad (15)$$

where

- S = the overall average saving rate,
- s_i = the saving rate of the i th age group,
- w_i = proportion of household heads in the i th age group, and
- y_i = ratio of average income in the i th group to the overall average.

While data do not exist to implement this model directly, the model does provide a useful framework for thinking about the role of factors such as demographics and income growth.

Demographics

Changes in the age structure of the population frequently have been ignored in time-series studies of consumption behaviour because they change so slowly over time that their influence is difficult to detect. Yet, population and income growth both played critical roles in Modigliani's original derivation of an aggregate saving rate and his tests on international data. In

addition, the issue of demographic change has attracted far more attention in recent years because it is alleged that the large increases in the elderly population of most industrial countries over the next several decades will result in dramatic reductions in rates of private saving. Japan, for example, is expected by some to join the United States by the turn of the century in becoming a net seller of its assets internationally to support consumption.⁸ Others argue, on the other hand, that demographic factors will contribute to substantial increases in the US saving rate as the baby-boom generation matures.

The importance of demographics has obtained support from several cross-national studies that conclude that differences in the age structure account for a significant portion of the international variation in the level of private saving rates. Three of the most prominent of such studies by Feldstein, Modigliani and Sterling, and Horioka are summarized in Table 4. These studies used a similar underlying model (Modigliani, 1970) in which the humped characteristic of the age profile of saving is captured by including the proportions of the population that are young or retire—the dependency rate. Furthermore, an increase in the proportion of the male population over age sixty-five that is retired is used as a proxy for changes in the expected length of the retirement period, which should lead to a higher rate of saving during the working years.

In re-estimating the equations of Feldstein and Modigliani-Sterling I found that subsequent data revisions have had major effects on their original conclusions—particularly with respect to the influence of social security. But by combining data for the 1960-72 and 1976-86 periods it is possible to obtain similar results for the demographic variables and income growth (equation 4 in the table).⁹ The use of data from later years sharply reduces the role of differences in income growth.

Although there is significant variation among the studies in the absolute magnitude of the demographic effects, they agree on the sign of the individual coefficients and the relative importance of the young versus the elderly. An increase in the proportion of the population under age twenty has about half the impact on the saving rate as an increase in the proportion that is retired.

The coefficients on the three demographic variables from the cross-country equations are used to compute a time-series index of demographic effects for each individual country, using both my own and Feldstein's

⁸ The potential for sharply lower rates of future saving as a result of an increase in the proportion of retirees in the population is stressed in Heller (1989). Horioka (1989a and 1989b) and several other Japanese studies project negative private saving rates for Japan early in the twenty-first century.

⁹ It should be noted, however, that the results remain very sensitive to changes in the specification or the countries that are included. Horioka's study differs primarily in his use of the proportion of the population over 65, rather than the proportion of *retired* elderly. In addition, I did not weight the sample observations by relative size of the country's GNP as in the other studies.

**Table 4: Cross-National Estimates of the Influence of
Demographics on Private Saving**

1.	Modigliani-Sterling	Period: 1962-73
	$S = 2.3 G1 - 0.48 AGE - 0.11 DEP + 0.27 CHPR - 0.09 B/E + 0.05$	
	(7.6)	(4.0) (1.2) (2.7) (2.0)
		SEE = 0.02 n = 21
2.	Feldstein	Period: 1960-75
	$S = 5.24 G2 - 1.21 AGE - 0.77 DEP - 0.54 LPAGED - 0.37 B/E + 0.92$	
	(3.9)	(2.7) (3.8) (2.0) (2.8)
		SEE = 0.02 n = 12
3.	Horioka	Period: 1975-84
	$S = 0.79 G1 - 1.09 AGE - 0.43 DEP - 0.15 LPAGED + 1140.1 IPCY + 0.46$	
	(0.5)	(2.4) (1.7) (1.0) (2.9)
		SEE = N.A. n = 21
4.	Bosworth	Period: 1962-73, 1976-85
	$S = 1.73 G2 - 0.77 AGE - 0.36 DEP - 0.22 LPAGED + 0.48$	
	(3.2)	(2.9) (3.1) (2.2)
		SEE = 0.04 n = 30

Definitions:

G1	=	Annual growth of real per capita disposable income.
G2	=	Annual growth of real private disposable income.
AGE	=	Ratio of retired persons over 65 years of age to persons between age 20 and 65. In the case of Horioka, the ratio includes all persons over 65.
DEP	=	Ratio of persons under 20 years to persons between ages 20 and 65. (For Modigliani-Sterling, the denominator of AGE and DEP is the male population, aged 20 to 65).
LPAGED	=	Labor-force participation rate of males aged 65 and over.
CHPR	=	Difference of male participation rate between ages 25.5 and 65+ expressed as a ratio to the former.
B/E	=	The benefit replacement rate (ratio to earnings) for public pension program.
IPCY	=	Reciprocal of per capita income (USD).

Sources: Feldstein (1980); Modigliani and Sterling (1980); Horioka (1989a); and author's calculations.

equation.¹⁰ Surprisingly, according to both indexes, the effect of demographic change has been to increase private saving rates over the last two decades by substantial amounts, and the magnitude of change differs widely among the countries of the sample. This is shown in Table 5. Column (1) presents the same change in the private saving rate between 1965-72 and 1984-87 that was shown in Table 2. The implied contribution of demographic change is shown in columns (2) and (3). The changes using Feldstein's equation are greater simply because his coefficients are larger.

In general, a large decline in the number of young people has offset the rise in the proportion of the population that is retired. At the same time, an increased propensity to retire, a proxy for an increased expected period of retirement, has exerted a substantial positive effect on the private saving rate of all the countries. In fact, it is the change in the retirement rate, not the age distribution, that dominates the change in the indexes. This is shown in column 4 which excludes the contribution of a reduced labour force participation rate by the elderly. Only in Sweden is the overall historical effect of demographic changes on saving negative. Because the two indexes are highly correlated, only the results with my own index will be reported in subsequent equations.

Income growth

A positive effect of income growth on the aggregate saving rate has been stressed as a key conclusion of the Life Cycle Model, and it has been cited as a major factor in accounting for international differences in private saving rates.¹¹ The conclusion, as obtained by Modigliani (1966,1970), results from the process of aggregation. An increased rate of income growth, whether from increases in population or productivity, raises the incomes of workers (savers) relative to the retired (dissavers), changing the weights attached to the saving of individual age cohorts in the aggregation process outlined in equation (15). Under the assumptions used by Modigliani, income growth had no effect on the saving rate of an individual age cohort.

The generality of the conclusion, however, was challenged by Farrell (1970) and Tobin (1967) who noted that it depended upon the assumption that each individual does not anticipate the higher level of future income—static expectations—and that dissaving occurs only in retirement. Referring back to equation (10), Modigliani's version of the lifecycle model assumed that individuals did not incorporate future income growth into the computation of lifetime resources. Alternatively, under an assumption of perfect foresight, expectations of high future income growth will lead the young to postpone saving. That is, expectations of higher income growth should reduce saving within age cohorts, offsetting the 'among-cohort' effect introduced through aggregation of groups with different saving rates. This result is readily apparent in equation (10), where an increase in the

¹⁰ The basic data on the demographic changes are obtained from OECD (1989b).

¹¹ The argument is laid out in Modigliani (1966) and empirical support is provided in Modigliani (1970 and 1980) and Feldstein (1980).

**Table 5: Measures of the Effect of Demographics on Changes in
Private Saving Rate, 1965-72 and 1984-87**

Country	Actual Change in Saving Rate	Predicted Change ^a :		
		Eqn. (2)	Eqn. (4)	Eqn. (4')
	(1)	(2)	(3)	(4)
United States	-2.4	8.3	6.5	4.3
Canada	4.4	19.8	9.6	7.1
Japan	-8.0	1.7	3.4	0.2
Australia	-5.0	5.8	5.5	2.5
Large European Countries:				
France	-6.4	9.3	6.1	2.4
Germany	-3.2	13.6	4.7	1.5
Italy	-4.0	4.0	1.8	-0.4
United Kingdom	0.6	3.9	4.9	-1.0
Small European Countries:				
Belgium	-0.8	--	--	--
Denmark	-4.3	5.8	2.1	-0.6
Finland	-0.5	16.2	6.7	0.6
Netherlands	-0.2	15.9	8.1	5.5
Sweden	0.5	-7.5	-0.8	-5.4

^a The change is computed by using the coefficients on AGE, DEP, and LPAGED in the equations of Table 4 to create indexes of the net contribution of demographic changes. The estimates in column (4) exclude the coefficient in LPAGED.

present discounted value of future labour income clearly increases the individual's current consumption.

Thus, in evaluating the effect of income growth on saving behaviour we must take account of two separate influences: the impact on the behaviour of the individual household and its effect on the aggregation process. If households are forward-looking in making consumption decisions, current saving should be negatively related to the expected rate of income growth. On the other hand, the process of aggregation across households, in which

wage earners are savers and the retired are dissavers, implies a positive relationship between the aggregate saving rate and income growth. In simulation models that incorporate both effects the within-cohort effect was found to dominate, producing a negative relationship between income growth and aggregate saving.¹²

The importance of the within-cohort effect of income growth will depend upon the age of the cohort since, referring back to equation (14), γ_2 will be small relative to A_0/Y_0 for older households. Its importance may also be reduced if account is taken of the limited opportunities for young households with very low levels of existing net worth to borrow against future income. In the following analysis I have used private disposable income because a measure of after-tax labour income was not available. I thought that it was more important to reflect the impact of tax rate changes on income growth than the distinction between the growth of labour and nonlabour income.

Wealth

While the basic life cycle model, summarized in equation (14), suggests that existing private sector wealth should be a critical determinant of saving, measures of private wealth are only available for a few of the countries in the sample. I constructed a rough measure of wealth by viewing wealth as the cumulative sum of past saving plus capital gains:

$$W_t = W_{t-1} + Sp_t + Cg_t \quad (16)$$

I assumed that individuals hold a sufficiently diversified portfolio of real and financial assets that they avoided capital losses due to general inflation. Thus, each year's net saving was converted to constant 1980 prices and cumulated to obtain a real wealth stock. An initial starting value for the stock of wealth was chosen so that the average wealth-income ratio of the 1965-72 period was the same as that implied by the ratio of the flow data in table 3. Finally, an index of corporate share prices, deflated by the consumption price index, was included in the following regressions to account for real capital gains or losses arising specifically from changes in share prices.¹³

Inflation and interest rates

The rate of price inflation could affect saving through three separate channels. First, it is an element of the real rate of interest, and an increased rate of inflation may, *ceteris paribus*, provide an incentive for individuals to lower their rate of saving in response to a reduced real rate of return. The

¹² Tobin (1967) reached conclusions similar to Farrell in arguing that increases in the rate of population growth and productivity would have negative effects on the aggregate saving rate. Tobin allowed for the discounting of future consumption as well as anticipation of future income growth. Similar conclusions are implied in the model used by Summers (1981).

¹³ Some support for this formulation was obtained for the United States which does have estimates of total household wealth. However, the formulation is very inaccurate for Japan because of the extremely large real capital gains in real estate.

two components of the real rate may not exert equal offsetting effects on saving, however, if individuals are subject to liquidity constraints or if they are limited in their ability to hedge their wealth portfolio against inflation risks. Thus, price inflation and the nominal interest rate are often viewed as separate determinants of saving.

Second, in measuring income the system of national accounts does not adjust for the component of interest payments that simply compensates bondholders for the inflation-induced decline in the real value of their assets. Thus, the national accounts overstate the income and saving of creditors and understate that of debtors.¹⁴ Within a closed economy these revaluation effects alter the allocation of income and saving among sectors without changing the national total. Ignoring changes in the net foreign balance, a direct measure of the correction for the private sector can be introduced by multiplying the rate of inflation by the outstanding net financial liabilities of government.¹⁵ This adjustment tends to amplify the decline in the private saving rate because inflation was generally more rapid after 1973 and many governments that had a net positive financial asset position in the 1960s issued large amounts of debt in the late 1970s.

Finally, it has been suggested that increases in inflation may translate into greater uncertainty about the future and thus increased precautionary saving.

The long-term bond rate, available from the OECD, is used as a measure of the nominal return on savings; and inflation is measured with a three-year weighted average change in the consumer price deflator—with weights of 0.5, 0.3, and 0.2. No adjustment is made for variations in tax rates because of the lack of available data, but I would expect that to be a relatively minor marginal effect in view of the wide variation in market interest rates.

Ricardo-Barro equivalence

A belief in this theorem would suggest an emphasis on the national, as opposed to the private, saving rate. If individuals undertake actions to neutralize the effects of variations in public saving in their own intertemporal spending plans, the national saving rate would be the appropriate measure of private intentions.¹⁶ While the underlying assumptions of that theorem may seem quite far-fetched, we can test for its potential relevance by including the public-sector saving rate as a potential determinant of the private saving rate.

Empirical results

The above discussion provides a list of the major factors that should be taken into account in examining the pattern of saving behaviour across

¹⁴ The importance of the depreciation in the real value of monetary assets due to inflation is discussed, with references, in Hill (1984).

¹⁵ No attempt has been made to correct for the effects of exchange rates and inflation in other countries on the real value of foreign assets and liabilities.

¹⁶ See R. J. Barro (1974). An evaluation of the Ricardo-Barro equivalence theorem is provided in B. D. Bernheim (1987).

countries. While the following model is very loosely specified, it provides some basis for comparing saving behaviour across countries:

$$rs_p = \alpha_0 + \beta_1 i + \beta_2 p + \beta_3 A + \beta_4 cp + \beta_5 dy + \beta_6 demo + \beta_7 rs_g \quad (17)$$

where

- rs_p = Private saving as a percent of private disposable income, both with and without the adjustment for inflation effects on net financial assets;
- i = nominal interest rate;
- p = rate of inflation;
- A = private net worth;
- cp = index of corporate equity prices, deflated by the consumer price deflator;
- dy = percentage rate of change of real private disposable income, measured as a 5-year weighted average with the weights obtained from a second degree polynomial;
- $demo$ = index of demographic changes;
- rs_g = government saving as a percent of private disposable income.

An initial exploration of the data resulted in a considerable reduction in the number of independent variables. To begin with, I could find no significant role for the constructed measure of private wealth; and, while the stock price index frequently had a negative coefficient, it was uniformly small and insignificant. Thus, these two terms were dropped from the analysis. The failure of the wealth variable may reflect measurement problems because I could not identify real capital gains and losses other than on corporate stock. However, official measures of private wealth for two countries, Japan and the United States, performed no better. Second, the reported equations are based on gross saving rates (inclusive of capital consumption allowances). The difference in results between the net and gross measures were not substantial, but the net saving rates had slightly larger residual errors and greater cyclical variability. Third, a measure of saving adjusted for inflationary income gains performed better only for Canada. Fourth, I could obtain no meaningful relationship for private saving in the Netherlands, so it was dropped from the sample. Finally, I chose to exclude variables whose coefficients differed from zero by less than one standard deviation.

The results are summarized in Table 6, and they are striking primarily for their lack of uniformity—the factors affecting saving seem to differ substantially from country to country.

There is some support for a role of demographics in seven of the twelve countries for which data was available, but it has the wrong sign in two other countries, the United States and France, and was insignificant for two

others. Plus, the coefficient for Japan and Denmark is far above the expected value of unity.¹⁷

The most uniform result was in finding a consistent positive relationship between income growth and private rates of saving. Furthermore, the income term seems to reflect something more than just transitory income movements, because the five-year weighted average consistently outperformed the one-year change in income. However, the absolute magnitude of the marginal effect of income growth (ranging from 0.5 to 1.5) is still far below the average wealth-income ratios that are clustered about 3.0.

Interest rates were significant for 5 countries, but the sign was negative in the case of Australia. Inflation generally had a positive net effect on saving, rather than the negative sign that would be expected if its dominant effect was operating through a real interest rate mechanism.

There was also often evidence of negative correlation between variations in government and private saving rates, and it was statistically significant in seven countries. The coefficient was consistently less than the value of unity implied by the extreme version of ultrarationality, but it does suggest some tradeoff between government and private saving. However, it may be that the correlation reflects common cyclical influences on both variables, because the government saving rate was seldom significant if it was lagged by one period. In fact, all of the coefficient estimates were quite sensitive to minor variations in specification. The summary of a single set of equations in Table 6 implies a greater degree of precision to the coefficient estimates than actually was present.

In general, these empirical results would suggest that lower rates of income growth are primarily responsible for the pattern of declining rates of private saving. That conclusion, however, is not consistent with a general life cycle model with forward-looking expectations. As was pointed out earlier, higher rates of income growth, projected forward, should reduce the rate of saving out of current income. Plus, the effect of income growth seems too strong to be explained by induced shifts in income between workers (savers) and retirees.

The second major surprise was in the strong role for demographic factors in accounting for saving trends in several countries. The demographic changes actually helped hold up saving rates over the estimation period, but their empirical significance would seem to support the argument that the aging of the population of the industrial countries will significantly reduce saving in the future.

Before we conclude that income growth and demographic changes are the primary factors behind the decline in private saving rates, however, I would like to report on some contrary evidence available from Japan.

¹⁷ Evidence of a major role for demographics in the time series data of Japan is also found by C. Horioka (1989b). His estimates are based on simple ratios of the young and the elderly, excluding any role for the retirement rate.

Table 6 (p.1)

Table 6: Regression Estimates for Private Saving Rates, 13 Countries, 1965-87

Country	Demo- graphics	Income Growth	Interest Rates	Inflation	Govt. Saving	Trend	R ²	SEE	DW
US	-0.34 (5.4)	0.95 (6.3)	0.17 (2.2)	0.69 (12.2)	-0.24 (4.2)	-	0.92	0.3	2.1
Canada	0.73 (3.3)	0.64 (5.7)	0.50 (4.2)	-	-0.53 (5.6)	-0.52 (4.3)	0.95	0.6	1.5
Japan	1.35 (10.2)	1.04 (17.4)	-	0.26 (7.0)	-	-	0.96	0.6	1.7
Australia	0.76 (2.5)	0.84 (5.8)	-0.86 (4.9)	0.31 (6.4)	-0.40 (3.2)	-	0.93	0.7	2.2
Large European Countries									
France	-0.80 (4.3)	1.32 (5.3)	-	0.25 (2.8)	-0.32 (2.1)	0.19	0.96	0.5	1.9
Germany	-	0.65 (4.5)	0.39 (1.7)	-0.36 (2.2)	-0.14 (1.2)	-	0.77	0.7	0.9
Italy	0.47 (1.2)	0.61 (3.3)	-	0.18 (3.3)	-0.46 (3.0)	-0.23 (5.4)	-0.84	0.6	1.2
UK	2.38 (4.3)	0.61 (3.0)	0.54 (3.4)	0.35 (3.0)	-0.31 (1.4)	-	0.93	0.8	1.0

Continued...

Table 6 (p.2)

Table 6 continued:

Country	Demo- graphics	Income Growth	Interest Rates	Inflation	Govt. Saving	Trend	R ²	SEE	DW
Small European Countries									
Belgium	n.a.	0.83 (6.4)	-	0.20 (2.4)	-	0.07 (1.8)	0.82	0.7	1.8
Denmark	2.09 (2.2)	0.48 (1.4)	-	0.54 (2.6)	-0.19 (1.8)	-0.35 (2.9)	0.88	1.0	2.2
Finland	-0.67 (9.0)	0.94 (8.2)	-	0.23 (4.0)	-	-	0.90	0.9	2.1
Sweden	-	1.06 (4.7)	-	-	-0.48 (8.6)	-	0.88	0.9	1.7

3. Saving by Age Cohorts

Evidence from Japan

The results of the prior section are suspect in two areas. First, the variation in the magnitude of the coefficient on the demographic variable about its expected value of unity suggests that it may be capturing some other secular effect. It is, after all, heavily dominated by a trend; and, even though a simple time trend was included in some versions of the regressions, the risk of a spurious result is high. Second, it is difficult to reconcile the large positive coefficient on income growth with the basic theoretical model: it seems too large to be attributable to the process of aggregation across age cohorts. An alternative explanation is that individuals systematically fail to anticipate future income growth in formulating their consumption plans.

Both of these aspects can be tested more directly by examining some survey data from Japan that has measured the income and saving of specific age groups over a long time span. As best I can determine, Japan is the only country with such information, and it is directly relevant to both of the above two issues.

Japan undertakes two surveys that provide information about the saving patterns of individual households. The Family Income and Expenditure Survey (FIES) is conducted on a monthly basis, and individual households report in a diary highly detailed information on their expenditures. However, given difficulties of measuring business income, information on household income is limited to those households headed by a worker, excluding the self-employed, farmers, retirees and single-member households. Because of the heavy burden of reporting, a sample household is surveyed for six months, with regular monthly rotation. The sample size is slightly in excess of 5000 households. I have made use of the annual data for worker households beginning with 1968.

A second supplementary survey, taken at the end of each year, gathers information on the flows and stocks of savings and liabilities as well as investments in fixed assets. The Family Saving Survey (FSS) asks for detailed information on the stocks of current assets as well as net purchases during the year. Furthermore, the FSS reports income of the self-employed and retirees, with a separate tabulation for worker households. Thus, this second survey is the only source of information on the saving of nonworker households. The disadvantage is that the information on income is limited to the total income of the household before taxes. The measure of saving for worker households should be comparable with that of the expenditure survey since the questions of net asset purchases appear to exclude unrealized capital gains. The FSS is available on a relatively consistent basis for the period after 1967 and includes separate tabulations by ten age groups and income quintiles.

These surveys were used to obtain three estimates of household saving. The first is from the FIES and is for worker households only. It is defined as the surplus of after-tax income less living expenditures. The second estimate is for worker households from the FSS and is computed as the net

change in financial assets minus the net change in financial liabilities plus net investment in physical assets. In computing the saving rate, disposable income was estimated by applying the effective tax rate in each category from the FIES to the reported income of the FSS. This methodology seems acceptable because the estimate of before-tax income in the saving survey, while higher than that of the expenditure survey, was very consistent over time—the mean ratio was 1.066 for the 1970-88 period with a 0.015 standard deviation. The third series, covering all households, is also from the FSS survey. The tax rate was again taken from the FIES. And, while the assumption that the rate is the same for worker and nonworker households cannot be defended, it still captures the more important pattern of a large secular rise in the effective rate.¹⁸

The average saving rates, as measured by the surveys, are compared to the household saving rate as reported in the national accounts in Figure 9. The survey measures of saving differ from the national accounts in four important respects. First, no imputation is made to the consumption and income of homeowners in the surveys for the implicit payment of rent on their properties. Second, the expenditure survey does not distinguish between interest and principal on the repayment of mortgage and other debt: interest income is measured on a gross basis. Third, the national accounts adds the cost of national health care to both income and expenditures, creating a difference in the denominator of the saving rate. Fourth, net equity in employer pension programs is included as part of income and saving in the national accounts, but not in the surveys. Pension programs are not as common in Japan as in the United States, but they are growing at a rapid pace.

The national accounts and the FSS both indicate a similar pattern of secular change in the saving rate, rising up to the mid-1970s and falling thereafter. But they differ on the magnitude and the precise timing. The post-1975 decline is much smaller in the FIES, even if the comparison between the FIES and the FSS is restricted to worker households where both surveys produced similar estimates of income. Finally, the surveys indicate a rise in the saving rate in 1987-88 that is not reflected in the national accounts.

At present, I do not have sufficient information to identify the sources of difference between the national accounts and the FIES. Some of the previously-mentioned differences in concepts could be eliminated, but the adjustments require data from the national accounts that are not publicly available. The differences in the estimates of saving by worker households between the two surveys can be traced primarily to a much lower rate of reported investment in physical assets from the FIES. The two surveys do agree that there has been a decline in the rate of financial asset accumulation. Because of the focus of the FSS on asset accumulation, I am

¹⁸ The assumption about similar tax rates seems particularly inappropriate for the older age group because the worker households exclude the retired who receive significant untaxed transfer income.

Figs 9 and 10

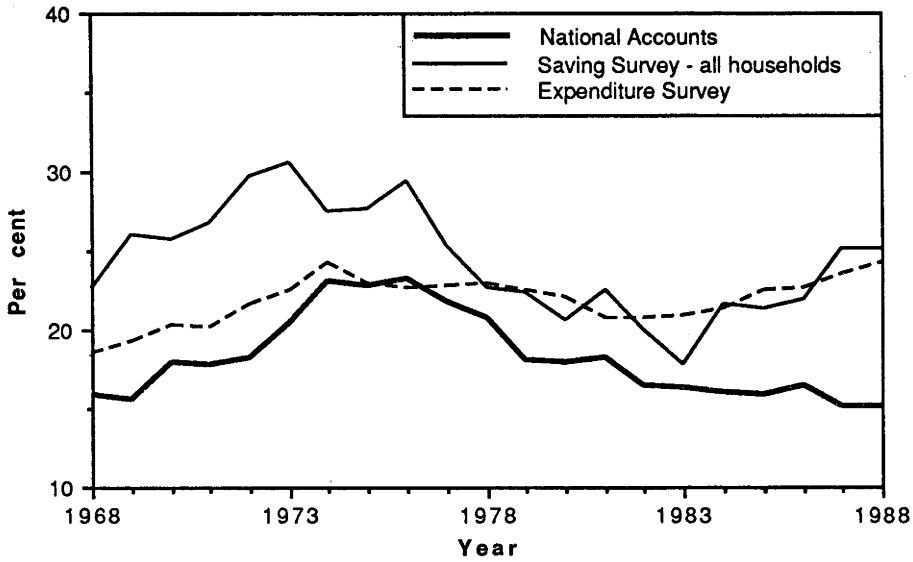
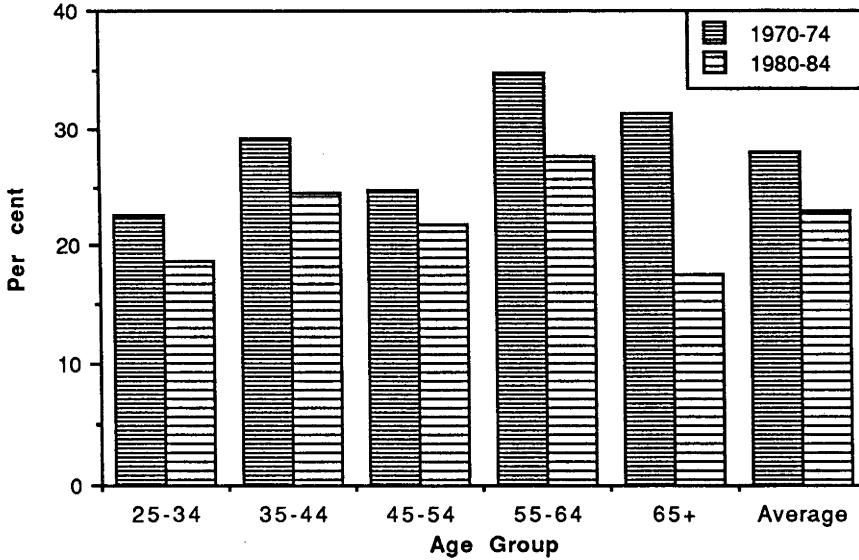


Figure 9: Alternative Measures of Household Saving
Japan, 1968-1988



Source: Family Saving Survey, various years. Data are for all households.

Figure 10: Japanese Saving Rates by Age Group
1970-74 and 1984-88

inclined to place greater reliance on its estimate of the saving rate, but that is the reverse of common practice within Japan, where use of the saving survey seems to be restricted to the information it provides on the stock of financial assets and liabilities. The saving rate provided by the FSS has the same general trend as the national accounts, and the differences in level should not be of major concern, given the inconsistent definitions of disposable income.

Demographics

This data is of primary value because it allows us to calculate a direct measure of the influence of demographic change on the overall saving rate. There has been a very dramatic increase in the proportion of Japanese who are retired—in our data the proportion of households headed by an individual aged over 65 has more than doubled, and the proportion of households in the 25-35 age brackets has declined by one half.

The survey data would seem to be ideally suited to testing the influence of shifts of the age composition of Japanese households because the surveys provide information on the saving rate of individual age groups over a twenty-year period. Household saving rates grouped by the age of the household head are shown in Figure 10 for the period of high saving, 1970-74, and the recent period, 1984-88. The data refer to the all-households classification of the FSS. The data do show a slightly humped distribution of saving by age, but the extent of difference among age groups is very limited. It is also notable that the secular decline in saving is evident in all age groups—it would appear to be a common phenomenon of all households rather than being attributable to changes in the distribution of households by age.

A more precise measure of the effects of demographic changes can be developed, however, by viewing the overall saving rate as a weighted average of saving rates of the individual groups according to the formula shown earlier in equation (15).

The survey provides estimates of the proportion of the population of households in each age group and their relative incomes. By holding constant the values of w_i and y_i , it is possible to generate an aggregate saving rate reflective only of changes in the rate of saving within each age group.

Such a calculation is shown in Figure 11 using 1968 values of w_i and y_i , although the specific choice of a base year has no significant influence on the results. It is evident that nearly all of the change in the overall saving rate can be traced to changes within age groups. And, as shown by the dotted line, the influence of demographic change alone (1968 values of S_i and y_i) has been to increase the overall saving rate over the 1968-88 period.¹⁹ More importantly, the differences in saving rates among age groups are simply not large enough to generate major demographic effects on the aggregate saving rate. Thus, while there is a secular correlation between the ageing of

¹⁹ There has been no significant change in the distribution of household income by age of the household head, and that specific result is not shown in the figure.

the population and the decline in household saving, the relationship does not appear to be causal.

A similar calculation was made using the data from the FIES. Again, the conclusion was that demographic changes had a small positive effect on the overall saving rate. The difference was that there is no implication of a significant decline in saving within age groups. Modest declines in the rate of saving in some of the older age groups were offset by increases for younger households.

The influence of an increased number of retirees on the saving rate is potentially obscured in the Japanese data by the tendency for elderly parents to live with their children, in which case the effect on saving would be spread over younger households because the household is classified by the age of its head. This explanation seems unlikely, however, because of the uniformity of the decline in saving across all the age groups. If the elderly were contributing to lower saving rates, we would expect to see the decline concentrated in those households who were most likely to have elderly parents. In addition, the tendency for parents to live with their children is declining, as witnessed by the substantial increase in the number of elderly households in the survey.

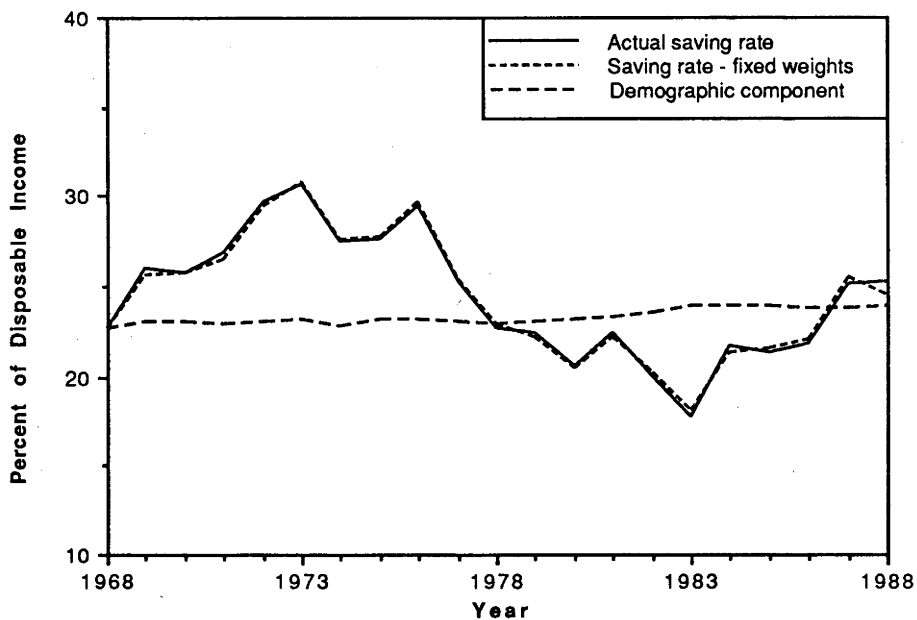
Income growth

Turning to the role of income growth, a clear correlation between the average saving rate and income growth is readily apparent in the survey data (see Figure 12). The availability of age-specific data, however, allows the exclusion of the 'among-cohort' effect of aggregation. The basic determinants of saving can be directly related to the saving rate of each age group. To begin with, I attempted to estimate an equation similar to (17), at the level of nine age groups.²⁰ The FSS does provide information on net financial wealth, but it was insignificant in all cases. Furthermore, Japanese families hold very little corporate stock and the stock price index played no significant role. Nor did I make any attempt to adjust the saving rate directly for inflation effects on measured income.

The statistical results reported in Table 7 are based on a very simple model that relates the saving rate of each age group to the change in income (adjusted for inflation), the rate of consumer price inflation, and the interest rate on one-year time deposits. The measures of income and price change are averaged over a three-year period. As with the international data, there is a strong correlation between income growth and the saving rate, and the use of a three-year average as opposed to one year is important. Thus, the association does not appear to be simply the result of unanticipated changes in income. On the other hand, there is no tendency for the magnitude of the coefficient on income change to decline with age, as would be expected from a model in which previous wealth accumulation would become an increasingly large component of available resources for older households. In addition, the coefficients on price changes are generally

²⁰ The sample of households under age 25 is very small and it was excluded from the analysis.

Figs 11 and 12



The fixed weight alternative uses 1968 demographic and relative shares to weight saving rates of each age cohort.

Figure 11: Sources of Change in the Japanese Household Saving Rate 1968-1988

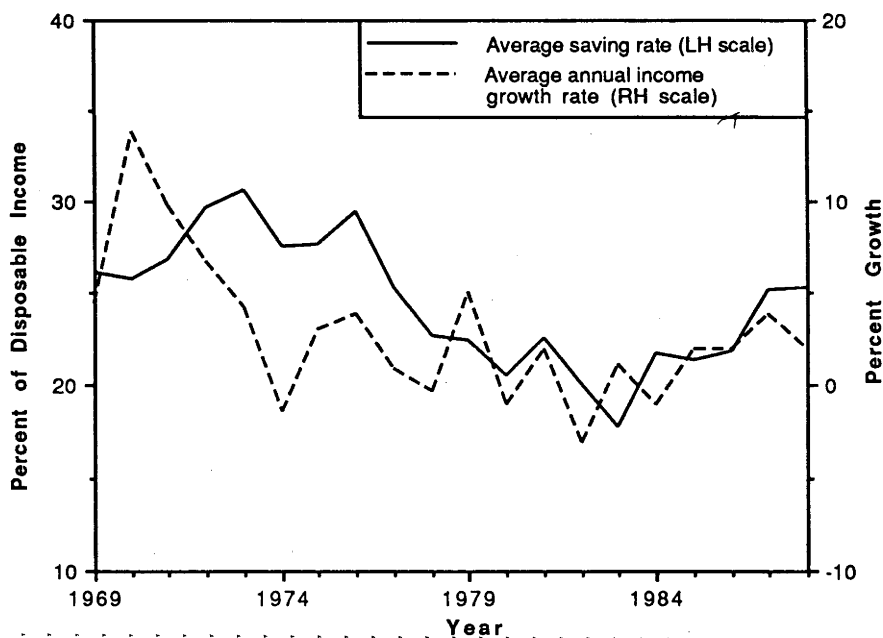


Figure 12: Comparison of Saving Rates and Income Growth Rates 1969-1988

Table 7: Regressions of Saving Rates by Age Group, 1971-88

Age Group	Income Change	Price Change	Interest Rate	R ²	SEE	DW
All Ages	0.706 (5.11)	0.684 (4.58)	-1.620 (2.67)	0.78	1.72	1.5
25-29	0.466 (2.01)	0.220 (0.88)	0.671 (0.66)	0.33	2.88	2.7
30-34	0.569 (2.22)	0.608 (2.20)	-1.638 (1.46)	0.37	3.19	1.7
35-39	0.618 (2.56)	0.688 (2.64)	-1.782 (1.68)	0.47	3.01	1.8
40-44	0.591 (2.78)	0.725 (3.15)	-2.237 (2.39)	0.54	2.65	1.2
45-49	0.865 (4.74)	0.800 (4.06)	-1.534 (1.91)	0.76	2.27	2.5
50-54	0.269 (1.31)	0.496 (2.24)	-1.080 (1.20)	0.28	2.56	2.2
55-59	0.202 (0.69)	1.412 (4.45)	-3.162 (2.45)	0.58	3.66	2.0
60-64	1.836 (4.42)	0.210 (0.47)	-1.761 (0.97)	0.54	5.17	1.4
65 and over	1.454 (3.87)	0.972 (2.39)	-0.332 (0.20)	0.65	4.68	2.7

Table 8: Regressions for Saving Rates by Income Class

Income Quintile	Income Change	Price Change	Interest Rate	R ²	SEE	DW
Lowest	0.739 (1.99)	1.962 (4.49)	-4.196 (2.38)	0.67	4.89	1.8
Second	0.419 (2.20)	0.480 (2.59)	-2.551 (3.45)	0.50	2.10	1.5
Third	0.701 (2.96)	0.473 (2.05)	-1.542 (1.64)	0.42	2.70	1.7
Fourth	0.785 (2.63)	0.755 (2.61)	-1.509 (1.28)	0.49	3.38	2.0
Highest	0.564 (4.70)	0.567 (3.68)	-0.899 (1.42)	0.74	1.78	1.8

positive and marginally significant. The coefficients on the interest rate are often negative and in a few cases significantly so.

These results suggest that the positive association between income change and saving rates is not a product of the process of aggregation. It is the result of the behaviour of individual households. Nor does it appear consistent with a life-cycle model in which individuals are forward-looking in evaluating the resources available to support consumption. Within the life-cycle model the secular decline of income growth in Japan should have been reflected in a higher saving rate.

Furthermore, while I have used relatively short lags in computing income growth, the actual decline in saving rates and income growth has now lasted for over fifteen years. I find it difficult to attribute this decline to inertia in the formation of expected income.

4. Conclusion

The United States does not stand alone in having experienced a decline in its private rates of saving. In fact, the decline has been even larger in other industrial countries, albeit they generally started from higher rates. It appears to be a general phenomenon that can be traced to the lower rates of income growth that have prevailed since the first oil shock of 1973.

In addition, the behaviour of saving rates at the aggregate level does not seem consistent with many of the standard life cycle models. While the formulation used by Modigliani does imply a positive relationship between income growth and the overall saving rate, it results from the aggregation of a very naive behavioural model of the individual's behaviour. It is also possible, using survey data from Japan, to demonstrate that the observed correlation is not the product of aggregation. The more sophisticated models of forward-looking behaviour imply a correlation between income growth and saving the opposite of that which is observed.

There are some possible explanations for the above results that need to be explored in future work. First, I used a measure of consumption that included consumer durables. As found by Hayashi (1982), the inclusion of durables, where we would anticipate a positive relationship between purchases and income growth, does bias the results. Latter tests should exclude durables or incorporate a mechanism for distinguishing between purchases and consumption of their services. However, a quick examination of the data for a few countries where I had measures of the purchase of durables suggests that it does not account for the decline in saving. Second, the analysis does not adequately take account of liquidity constraints that may limit individuals' ability to consume out of expected future income. However, the finding of a positive association between saving and income growth for older Japanese households, who certainly have substantial current assets, suggests that this explanation is unlikely to be important.

Finally, there is some suggestion in the analysis of international patterns of change that demographic factors may be an important explanation of changes in the aggregate saving rate. On the other hand, that explanation

was decisively rejected for Japan, where the conclusion seems to be that the significance of demographic variables in empirical models of saving behaviour is spurious. Furthermore, available measures of saving rates by age groups simply do not suggest that the differences are large enough by age group for demographic changes to be a significant determinant of movements in the aggregate saving rate.

SECTION II
POLICY ISSUES

Saving, Policy and Growth

Peter J. Stemp

**Saving Policy Issues Examined with a
Macroeconometric Model**

Chris Murphy

SAVING, POLICY AND GROWTH

Peter J. Stemp*

1. Introduction

Since the latter half of the 1980s, there has been a focus on raising aggregate national saving as a means for reducing the current account deficit. Present preoccupation with the current account imbalance emphasises only one of a range of policy issues for which saving has relevance. This paper provides a broad overview of the issues relating saving, policy and growth in Australia. Three topics are discussed in detail. Firstly, a range of saving concepts and their relevance for different policy issues are highlighted. In particular, it is demonstrated that different definitions of saving will be appropriate in different circumstances. Secondly, the relationship between saving and long-term levels of output and consumption is examined using simple theoretical models of open and closed economies. Thirdly, the paper analyses the recent Australian policy emphasis on reducing saving in the context of recent high levels of the current account deficit and net foreign liabilities. The paper also examines the effectiveness of various policy responses purportedly designed to reduce the current account deficit.

The policy maker has reason to be concerned about saving for many reasons. The possibility that private agents may save too much, reducing aggregate demand, has been encapsulated in the so-called *paradox of thrift*. The possibility that saving was too high was the chief concern in the 1970s: statistical measures of saving had increased substantially with the inflationary surge of 1974-75 and remained high throughout the rest of the decade. Demographic profiles which show an ageing Australian population emanating from the post-war baby boom are another reason for concern about saving levels. As a consequence, there is a need to increase saving for retirement purposes so as to avoid excessive calls on publicly funded pensions in the future. More significantly, saving provides a means of financing the accumulation of capital owned by domestic residents, allowing the attainment of higher future national income levels.

Saving behaviour involves a trade-off between current and future consumption possibilities. Through this trade-off, saving has an impact on economic growth in both closed and open economies. In a closed economy, all domestic investment is financed by domestic saving so that a nation's saving history determines its current capital stock. However, in an open economy, capital accumulation can be financed by overseas borrowing and

* The author is grateful to Ian Castles, Owen Covick, Malcolm Edey, Bob Gregory, John Piggott, Bill Scarth and authors of other papers presented at the Conference, for helpful comments. Ross Harvey from the Australian Bureau of Statistics responded to numerous questions about National Accounts data. Thanks also to Rohan Ekanayake for enthusiastic research assistance. The views expressed remain solely those of the author.

net foreign liabilities become an important determinant of future economic welfare. Following financial de-regulation over the course of the 1980s and increased international capital mobility, the open economy framework has become even more appropriate as a paradigm for analysing the Australian economy. As might be expected, high levels of foreign borrowing have also become more common.

The various policy measures designed to increase saving as a response to recent high current account deficits are examined. It is shown that, as a means of redressing the current account imbalance, these responses have had mixed and, sometimes, indeterminate success. The paper concludes that the Government's policy choices can be justified from an ideological perspective that seeks to achieve a more market oriented economy in an increasingly competitive world economic environment.

2. The Various Concepts of Saving

There are a broad range of concepts that in every-day usage are referred to as 'saving(s)'. The context in which the label is applied will have a strong bearing on which concept can be appropriately used. In order to distinguish between these different saving concepts, four questions can be asked:

1. Are we referring to the flow of saving (defined as the difference between suitably defined concepts of income and consumption)? Or, are we referring to the stock of savings defined by accumulating the flow of saving over time? The stock of savings is frequently referred to as 'wealth'.¹
2. Are we referring to gross saving (which includes saving needed to replace depreciated capital stock) or net saving (defined as gross saving minus a depreciation allowance for consumption of fixed capital)?
3. Who is doing the saving? Is it the aggregation of all units in the economy, the private sector, the public sector or some other subgroup within the economy?
4. How are specific accounting relationships incorporated in the saving concept? An important question is whether the measure of saving incorporates capital gains/losses. Examples of other related issues are: whether consumer durables have been treated as consumption or investment expenditure in the compilation of saving figures; how current and future pension and social security payments are treated; whether bonds should be treated as a component of net wealth.

¹ There appears to be a convention that restricts use of the term *savings* (with the final 's') to the stock of wealth that has accumulated over time. Under this convention the term *saving* (without the final 's') refers to the flow of wealth over a period of time. Thus *savings* (the stock) is the aggregation of *saving* (the flow) over previous periods. This convention has been adhered to throughout the paper.

In certain instances, a range of saving concepts defined above may be used appropriately. However, it may be fallacious to use certain concepts of saving in response to some questions. This may be particularly confusing to the public at large, who may hear the label, 'saving(s)', being used in a particular context and associate a totally inappropriate concept with that label.

2.1 Australian National Accounts

The Australian National Accounts (ANA) present quarterly and annual measures of the flow of saving. Saving and investment aggregated over all units in the economy are summarised in the national capital account tables of the ANA. The format of the national capital account is summarised in Table 1. As an aid to understanding, common usage terms are presented in brackets. For example, depreciation is referred to in the ANA as consumption of fixed capital. Gross saving is defined as the finance of gross accumulation. Gross investment is defined as the sum of gross fixed capital expenditure and the change in stocks.² Net saving is defined as gross saving minus depreciation. Net investment is defined as gross investment minus depreciation. Net lending to overseas, which is the ANA counterpart of the current account balance³, is defined as gross saving minus gross investment. All data presented in the ANA abstract from capital gains/losses.⁴

The ANA Tables also divide the economy into distinct institutional sectors. These sectors can be distinguished according to the economic roles of units within each sector, with the emphasis being on the differences in their financial behaviour. The distinct domestic sectors have four broad groupings: corporate trading enterprises (including public trading enterprises), financial enterprises (including the nominal industry), households (including unincorporated enterprises) and general government. Each domestic sector has a capital account table of a similar

2 In the case of investment financed by an overseas entity, the ANA effectively defines a (shadow) domestic subsidiary which undertakes investment on behalf of the foreign entity, financed by net lending from overseas.

3 Net lending to overseas differs in concept from the current account balance by the net amount of reinvested earnings. This reflects the differing treatments of reinvested earnings presently adopted by the international standards for national accounts and balance of payments statistics (Australian Bureau of Statistics, 1990, p. 95).

4 The ANA capital account seeks to provide measures of saving, investment and net lending from which all measures of capital gains/losses have been removed. Measures of capital gains/losses can only be included, inadvertently, in these ANA aggregates. The international standards of national accounts make provision for the presentation of capital gains/losses in a separate reconciliation account. In association with the capital accounts, the reconciliation account provides a complete picture of the processes in moving from the balance sheet position at the beginning of the period to that at the end of the period. Neither balance sheets nor reconciliation accounts are currently compiled as part of the ANA.

form to Table 1.⁵ Thus concepts such as gross saving, gross investment and net lending are defined for each sector. In addition, net lending to overseas is derived from the national capital account table. The sectoral capital account tables can be aggregated to yield the national capital account table. In particular, sectoral saving, sectoral investment and sectoral net lending can be aggregated to yield equivalent national concepts.

Measures of gross and net saving, expressed as a percentage of GDP, are presented in Figure 1.⁶ Data are presented for the public sector (comprising general government, public trading enterprises and public financial enterprises) and the private sector (comprising all other domestic sectors) as well as the aggregate national sector. Gross and net national saving have risen substantially in recent years. The growth in national saving can be attributed to increased public sector saving. Private sector saving has declined marginally in recent years.

Table 1: National Capital Account

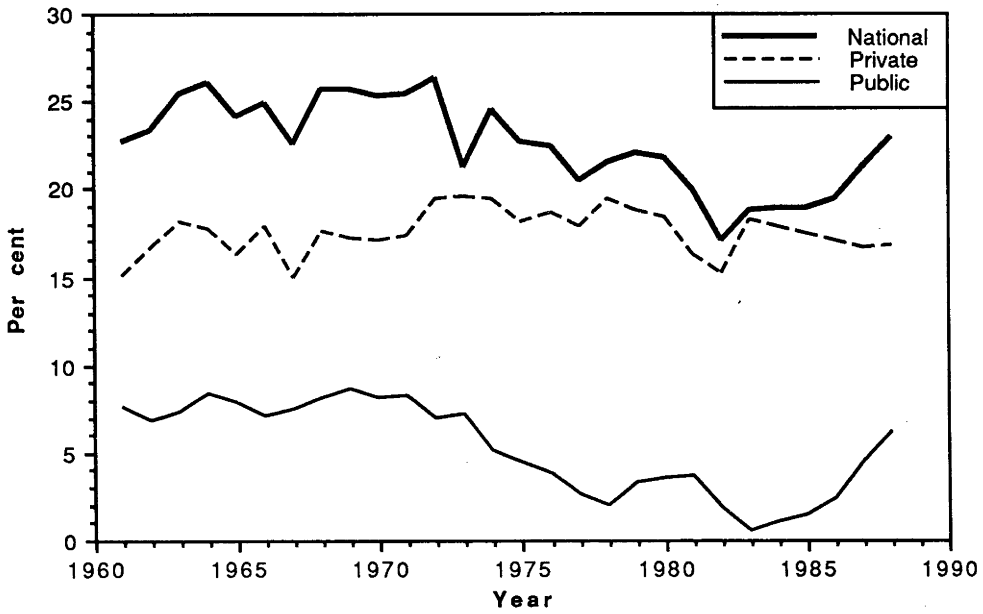
CONSUMPTION OF FIXED CAPITAL (DEPRECIATION)	GROSS FIXED CAPITAL EXPENDITURE (plus) INCREASE IN STOCKS (equals GROSS INVESTMENT)
NET SAVING	STATISTICAL DISCREPANCY ⁷ NET LENDING
FINANCE OF GROSS ACCUMULATION (GROSS SAVING)	GROSS ACCUMULATION

⁵ The sectoral capital account tables divide finance of gross accumulation into consumption of fixed capital, a saving component, increase in income tax provisions, and net capital transfers from other sectors. For the purpose of this paper, gross saving is defined as finance of gross accumulation and net saving is defined as gross saving minus consumption of fixed capital.

⁶ The ANA data presented in the figures in this paper are derived from ABS Catalogue Numbers 5204.0, 5206.0 and 5207.0. The author is grateful to Mark Britten-Jones, from the Reserve Bank of Australia, for compiling and making available some of the historical series. In all figures, data for a financial year are attributed to the calendar year in which the financial year began. For example, data for 1988-89 are attributed to 1988.

⁷ The statistical discrepancy represents the difference between estimates of gross national expenditure plus exports, and gross domestic product plus imports. Conceptually these two totals are the same (Australian Bureau of Statistics, 1990, p. 284).

Gross Saving



Net Saving

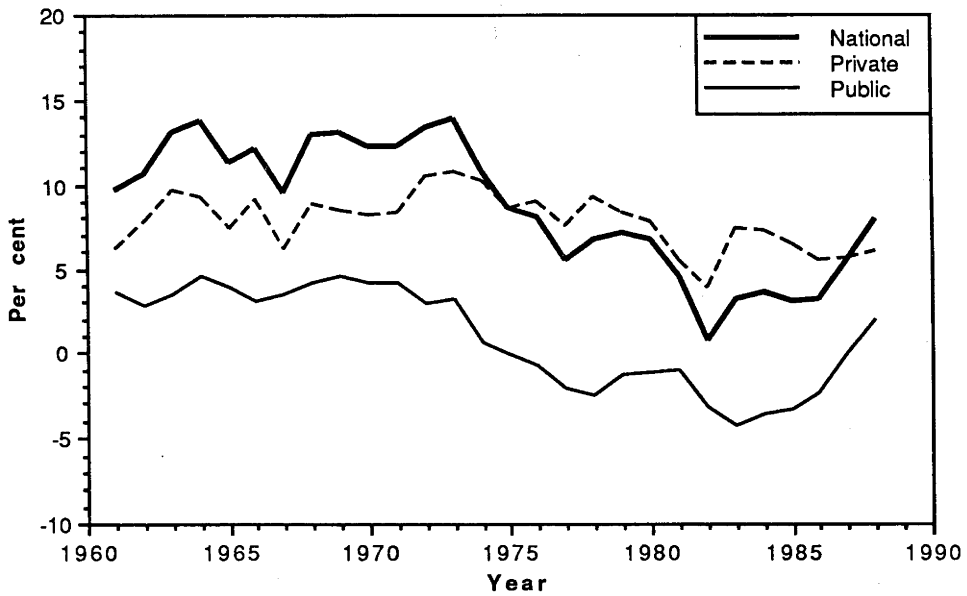


Figure 1: Gross and Net Saving (% of GDP)

Household Saving Ratio and Gross Private Saving (% of GDP)

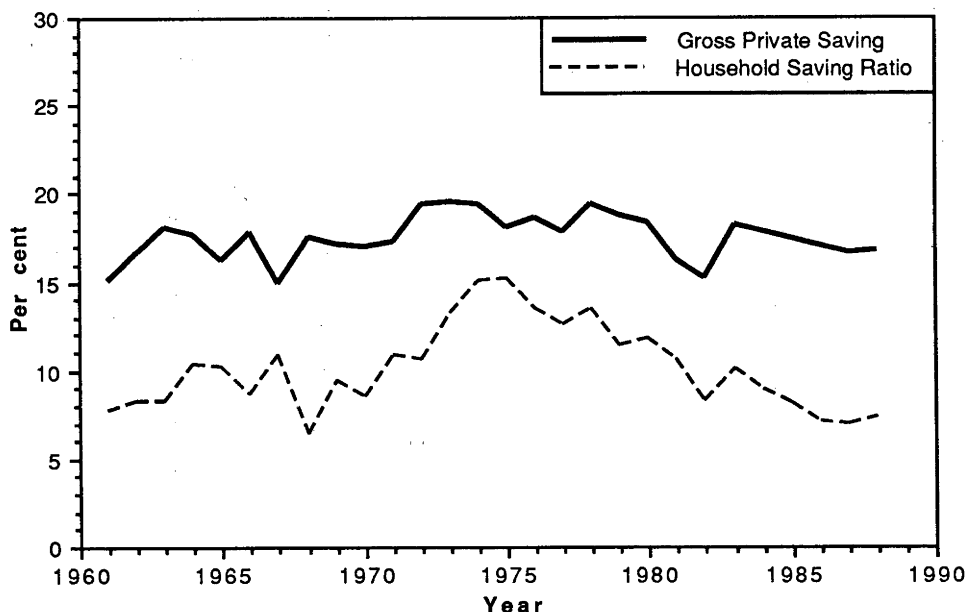


Figure 2: Private Saving (Unadjusted for Inflation)

Another measure of private saving, frequently highlighted by commentators, is the household saving ratio which expresses net saving by the household sector as a percentage of household disposable income.⁸ Figure 2 shows the relationship between the household saving ratio and gross private saving as a proportion of GDP. It is apparent that the movements in the two ratios do not track well and so interpretations, based on one or the other ratio, may differ significantly. The household saving ratio is particularly sensitive to inflation with the peak period ratio between 1960 and 1990 occurring at the time of the 1974-75 inflationary surge.

(a) Accuracy and reliability

A major problem associated with the analysis of economic issues using ANA data is one of accuracy and reliability. One source of concern is the statistical discrepancy which is indicative of inconsistencies between the

⁸ The ANA measure of the household saving ratio is a net saving concept. It is also possible to define a gross household saving ratio, with gross household saving as the numerator in the ratio. The measure of net saving employed in the household saving ratio differs from net household saving defined in accordance with footnote 5 because it excludes net capital revenue, capital grants from general government and extraordinary insurance claims. In practice, the net contribution of these components is small. Note also that, in the ANA, the household sector comprises unincorporated enterprises as well as households.

income and expenditure estimates of GDP. Recent commentators (McKibbin and Morling, 1989; Gregory, 1989; Edey and Britten-Jones, 1990) have observed systematic variation in the statistical discrepancy over time and have examined the implications of allocating the statistical discrepancy to different economic aggregates. Other issues for concern are the magnitude and frequency of revisions to estimates. As an aid to the assessment of the quality of ANA data, the Australian Bureau of Statistics (ABS) (1990) has provided accuracy gradings for a large range of ANA aggregates.⁹

One way of assessing the reliability of saving figures derived from the ANA is to compare overlapping series as they have been presented at different points in time. Figure 3 shows estimates of the statistical discrepancy, net lending to overseas and sectoral saving as they have been presented for the past five years.¹⁰ These data indicate systematic movement over time in revisions to specific series. It is evident that the statistical discrepancy and gross household saving have been consistently adjusted downwards following revisions to the data. For example, the estimate of gross household saving for the year 1984-85 has been revised downwards by 2 per cent of GDP between 1984-85 and 1988-89. Gross private corporate saving has been consistently revised upwards with the published estimate for 1984-85 increasing by 2 per cent of GDP over the last five years.

Systematic revisions like those observed in Figure 3 are quite likely to dominate statistical tests of economic hypotheses. The comparisons in Figure 3 cast particular doubt on the reliability of the estimates of the components of gross private saving. Since private saving is a component of private net lending, this also casts doubt on net lending figures.

The quality of sectoral net lending figures can also be examined using recently released flow of funds data. The flow of funds accounts provide two independent measures of net lending: one measure, referred to as *net lending*, derived from sectoral capital account figures on the same basis as data presented in Figure 3; and a second measure, referred to as the *change in financial position*. This latter item is conceptually identical to net lending in the capital account and is an alternative measure of that item derived directly from measures of the changes in financial assets and liabilities in the financial transactions account. The two measures should be identical, but rarely are in practice as they are derived from different data sources. The difference between *net lending* and the *change in financial position* is referred to as the *balancing item* and is one indicator of the accuracy and reliability of the estimates.

⁹ Notably, these gradings assess the quality of household saving as C ('poor') and estimates of household net lending as D ('very poor').

¹⁰ Unlike elsewhere in this paper, Figures 3 and 9 define the public sector as general government plus public trading enterprises. In these figures, public financial enterprises, along with private financial enterprises, are treated as components of the financial sector.

Fig 3, page 1

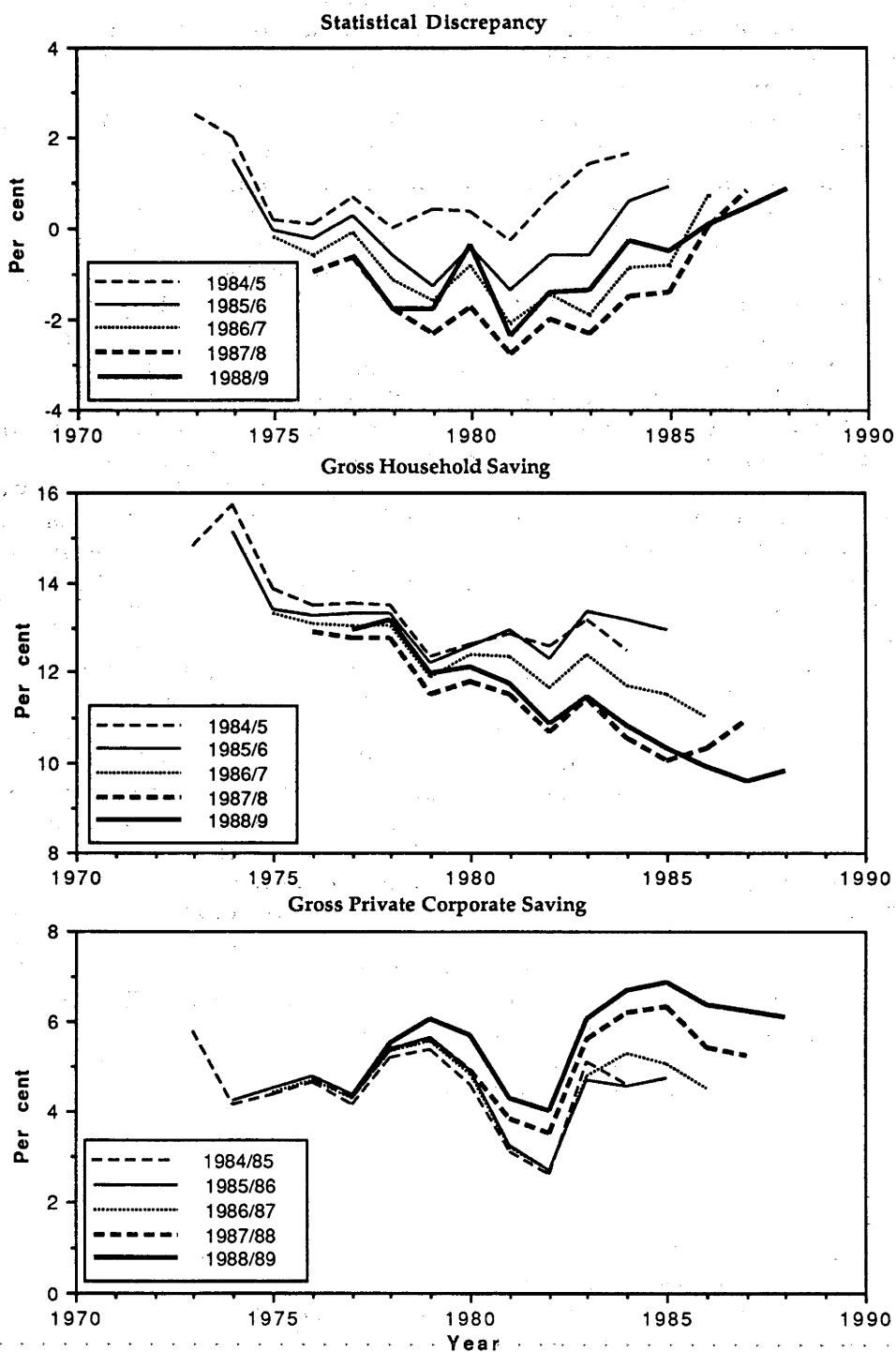


Figure 3: Comparison of ANA Estimates (% of GDP) (continued over...)

Fig. 3, page 2

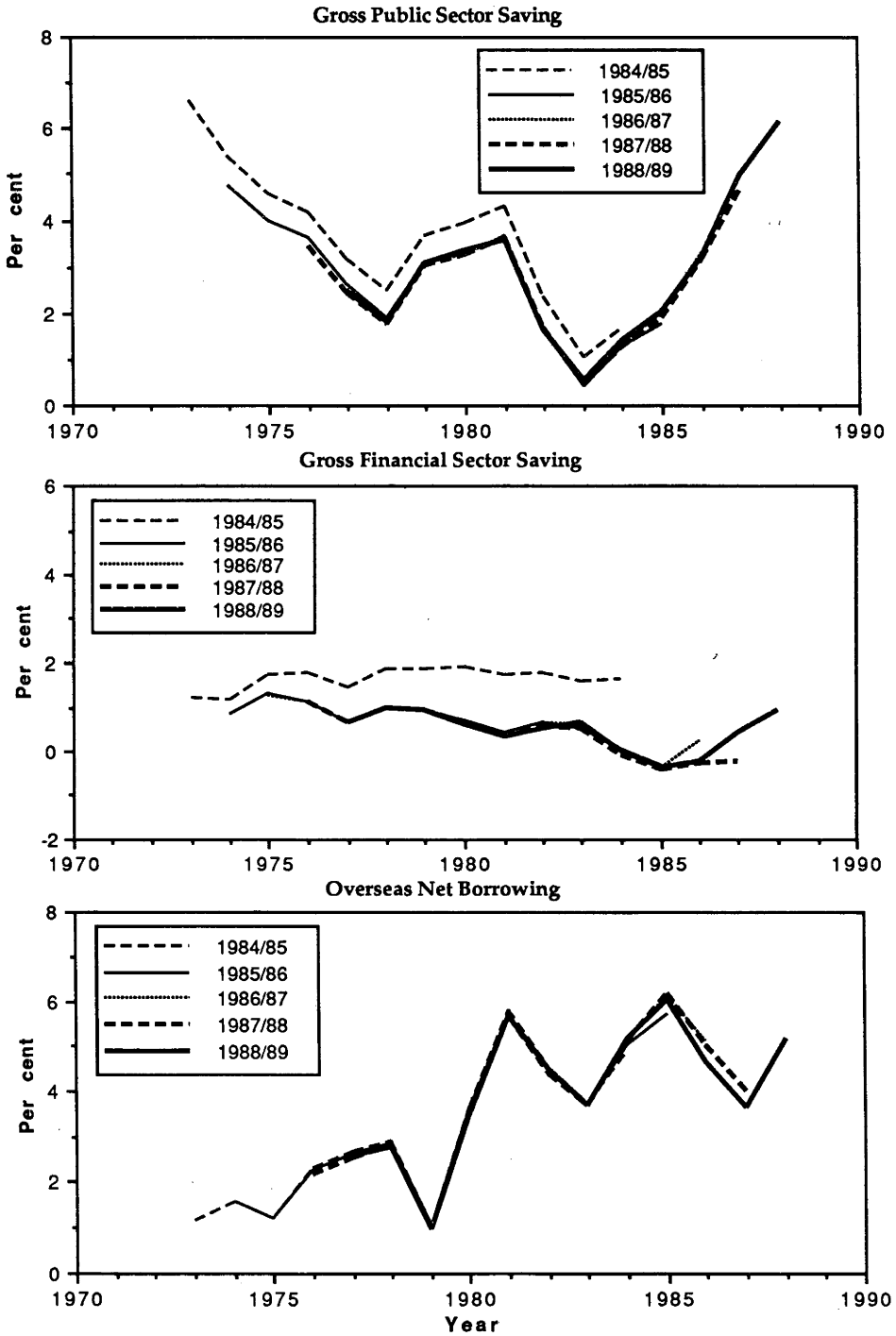


Figure 3 (continued): Comparison of ANA Estimates (% of GDP)

The results for the items *net lending*, *change in financial position*, and *balancing item* for each sector and sub-sector for the six months ended 30 June 1989 are shown in Table 2.¹¹ In addition, the *balancing item* is expressed as a percentage of GDP for the same period. The data presented in Table 2 confirm that a high level of uncertainty can be attached to net lending (and hence saving) figures of the household sector and the private trading enterprises sector. These sectors have balancing items of +3.56 per cent of GDP and -4.67 per cent of GDP, respectively. Since these two sectors form major components of the private sector, the uncertainty about the quality of estimates of the components of gross private saving is reinforced by the flow of funds data.¹²

Until these inconsistencies can be resolved, there must be some considerable doubt about the reliability of data on saving and net lending for sub-sectors within the private sector.

**Table 2: Net Lending, Change in Financing Position, Balancing Item
Six Months Ended 30 June 1989**

	Net Lending (\$ million)	Change in Financial Position (\$m)	Balancing Item (\$m)	% GDP
Trading Enterprises:				
Commonwealth	+898	+72	-826	-0.49
State and Local	+7	-2255	-2262	-1.35
Private	-8057	-15873	-7816	-4.67
Financial Enterprises	-2521	-1929	+592	+0.35
General Government:				
Commonwealth	+6931	+8487	+1556	+0.93
State and Local	+839	+587	-252	-0.15
Households	-5257	+681	+5956	+3.56
Rest of World	+9397	+7608	-1789	-1.07

¹¹ The above discussion of the flow of funds accounts and Table 2 are reproduced from ABS Catalogue No. 5232.0, released on 10 July, 1990.

¹² The quality of these data is also challenged by examination of the extended capital account for households presented in the ANA. This extended table divides household net lending into eight subgroups. One component of net lending derived from this table, titled *other net lending* (including the statistical discrepancy), is a catch-all for components not allocated to the other sub-groups. This catch-all component decreases from \$77m in 1976-77 to -\$23520m in 1988-89 (see Table 46, ABS Catalogue No. 5204.0, containing estimates up to 1988-89, released on 10 May, 1990). With *other net lending* making up nearly 70 per cent of gross household saving in 1988-89, it is difficult to see what factors contribute to the growth in this component.

(b) Adjustments to data

Eisner (1988) has examined a range of adjustments that can be made to standard national accounting aggregates. Edey and Britten-Jones (1990) examine the robustness of ANA saving figures to alternative methods of calculating depreciation and to alternative treatment of consumer durables. They argue that the decline during the 1980s in net private saving rates presented in Figure 1 is extremely sensitive to assumptions about the rate of capital depreciation. To avoid this problem, they advocate a focus on gross rather than net saving rates. They also obtain an alternative measure of household saving by excluding expenditure on durables from consumption, and adding back an imputed service flow from the stock of durables outstanding. The main effect of this adjustment is to change the timing rather than the level of adjustment, so that the adjustment does not have an important quantitative effect on the general trends.

As noted above, ANA aggregates take no account of capital gains and losses. One particular form of capital gain/loss is associated with distortions introduced by inflation:

Inflation decreases the real value of nominally denominated assets and liabilities, resulting in a transfer of purchasing power from creditors to debtors. In the Australian context, corporate trading enterprises, financial enterprises and general government have made holding gains over the last decade, while households have made holding losses. No adjustments to income or saving are made in the national accounts for such inflation-induced gains or losses (Australian Bureau of Statistics, 1990, p. 10).

Papers by Anstie, Gray and Pagan (1983), EPAC (1988) and Edey and Britten-Jones (1990) have examined the implications of inflation-adjusted private sector saving aggregates. Figure 4 compares inflation-adjusted estimates of gross private saving as a proportion of GDP and the household saving ratio.¹³ The data in Figure 4 are directly comparable with inflation-unadjusted figures presented in Figure 2. Over the past decade, the household sector has generally been a net creditor. Accordingly, inflation-adjustment leads to a significant downward reduction in the household saving ratio. With the public sector a net debtor, gross private saving is also reduced. In particular, the noticeable peak in the household saving ratio around the time of the 1974-75 inflationary surge is eliminated by the adjustment.

¹³ Inflation-adjusted data for the household saving ratio were calculated by the Office of EPAC (EPAC, 1988, p. 5). Inflation-adjusted figures on gross private saving are taken from Edey and Britten-Jones (1990).

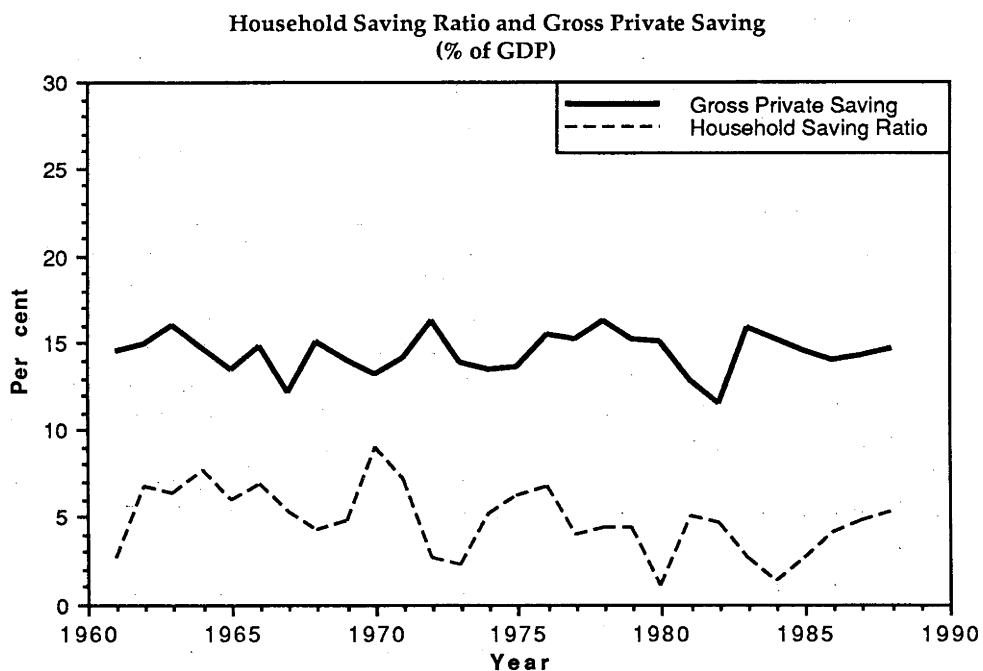
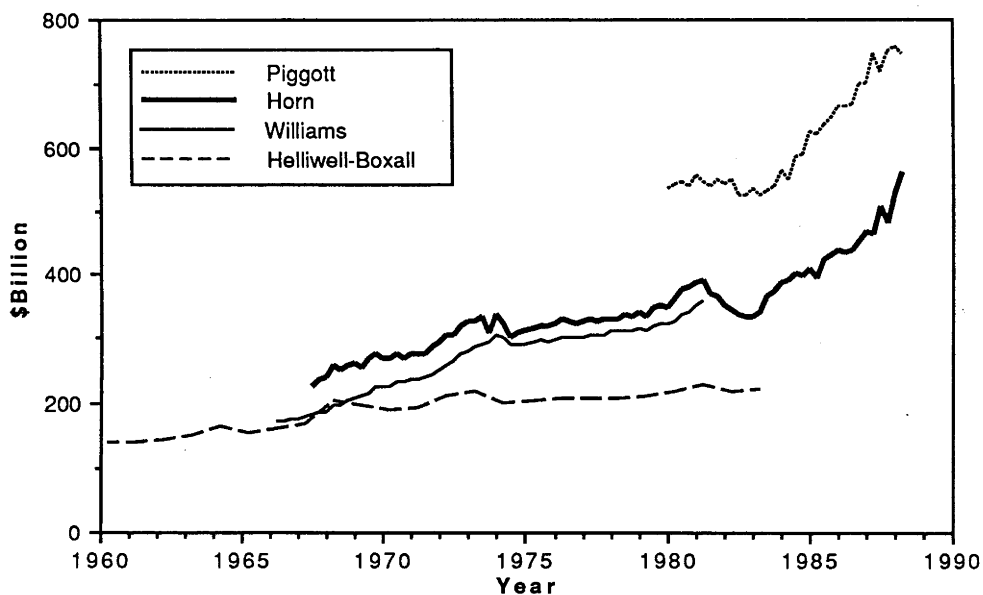


Figure 4: Private Saving (Adjusted for Inflation)



**Figure 5: Alternative Wealth Series
(June 1981 Prices)**

2.2 *Wealth series*

Measures of the stock of savings (wealth) are not published by the Australian Statistician but suitable estimates have been compiled for specific purposes. The most well known wealth series are those compiled by Helliwell and Boxall (1978), Williams (1983), Piggott (1987) and Horn (1987). All four series are derived using inventory approaches which rely on independent information about the total holdings of particular assets. All series incorporate capital gains/losses. The series provide estimates of net wealth of the private sector. In particular, the series exclude human wealth, the present value of state-provided benefits (such as government schools, state pension rights) and the present value of unfunded public sector occupational superannuation.

Figure 5 plots the four wealth series, updated when available, and deflated by a CPI index so that all series are expressed in June 1981 prices.¹⁴ There are differences between the level and movement of the alternative series. For example, the Helliwell-Boxall series, presented in the chart, excludes the value of land, while the other series use different methods of land valuation. As a consequence of this difference in specification, the Helliwell-Boxall series shows less volatility than other wealth-based series.

Piggott (1987) provides a critical assessment of the differences between his series and those of Helliwell-Boxall and Williams. He attributes most of the discrepancies between the series to differences in coverage and to alternative methods of valuing land and rural wealth. He also points to different treatments of the non-official domestic holdings of local authority and semi-government bonds. Differences in these treatments also explain the discrepancies between the Horn series and other series.¹⁵

The discrepancy in the levels of the three series which include land valuations has been attributed to coverage differences. However, the strong correlation in the movements is gratifying, particularly for the analysis in the next sub-section which uses the annual change in wealth as a measure of private saving.

2.3 *Comparison of alternative saving measures*

In every-day usage, the label 'saving' is frequently used to denote the increase in private wealth. In this context, the correlation between movements in wealth series, observed above, assumes increased significance.

Figure 6 plots (flow of) saving measures derived from the various wealth series, and compares these measures with the ANA concept, net private saving. An immediate observation from the comparison of the alternative saving measures is the marked volatility of the saving measure derived

¹⁴ The Helliwell-Boxall series was updated by the Reserve Bank of Australia and published in Reserve Bank of Australia (1984). The Piggott series has been updated by the Reserve Bank of Australia. The Horn series (measured at market value) has been updated by the Australian Treasury. All four series have been deflated by the CPI adjusted for medicare and exclude mortgage interest charges.

¹⁵ I am grateful to John Piggott and Peter Horn for helpful discussions on these points.

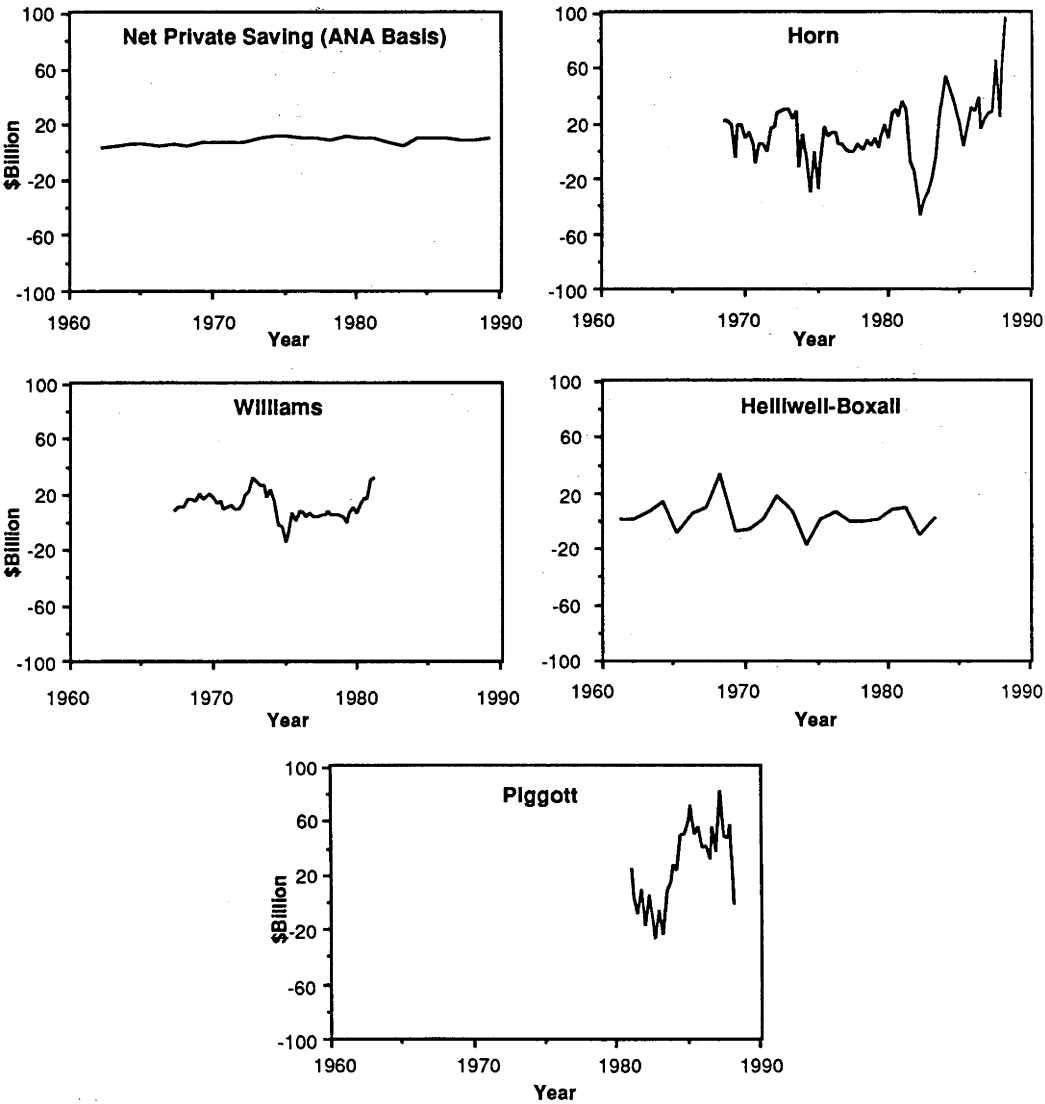


Figure 6: Comparison of Alternative Saving Series
(June 1981 prices)

from wealth series compared with the stability of the ANA aggregate. In particular, private net saving from the national accounts is always positive, whereas the other saving measures can be negative for sustained periods.

The principal reason for the observed volatility in the wealth-based saving measures is no doubt the fact that capital gains/losses are incorporated in the wealth series. Contrast this with the stability of the ANA measure which abstracts from capital gains/losses. A consequence of the above would be that an ANA measure of wealth derived by summing ANA net private saving figures would have movements significantly different from the wealth figures presented in Figure 5.

2.4 Using the saving measures

It is evident, from data presented above, that different saving measures have significantly different properties. This observation invites the question: what is the appropriate saving concept to employ? The answer to that question will change depending on how the saving concept is being used.

An appropriate measure of the stock of private savings (wealth) will be the basis for a range of decisions by the household sector. There is continuing debate as to whether bonds and unfunded social security entitlements should be incorporated as components of a wealth variable in a neoclassical consumption function (Barro 1989; Bernheim 1989). Also, Hayashi (1989) has argued that, in estimating consumption functions, land value should not be incorporated as a component of wealth. Nevertheless, there is general agreement that some suitably defined measure of wealth should be derived as an argument in the consumption function of an optimising consumer and also in the demand for money function.

While private sector behavioural decisions will be based on the stock of private savings (wealth), private sector saving outcomes can be described using a range of series. Saving outcomes for the private sector can be described using the ANA measure of gross private saving. Some commentators choose to describe the saving behaviour of the household sector by reference to the household saving ratio (Williams, 1979; Anstie, Gray and Pagan, 1983). If households managed to see through the corporate veil, so that corporate retained earnings were perceived as accruing to agents in the household sector as the ultimate owners of corporate trading enterprises, then household saving outcomes would best be described using the ANA measure of gross private saving.

The principal reason for concern about saving levels may arise from demographic profiles that indicate an ageing population. A measure of saving that incorporates capital gains/losses will be the appropriate basis on which to assess funds available for private agents to finance their retirement. In this case, saving derived by taking annual changes in an appropriate measure of net private sector wealth would be most suitable. However, such data are not generally available, and for many purposes users may have to resort to ANA measures.

All accumulation of capital owned by a nation must be financed from saving made up of national income that has not been consumed.¹⁶ ANA measures of net saving are appropriate in the context of determining whether domestic saving is sufficient to finance a desired level of capital accumulation.

Since the second half of the 1980s, economic concerns have been dominated by the level of net foreign debt and net foreign liabilities.¹⁷ This leads in turn to concern about recent high current account deficits. The current account balance is closely approximated by the ANA figures on net lending to overseas. In turn net lending to overseas is equal to the difference between national saving and national investment. Hence, if the level of national investment is at or below a desirable level, concern about the current account deficit can be translated into concern about the level of national saving.

What is the appropriate saving concept to use in this context? In particular, should the saving concept incorporate capital gains/losses? The current account deficit (CAD) can be defined as follows:

$$\text{CAD} = (I_P - S_P) + (I_G - S_G) \quad (1)$$

where I_P , S_P denote, respectively, net private investment and net private saving and I_G , S_G , denote net public investment and net public saving. By aggregating private and public net investment and saving to yield national aggregates denoted by I_N , S_N , it is possible to rewrite the above identity as:

$$\text{CAD} = I_N - S_N \quad (2)$$

so that the current account deficit is defined as the difference between net national investment and net national saving. The same measure of consumption of fixed capital is added to both sectoral net saving and sectoral net investment to yield sectoral gross saving and sectoral gross investment. Thus, in analysing implications of saving for the current account deficit, it is possible to use either gross or net concepts of saving provided the same gross or net concept is used to define investment.

More importantly, the saving and investment concepts should abstract from capital gains/losses.¹⁸ Hence, when analysing how saving outcomes should change to influence the current account balance, ANA saving concepts should be employed.

The above discussion is summarised in Table 3 which gives the most appropriate saving concepts for use in specific circumstances.

The public at large would generally associate the label 'saving' with the change in their net wealth position. Thus their concept of saving would be

¹⁶ A net creditor can finance capital accumulation through an inflow of interest payments from overseas. A country with an immigrant inflow can finance the current account from migrants' transfers of their wealth.

¹⁷ Throughout the paper, the term 'net foreign liabilities' refers to net foreign debt plus net liabilities from equity investment plus net other investment liabilities.

¹⁸ This proposition was demonstrated formally in an Appendix to the paper presented at the Conference.

Table 3: Saving Concepts Appropriate to Different Contexts

CONTEXT	SAVING CONCEPT			
	Wealth Based Series	ANA Concepts		
		Gross	Net	(Net) Household Saving Ratio
Private Sector Behaviour: - determination - description	X	Private		X
Retirement Provision	X			
Capital Accumulation (owned domestically)			X	
Current Account Imbalances		X	X	

based on changes in a measure of wealth that incorporates capital gains/losses. Significantly, this is not the appropriate concept for consideration in some important policy questions. For example, in questions directed at defining whether saving is sufficient to achieve a desired capital stock, a measure of saving derived from the ANA is appropriate. An ANA saving concept should also be employed in discussion as to whether the level of saving is sufficiently high in light of recent current account deficits. In this context, measurement of saving derived from wealth-based data would be totally inappropriate. Even if other concepts are more appropriate, ANA data are frequently the only figures available in a timely fashion, with a suitable level of disaggregation and with sufficient regularity.

3. Saving, Growth and Recent Policy Initiatives

Various concepts of saving were discussed above. In this section, the interaction between saving and growth is examined. Two measures of growth that may be important from the viewpoint of agents in the economy are the growth in output and the growth in domestic consumption. Both these measures may be used as an approximation for the more nebulous concept: growth in welfare. The level of saving will have an impact on the long-run levels of output and growth. However, the nature of the saving impact depends on the structure of the national economy and, in particular, the extent to which the economy is closed or open to trade with the rest of the world.

3.1 Saving and growth

In a closed economy, the level of national saving has a one-for-one relationship with the level of national investment and, hence, capital accumulation. In an open economy, national investment may be determined independently of national saving, but at any point in time the difference between national investment and national saving defines the current account deficit. Over time, the accumulation of current account deficits plus capital losses on overseas borrowings determines the nation's net foreign liabilities position. In turn, a nation's foreign liabilities have to be financed by foregoing current or future consumption. Foreign liabilities that are sustained indefinitely will eventually have to be serviced by the reduction in domestic consumption.

(a) The closed economy

Consider a simple model with two periods, today and tomorrow, represented in Figure 7. The model assumes a given level of employment for each consumer in the two periods and a given endowment of capital at the beginning of the first period. In this model, consumers can choose to consume less today (save) so that they can consume more tomorrow. Given diminishing marginal utility, the relationship between saving today and the real interest rate is positively sloped, yielding the S-S' schedule. Today's investment less today's capital depreciation determines tomorrow's level of the capital stock. In turn, tomorrow's level of capital, an input to the production process, plays a major role in determining tomorrow's output. Thus, firms can increase tomorrow's production possibilities by investing now and increasing the level of the capital stock tomorrow. Diminishing marginal returns on capital ensure that the demand for investment goods is negatively related to the real interest rate. The demand for investment goods today is represented by the ID-ID' schedule which has the same slope as the marginal product of capital schedule. Given a demand for investment goods and a supply of saving, the interest rate will adjust so that saving and investment are equal at each instant of time.

The implication of saving behaviour for capital accumulation can also be examined in more sophisticated models of a closed economy. In growth model frameworks, the long-run level of output can be maximised by choosing a suitable long-run level for the capital stock. In such a framework, the long-run level of the capital stock is said to satisfy the *golden rule* of capital accumulation.¹⁹ In simple models, the long-run level of the capital stock may not maximise long-run output so that the capital stock will differ from the level derived under the golden rule. The long-run capital stock may not satisfy the golden rule if individuals in the economy have a positive rate of time preference and choose saving so as to maximise the present discounted value of their future consumption. The existence of

¹⁹ In suitable growth models, the golden rule of capital accumulation can take very simple forms. For example, in simple models like those of Solow (1956) and Swan (1956) with a production function, $F(K)$, and rate of population growth, n , the golden rule requires that the long-run capital stock, K^* , satisfies $F'(K^*) = n$.

unfunded public social security schemes can also lead to violations of the golden rule. The economy can even have the long-run property that more capital is accumulated than would be the case under the golden rule. Then the economy is said to be *dynamically inefficient* and has the property that everyone can be made better off (a pareto improvement) by reducing the level of the long-run capital stock (Blanchard and Fischer, 1989, pp. 103-104).

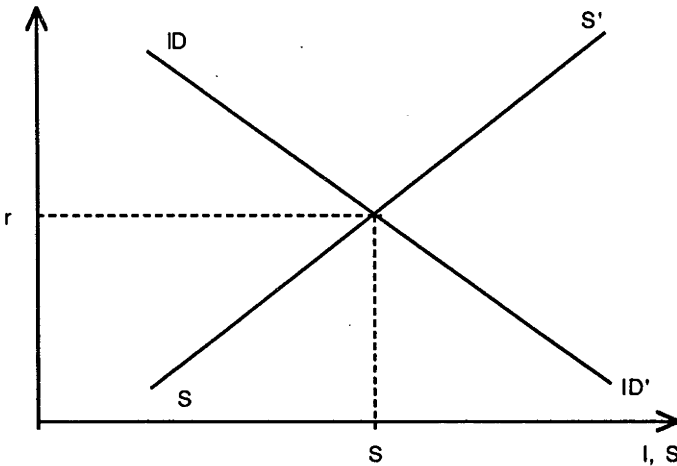


Figure 7: Saving and Investment in a Closed Economy

Saving essentially involves a choice between present and future consumption. It is not surprising, therefore, that these simple growth models show that the optimising consumer will adopt a saving profile that depends on her rate of time preference, expected population growth and technological progress, as well as the extent to which future generations' welfare is incorporated in her optimisation decision.

(b) *The open economy*

A model of a small open economy can be derived from the simple two-period closed economy model presented earlier. Assume there are no restrictions on foreign exchange transactions and extend the closed economy model by allowing agents to borrow and lend to an overseas sector. Assume also that all borrowers/lenders face a fixed world interest rate, r^* , and a fixed real exchange rate. The market for investment goods is then described in Figure 8.

Figure 8 describes a situation where there is a short-fall of domestic saving that must be made up by borrowing from overseas. In this framework, domestic saving is given by OA, while domestic investment is given by OB. The short-fall in domestic saving, AB, must be made up by borrowing from abroad. The aggregate level of output is OBCF, the same as it would have been irrespective of the level of overseas borrowing. But agents in the domestic economy will have to return ABCD overseas in the

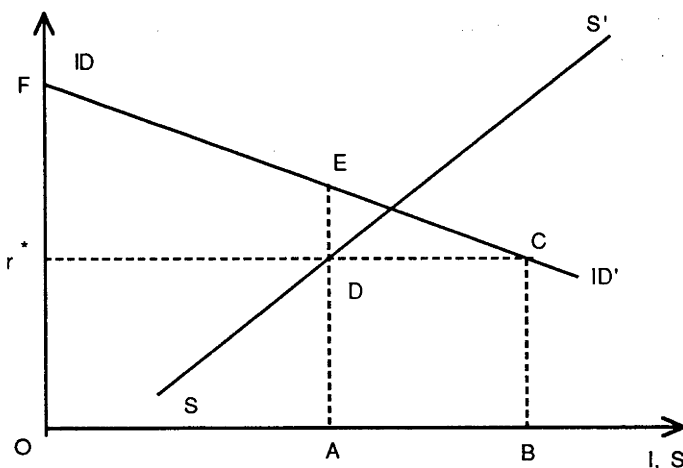


Figure 8: Saving, Investment and Current Account Imbalances in an Open Economy

form of interest payments, leaving a national income accruing to domestic agents of $OA EF + CDE$. Payments required to service the debt tomorrow will also reduce tomorrow's consumption possibilities.

In more general growth model frameworks, domestic agents face a trade-off between saving more now or having to service greater foreign liabilities in the future. As in the closed economy model, this reverts to a choice between current and future consumption. In simple open economy growth models, this choice is facilitated by expending resources to service the foreign liabilities rather than through a change in the long-run capital stock.

In more sophisticated open economy models, net foreign debt can also raise the interest rate facing domestic borrowers, lead to a depreciation of the real exchange rate, reduce the long-run level of the capital stock and lead to a reduction in real domestic production. Once again, the optimising consumer's choice of a saving path will be sensitive to a range of factors including her rate of time preference and the extent to which future generations' welfare is incorporated in her optimisation decision.

An open economy with strong regulation of the financial and foreign exchange markets may operate in a similar fashion to the model of the closed economy presented earlier. Significant current account imbalances will not arise because of financial restrictions. However, with deregulation of the financial markets, such an economy may be more appropriately represented by the open economy model. Current account imbalances are then likely to become a much more common occurrence. Without subsequent adjustments through the exchange rate and the current account deficit, a given current level of net foreign liabilities will require that interest payments to service these liabilities must be paid in perpetuity. For a given level of net exports, such interest payments will increase the current account deficit in all subsequent periods. Therefore, the stock of net foreign

liabilities has a *hysteresis* effect on the current account deficit. In reducing national income by the amount of interest repayments, foreign liabilities also have a hysteresis effect on future consumption possibilities. Higher foreign liabilities now inevitably mean lower welfare outcomes for future generations.

The above analysis shows that the long-run level of consumption in a small open economy, with no foreign exchange restrictions, will primarily be driven by the long-run level of net foreign liabilities. In practice the increment to these liabilities over any time period will depend on the size of the current account deficit plus capital losses derived from movements in the real exchange rate. If a view is adopted that there is little that can be done in the domestic economy to change the long-run path of the real exchange rate²⁰, then any attempt to reduce the level of foreign liabilities must be restricted to reductions in the level of the current account deficit.

3.2 Saving, investment and net lending

The Australian Government instituted significant financial sector reforms during the course of the 1980s.²¹ The theoretical analysis above suggests that financial deregulation may lead to greater imbalances in the current account. Australia's present high current account imbalance began in the early 1980s. As well as coinciding with the impact of financial de-regulation, this imbalance initially occurred at the same time as a surge in private investment in energy and resource-related projects in the early 1980s. Subsequent high current account deficits were coincident with large fiscal deficits, changes in competitiveness and more recently with strong growth in aggregate demand. The current account deficit during the 1980s has been at high levels for a sustained period. In turn, high current account deficits combined with a concurrent substantial shift from equity to borrowings as the mode of investment have been associated with a rapid rise in net foreign debt.²²

Recent discussion of Australian economic policy has been driven by concern with this growth in net foreign debt. During the second half of the 1980s many commentators argued that high current account deficits were undesirable and that the Government should intervene to achieve external balance. Subsequently a debate has ensued between those who support intervention to reduce the current account deficit and those who argue that current account imbalances are just the consequence of optimal choice by market participants. Those issues have been argued elsewhere and it is not

²⁰ This view is supported by Alesina, Gruen and Jones (1990) who argue that there is evidence of a potential market failure in the foreign exchange market.

²¹ The financial reforms most likely to influence capital flows were: the removal of official restriction on almost all bank interest rates and on bank lending (December 1980; August 1984; April 1985; April 1986); the floating of the Australian dollar and the removal of most exchange controls (December 1983); the entry of new banks and other financial intermediaries (from early 1985).

²² At 31 December 1989, the ratio of Australia's net foreign debt to GDP was 32.9 per cent. The ratio of net liabilities from equity investment to GDP was 12.1 per cent. The ratio of net foreign liabilities to GDP was 45.0 per cent (ABS Catalogue No. 5306.0).

the intention to cover them again in this paper.²³ However, the relationship between sectoral saving and the national net borrowing position is examined below.

Figure 9 plots measures of gross saving and gross investment for different sectors in the economy. Over the course of the 1980s, there has been marked volatility in gross investment by the household and private corporate sectors. Rises in gross private corporate saving have been offset by a decline in gross household sector saving. As observed earlier, overall the net change of private gross saving over the course of the 1980s has not been great. Up until recently, the household sector had been a net lender to other sectors: gross household saving exceeded gross household investment. ANA figures suggest that the household sector was a net borrower in 1988-89 as a result of a strong surge in household sector investment.

Public sector behaviour can be expected to be less influenced by financial deregulation. For nearly the entire period since the early 1970s, the public sector has been a net borrower. Strong saving performance since 1983-84 has meant that the public sector became a net lender in 1988-89.²⁴ The private corporate and financial sectors are net borrowers. The short-fall in flow of funds available in the domestic economy has been made up by a strong inflow of funds from overseas, manifest in a large current account deficit.

Success in reducing the current account imbalance can only be achieved by increasing aggregate national saving or reducing aggregate national investment. In particular, if the government decides to intervene to increase saving in a certain sector, care must be taken to ensure that such intervention does not lead to reductions in saving of other sectors. For example, it is not sufficient to provide tax concessions which increase saving in the private sector, if resultant reductions in taxation revenue lead to a more than offsetting reduction in public sector saving. Various policy responses adopted by the Government are discussed below.

3.3 *The policy response*

The perception that there is a problem with the current account deficit has persisted since the mid-1980s. On May 16, 1986, the Treasurer, Mr Keating, made his famous statement asserting that Australia would become a 'banana republic' if appropriate policy responses were not adopted. By now, the Government's longer term macroeconomic response has become firmly established. This response has involved considerable reduction in the fiscal deficit as well as the comprehensive revision of retirement incomes

²³ The two extreme positions in the debate are summarised by EPAC (1989) and Pitchford (1990). Other contributions to the debate have been made by Alesina, Gruen and Jones (1990), Forsyth (1990), Kingston (1990), Lewis and Polasek (1990) and Wells (1989).

²⁴ Inclusion of public financial enterprises in the public sector leaves the aggregate public sector with close to zero net borrowing in 1988-89.

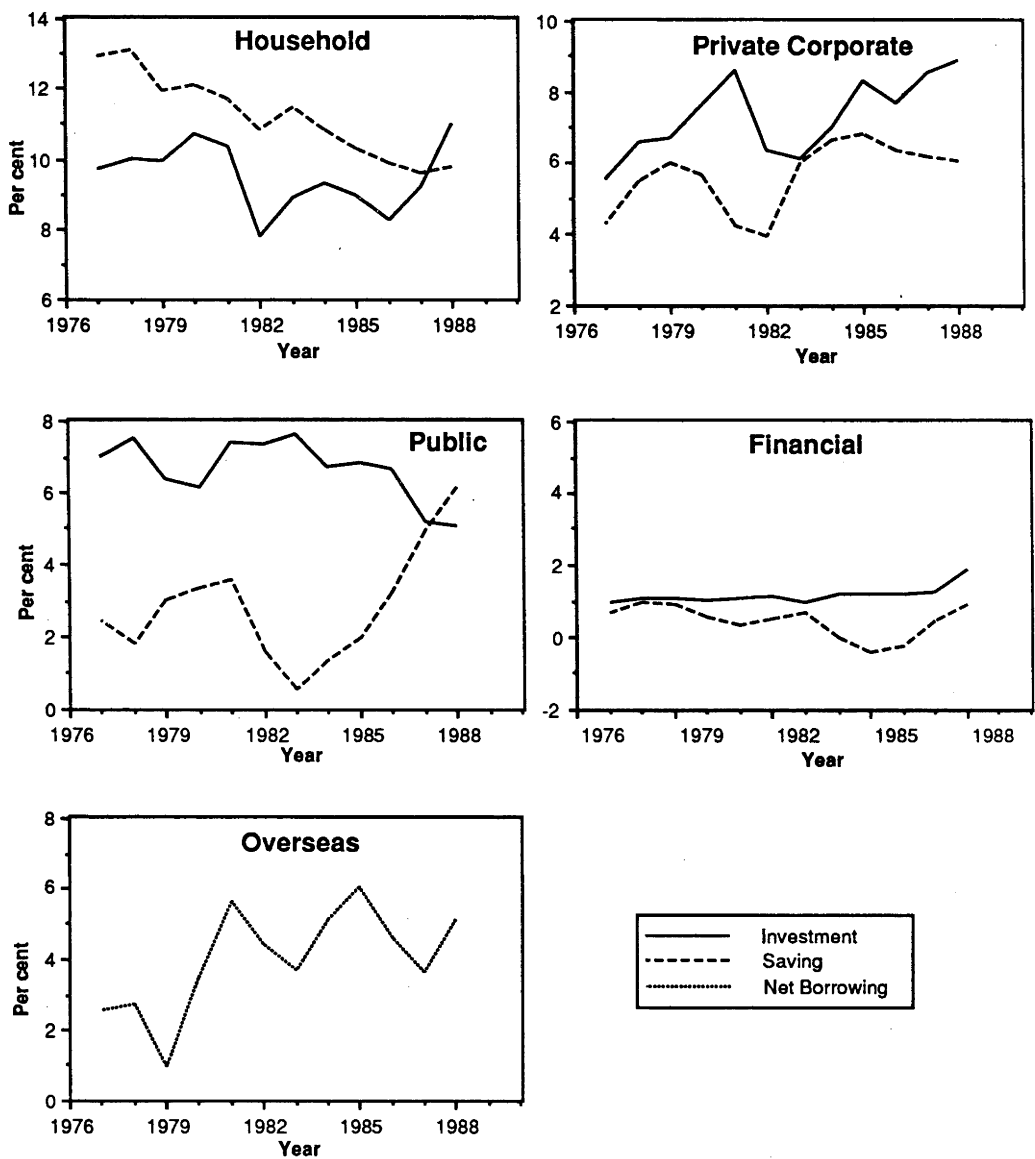


Figure 9: Gross Saving and Investment By Sector
(% of GDP)

policy.²⁵ As a short-term measure, tight monetary policy has also been employed in an attempt to reduce aggregate demand and the current account deficit in an overheated economy.

(a) *Reductions in net public sector borrowing*

Reductions in net public sector borrowing have been emphasized as a means designed to reduce the current account deficit. Such reductions will only be successful in reducing current account imbalances to the extent that the favourable effects are not offset by changed behaviour in the private sector. There is strong evidence that, over the longer term, reductions in net public sector borrowing will be reflected in an improved current account position.²⁶

The size of the fiscal deficit has been progressively reduced over the second half of the 1980s. This is clearly demonstrated in Figure 10 which shows that the net borrowing requirement of the public sector (unadjusted for inflation) has declined since 1983-84. The same is true of the inflation-adjusted public sector borrowing requirement. It is, however, instructive to examine the gross saving and gross investment components to observe how this reduction has been achieved.

Public sector saving (both inflation adjusted and unadjusted) reached a trough in 1983-84 and has increased significantly since that time. However, neither aggregate has reached levels achieved from 1960 to the early 1970s. Clearly, if increases in gross public saving are to reduce the current account deficit, it is important to ensure that these increases are not offset by compensating increases in gross public investment. Figure 10 shows that public sector gross investment has followed a steady decline since the beginning of the 1960s.²⁷

There can be problems in comparing public sector net borrowing figures at different points in time. In a powerful challenge to the traditional interpretation of the size of public saving/dissaving, Kotlikoff (1986) argues that 'the deficit is an inherently arbitrary accounting construct that provides

25 Microeconomic reform has also been seen as another avenue by which competitiveness could be improved and the current account deficit reduced. So far, there is little evidence of success from this quarter. Forsyth (1990) argues that such an approach is 'doomed to fail'. Effects on saving/investment imbalances aside, there are sound reasons why the efficiency gains to be derived from microeconomic reform should be pursued in their own right.

26 Results from the recent Centre for Economic Policy Research Conference Fiscal Policy and the Current Account, provide support for a position where changes in the public sector borrowing requirement are only partially offset by private net borrowing (Pagan, 1990).

27 Alesina, Gruen and Jones (1990) give a political interpretation to this outcome, asserting that a 'disproportionate part of the fiscal consolidation was achieved by cutting public investment spending'. They argue that it can be 'politically more costly to cut government consumption than to cut government investment'. This will be the case 'because the effects of the the first type of cuts [will be] perceived by the voters (in terms of reduced transfers and reduced public services), whilst the second type of cuts have negative consequences which [will not be] perceived directly for a relatively long time'.

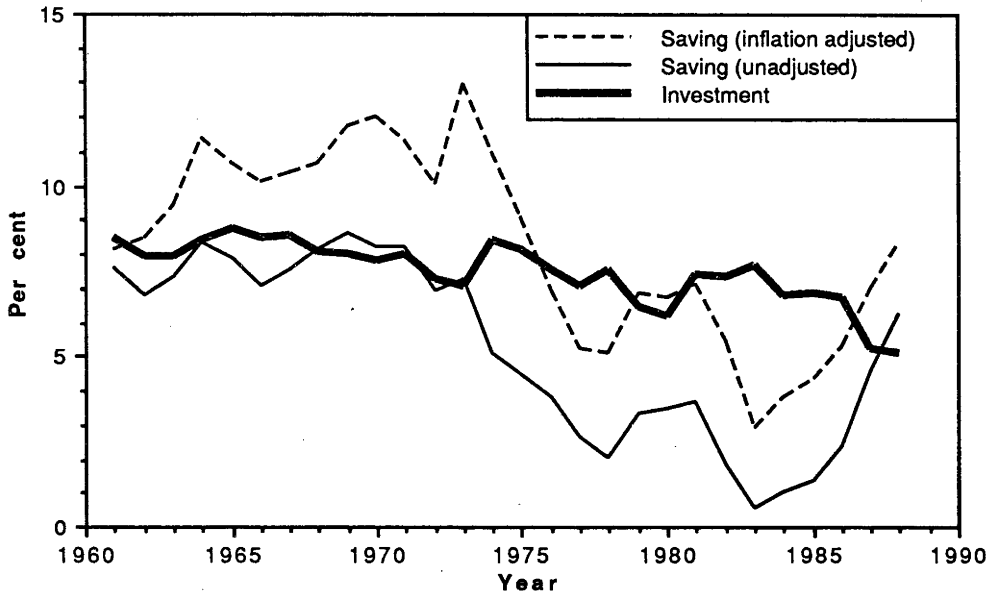


Figure 10: Gross Public Saving and Investment
(% of GDP)

no real guide to fiscal policy'. He argues that the choice of labelling specific receipts as 'taxes', 'borrowing', 'receipts from sale of assets', 'receipts from printing money', or 'interest received' is entirely arbitrary. Similarly, the labelling of specific government payments as 'consumption', 'purchase of assets', 'transfer payments', and 'interest and principal payments' is also arbitrary. In particular, by changing labels, it is possible to change the fiscal deficit without having any real effect on the economy. Clearly, the change of labels will have *spill-over* effects onto estimates of private saving/investment imbalances and onto the estimate of the current account deficit. Two clear cases where labelling can be important are in the sale of government assets and in changes of timing of superannuation taxation.

Sales of government assets will reduce public gross investment, which is defined as purchases less sales of capital investment goods, thereby improving the public sector net borrowing position. Since the ANA defines all investment as undertaken by domestic entities, this improvement in net public sector borrowing will be offset by a compensating increase in private gross investment and hence private net borrowing. While the sale of government assets may be justified on efficiency grounds, it will have no effect on the nation's net borrowing position.

Under arrangements foreshadowed in the Economic Statement of May, 1988, there was to be a shift in the timing of the taxation of employer contributions for superannuation.²⁸ Previously, tax was paid by employees on receipt of monies from the fund. Under the new system, part of the tax

²⁸ This change of timing also applied to deductible employee/self-employed contributions.

was to be paid by the fund itself as contributions were made by employers. The change in timing of taxation on superannuation funds would have favourably improved the public gross saving position without having any real effect on aggregate saving. The change allowed the bringing forward of nearly \$1 billion in tax money, making up 0.3 per cent of GDP. While this increased public sector saving, private sector saving was reduced by the same amount, thus having zero net effect on aggregate saving.

The danger with these two changes in the size of the net public sector borrowing requirement is that the Government may be tempted to spend the money it has 'saved'. Such appears to have been the case with the change in timing of superannuation taxation. The Treasurer even asserted in the 1988 Budget Speech that '[t]his money [would] contribute towards the personal tax cuts [to be made in the] next year'.

Clearly, public sector saving and investment outcomes have been somewhat masked by the sale of assets and tax-timing changes which tend to reduce the recorded net borrowing position of the public sector while increasing the net borrowing of the private sector. Furthermore, while public sector saving has increased since 1983-84, public sector saving still has to increase further, in inflation-adjusted and unadjusted terms, to attain the averages of the 1960s and 1970s.

(b) Saving for retirement

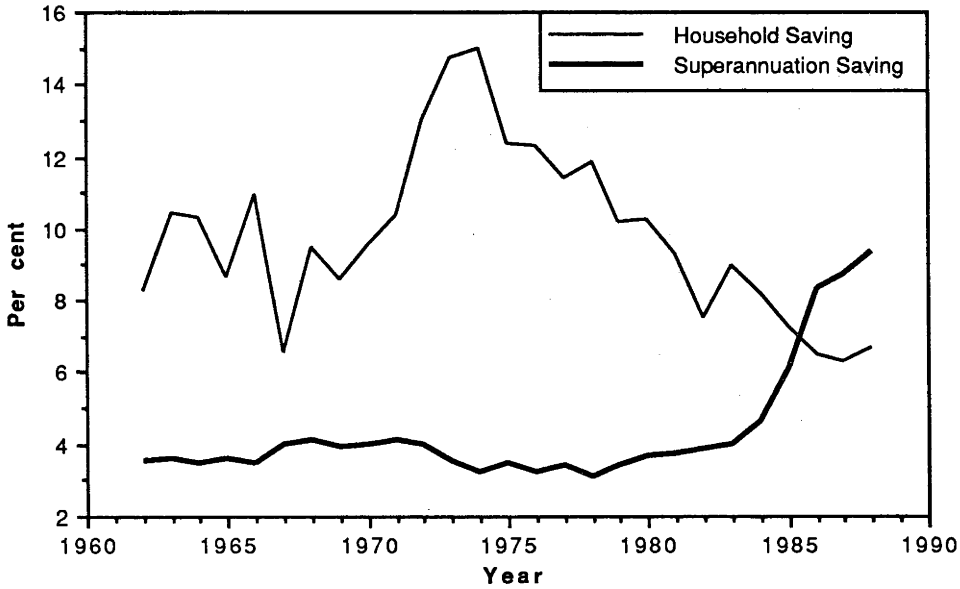
Theoretical and empirical analyses of superannuation and pension schemes and associated taxation treatments show that the structure of these schemes can affect aggregate saving levels (Stemp, 1988). Since 1983, the Hawke Government has introduced significant legislative changes (summarised by Bateman, Frisch, Kingston and Piggott, 1990) to provide greater incentive for retirement saving.

Figure 11 uses relevant ratios to assess the contribution of superannuation saving to household saving and private sector saving.²⁹ Note that household saving and gross private saving include all superannuation saving. In particular, the data show that non-superannuation saving by the household sector has been negative in recent years. Since the introduction of Approved Deposit Funds, improved provision for vesting, preservation and portability³⁰, and the 3 per cent wage/productivity trade-off negotiated under the Prices and Incomes Accord, ANA data show that the contribution of superannuation saving to household saving has increased by a factor of three. Also, superannuation

29 Superannuation saving is defined as 'saving through life insurance and superannuation funds' (ABS Catalogue No. 5204.0, Table No. 46). This concept is also referred to as 'net equity of households on life insurance reserves and superannuation funds' (ABS Catalogue No. 5204.0, Table No. 44).

30 Vesting refers to an individual's entitlement to a superannuation benefit upon leaving a scheme whether before or at retirement. Portability refers to the ability to transfer superannuation benefits on changing employment. Preservation refers to the retention of superannuation benefits either within a superannuation scheme or other approved investment until a specified age or on the occurrence of certain events, such as permanent retirement, death or permanent disability.

**Household Saving Ratio and Superannuation Saving Ratio
(% of Household Disposable Income)**



**Gross Private Saving and Superannuation Saving
(% of GDP)**

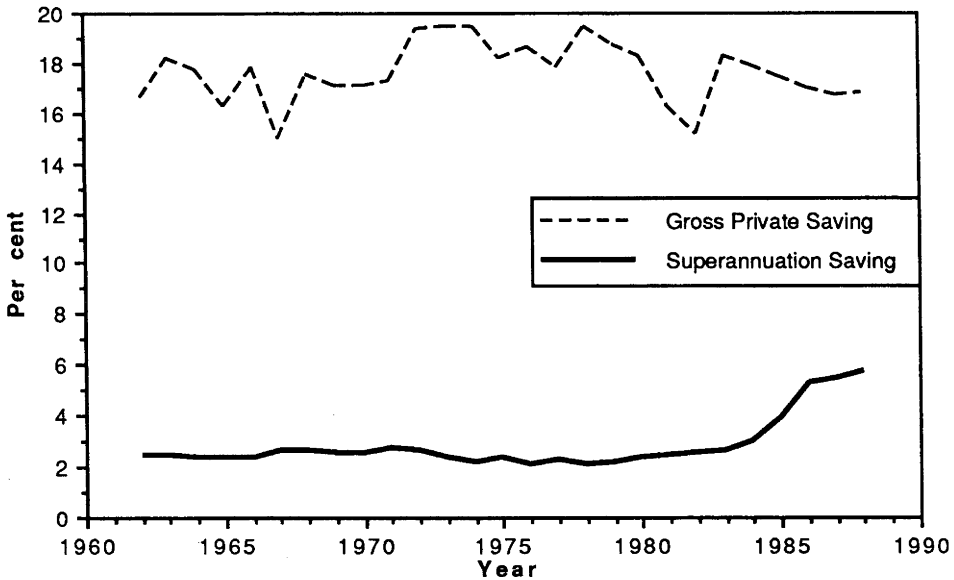


Figure 11: Comparison of Superannuation Saving With Other Measures of Private Saving

net premiums and claims have both increased substantially since 1983-84 with the difference between net premiums and claims widening over the same period. Information derived from the 1984 and 1988-89 Household Expenditure Surveys indicate that this phenomenon is not the result of increased contributions by employees.³¹ While some of the reforded increase in superannuation saving is no doubt the consequence of the 3 per cent wage/productivity tradeoff, it is important to determine whether all of the increase is due to a substitution between superannuation saving and other forms of saving. Only if superannuation saving is a less than perfect substitute for other forms of saving will the recent Government policy initiatives result in increased aggregate saving.

The following scenario may well describe changed behaviour patterns: prior to 1983, a typical individual on leaving her place of employment would withdraw her contributions from the superannuation scheme and deposit these in a bank account, thus increasing non-superannuation household saving. Over subsequent periods, former superannuation entitlements would be withdrawn from the bank account to finance current consumption expenditure, but the amount in bank accounts would, on average, remain higher than if the individual had not received the superannuation payout. Following recent changes to superannuation arrangements, the retiring employee's contribution would remain with the superannuation scheme. As a consequence, aggregate bank deposits would be less than they would have been prior to 1983 but would be more than offset by contributions remaining with superannuation funds.

However, there is another interpretation. Section 2 questions the quality of data on gross saving and net lending by sub-sectors of the private sector. In particular, superannuation saving is a component of household net lending. The highlighted inconsistencies in household net lending and gross household saving figures must cast some considerable doubt on the quality of available ANA data for superannuation saving. Certainly, revisions to recent figures on household saving and superannuation saving may be substantial.

Available data does not have sufficient reliability to indicate whether or not aggregate household saving will eventually increase as a consequence of changes to retirement provision. Thus, it is not possible to confirm at this stage whether or not Government initiatives to increase aggregate saving through changes in retirement policy have been successful.³² However, even allowing for questions of data quality, the ANA data provide a very strong indication that deposits with superannuation funds will remain substantially above pre-1983 levels.

31 Household Expenditure Survey Data for the two surveys are contained in ABS catalogue No. 6530.0.

32 Indeed, since retirement saving is a life-cycle phenomenon, the full effects of changes to retirement policy may take many years to come into play.

(c) Tight monetary policy

Gross saving and investment figures for the household and private corporate sectors (Figure 9) highlight the strong growth in gross private investment since 1986-87. This has offset recent substantial reductions in the public sector borrowing requirement. As a consequence there has been a breakdown in the twin-deficits relationship and an increase on the net overseas borrowing requirement to 5 per cent of GDP in 1988-89.

The Government's response has been to use tight monetary policy to reduce aggregate demand. While there can be no doubt that such a policy will eventually be effective, it is less clear what the outcome for the current account deficit will be. Tight money will raise domestic interest rates. In turn, this will tend to encourage increased capital inflows and increase the exchange rate thus making imports cheaper and exports more expensive. From a theoretical perspective, it is not clear whether increased capital inflow or reduced aggregate demand will dominate the effect on the current account imbalance; this leaves as indeterminate the ultimate impact on overseas net borrowing and the current account imbalance.

Significantly, too, the consequences of tight money may disappear very rapidly once a looser monetary stance is adopted. A tight monetary policy stance may reduce the current account deficit in the short-run, without removing the root causes that underly present saving/investment imbalances. Then, high current account deficits are likely to return once a less contractionary policy stance has been adopted.

If econometric estimates indicated that tight money would yield an unambiguous improvement in the current account imbalance, even if only temporary in its effects, then tight money may be justified as a suitable policy to reduce the current account deficit. Such a justification could be based on the hysteresis effects of overseas liabilities on future current account imbalances: once overseas liabilities have been incurred, the cost of servicing those liabilities will persist in all subsequent current account figures, lowering the welfare outcomes for future generations.

Because of uncertainties about its ultimate impact on the current account deficit, tight money should not be seen as a policy response designed to reduce saving/investment imbalances. Rather, it should be regarded as a demand management response designed to restore internal balance in an overheated economy.

4. Concluding Remarks

This paper has defined a range of alternative saving concepts showing how distinctions can be made between different forms of saving. Gross saving, net saving and household saving ratios have been discussed and the properties of the data analysed using a range of sectoral breakdowns. Wealth-based measures of saving which include capital gains/losses have been contrasted with ANA measures which have capital gains/losses removed. Different saving concepts have been shown to be appropriate in response to different policy questions. Saving may mean one thing to the

person in the street and something completely different for the policy debate.

In practice, considerations of timeliness and availability dictate that ANA based saving measures must be used to analyse many policy questions. With the accuracy and reliability of ANA data of particular concern, there is evidence that data on components of private sector saving are subject to frequent and substantial revisions. This can mean that tests of specific hypotheses about economic behaviour can be dominated by data revisions.

Simple theoretical models have been used to examine the relationship between saving and growth; in a closed economy, there is a trade-off between current consumption and the future level of the capital stock. In the simple open economy framework presented in this paper, the level of the capital stock is determined independently of saving behaviour. There is, however, a trade-off between current consumption and the future level of net foreign liabilities. Effectively, in both open and closed economies, there is a trade-off between current and future consumption. The saving path chosen by an optimising consumer will be sensitive to a range of factors, including a rate of time preference and the extent to which future generations' welfare is incorporated in the optimisation decision. In principle, because of the existence of economic distortions, it is even possible for agents in an economy to save too much.

International capital mobility means that the open economy paradigm is the best framework for analysing the Australian economy. In such a framework, current account imbalances may be an outcome of optimising behaviour by consumers. Australian data show sustained net overseas borrowing throughout the 1980s. This has been coincident with high public sector borrowing in the early 1980s and strong growth in aggregate demand toward the end of the decade. Government responses have involved reduction in the net public sector borrowing, the encouragement of retirement saving and, most recently, tight monetary policy.

Some policy changes have reduced public sector borrowing by increasing private sector borrowing. This has masked the level of true reductions in aggregate saving flowing from reduced public sector borrowing. The reduced public borrowing has been achieved by increasing gross public saving and reducing gross public investment, but public saving still must increase to attain the averages of the 1960s and 1970s. Questions of data quality obscure the consequences for aggregate saving of increased incentives for retirement saving though it is clear that deposits with superannuation funds have increased substantially. While tight money is more appropriate as an instrument for demand management, contractionary monetary policy is not well suited toward increasing aggregate saving or reducing the current account deficit.

There is little evidence that these responses have been particularly successful in removing the current account imbalance. However, one particular impact of the saving debate should not be discounted too easily. While policy responses have not reduced the current account deficit, each response has been directed to making the Australian economy more

competitive in the 1990s. If the Government had been determined to remove the current account deficit at any price it could easily have done so. Emphasis on the current account *problem* has allowed a political mandate for the removal of undesirable distortions. From the perspective of creating a more competitive economy, reducing public sector borrowing and encouraging private provision of retirement benefits are desirable outcomes in their own right. Contractionary monetary policy is the most suitable instrument for achieving reductions in excess aggregate demand. While recent moves toward microeconomic reform may not be effective in reducing the current account deficit, they will make the economy more efficient. These are all desirable outcomes, irrespective of their effect on the current account imbalance.

REFERENCES

- Alesina, Alberto, David W. R. Gruen and Matthew T. Jones (1990) 'Fiscal Adjustment, the Real Exchange Rate and Australia's External Balance', Discussion Paper No. 233, Centre for Economic Policy Research, Australian National University, May.
- Anstie, R.K., M.R. Gray and A.R. Pagan (1983) 'Inflation and the Consumption Ratio', in A.R. Pagan and P. K. Trivedi (eds), *The Effects of Inflation: Theoretical Issues and Australian Evidence*, Centre for Economic Policy Research, Australian National University, 321-349.
- Australian Bureau of Statistics (1990) *Australian National Accounts: Concepts, Sources and Methods*, ABS Catalogue No. 5216.0, Canberra, May.
- Barro, Robert J. (1989) 'The Ricardian Approach to Budget Deficits', *Journal of Economic Perspectives*, 3, Spring, 37-54.
- Bernheim, B. Douglas (1989) 'A Neoclassical Perspective on Budget Deficits', *Journal of Economic Perspectives*, 3, 55-72.
- Bateman, Hazel, Jack Frisch, Geoffrey Kingston, and John Piggott (1990) 'Demographics, Retirement Saving, and Policy: An Australian Perspective', Discussion Paper No. 241, Centre for Economic Policy Research, Australian National University.
- Blanchard, Olivier Jean and Stanley Fischer (1989) *Lectures on Macroeconomics*, MIT Press, Cambridge Massachusetts; London, England.
- Edey, Malcolm, and Mark Britten-Jones (1990) 'Saving and Investment in the 1980s', paper presented to the Conference, The Australian Macro-Economy in the 1980s, Reserve Bank of Australia, 20-21 June.
- Eisner, Robert (1988) 'Extended Accounts for National Income and Product', *Journal of Economic Literature*, 36, December, 1611-1684.
- Economic Planning Advisory Council (EPAC) (1988) *Trends in Private Saving*, Council Paper No. 36, Canberra: AGPS, December.
- EPAC (1989) *External Debt: Trends and Issues*, Discussion Paper 89/06, Canberra: AGPS, June.
- Forsyth, Peter J. (1990) 'Competitiveness, Microeconomic Reform and the Current Account Deficit', Discussion Paper No. 228, Centre for Economic Policy Research, Australian National University, March.
- Gregory, Robert G. (1989) 'The Current Account and Australian Economic Policy under the Labor Government', paper presented to the 18th Pacific Trade and Development Conference, Kuala Lumpur, Malaysia, December 11-14.

- Hayashi, Fumio (1989) 'Is Japan's Saving Rate High?', *Federal Reserve Bank of Minneapolis Quarterly Review*, Spring, 3-9.
- Helliwell, John, and Peter Boxall (1978) 'Private Sector Wealth: Quarterly Estimates for Use in an Aggregate Model', *The Economic Record*, 4, April, 45-64.
- Horn, Peter (1987) 'Private Non-Human Wealth of Australian Residents in the NIF88 Model', *mimeo*, The Australian Treasury, December. Also made available as Background Paper No. 9, Centre for Economic Policy Research and Australian Treasury Conference, The Australian Macro-Economy and the NIF88 Model, February 1988.
- Kingston, Geoffrey (1990) 'Stabilising External Debt: Twin Deficits versus Tight Money', forthcoming in C. Kearney and R. McDonald (eds), *Developments in Australian Monetary Economics*, Longman Cheshire.
- Kotlikoff, Laurence J. (1986) 'Deficit Delusion', *Public Interest*, 84, 53-65. Reprinted in L. J. Kotlikoff, *What Determines Savings*, Cambridge Mass; London, England: MIT Press, 1989.
- Kotlikoff, Laurence J. (1988) 'Intergenerational Transfers and Savings', *Journal of Economic Perspectives*, 2, Spring, 41-58.
- Lewis, M. K. and M. Polasek (1990) 'Whither the Balance of Payments?', *Australian Economic Review*, 3'90, 5-16.
- McKibbin, Warwick, and Steven Morling (1989) 'Macroeconomic Policy in Australia: A Longer Run Perspective', paper presented to the Australian Economic Policy Conference, Centre for Economic Policy Research, Australian National University, 27-28 November.
- Norton, W.E. and P.M. Garston (eds), *Australian Economic Statistics: 1949-50 to 1982-83: I Tables*, Reserve Bank of Australia, Occasional Paper No. 8A, January.
- Pagan, Adrian (1990) '"Twin Deficits" and the Australian Models: Comments on a Conference', Discussion Paper No. 222, Centre for Economic Policy Research, Australian National University, February.
- Piggott, John (1987) 'The Nation's Private Wealth - Some New Calculations for Australia', *The Economic Record*, 63, March, 61-79.
- Poterba, James M. (1987) 'Tax Policy and Corporate Saving', *Brookings Papers on Economic Activity*, 2, 455-503.
- Pitchford, John D. (1990) *Australia's Foreign Debt: Myths and Realities*, Sydney: Allen and Unwin.
- Solow, Robert M. (1956) 'A Contribution to the Theory of Economic Growth', *Quarterly Journal of Economics*, 70, February, 65-94.
- Stemp, Peter J. (1988) 'Tax Concessions for Occupational Superannuation: Implications for Aggregate Saving', *Economic Papers*, 2, June, 33-53.

- Swan, Trevor (1956) 'Economic Growth and Capital Accumulation', *The Economic Record*, 32, November, 334-361.
- Wells, Graeme (1989) 'Debt and the Current Account'. Talk given to the Annual General Meeting, New Zealand Association of Economists, Wellington, 21 September.
- Williams, Ross A. (1979) 'Household Saving and Consumption in the 1970s', in W.E. Norton (ed), *Conference in Applied Economic Research*, Reserve Bank of Australia, December, 130-163.
- Williams, Ross A. (1983) 'Ownership of Dwellings and Personal Wealth in Australia', *Australian Economic Review*, 2nd Quarter, 55-62.

COMMENT

Ian Castles

As Dr Stemp notes, there is a broad range of concepts which are referred to as 'saving' or 'savings'. This commentary will concentrate on the flow of saving rather than the stock; on gross saving rather than net; on aggregate national saving rather than the saving of individual sectors; and on the specific accounting relationships which are used in the Australian National Accounts (ANA) rather than alternative definitions which are to be preferred for some purposes.

Statistical Discrepancies

Any integrated system of national accounts will necessarily include a number of statistical discrepancies. As there are millions of transactions every day in a modern economy, identities which are equal by definition are extremely unlikely to be estimated to be equal when they are independently calculated from a range of data sources of varying quality.

The statistical discrepancy between the income and expenditure sides of the domestic production account can be handled in various ways. Some countries do not show a discrepancy because they derive one or more components (e.g. increase in stocks) as a residual. Others allocate the discrepancy across components using various types of procedures. In the ANA, the discrepancy is shown explicitly on the expenditure side of the domestic production account. Analysts thus have a measure of the *net* errors and omissions in that account. Revisions to the statistical discrepancy may arise because later information or alternative and improved sources of data have become available, or because conceptual changes have been introduced, or as a result of measuring in-scope components which were previously excluded because of the lack of a suitable data source.

As pointed out in the paper, the ABS now publishes accuracy gradings for a large range of ANA aggregates. In these gradings, estimates of household saving are rated as C ('poor'), because they are derived as a residual item in the Households (including unincorporated enterprises) income and outlay account. Estimates of household net lending are rated D ('very poor') because they are derived as a residual reflecting net errors and omissions in both the current and the capital accounts for the household sector. And the 'other net lending (including statistical discrepancy)' item is, literally, a residual of a residual of a residual.

Revisions to Estimates

Dr Stemp expresses concern at the frequency and magnitude of revisions to estimates, and the charts presented in Figure 3 of his paper trace the revisions to a number of series as they have been presented for the past five years. In response, I make four points.

First, it is obvious that national accounting estimates which are derived as residuals are more likely to be revised, and to be revised by greater amounts, than those which are estimated directly. The figures change whenever there is a revision in any of the items in the account in which the residual appears.

Second, the analysis of revisions is put forward as 'one way of assessing the reliability of savings figures derived from the ANA'. Yet the comparisons do not always match like with like. For example, significant adjustments were made to several series of saving by sector in 1985-86, in order to incorporate the treatment of finance leasing transactions which was recommended in Australian Accounting Standards 17. In the same year there was a large downward revision in the series 'Surplus on current transactions' of general government as a result of a change in the treatment of road maintenance expenditure. Previously, all roads expenditure had been treated (and had been clearly stated to be treated) as capital expenditure. To the extent that 'revisions' of this kind have been incorporated, Dr Stemp's discussion and charts are somewhat misleading.

Third, the charts depict successive revisions to estimates for *components* of gross saving, but there is no chart showing how revisions have affected *total* gross saving. In fact, and leaving aside conceptual changes, the overall revisions in this aggregate have not been large, nor have they always been in the same direction. For example, the simple average of the gross saving rates in respect of the eight-year period 1977-78 to 1984-85 was 20.16 per cent in the 1985-86 ANA. In the current 1988-89 ANA the simple average of the gross saving rates over the same years was 20.02 per cent. The average difference between the estimates in the 1985-86 ANA and 1988-89 ANA of GDP for the eight individual years, ignoring the sign, was 0.26 per cent. In none of the eight years was the change in the estimate of gross saving as much as 0.50 per cent of GDP. These are quite modest revisions.

Fourth, a lack of revisions to a series does not necessarily imply that the series is accurate - it is more likely to indicate that no later information is available.

Accuracy of Total Gross Saving Estimates

The fact that revisions to total gross saving estimates have been relatively small does not necessarily imply that the estimates of this aggregate are of good quality. It is, however, possible to obtain an indication of the accuracy of estimates of gross saving by comparing them with an alternative *and completely independent* estimate of gross saving derivable from the ANA.

Gross saving is equivalent to income available for (but not spent upon) final consumption, and also to investment *less* net borrowing from overseas. The former identity is the 'Finance of Gross Accumulation' concept in the National Capital Account, which may be represented as GDP *minus* Net Overseas Transfers *minus* Final Consumption Expenditure; and the latter identity can be represented as Gross Investment *minus* the Balance on 'Capital Account' (excluding retained earnings) in the Balance of Payments (which can be derived from Table 57 of the ANA).

These alternative measures of Gross Saving are compared for 1987-88, 1988-89 and 1989-90 in the following table.

	1987-88	1988-89	1989-90
	\$m	\$m	\$m
Gross domestic product	296,423	337,592	368,627
Less Net overseas transfers	-8,285	-10,713	-13,306
Less Final consumption expenditure	-227,712	-251,055	-276,660
= Gross accumulation (1)	60,426	75,824	78,661
Gross fixed capital expenditure and increase in stocks	71,921	90,600	93,392
Less Capital account balance	-8,569	-14,353	-15,224
= Gross accumulation (2)	63,352	76,247	78,168
As % of GDP			
(A) Gross accumulation (1)	20.39	22.46	21.34
(B) Gross accumulation (2)	21.37	22.59	21.21
Difference (A) - (B)	-0.98	-0.13	0.13

The correspondence between these alternative measures of total gross saving has been particularly close in the last two years. The differences in some earlier years have been significant, but the broad trend in the ratio of gross saving to GDP during the past 30 years is indicated clearly in Chart 1.

It must be stressed that the two sets of estimates of capital accumulation (i.e., gross saving) shown in Chart 1 are *independent*. Any revisions to the estimates for any component of income, or of final consumption expenditure, or of interest, dividends or other transfers to and from overseas, would affect the 'A' line in the Chart *but not the 'B' line*. Conversely, any revisions to the estimates for any component of gross fixed capital expenditure, or increase in stocks, or inflow or outflow of capital would affect the 'B' line *but not the 'A' line*. Of course, it cannot be inferred that, because the two estimates are independent, the 'true' saving level necessarily lies between them.

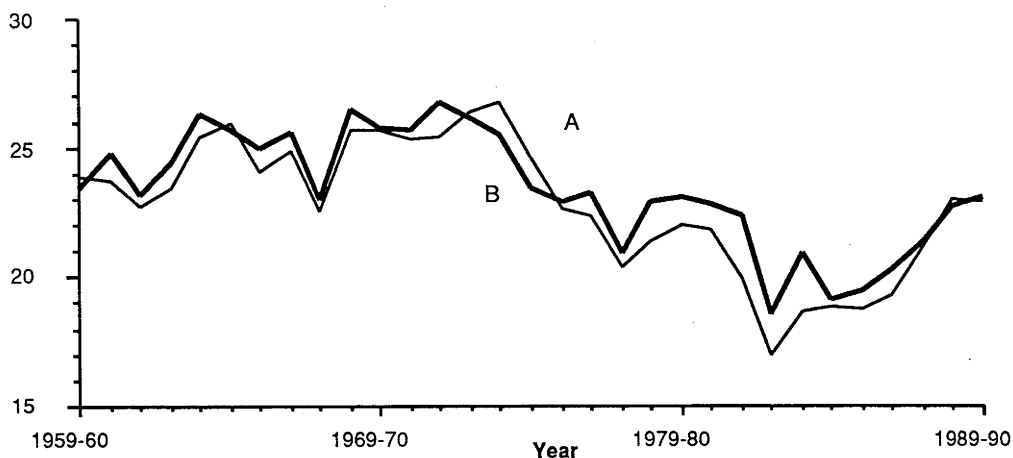


Chart 1

- A Numerator is gross accumulation as published in the national capital account.
- B Numerator is gross accumulation estimated as:
- Total gross fixed capital expenditure
 - Plus Total increase in stocks
 - Minus Capital account balance
 - Minus Net reinvested earnings

Conclusion

While there are grounds for concern about the accuracy and reliability of ANA data relating to saving, the estimates of aggregate national saving are fairly robust. The ABS has acknowledged that the quality of the sectoral estimates is poor, and the developmental estimates of flow of funds statistics which were published last July confirm this.

In particular, it has always been recognised within the Bureau that the direct measures of 'change in financial position' for each sector which are produced as part of the flow of funds accounts could differ substantially from the conceptually identical item 'net lending' derived as a residual in the national accounts. Having regard to the complete absence of data in some areas (e.g. inter-sector sales of land and second-hand assets), it is not surprising that large discrepancies have been identified. This is an important potential benefit from the development of flow of funds accounts.

Meanwhile (and in fact always) the analyst of economic issues must take account of the limitations of statistical data. It is true, as Stemp notes, that revisions to statistical series are quite likely to dominate other statistical tests of economic hypotheses. By the same token, conclusions based on inaccurate data will themselves be inaccurate. It is better that the inaccuracy be exposed as a result of subsequent revision of the data than that it be concealed because no new information becomes available.

SAVING POLICY ISSUES EXAMINED WITH A MACROECONOMETRIC MODEL

C.W. Murphy

1. Introduction

This paper uses the Murphy model of Australia (Murphy, 1988a; 1988b), described in section two of this paper, to examine various saving policy issues. These issues have been receiving increasing attention as researchers search for an explanation for the high level of the current account deficit during the 1980s (Dept of the Treasury, 1990; Edey and Britten-Jones, 1990; Murphy, 1989b; Economic Planning Advisory Council (EPAC), 1986 and 1988a). Some studies have found that a fall in private saving may provide a partial, proximate explanation for the high current account deficit (Murphy, 1989b; EPAC, 1988b and 1990) while others place more stress on other factors (Edey and Britten-Jones, 1990). This debate is surveyed briefly at Appendix B.

There is fairly general agreement that, whatever its genesis, the high current account deficit is likely to persist for some time. This is drawn out in Section 3 of this paper in a model-based baseline scenario for the next five years. The baseline scenario also provides a frame of reference for the investigation of the effects of various saving policies.

The government's main policy response to the fall-off in private savings has been to increase public saving, and in the baseline scenario this policy is maintained. However, in the first alternative scenario, presented in section four, a more lax fiscal policy is investigated.

The government has ruled out various tax reform options affecting private savings. Keating (1989) dismissed proposals to inflation-adjust interest income and payments for income tax purposes. More recently, Keating (1990) has rejected a shift in the tax mix from taxation of income to taxation of consumption via the introduction of a broad-based consumption tax.

The proposal to inflation-adjust interest income and payments cannot be analysed fully using the model. However, one of its more significant effects may be to increase private savings. In our second alternative scenario, presented in Section 5, we consider the effects of an autonomous increase in private saving.

In our third and final alternative scenario, contained in Section 6, we examine a shift in the tax mix away from taxing income and towards taxing consumption. The effects during the adjustment period depend crucially on what accompanying adjustments occur in monetary policy and wage outcomes. This is shown in two variants of this scenario.

The conclusion draws together our main results for saving policy.

2. The Model

The Murphy model is a 96-equation, quarterly, macroeconometric model of the Australian economy used for policy analysis and regular forecasting. Some explanation of the major macroeconomic features of the model is required here, because its simulation results are used extensively in the remaining sections of the paper. A fuller account of its macroeconomic structure is given in Murphy (1989a), the detailed specification of an earlier version of the model is given in Murphy (1988a, 1988b), and forecasting with the model is considered in Murphy (1990). The model's private consumption equation is of special relevance for this paper and is set out at Appendix C.

Among Australian models, the closest relatives of the Murphy model are the AMPS model (Murphy, Bright, Brooker, Geeves and Taplin, 1986), and the MSG2 model (McKibbin, 1988). All three models emphasise the supply side, and have some forward-looking behaviour in financial markets, but at the same time have sticky prices in some other markets which yield a Keynesian short run. The main differences from the AMPS model are that in the Murphy model rational expectations are explicitly used in financial markets, there is a more rigorous theoretical basis for its supply side, quarterly rather than semi-annual data are used, and more attention has been given to fine tuning its empirical performance. As Parsell, Powell and Wilcoxon (1989) demonstrate, its theoretical structure is close to that of the MSG2 model which was developed concurrently but independently. MSG2 has the additional feature that it is a global model (with an Australian module), but differs in that it places less emphasis on analysis of the historical data.

The model includes 19 behavioural equations and a further 77 identities. Its parameters are estimated with quarterly data extending from 1976.1 to the most recently available data, which is currently for 1990.3. The estimation techniques used include OLS, NLS, IV and FIML. In developing these equations, considerable attention was paid to the specification of dynamics in the spirit of the general-to-specific testing approach recommended by Hendry and Richard (1982). In addition, a wide range of diagnostic tests of model adequacy were performed as recommended by Pagan and Hall (1983) and others.

The Murphy model shares all of the main features of the intermediate run version of the Dornbusch model (Dornbusch, 1976):

- (i) in the short run the markets for non-traded goods, and labour, are in disequilibrium, and the quantities traded are demand-determined;
- (ii) the prices of non-traded goods and labour are sticky;
- (iii) asset prices are flexible;
- (iv) all assets other than money are perfect substitutes;
- (v) expectations in the financial sector are rational or model-consistent;
- (vi) monetary policy targets the volume of money.

The model also has other important dimensions:

- (i) the fiscal policy closure avoids the possible instability associated with bond financing by using an approach which is similar to bond financing in the short run but ensures tax financing in the long run;
- (ii) Ricardian equivalence does not hold: public sector bonds are regarded as part of private sector net worth;
- (iii) foreign debt affects private consumption via private sector net worth;
- (iv) the model converges to a long run with Neoclassical optimising behaviour in production and balanced growth.

3. The Baseline Scenario

The model is used four times a year to produce a five-year-ahead quarterly forecast for the Australian economy. These forecasts are issued one week after the release of the Quarterly National Accounts. The forecast takes the form of a written report, and software on diskette which enables the user to produce his own baseline forecast and alternative scenarios.

The baseline forecast summarised briefly here was issued on 4 December following the release of the September Quarter 1990 National Accounts on 28 November. It covers the period 1990-91 to 1994-95. We discuss the model inputs first, then the model outputs.

Model inputs

With increasing evidence of a slowing world economy, continued weakening in prices for non-energy commodities is forecast to lead to a decline in the terms-of-trade totalling 7 per cent in the two years to 1991-92.

Monetary policy is assumed to be set with a medium-term target for inflation of around 6 per cent per annum. This results in the 90-day commercial bill rate varying in the range 11.5-14.5 per cent per annum depending on the stage of the economic cycle.

Regarding fiscal policy, with a weakening economy, the Net PSBR is expected to approach 1 per cent of GDP in 1990-91, compared with the Budget-time estimate of zero, but is assumed to be reined back to around zero for 1991-92 and beyond.

Close to a 'hands-off' model forecast has been produced, with most residuals of the behavioural equations set to zero for most of the forecast period.

Model outputs

A selection of some model outputs on a financial year basis is shown at Appendix A in Table A1. The first panel of the table shows growth in real GDP, with a breakdown of the contributions from some its major components. The second panel shows price and wage inflation, the unemployment rate, the 90-day bank bill rate, the Trade Weighted Index (TWI) exchange rate, the Net PSBR, and the current account balance.

From the first panel of the table, private consumption is forecast to grow at an average rate of 2.0 per cent per annum over the forecast period, below

the average for real GDP of 2.4 per cent per annum. This difference is mainly due to downward adjustments to the consumption function designed to take account of the fact that prospective wage increases totalling 3 per cent, to be paid in the form of increased employer contributions to superannuation, are likely to increase consumption less than equivalent wage increases paid in the hand. The year-by-year contributions to growth from private consumption are shown in the first column of the first panel of Table A1. As shown in the last column, real GDP is forecast to show zero growth in 1990-91, before recovering to grow at an average rate of just over 3 per cent per annum for the remaining four years of the forecast period. The current downturn in GDP has been led by private investment, which detracted 4.7 per cent from growth over the year to the September Quarter 1990, with the biggest negative contribution coming from private non-farm inventory investment.

As discussed under the heading of Model Inputs, and shown in the sixth column of the second panel of the table, the Net PSBR is projected to be around zero from 1991-92. The last column shows that after falling from -5.8 per cent of GDP in 1989-90 to -4.6 per cent in 1990-91, the balance on current account remains at around -5 per cent for the remainder of the forecast period: the unfavourable effect of the falling terms-of-trade is offset by the favourable effect of the assumption of continued high public saving (with a Net PSBR around zero). With the current account balance at that level, the ratio of foreign debt-to-GDP rises steadily. The effects of varying the public (and private) saving assumptions are considered in the next two sections of this paper.

4. Looser Fiscal Policy

The baseline scenario assumes that the government's tight fiscal policy of recent years is maintained. In this section we consider the consequences of a looser fiscal policy, i.e. of a lower level of public savings than is assumed in the baseline. Historical and forecast data for the 'Twin Deficits' are shown in Table 1.

During the 1980s many explanations were offered for the high current account deficit and associated build-up of foreign debt. (See Murphy 1989, for a quantitative analysis of these explanations.) By the mid 1980s attention began to focus on the so-called 'Twin Deficits Hypothesis', which engendered a belief that the high Net PSBR during the early to mid-1980s could have been the main causal factor. This was emphasised as early as October 1985 by the Office of EPAC (1985). Against that background, the net PSBR was steadily wound back from a peak of 7.1 per cent in 1983-84 to a trough of -1.5 per cent in 1988-89. Since then, there has been some slippage in fiscal policy. The Commonwealth Budget forecast a Net PSBR for 1990-91 of zero but it now seems likely to be close to 1 per cent of GDP, due mainly to the effects of a rapidly weakening economy.

Regarding fiscal policy, with a weakening economy, The Net PSBR is expected to approach 1 per cent of GDP in 1990-91, compared with the

Table 1: Twin Deficits
(% of GDP)

	Year 19..	Net PSBR	Current A/c Deficit
Historical Data	80-81	2.9	3.9
	81-82	3.4	5.9
	82-83	5.7	4.1
	83-84	7.1	3.9
	84-85	5.1	5.3
	85-86	4.7	6.1
	86-87	3.5	4.7
	87-88	0.2	3.8
	88-89	-1.5	5.3
	89-90	0.5	5.8
Baseline Scenario	90-91	0.8	4.6
	91-92	0.1	5.2
	92-93	-0.1	5.4
	93-94	0.2	5.1
	94-95	-0.1	4.9
Looser Fiscal Policy	90-91	2.2	4.9
	91-92	1.8	5.9
	92-93	1.5	6.1
	93-94	1.5	5.9
	94-95	1.1	5.6

Budget-time estimate of zero, but in the Baseline Forecast this is assumed to be reined back to around zero for 1991-92 and beyond.

Here we consider the consequences of a possible alternative scenario in which fiscal policy is loosened further via lower income tax rates, although the policy would still be described as tight rather than loose in the sense that it is consistent with the ratio of public debt to GDP declining at a modest rate.

In the Looser Fiscal Policy scenario, the Net PSBR averages 1.6 per cent of GDP for the period 1990-91 to 1994-95, compared with 0.2 per cent of GDP for the same period in the Baseline Scenario, an increase of 1.4 per cent of GDP. The table shows this looser fiscal policy results in an increase in the average current account deficit from 5.0 per cent of GDP to 5.7 per cent of GDP, an increase of 0.7 per cent of GDP. Thus a crude 'Twin Deficits' calculation

gives the result that an increase in the Net PSBR of 1.4 per cent of GDP results in an increase of 0.7 per cent of GDP in the current account deficit over a five-year horizon, implying a pass-through factor of 0.5. Similar results from several macroeconometric models (AMPS, MSG2, Murphy, ORANI) were obtained for another CEPR conference, Fiscal Policy and the Current Account, held in June 1989.¹

More detailed results for this Looser Fiscal Policy scenario are reported at the end of this paper in Table A2, which reports the *differences* between the Looser Fiscal Policy results, and the Baseline results (Table A1).

The first point to make is that the government has an intertemporal budget constraint which implies that it is not feasible to have lower taxes permanently without any other fiscal adjustment. In the Looser Fiscal Policy scenario, compared with the Baseline scenario, taxes are lower during the forecast period, but this leaves a legacy of a higher public debt. After the forecast period, there is a small tax increase in perpetuity to service the expanded stock of debt.

Ricardian consumers would appreciate that the present value of their future stream of taxes has not been changed, with lower taxes in the first five years being offset by slightly higher taxes thereafter. There would be no change in consumption or any other variables.

However, in the Murphy model there is an Ando-Modigliani consumption function (see Appendix C for more details of the consumption function) so consumers are not assumed to understand the government's intertemporal budget constraint. Thus the (temporary) tax cut induces an average increase in consumption relative to the baseline of 0.8 per cent of GDP. This is shown in the first panel of Table A2. The resulting shortfall of domestic savings to finance investment results in an increase in the demand for borrowing which causes the exchange rate to appreciate. This reduction in competitiveness reduces exports and increases imports so the current account deficit is higher. Hence the looser fiscal policy gives rise to the twin deficits-type reaction mentioned earlier.

Why is the pass through factor to the current account only 0.5? The main reason is that while the income tax cut increases the Net PSBR by an average of 1.4 per cent of GDP, it only increases private consumption by 0.8 per cent of GDP. This is because higher interest rates and the erosion in net worth resulting from a higher current account deficit both reduce consumption.

In short, over the forecast period, lower public savings result in a higher current account deficit, higher private savings and lower GDP. In terms of the level of the current account deficit, by 1994-95 this stands at 5.6 per cent of GDP in the Looser Fiscal Policy scenario, compared with 4.9 per cent of GDP in the Baseline scenario.

In the long run (not shown in the tables) consumers are worse off. Extra interest income from the expanded holding of public debt compensates for the tax increase, but consumers have a legacy of a higher level of foreign

¹ Joint Treasury-Centre for Economic Policy Research, Australian National University Conference, 5-6 June 1989. The revised conference papers are published in CEPR Discussion Papers Nos. 222-225 (1990).

debt resulting from the period of higher consumption, and this debt needs to be serviced. This occurs through a real depreciation of the exchange rate which improves the trade account sufficiently to cover the increase in foreign debt service payments. This increase in net exports leaves less of GDP available for private consumption which falls by 0.11 per cent of GDP.

5. Higher Private Saving

Certain distortions can be identified in the taxation system which are likely to discourage private saving, and may therefore be significant factors underlying the high current account deficit of the 1980s. However, there is some debate about whether other factors may have been more important in the emergence of the high current account deficit, and this debate is summarised in Appendix B. In any case, most economists would agree that the tax distortions should be addressed, whether or not they have been major factors behind the high current account deficit.

One distortion which possibly discourages savings is that nominal rather than real interest income is taxed. To take a simple numerical example, if an individual deposits a sum of money in the bank, which earns interest of 13 per cent per annum, but inflation is 7 per cent per annum, his pre-tax real rate of return is 6 per cent per annum i.e. the purchasing power of his bank balance rises by 6 per cent per annum before allowing for tax. However, if he faces a notional marginal tax rate of 47.5 per cent (including the Medicare levy) on his *nominal* interest income, he is taxed $(0.475)(13.0) = 6.2$ per cent per annum leaving a post-tax real rate of return of -0.2 per cent per annum. Thus the marginal tax rate on his real interest income is 103 per cent. This could discourage savings.

This distortion could be removed by eradicating inflation or by inflation-adjusting interest income and payments for income tax purposes. In the 1980s, Australia has not matched the progress of most other OECD countries in reducing inflation, although there has been some recent improvement in this area. Keating (1989) rejected proposals to inflation-adjust interest income and payments for income tax purposes.

The specification of the Murphy model does not incorporate all the subtleties necessary for a full analysis of this particular tax reform. However, it can tackle the much simpler question of the effects of an autonomous increase in private savings, i.e. a downward shift in the consumption function. This may proxy one of the more significant effects of inflation-adjusting interest income and payments for tax purposes.

Results for an autonomous increase in private savings are reported in Table A3, which reports the *differences* between the Higher Private Saving results, and the Baseline Scenario results (Table A1).

The size of the downward shift in private consumption is 3 per cent, which is equivalent to 1.7 per cent of GDP. This magnitude was chosen quite arbitrarily. Notice that it refers to the size of the shift in the consumption function, not the change in actual consumption. The result for actual consumption can be different to the extent that the shock affects variables appearing in the consumption function itself. This turns out to be the case,

as the average fall in actual consumption is 1.2 per cent of GDP, compared with the shock itself which is 1.7 per cent of GDP. This is because the higher level of private savings reduces interest rates, and reduces the current account deficit resulting in a build-up of net worth. Lower interest rates and higher level worth induce a partially offsetting increase in consumption.

The explanation for the effects of this increase in private savings is similar to the explanation given in the previous section for the effects of a reduction in public savings. The tax cut considered in the previous section increased private consumption by an average of 0.8 per cent of GDP, whereas the shift in the consumption equation considered in this section reduces private consumption by an average of 1.2 per cent of GDP. Not surprisingly, a reasonable approximation to the results for the increase in private savings reported in Table A3, can be obtained by multiplying the results for the reduction in public savings reported in Table A2 by $-1.2/0.8 = -1.5$. Therefore the results in Table A3 are not discussed any further.

6. Changing The Tax Mix

In our third and final alternative scenario we consider another proposal to move the tax system closer to neutrality with respect to the consumption-savings choice, namely a shift in the tax mix away from taxing income and towards taxing consumption.

We consider a substantial change in the tax mix which, in terms of model tax rates, raises the average rate of tax on consumption excluding rental services from 14.0 per cent to 20.4 per cent, and reduces the average rate of tax on personal income from 22.5 per cent to 19.0 per cent. The size of the cut in the average rate of tax on personal income tax is calculated to give what could broadly be described as a deficit-neutral outcome in the long run. More precisely, the steady state public debt-to-GDP ratio is unaffected. This does not imply a deficit-neutral outcome in every year, but does roughly imply a deficit neutral outcome averaged across all years.

Keating (1990) prefers to calculate the personal income tax cut to give an outcome which is neutral with respect to the after-tax real wage facing employees, for a *given* nominal wage rate and pre-tax price of consumption. Our change in the tax mix reduces the after-tax real wage by 0.6 per cent compared with the reduction in the event of no personal income tax cut of 4.3 per cent. Thus our personal income tax cut is 86 per cent of that required using Keating's criterion.

That a deficit-neutral outcome in the long run implies a small reduction in the after-tax real wage facing employees is not surprising given that, as Keating pointed out, the tax base for personal income tax is broader than that for a consumption tax because the savings ratio is positive.

With respect to transfer payments, these are assumed to be set as a proportion of the after-tax nominal wage. That is, recipients of transfer payments receive the same proportionate compensation in their nominal incomes in the form of an increase in their rate of benefit, that others receive in the form of a cut in the rate of personal income tax.

In analysing the results of this change in the tax mix, we focus particularly on the accompanying responses of wages and monetary policy. A fear that the traditional strong link in Australia from the CPI to wages would result in a wages hike, was perhaps the main reason a major change in the tax mix was rejected at the Tax Summit held in 1985.

We consider three variations on the assumptions for wages and monetary policy.

(1) Base Case (Table A4)

This uses the model's standard wage equation, and standard monetary policy assumption. The standard wage equation is an inflation expectations augmented Phillips Curve, where inflation is measured in terms of consumer prices. This implies that nominal wages are mainly driven by consumer prices in the short run, but adjust in the long run to achieve a fixed unemployment rate, estimated currently to be 6.3 per cent. The standard assumption for monetary policy is that the money supply is targetted.

(2) With Wage Deal (Table A5)

The Base Case shows nominal wages being pushed up in the short run by the higher consumer prices resulting from the consumption tax increase, because the income tax cut is not taken explicitly into account in wage setting. This scenario assumes a wage deal is struck in which consumer prices are discounted for the effects of the increase in consumption tax.

(3) With Wage Deal and Accommodating Monetary Policy (Table A6)

Even with wage discounting, interest rates rise in the second scenario, because the increase in consumer prices resulting from higher consumption tax reduces the real money supply. In this scenario, the nominal money supply is adjusted to accommodate the direct effect on prices of higher consumption tax.

A comparison of some of the main results from the three different cases is given in Table 2. These results are extracted from Tables A4-A6 (Appendix A).

The first point to emphasise is that the long run outcomes for *real* variables is the same for all three cases. However, the differences in the adjustment path of the economy between the three cases are nevertheless important: an adjustment path can be so painful that any long run benefits do not justify the short run costs.

The adjustment path seems most painful in the Base Case. The increase in the CPI, resulting from the consumption tax increase, has two adverse effects beginning in the first year. First, it reduces the real money supply leading to a lift of around 3 percentage points per annum in the 90-day bill rate. Second, it flows through into wages, leading to an increase of more than 1 per cent in the *after-tax* consumer real wage. This also implies an increase in the producer real wage. These interest rate and real wage developments hit real GDP hard, and it troughs at 3.2 per cent below Baseline in the third and fourth years.

Table 2: Changing the Tax Mix
(deviations from Baseline scenario)

		1990-91	1991-92	1992-93	1993-94	1994-95
Wages	(a) - (1)	1.25	3.49	3.49	2.79	1.34
	- (2)	-0.01	-0.44	-1.75	-2.47	-3.00
	- (3)	0.03	0.35	0.54	0.41	-0.08
CPI	(a) - (1)	3.91	6.01	6.97	7.23	6.59
	- (2)	4.08	4.65	3.37	3.23	2.85
	- (3)	4.24	5.64	5.76	5.93	5.69
90-day bill rate	(b) - (1)	0.00	2.85	3.02	2.82	1.61
	- (2)	0.00	1.93	-0.77	0.65	-0.69
	- (3)	0.00	-0.08	0.00	0.30	-0.08
Current Account Balance	(c) - (1)	0.11	-0.11	-0.15	0.00	0.19
	- (2)	0.19	0.71	0.53	0.52	0.79
	- (3)	0.24	0.55	0.55	0.56	0.60
Private Consumption	(d) - (1)	-0.25	-0.69	-1.49	-2.04	-2.26
	- (2)	-0.35	-1.16	-1.33	-1.24	-1.12
	- (3)	-0.33	-0.88	-1.07	-1.08	-0.93
Private b.f.i. *	(d) - (1)	-0.02	-0.53	-0.38	-0.44	-0.36
	- (2)	-0.01	-0.35	-0.07	0.10	-0.02
	- (3)	-0.00	-0.01	-0.03	-0.04	-0.03
Real GDP	(a) - (1)	-0.80	-2.62	-3.15	-3.16	-2.67
	- (2)	-0.40	-1.61	-0.95	-0.14	-0.26
	- (3)	-0.19	-0.56	-0.60	-0.56	-0.41

* b.f.i = business fixed investment

- (1) Base Case.
- (2) With Wage Deal.
- (3) With Wage Deal and Accommodating Monetary Policy.
- (a) Percentage deviation from Baseline.
- (b) Deviation from baseline in percentage points per annum.
- (c) Deviation of percentage ratio to GDP.
- (d) Deviation expressed as a percentage of baseline GDP.

The Wage Deal removes one of the two adverse effects of the CPI increase. Wages are discounted for the increase in the CPI resulting from the consumption tax increase, and show little movement in the first year. However, the higher CPI still reduces the real money supply, and there is an increase in the 90-day bill rate of almost 2 percentage points per annum. This is less than in the Base Case, where the CPI rises by more because wages increase. Higher interest rates result in a trough in real GDP at 1.6 per cent below Baseline in the second year. In this scenario the potential one-off increase in the aggregate price level resulting from higher consumption tax is pushed back by an unchanged nominal money supply.

In the third and last case this one-off increase in the price level is accommodated by an increase in the nominal money supply. There is also a wage deal as in the previous case. In these circumstances there is little movement in either producer real wages or interest rates, so the macroeconomy adjusts fairly smoothly to the change in the tax mix.

While judgements about the relative merits of different outcomes are always subjective, the third case seems to offer the best adjustment path as it avoids the oscillations in interest rates, real wages, and real output seen in the other two cases.

In the second and third cases the current account deficit is reduced by about 0.6 per cent of GDP from the second year onwards. This is because the change in the tax mix succeeds in increasing private savings. To understand why private savings increase, we need to consider the model's Ando-Modigliani consumption function set out at Appendix C.

Notice that in the consumption equation, consumption is not affected by the after-tax real rate of interest, so the rise in savings has nothing to do with the reduction in the marginal rate of tax on real interest income implied by the cut in income tax. In any case the reduction in this marginal tax rate is not very large, even though the change in the tax mix is quite substantial. To see this, return to the numerical example we gave in the previous section. Suppose the cut in the income tax results in marginal and average tax rates falling by the same proportion. The top notional marginal rate would fall to:

$$(.19/.225) \times 47.5 = 40.1\%$$

(In reality the top marginal rate would probably be cut by less, otherwise there would be a reduction in the overall progressivity of the taxation system.) This implies a new effective marginal tax rate on real interest income of:

$$(100) \cdot [(0.401) \cdot (13)] / (6) = 87\%$$

compared with 103 per cent previously. The incentive to save would still seem to be rather weak.

However, in the equation consumption is affected by real private sector net worth, which falls by about 4 per cent, because of the one-off increase in the price of consumption, relative to the producer price of output. This fall in wealth reduces desired consumption by over 1 per cent. Quite possibly,

for this change in the tax mix, the wealth effect is more important than the rate of return effect not just in the model's equation, but in reality as well.

We have deliberately avoided making claims about the longer run effects of a change in the tax mix. For that we believe we would need a model which incorporates both more detail of the taxation system, and possibly employs more formal intertemporal optimisation by economic agents.

7. Conclusions

Our understanding of the root causes of the uplift in the current account deficit in the 1980s is rather imperfect, including what role, if any, was played by private saving.

However, the best guess forecast presented here has the current account deficit remaining at around 5 per cent of GDP through to the mid 1990s: the unfavourable effect of likely falls in the terms-of-trade through to the end of 1991 is offset by the favourable effect of the assumption of continued high public saving (with a Net PSBR around zero). With the current account balance at that level, the ratio of foreign debt-to-GDP rises steadily.

Measures to reduce or eliminate certain tax distortions affecting the consumption/savings choice should be welcomed in their own right. They may also increase private savings and thereby contribute to a reduction in the current account deficit.

Inflation-adjusting interest income and receipts for tax purposes would have its main effect on private savings by about halving the effective marginal tax rate on real interest income. To the extent that its main direct effect was on the level of private savings, the overall macroeconomic effects were shown to be similar to those emanating from a change in public savings via a change in the rate of income tax. However, the effects at the microeconomic level may be quite different.

A change in the tax mix away from taxing income and towards taxing consumption would have a relatively modest effect on the marginal rate of tax on real interest income, a point emphasised by Keating (1990). However, the one-off increase in consumer prices resulting from higher consumption tax would have a marked effect on real private net worth which could have a substantial effect on savings. A change in the tax mix was analysed which reduced private consumption by an average of 1 per cent during the first half of the 1990s, and as a result reduced the current account deficit by about 0.6 per cent of GDP from the early 1990s. The short run adjustment costs of the change in the tax mix were shown to be small provided a wage deal was struck to prevent the increase in the CPI flowing through to higher real after-tax consumer real wages, and provided the nominal money supply was adjusted to accommodate the one-off increase in the price level. If the first condition or, to a lesser extent, the second condition was not met, high adjustment costs were observed.

Inflation-adjusting interest income for taxation purposes, and shifting the tax mix away from taxing income and towards taxing consumption, would reduce distortions to the consumption-savings choice. One consequence of not pursuing such tax reform is likely to be a continuation of

a high current account deficit. Indeed, if commodity prices fall more than assumed here, or if fiscal policy is not re-tightened, the current account deficit could soon be on an upward path again, unless some of the tax distortions discouraging private saving are addressed.

Appendix A: Tables

Variable Definitions

Code	Description	Units for Levels Tables
NA1	Private Consumption	n.a.
NA3	Private Dwelling Investment	n.a.
NA4	Private Business Fixed Investment	n.a.
NA11	Gross National Expenditure	n.a.
NA12	Exports of Goods & Services	n.a.
NA13	Imports of Goods & Services	n.a.
NA14	Gross Domestic Product	n.a.
WT	Average Earnings (Nat. A/c. Basis)	n.a.
PCPIT	Consumer Price Index	n.a.
URT	Unemployment Rate	% of labour force
RCST	90-Day Commercial Bill Rate	% per annum
ETWIT	TWI Exchange Rate	May 1970 = 100
PSBRT	Net PSBR	% of GDP
CURB	Current Account Balance	% of GDP

Calculations of Deviations

WT,PCPIT,ETWIT:	percentage deviations
URT:	simple deviation; per cent of labour force
RCST:	simple deviation; per cent per annum
PSBRT, CURB:	simple deviations; per cent of GDP

Table A1: Baseline Forecast

(contribution to percentage change in GDP)

	NA1	NA3	NA4	NA11	NA12	NA13	NA14
1989-90	2.45	-0.21	-0.06	3.19	1.20	-0.88	3.50
1990-91	1.15	-0.48	-0.97	-1.27	1.04	0.26	0.03
1991-92	1.30	0.56	-0.05	2.84	1.17	-0.81	3.21
1992-93	0.96	0.01	1.21	2.80	1.13	-0.64	3.29
1993-94	0.80	-0.36	0.61	1.44	0.86	0.00	2.30
1994-95	1.17	0.23	0.51	2.72	1.09	-0.42	3.39

(growth rates/levels)

Year	WT	PCPIT	URT	RCST	ETWIT	PSBRT	CURB
1988-89	7.30	7.35	6.688	13.15	59.80	-1.489	-5.303
1989-90	6.81	8.01	6.210	18.30	59.40	0.538	-5.810
1990-91	6.55	5.42	7.965	15.10	61.60	0.831	-4.645
1991-92	6.47	6.01	8.192	12.09	55.66	0.077	-5.176
1992-93	6.28	7.31	7.690	14.12	53.58	-0.054	-5.391
1993-94	6.38	6.58	7.544	13.69	50.92	0.174	-5.058
1994-95	5.48	5.19	7.273	12.34	48.88	-0.057	-4.861

Table A2: Looser Fiscal Policy (Deviations from Baseline)

(contributions to percentage deviation in GDP)

Year	NA1	NA3	NA4	NA11	NA12	NA13	NA14
1990-91	0.60	-0.01	-0.01	0.67	-0.14	-0.40	0.14
1991-92	1.19	-0.10	-0.18	1.14	-0.29	-0.79	0.06
1992-93	1.02	-0.11	-0.10	0.98	-0.32	-0.66	-0.01
1993-94	0.84	-0.01	-0.06	0.90	-0.30	-0.56	0.04
1994-95	0.64	-0.03	-0.10	0.55	-0.26	-0.38	-0.08

(simple/percentage deviations)

Year	WT	PCPIT	URT	RCST	ETWIT	PSBRT	CURB
1990-91	0.04	-0.18	-0.053	0.00	0.00	1.396	-0.258
1991-92	-0.13	-0.63	-0.020	0.93	5.56	1.675	-0.695
1992-93	-0.16	-0.63	0.055	0.72	4.66	1.508	-0.758
1993-94	-0.01	-0.28	0.071	1.05	3.82	1.322	-0.820
1994-95	0.16	0.10	0.095	1.06	2.70	1.146	-0.777

**Table A3: Higher Private Savings
(Deviations from Baseline)**

(contributions to percentage deviation in GDP)

Year	NA1	NA3	NA4	NA11	NA12	NA13	NA14
1990-91	-1.38	0.01	0.02	-1.57	0.18	0.75	-0.64
1991-92	-1.54	0.26	0.31	-1.17	0.46	0.95	0.24
1992-93	-1.21	0.14	0.17	-1.08	0.54	0.83	0.30
1993-94	-1.01	-0.05	0.09	-1.16	0.45	0.72	0.01
1994-95	-0.81	0.05	0.17	-0.65	0.37	0.45	0.16

(simple/percentage deviations)

Year	WT	PCPIT	URT	RCST	ETWIT	PSBRT	CURB
1990-91	-0.20	0.12	0.166	0.00	0.00	0.072	0.597
1991-92	-0.42	0.31	-0.024	-2.21	-7.37	-0.213	0.984
1992-93	-0.16	0.54	-0.220	-0.94	-5.97	-0.202	1.148
1993-94	-0.07	0.17	-0.176	-1.79	-4.80	-0.112	1.238
1994-95	-0.01	-0.09	-0.179	-1.20	-3.28	-0.090	1.103

**Table A4: Changing the Tax Mix: Base Case
(Deviations from Baseline)**

(contributions to percentage deviation in GDP)

Year	NA1	NA3	NA4	NA11	NA12	NA13	NA14
1990-91	-0.25	-0.02	-0.02	-0.37	-0.27	-0.16	-0.80
1991-92	-0.69	-0.31	-0.53	-1.63	-0.77	-0.22	-2.62
1992-93	-1.49	-0.34	-0.38	-2.39	-0.93	0.16	-3.15
1993-94	-2.04	-0.16	-0.44	-2.86	-0.85	0.55	-3.16
1994-95	-2.26	0.00	-0.36	-2.80	-0.63	0.76	-2.67

(simple/percentage deviations)

Year	WT	PCPIT	URT	RCST	ETWIT	PSBRT	CURB
1990-91	1.25	3.91	0.163	0.00	0.00	0.809	0.113
1991-92	3.49	6.01	1.045	2.85	6.27	1.418	-0.105
1992-93	3.49	6.97	1.589	3.02	3.33	1.042	-0.150
1993-94	2.79	7.23	1.776	2.82	0.30	0.510	-0.001
1994-95	1.34	6.59	1.660	1.61	-1.99	-0.123	0.185

**Table A5: Changing the Tax Mix:
With Wage Deal (Deviations from Baseline)**

(contributions to percentage deviation in GDP)

Year	NA1	NA3	NA4	NA11	NA12	NA13	NA14
1990-91	-0.35	-0.01	-0.01	-0.43	-0.06	0.08	-0.40
1991-92	-1.16	-0.28	-0.35	-2.17	-0.14	0.70	-1.61
1992-93	-1.33	0.13	-0.07	-1.35	-0.10	0.51	-0.95
1993-94	-1.24	0.44	0.10	-0.61	0.09	0.37	-0.14
1994-95	-1.12	0.23	-0.02	-0.97	0.19	0.52	-0.26

(simple/percentage deviations)

Year	WT	PCPIT	URT	RCST	ETWIT	PSBRT	CURB
1990-91	-0.01	4.08	0.067	0.00	0.00	0.272	0.189
1991-92	-0.44	4.65	0.456	1.93	-0.24	0.414	0.708
1992-93	-1.75	3.37	0.550	-0.77	-0.67	-0.040	0.526
1993-94	-2.47	3.23	0.270	0.65	-0.54	-0.329	0.519
1994-95	-3.00	2.85	0.174	-0.69	-0.80	-0.352	0.794

**Table A6: Changing the Tax Mix:
With Wage Deal and Accommodating Monetary Policy
(Deviations from Baseline)**

(contributions to percentage deviation in GDP)

Year	NA1	NA3	NA4	NA11	NA12	NA13	NA14
1990-91	-0.33	0.00	0.00	-0.39	0.03	0.17	-0.19
1991-92	-0.88	0.04	-0.01	-1.00	0.03	0.42	-0.56
1992-93	-1.07	0.19	-0.03	-0.97	0.00	0.37	-0.60
1993-94	-1.08	0.23	-0.04	-0.92	0.00	0.36	-0.56
1994-95	-0.93	0.18	-0.03	-0.81	0.05	0.35	-0.41

(simple/percentage deviations)

Year	WT	PCPIT	URT	RCST	ETWIT	PSBRT	CURB
1990-91	0.03	4.24	0.042	0.00	0.00	0.070	0.240
1991-92	0.35	5.64	0.178	-0.08	-1.64	0.199	0.554
1992-93	0.54	5.76	0.282	0.00	-1.54	0.171	0.552
1993-94	0.41	5.93	0.295	0.30	-1.72	0.089	0.557
1994-95	-0.08	5.69	0.230	-0.08	-1.92	-0.048	0.599

Appendix B:

Private Savings and the High Current Account Deficit

The uplift in the current account deficit in the 1980s can be re-interpreted as an increase in the difference between investment and savings, which in turn can be decomposed into the contributions from the public and private sectors (e.g. Dept of the Treasury, 1990). The results of such accounting-based decompositions can be sensitive to:

- (i) whether savings are adjusted for inflation (Edey and Britten-Jones, 1990; Stemp, 1991) and/or depreciation (Office of EPAC, 1990);
- (ii) whether the private sector is treated in aggregate or decomposed further into the household sector and private corporate sector (Edey and Britten-Jones, 1990; Stemp, 1991);
- (iii) the allocation of balancing items (Castles, 1991); and
- (iv) the precise time periods selected for the comparisons.

For example, in a careful application of the accounting-based decomposition approach, Edey and Britten-Jones (1990) conclude that private savings have not been a factor in the uplift in the current account deficit, but as pointed out in EPAC (1990) this conclusion can be overturned if savings are measured net of depreciation.

In the final analysis, accounting-based decompositions can only suggest tentative conclusions on the root causes of the uplift in the current account deficit for two reasons. First, it is inappropriate to regard private savings and investment as potential causal factors in their own right: rather they are endogenous to the economic system and are influenced by a wide range of factors. Second, there are interdependencies between public and private savings and investment which are not taken into account in accounting-based decompositions.

Firmer conclusions on the root causes of the high current account deficit require a examination of the underlying behavioural relationships (especially those for private consumption, and private investment), as part of an economy-wide analysis.

In his paper Smith (this volume) finds some evidence of quantitatively important reductions in saving in the 1980s due to financial market deregulation and ageing of the population. This seems to conflict with Edey and Britten-Jones (1990) who argue that private savings behaviour has been stable. However, Smith examines gross household saving while Edey and Britten-Jones examine net private saving. What is needed is further regression based research which embraces all of the measurement issues, and systematically considers all of the major possible determinants of consumption. Even more work is needed on private business fixed investment in the 1980s.

Murphy (1989b) reports an attempt to dissect the increase in the current account deficit using an econometric model. He finds that developments in the terms-of-trade and public savings have played only limited roles.

Further conclusions, however, are clouded by reliance on positive time trends to 'explain' strong growth in both private consumption and private business fixed investment in the 1980s. The economy-wide approach is probably not worth pursuing further until we have a better grasp of private consumption and investment behaviour in the 1980s.

Appendix C:

An Equation For Private Consumption

Here we set out the consumption equation in the Murphy model to aid in the interpretation of the simulation results presented in sections three to six. The reader requiring an empirical study of private consumption in Australia is referred to Smith (1991).

There are three differences between the model consumption equation and the traditional focus on the household net savings ratio which are of significance:

- (i) In measuring the rental services component of private consumption, we replace the ABS estimate with an alternative estimate imputed from the stock of dwellings.
- (ii) We accept the empirical evidence of Feldstein and Fane (1973) and Feldstein (1973) that households lift their consumption in response to an increase in corporate retained earnings and thus 'see through the corporate veil' (Feldstein, 1973). On the other hand, the National Accounts definition of household disposable income excludes retained earnings. To obtain the Feldstein and Fane measure of income, we consolidate the household sector with the corporate sector to form a private sector.

In passing, we mention that we do not accept the view associated with Barro (1974) and others, and termed the 'consolidated approach' by Kormendi (1983), that the public sector should also be included in the consolidation. This implies that government spending rather than taxation should be subtracted from income to obtain disposable income. It rests on the assumption that households are 'Ricardian': they understand that the issuance of public debt does not change the present value of the future path of tax collections because taxes will need to be increased in the future for the government to service the debt. We do not believe that households are that sophisticated, and in any case the empirical evidence comparing the consolidated approaches with the other approaches is conflicting (c.f. Feldstein, 1982 with Kormendi, 1983 and Aschauer, 1985).

- (iii) Instead of assuming that consumption depends upon total disposable income, we prefer the approach of Ando and Modigliani (1963) which has a different treatment for labour income and property income. In particular, labour income is included as an explanatory variable, but property income is replaced with the value of the stock of assets from which it is derived, namely, private non-human wealth.

The full model equation is set out in Table C1.

Table C1: Private Consumption Equation
(1976.1-1990.3)

$$\log(\text{CON}) = \text{C040} + \text{C041.TF} + \text{C042.log[COND]} + (1-\text{C042}).\log[\text{CON}(-1).\text{GR}] \\ + \text{C043.}[UR-UR(-1)] + \text{C044.}[RLIP-RL] + \text{C045.YCURVE}(-4)$$

where:

$$\log[\text{COND}] = (2/3).\log[(1-\text{POL1}).\text{W.NT}+\text{TRPUPR}+(\text{POL14}-\text{POL3}).\text{GDP\$}] \\ + (1/3).\log[\text{M}+\text{B}-\text{ZPA}-\text{ZP}/\text{ED}+\text{PYD}.\text{(KH+KINF+KF-FKF)} \\ +\text{PEXC.KIF}]-\text{LPCON}$$

Coefficient	Estimate	Standard Error
C040	-0.2527	(0.0472)
C041	0.004578	(0.000848)
C042	0.3511	(0.0646)
C043	-0.00333	(0.00226)
C044	0.002839	(0.000678)
C045	-0.000974	(0.000455)
R ² = .9976	SE = .00620	DW = 2.05

Autocorrelation Test (B-G):	chi ² (5)	=	0.76
Heteroskedasticity Tests (B-P):	asy. t-stat	=	2.54*
Structural Change Test (Chow):	F(6,47)	=	1.71

The six explanatory variables are discussed in turn below.

- (i) The time trend, TF, has a high t-statistic of 5.4. When the model is used for forecasting, the TF variable is held fixed at its value at the end of the historical period.
- (ii) The second variable, COND, is the most important variable in the equation and is constructed as a geometrically weighted average of after-tax labour income, plus transfers from the public and foreign sectors,
(1-POL1).W.NT+TRPUPR+(POL14-POL3).GDP\$,
and private non-human wealth,
M+B-ZPA-ZP/ED+PYD.(KH+KINF+KF-FKF)+PEXC.KIF.

The elasticities attached to these variables are $2/3$ and $1/3$ respectively, and are broadly consistent with equal propensities to consume out of both labour and property income. Free estimation gave an elasticity for non-human wealth which was higher than, but not significantly different from, the imposed value.

(iii) The lagged dependent variable $CON(-1)$ appears next, and its estimated coefficient implies a mean lag of two quarters before a change in equilibrium consumption is transmitted to actual consumption.

(iv) The change in the unemployment rate,
 $UR-UR(-1)$,

enters with a negative sign. Rising unemployment may reduce consumption by increasing the probability a consumer attaches to losing his own job at a future date.

(v) The difference between the average interest rate paid on outstanding government bonds, and the interest rate on newly issued bonds,

$RLIP-RL$

enters with a positive sign. A lift in the interest rate on newly issued bonds above the average interest rate paid on the outstanding stock will result in a capital loss for holders of the outstanding stock which may reduce consumption.

(vi) The change in differential between the interest rate on 90-day bank bills and 10-year bonds between the current quarter and the average value in the previous year,

$YCURVE$

appears with a lag of four quarters and is intended to capture the tightness of monetary policy.

All of these variables are statistically significant except for the inflation variable; the equation has a standard error of 0.6 per cent which is good for an Australian consumption function and, apart from some evidence of heteroskedasticity, all of the diagnostic tests are passed.

Presumably the time trend is serving as a proxy for important omitted variables. Two possibilities are taken up in Smith (1991). The first is demographic change. The second is that financial market deregulation has reduced the savings ratio by removing barriers to both domestic and overseas borrowing. Smith reports some encouraging results for that hypothesis but, as cautioned in Appendix B, more research is needed in this area.

REFERENCES

- Ando, A. and F. Modigliani (1963) 'The "Life Cycle" Hypothesis of Saving: Aggregate Implications and Tests', *American Economic Review*, 53 (1), 55-84.
- Anstie, R.K., M.R. Gray and A.R. Pagan (1983) 'Inflation and the Consumption Ratio', in A.R. Pagan and P.K. Trivedi (eds), *The Effects of Inflation: Theoretical Issues and Australian Evidence*, Centre for Economic Policy Research, Australian National University.
- Aschauer, D.A. (1985) 'Fiscal Policy and Aggregate Demand', *American Economic Review*, 75(1), 117-127.
- Barro, R.J. (1974) 'Are Government Bonds Net Wealth?', *Journal of Political Economy*, 82(6), 1095-1117.
- Castles, I. (1991) 'Comment' on P.J. Stemp 'Saving, Policy and Growth', this volume.
- Dornbusch, R. (1976) 'Expectations and Exchange Rate Dynamics', *Journal of Political Economy*, 84(6), 1161-76.
- Edey, M. and M. Britten-Jones (1990), 'Saving and Investment in the 1980s', paper presented to the Conference The Australian Macro-Economy in the 1980s, Reserve Bank of Australia, June.
- EPAC (1986) 'External Balance and Economic Growth', Council Paper No. 22, Canberra: AGPS.
- EPAC (1988a) 'Australia's Medium-term Growth Potential', Council Paper No. 30, Canberra: AGPS.
- EPAC (1988b) 'Trends in Private Saving', Council Paper No. 36, Canberra: AGPS.
- EPAC (1990) 'Australia's Capital Needs in the 90s', Council Paper No. 43, Canberra: AGPS.
- Feldstein, M. and G. Fane (1973) 'Taxes, Corporate Dividend Policy and Personal Saving: The British Postwar Experience', *Review of Economics and Statistics*, 55 (4), 399-411.
- Feldstein, M. (1973) 'Tax Incentives, Corporate Saving and Capital Accumulation in the USA', *Journal of Public Economics*, 2(2), 159-171.
- Hendry, D.F. and J.F. Richard (1982) 'On the Formulation of Empirical Models in Dynamic Econometrics', *Journal of Econometrics*, 20(1), 3-33.
- Keating, P.J. (1989) 'Address by the Treasurer, the Hon P.J. Keating MP in Support of the ALP Candidate for Parramatta, Mr Paul Elliott', Parramatta Leagues Club, Sydney, 9 August.
- Keating, P.J. (1990), 'Consumption Tax and Other Myths', Address by the Treasurer, the Hon P.J. Keating MP to the National Press Club, Canberra, 9 May.

- Kormendi, R.C. (1983) 'Government Debt, Government Spending and Private Sector Behaviour', *American Economic Review*, 73 (5), 994-1010.
- McKibbin, W.J. (1988) 'Policy Analysis with the MSG2 Model', in M.E. Burns and C.W. Murphy (eds), 'Macroeconomic Modelling in Australia', *Australian Economic Papers*, Supplementary Conference Issue, 61-88.
- Morgan, D. (1990) 'Consumption Tax Reform', paper delivered at the Hilton Hotel, Sydney, 30 May.
- Murphy, C.W., I.A. Bright, R.J. Brooker, W.D. Geeves and B.K. Taplin (1986) 'A Macroeconometric Model of the Australian Economy for Medium-term Policy Analysis', EPAC Technical Paper No. 2, Canberra.
- Murphy, C.W. (1988a) 'An Overview of the Murphy Model', in M.E. Burns and C.W. Murphy (eds), *Macroeconomic Modelling in Australia*, Supplementary Conference Issue of *Australian Economic Papers*, 175-199.
- Murphy, C.W. (1988b) 'Rational Expectations in Financial Markets and the Murphy Model', in M.E. Burns and C.W. Murphy (eds), *Macroeconomic Modelling in Australia*, Supplementary Conference Issue of *Australian Economic Papers*, 61-88.
- Murphy, C.W. (1989a) 'The Macroeconomics of a Macroeconometric Model', *mimeo*, Australian National University.
- Murphy, C.W. (1989b) 'The Budget Strategy and Foreign Debt', *Australian Economic Review*, 4'89, 32-51.
- Murphy, C.W. (1990) 'Forecasting with a Macroeconometric Model of Australia', *Western Australian Economic Review*, 10(1) (June), 8.1-8.16.
- Pagan, A.R. and A.D. Hall (1983) 'Diagnostic Tests as Residual Analysis', *Econometric Reviews*, 2 (2), 159-218.
- Parsell, B.F., A.A. Powell and P.J. Wilcoxon (1989) 'The Effects of Fiscal Restraint on the Australian Economy as Projected by the Murphy and MSG2 Models: A Comparison', Discussion Paper No. 225, Centre for Economic Policy Research, Australian National University.
- Smith, P.N. (1991) 'The Consumption Ratio: Australian Evidence', this volume.
- Stemp, P.J. (1991) 'Saving, Policy and Growth', this volume.
- Treasury, Dept of (1990), 'Saving, Investment and the Current Account Deficit', *Budget Paper No. 1*, 1990-91, 2.47-2.55.

SECTION III
SAVING IN AUSTRALIA

**The Consumption Ratio:
Theory and Australian Evidence**

Peter Smith

Saving and Taxation

Matthew Benge and Robert Albon

**Demographics, Retirement Saving and
Superannuation Policy**

*Hazel Bateman, Jack Frisch, Geoffrey Kingston,
John Piggott*

THE CONSUMPTION RATIO: THEORY AND AUSTRALIAN EVIDENCE

Peter N. Smith*

1. Introduction

The consumption decision is one of the most basic choice decisions in economics and the consumption function is at the core of most macroeconomic models. Understanding the determinants of this decision at both the micro and macro economic level is therefore of great importance. The behaviour of consumption at the aggregate level in Australia over the past twenty years has produced a number of puzzles. These puzzles have centred on the substantial shifts that have taken place in the consumption ratio. Figure 1 shows the household sector consumption ratio, which is the ratio of private consumption expenditure to household disposable income. In the 1970's the consumption ratio fell and research concentrated upon the implications of high and variable inflation. This research, which is well represented by the collection of papers in Pagan and Trivedi (1983), led to a concentration upon the distributional effects of inflation, and other asset price changes, on consumption through the revaluation of assets and liabilities.¹ During the 1980s the consumption ratio tended to rise and research has concentrated upon a more varied set of explanations. This paper considers the determination of aggregate consumption emphasising the implications of constraints on borrowing, the effects of financial market deregulation, and the more general issue of aggregation across individuals in the population.

The analysis of consumption and saving can take place at a variety of levels of aggregation of types of good and consolidation of sectoral accounts. A number of explicit assumptions are made concerning the appropriate level of each. Total consumption expenditure is chosen as the level of aggregation. On consolidation it is also assumed that the household is the appropriate level at which to model consumption. There appears to be strong evidence that the relative fungibility of assets held is of importance for the consumption decision. Given that the household sector holds assets with financial institutions within the domestic private sector, a complete consolidation of the private sector accounts might be expected to obscure the structure of both assets and liabilities held by parts of the private sector. If it is assumed, however, that net of foreign holdings of Australian business assets, the household sector owns the business sector and treats its assets as

* The author is grateful for comments from Bob Gregory, Karen Mumford, Chris Murphy, Brett Ryder, Andrew Scott, Peter Stemp, an anonymous referee and participants at the conference, with the usual disclaimer.

1 See also Pesaran and Evans (1984) for discussion of the effects of changes in various asset prices on consumption and evidence for the UK.

net financial wealth then modelling of the private sector consumption ratio is appropriate. The extent to which households see through the 'corporate veil' in making their consumption and saving decisions is discussed in some detail by Edey and Britten-Jones (1990). They support consolidation arguing that the distinction between the household and business sectors is essentially artificial. They note that activities such as self-employment, which is currently included in the official definition of the household sector, could justifiably be included in the business sector. Both possibilities are considered in the empirical results below. A comparison of the consumption ratios of the household and private sectors is helpful in assessing any differences in experience over the recent past. In Figure 2 the two ratios are shown for the period since 1973. It is clear that both have risen substantially over the period. These developments are mirrored in the estimation results analysed below.

In any analysis of consumption and saving the interaction of real and financial decision making is of prime importance. It will be useful to establish some stylised background facts about the household sector before considering the modelling of the consumption/saving decision. The sector has been in substantial financial surplus for much of the past twenty years. Comparison of Figures 2 and 3 illustrates, however, that the financial surplus of the household sector is quite highly negatively correlated with the consumption ratio and has fallen significantly in recent years. The last flow of funds data published by the Reserve Bank of Australia, (*RBA Bulletin*, November 1989) shows the household sector in financial deficit for the first time in the recent past; \$5.0bn. in 1989.² Figure 3 shows that there has been a steady decline in the financial surplus since 1982, over which time the consumption ratio has risen substantially.³ One explanation for the shift in the net financial position is the effect of relaxation of credit constraints.

In a world of freely available credit it is not clear why the household sector as a whole chose to remain in financial surplus for a sustained period and be exposed to the capital losses that result from general price inflation. Risk averse behaviour, as well as the desire to make bequests, would lead to some net holding of assets. But if net asset holding was due to imperfections in credit markets which restricted borrowing then some decline in the surplus could be expected to follow deregulation of financial markets. The age structure of the population may also play a role.

Over the past twenty years demographic trends have shown a rise in the ratio of the over 65 year olds to the prime aged population (referred to below

² The first flow of funds estimates produced by the ABS for the first half of 1989 suggest that this trend continued through 1989. The unattributed residual in the accounts for the household sector was \$10.2bn in 1987-88. The inaccuracies in the flow of funds data make analysis difficult. However, the trend over the post-1982 period seems clear in the data.

³ Figure 3 shows data published by the Reserve Bank in 1986 and 1989. Revisions made to the data in 1989 were not made to the figures prior to 1979-89, therefore both sets of data are shown in the figure.

as the aged dependency ratio), and a fall in the proportion of 45-54 year olds. As the latter age group comprises the biggest savers, both in absolute and relative terms, we might expect this development to affect the aggregate consumption ratio. Many other developed economies have been subject to similar trends in both changes in the consumption ratio and demographic profile. A causal relationship between these developments is suggested by the empirical results given below and research from other countries. An example of these results for the UK is given in Scott et al (1990). Demographic issues are discussed further in Section 2.

Further evidence for the proposition that the net position of the household sector has changed substantially over recent years can be observed in Figure 4. The volume of consumer debt of all types has risen substantially relative to the household sectors holdings of liquid assets over the past decade.⁴ This has led the sector as a whole to move from a position where inflation induced capital losses, to a position where inflation can be expected to have a much smaller negative effect on income. The causes of these changes are varied. Both the level of holdings of liquid assets and debt are endogenous variables and can be expected to respond to shocks that affect both income flows and consumption and savings decisions. In the analysis below, both the effects of lower inflation over the last fifteen years and, more recently, the effects of demographic developments and financial deregulation are emphasised.

In the empirical results in Section 4 it is found that there has been a significant upward drift in consumption since the mid-1970's given both income and wealth. This result is robust regardless of which model of consumption behaviour is employed. Some of the drift is due to reduced inflation, but much appears to be due to demographic changes and a residual which we might wish to attribute to financial deregulation. Although the evidence supporting the latter explanation is not particularly strong, taken with the auxiliary data analysis presented in Section 2, the empirical results suggest that consumers have been able to borrow substantially more to finance higher consumption given the level of disposable income.

⁴ The construction of the series shown in Figure 4 is described in detail in the data appendix. In brief, the debt series is made up from housing and non-housing consumer debt with an allowance for borrowing by persons to finance house purchase for investment purposes. The liquid asset series contains estimates of both interest and non-interest bearing assets held by persons.

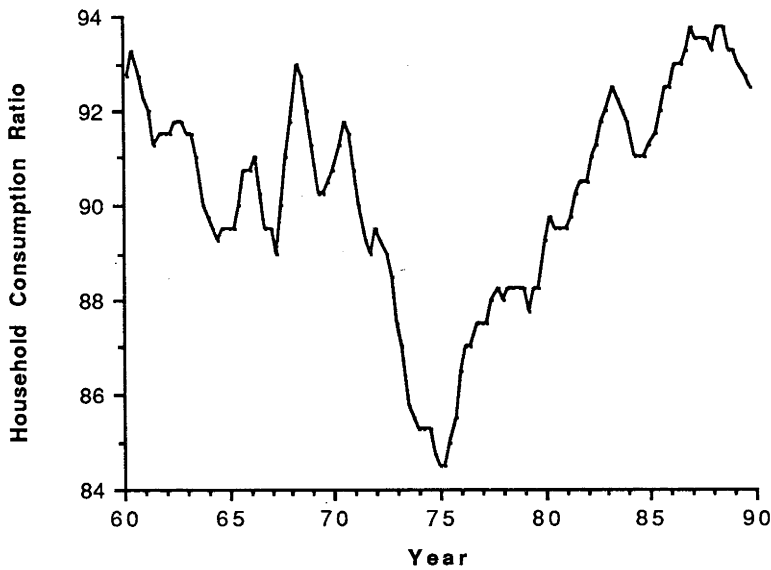


Figure 1: Household Consumption Ratio

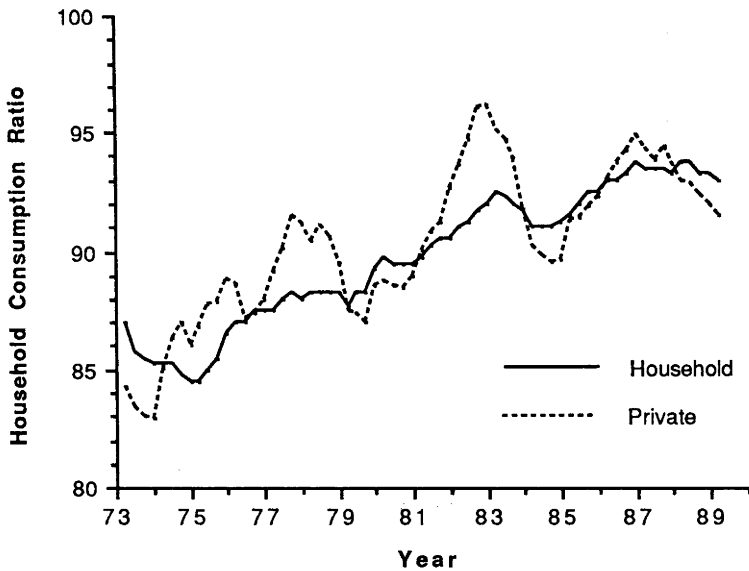


Figure 2: Household and Private Sector Consumption Ratio

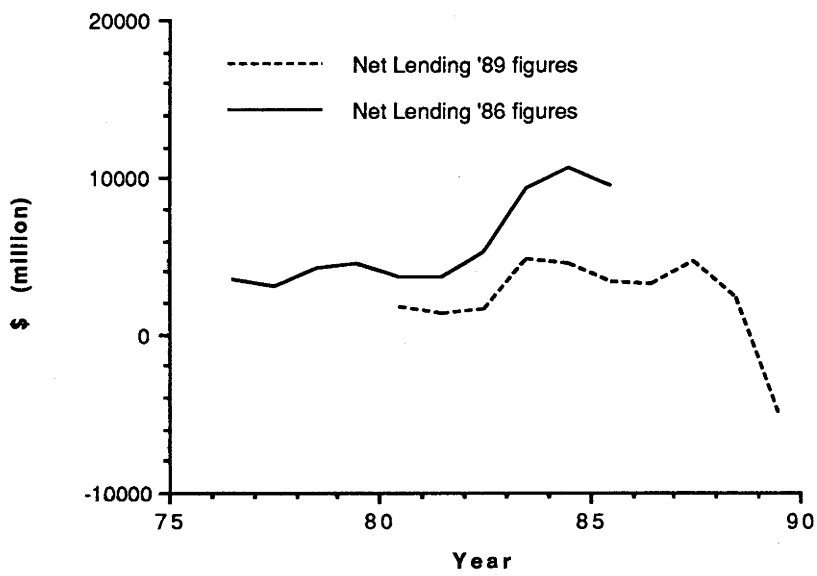


Figure 3: Net Lending by the Household Sector

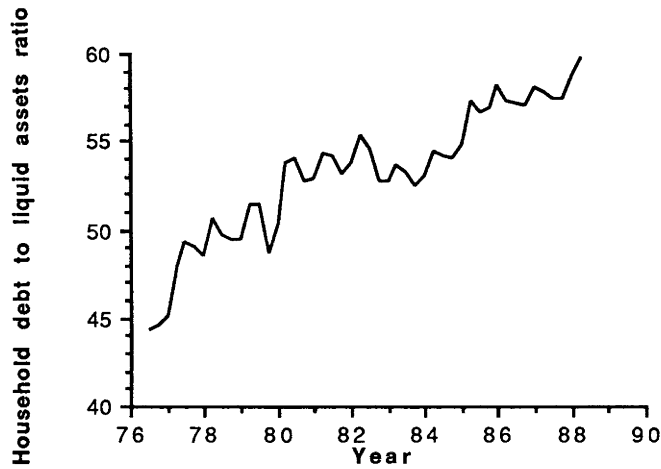


Figure 4: Household Debt to Liquid Assets Ratio

2. Modelling Consumption Expenditure

Measurement issues in consumption and income

The impact of inflation on income, saving and consumption has been the source of much research over the period since the mid-1970's when double-digit inflation occurred for the first time, on a wide scale, since the 1920's. Inflation has two effects on the relationship between income flows and consumption: the first concerns the measurement of income and the second the uncertainty of whether observed inflation represents absolute or relative price changes. In this and subsequent sections a number of approaches to modelling consumption decisions are discussed as a preliminary to the empirical analysis below. Simple models where emphasis is put on the definition of income are discussed first. The absence of optimising behaviour by consumers in these models is rectified in later discussion of a model where intertemporally optimising agents are assumed to face borrowing constraints.

Anstie et al (1983) and Pesaran and Evans (1984) present strong evidence of the importance, when measuring income, of taking into account any nominal capital gains and losses which have taken place over the current time period and to include these gains and losses in the measurement of income. The precise role of inflation in modelling consumption depends on the precise form of the consumption function being used. Anstie et al use the relationship:

$$C_t = \alpha + \beta Y_t^h \quad (1)$$

where real consumption expenditure C_t is a per-period function of real Hicksian, or economic income, Y_t^h . This is the amount of income that can be consumed in the current period whilst leaving financial wealth unchanged. They show that this relationship becomes:

$$C_t/Y_t^d = \alpha/Y_t^d + \beta - \beta \Delta p_t (A_{t-1}/Y_t^d) \quad (2)$$

where the initial value of total real financial wealth is A_{t-1} , current period real disposable income, as usually defined, is Y_t^d and consumer price inflation Δp_t . Variables in lower case are defined to be in logarithms and for any variable x_t ; $\Delta x_t = x_t - x_{t-1}$. If there are capital gains made on the stock of wealth, then (2) becomes:

$$C_t/Y_t^d = \alpha/Y_t^d + \beta + \beta (cg_t - \Delta p_t)(A_{t-1}/Y_t^d) \quad (3)$$

where cg_t is the rate of change in the nominal price of A_t . If p_t^A is the logarithm of the nominal price of A_t then $cg_t = \Delta p_t^A A_{t-1}$. If A_t were composed entirely of money then cg_t would be equal to zero.⁵ This simple

⁵ The calculations reported by Edey and Britten-Jones (1990) and by Stemp (this volume), show the implications of this adjustment for the measurement of the savings ratio. The

consumption function (3) neglects the importance of intertemporal calculations; it concentrates on the measurement of *current* period income only. The most celebrated formulation which takes an explicitly intertemporal view of the consumption expenditure choice is the lifecycle hypothesis due to Ando and Modigliani (1963). The relationship between consumption and total wealth suggested by Ando and Modigliani was

$$C_t = aW_t$$

where W_t is equal to the sum of financial wealth A_t and human wealth (which is the discounted expected sum of lifetime labour income). Assuming a constant interest rate and if labour income follows a random walk, this formulation would lead to a relationship of the form:

$$C_t = \gamma_0 + \gamma_1 Y_t + \gamma_2 A_t + \varepsilon_t \quad (4)$$

where Y_t is labour income and the discount rate and any drift parameters are included in the coefficients. For comparison with other models, it is more convenient to estimate equation (4) in logarithms. Muellbauer and Murphy (1990) show that if real income follows a random walk with drift, then

$$W_t = A_t + Y_t/(R-g)$$

where R is the real interest rate (assumed constant) and g is the long-run growth rate of income

(i.e. $g = \Delta \tilde{Y}_T / \tilde{Y}_{T-1}$, for long-run values of income $\tilde{Y}$).

In logarithms we need an approximation to

$$\ln(W_t) = \ln(A_t + Y_t/(R-g)), \text{ which is}$$

$$\ln(W_t) \approx \ln(Y_t/(R-g)) + (R-g)A_t/Y_t.$$

This log linearisation, conveniently allows the consumption function (4) to be written as:

$$c_t = \alpha_0 y_t + \alpha_1 (A_t/Y_t) + \alpha_2 Z_t + \varepsilon_t \quad (5)$$

where variables in lower case are in logarithms and Z_t is a set of additional variables to be outlined below. This equation forms the basis for part of the estimation given in the following section, where the precise form of the equations estimated is also described.

Rational expectations and the intertemporal consumption decision

The formulations of the consumption relationship given above are not based on any explicit solution to an intertemporal optimisation problem. Much recent research has been directed towards the implications of intertemporal decision making, assuming that agents form expectations rationally.

form of the relationship is of more importance for the modelling of consumers expenditure.

Intertemporal optimisation generates at least one important behavioural implication which has been the subject of much empirical examination. As can be seen from the discussion in the appendix to Smith (1991), assuming that consumers can borrow and lend at a given real interest rate R_t and have rational expectations:

$$c_{t+1} - c_t = (1/\alpha)[\alpha_0 - \ln\beta + E_t \ln(1+R_t)] + \varepsilon_{t+1} \quad (6)$$

Thus the change in the log of consumption is unpredictable given the real interest rate.⁶ In particular, the change in consumption is unaffected by the current level of income (aside from its unanticipated component).

The empirical results presented by Flavin (1981) and Campbell and Mankiw (1989) clearly reject this form of the model in favour of an equation where the change in consumption is determined partially by current period disposable income. Many authors have identified the so-called 'excess sensitivity' of consumption to current income as *prima facie* evidence for the presence of liquidity constraints. (Hall, 1978; Flavin, 1981; and Campbell and Mankiw, 1989, all use this argument.) An alternative hypothesis, suggested in all of these papers, is that there exists a group of consumers who are unable to carry out the intertemporal substitution of income flows by borrowing optimally in the current period. These consumers, therefore, have to consume out of current period income. It is assumed that this group receive a proportion γ_t of total disposable income. Their consumption expenditure can be written as:

$$C_t^c = \gamma_t Y_t^d \quad (7)$$

The proportion γ_t cannot be measured directly but it can be identified from the aggregate equation which results from combining equations (6) and (7). For the moment we abstract from variation in the interest rate. The usual assumption made in the estimation of this equation is that γ_t is a constant γ over the estimation period. The aggregate Euler equation then becomes:

$$C_t - C_{t-1} = a_0 + \gamma(Y_t^d - Y_{t-1}^d) + \varepsilon_t \quad (8)$$

The equation has been estimated by a number of authors, including Japelli and Pagano (1989) who present results for seven countries. Using annual data from the early 1960s to the late 1980s, they find that γ is positive and significantly different from zero for all countries except Sweden. In particular, they find estimates ranging between 0.12 and 0.58: Greece, Spain and Italy, have estimates of γ greater than 0.5; Sweden and USA, less than 0.3; Japan and the UK lie between these two groups. These results produce a ranking of excess sensitivity, the USA and Sweden being the least sensitive. For Australia results have been presented by McKibbin and Richards (1988). Using a variety of specifications and formulations on annual and quarterly data between 1962 and 1987, they obtain estimates of γ in the range 0.11 to 0.5.

⁶ There are further restrictions on the generality of the result and these are described by Hansen and Singleton (1983).

(In most cases they find their estimates of γ to be significantly different from zero and unity.) These results put Australia in the group of countries with relatively little excess sensitivity of consumption to current income.

The question of the likely size of the liquidity constrained group of consumers can also be examined by analysis of the size of the market for consumer debt. Japelli and Pagano (1989) show that the ranking of the ratio of the outstanding stock of consumer debt to consumption expenditure is similar to the country-ranking by degree of excess sensitivity. The proportions, based on the sum of housing and other consumer debt, range from 117 per cent for Sweden, to 33.8 per cent for Japan, and 10 per cent for Italy and Greece. On a comparable basis, Australia has housing loans at 25.4 per cent and other consumer loans at 12.6 per cent of annual consumption expenditure, making 38 per cent in total. Again, this puts Australia within the group of countries where consumers borrow more actively from capital markets.⁷ To analyse whether the extent of this activity has changed recently, we examine data from 1977 to 1988 in Figure 5, where it can be seen that both ratios have risen substantially over the period from 1983. The mortgage ratio has risen by some five percentage points and other lending by three. These results provide some evidence for the proposition that the existing constraints are of less importance than they once were.

Clearly, this issue can be clarified by specifically modelling borrowing by consumers, providing the following consumption function which is described in more detail in Smith (1991):

$$c_t = y_t + (R-g)(A_t/Y_t) + (1-1/\alpha) E_t \sum_{j=1}^{\infty} \alpha^j \ln(1+R_{t+j}) \\ - 1/\alpha E_t \sum_{j=0}^{\infty} \alpha^j \ln(1+\mu_{t+j}) + \alpha(k-a_0/\alpha)/(1-\alpha) \quad (9)$$

where R is the real interest rate, g is the long-run growth rate of income and μ_t is the discounted present value of an indicator variable for the presence of a liquidity constraint: ψ_t . ψ_t is positive in any period when the constraint binds and the representative consumer is unable to borrow as much as he wants. It is otherwise equal to zero.

From the above discussion of the model, it is clear that the form of the constraint is likely to be more complicated than simply assuming that the consumption of the liquidity constrained group is a constant function of the current level of income. In particular, the current effect of the constraint on a currently liquidity constrained individual depends upon whether he expects to be constrained in the future. In terms of equation (9) this would

⁷ These proportions are the average of annual figures for the period 1980 to 1985. Taxation differences across countries complicate the ranking. Japelli and Pagano note the difficulties but point out that this cannot alone explain the rankings. It is not obvious that the relatively substantial borrowings by Australian consumers can be explained only by relatively attractive tax incentives compared to countries such as Italy and Greece.

mean positive values for $E_t(\ln(1+\mu_{t+j}))$ for $j>0$. The simple relationship between current period changes in consumption and income will also be affected by any current holdings of assets. These holdings are included in the calculation of the shadow price μ_t and will be run down to some extent by the constrained consumer in order to achieve the constrained intertemporally optimal level of consumption. It may, of course, be the case that the current level (or change) in income will be a good indicator of the impact of the binding constraint on the current level of consumption. This is essentially an empirical question. To have an understanding of the likely extent, and determinants, of the constraint in the Australian context it is instructive to examine the behaviour of the financial institutions over the past fifteen years, as well as the changes in regime that these institutions have faced. This is presented in Section 3. Empirical assessment of the importance of the issues raised is made in Section 4.

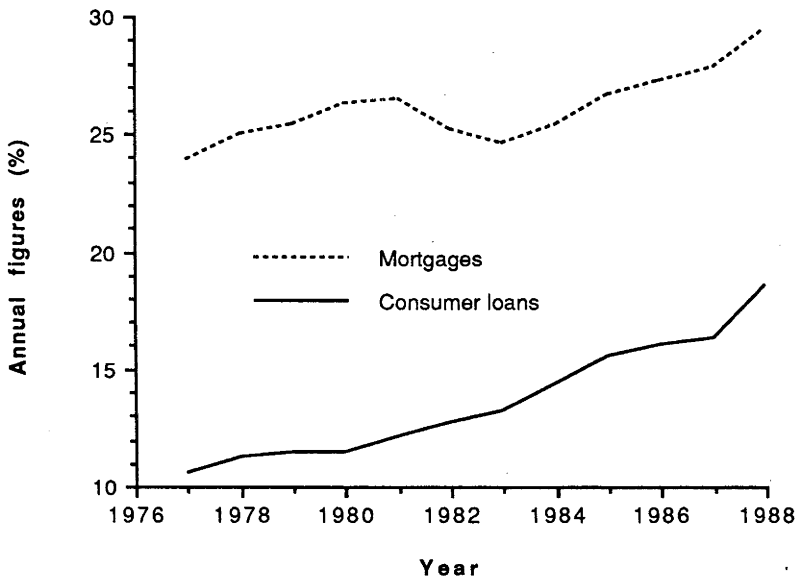


Figure 5: Ratio of Consumer Debt to Consumption Expenditure

3. Modelling Issues

Financial deregulation and financial institutions

In the period since 1980 Australian financial institutions, and especially the banks, have faced substantial change in the rules governing their behaviour. In common with banks in many countries, in the period up to 1980 the level of bank lending was determined primarily by the level of bank deposits from the private sector. As Battellino and McMillan (1989) document, the trading banks in Australia were asset managers; allocating available funds between the various possible borrowers at almost predetermined interest rates. The ceilings on both deposit and lending rates ensured that the trading and savings banks were virtually passive recipients of private sector deposits. Figure 6 illustrates that, in the period up to the end of 1980, lending growth lagged behind deposit growth. In December 1980, the controls on interest rates paid to depositors were abolished allowing the banks to compete for retail funds. The impact of this change in controls was somewhat muted by the fact that the ceiling on the interest rate charged on advances remained. These ceilings on bank interest rates were abolished in April 1985, with the exception of loans for owner-occupied housing which remained in force for another year.⁸ One way of looking at the impact of the changes in the controls is to examine the spread between interest rates on lending and deposits. In Figure 7 the average rate charged on an overdraft under \$100,000 and the interest rate on a weighted average of trading bank fixed deposits are shown. There is an obvious increase in the spread between lending and deposit rates in April 1985, illuminating the improved profitability of the trading banks retail business following the abolition of the ceiling on borrowing rates. The data in Figure 6 shows that a substantial growth in net lending to the household sector took place subsequent to the abolition of the interest rate ceiling in early 1985. Much of this lending was financed from new sources such as borrowing from overseas by banks and various non-deposit liabilities (including the issuance of bills), and some finance from capital through the birth of new banks. The consequence of all of these developments is a substantial reduction in the likelihood of supply volume constraints applying to household demand for borrowing. In terms of the model presented in the appendix to Smith (1991), which is summarised in equation (9) above, these developments can be seen to have reduced the stringency with which financial institutions enforced the income test on the ability of potential borrowers to repay loans. The availability of additional types of borrowing not directly, or continually, subject to the income test would have had a similar effect (credit card accounts would be an example).

⁸ The interest rates charged on existing loans under \$100,000 are still subject to a ceiling of 13.5 per cent.

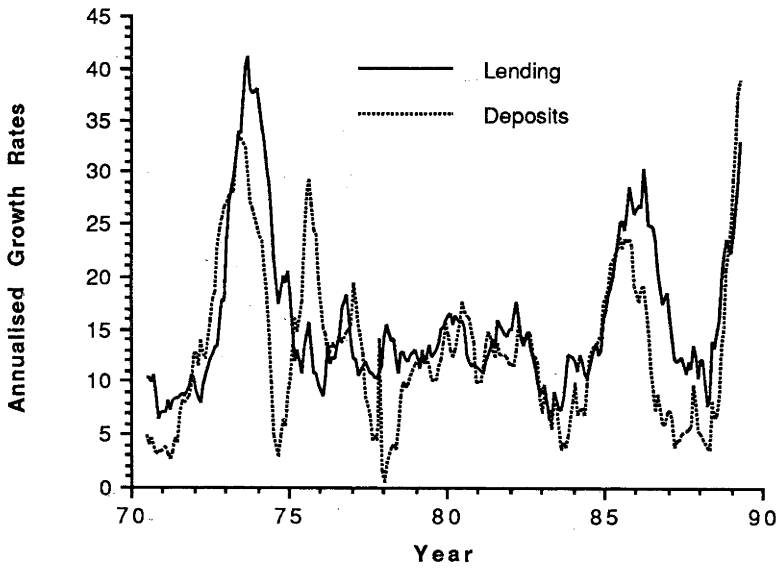


Figure 6: Trading Bank Lending and Deposits

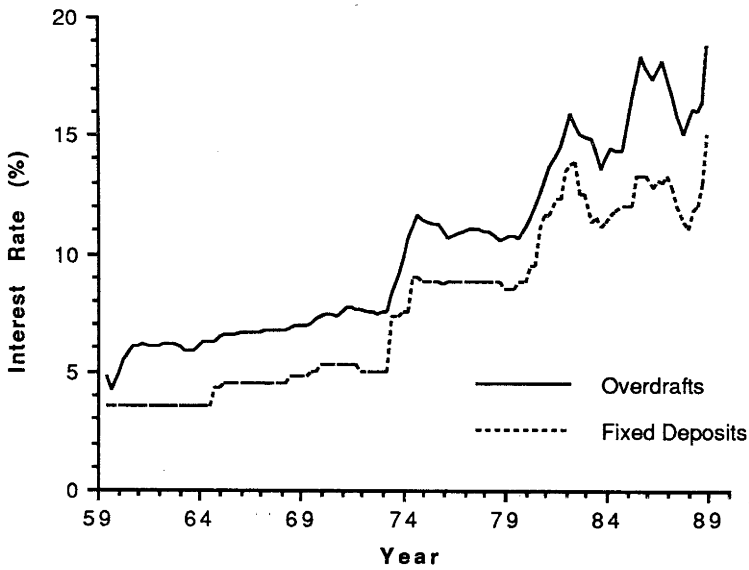


Figure 7: Trading Banks Interest Rates

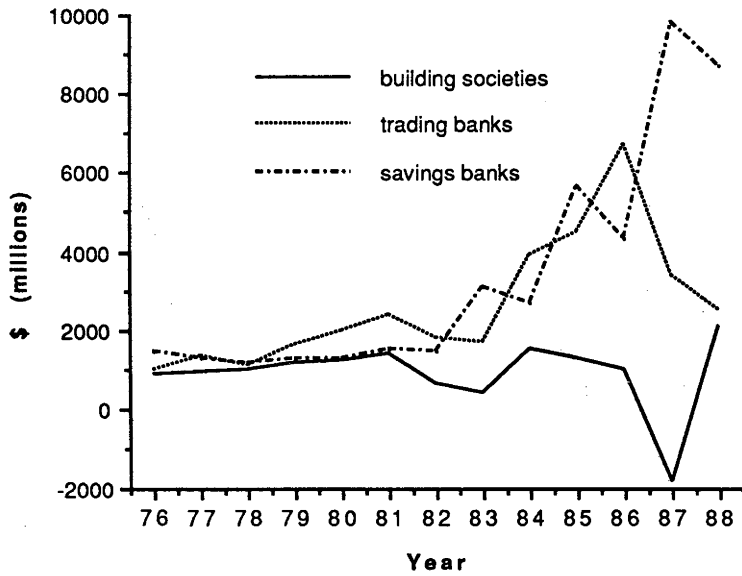


Figure 8: New Lending to Households by Financial Institutions



Figure 9: Proportion of 45-54 Year Olds in the Population

The impact of financial deregulation on the banks is only part of the picture describing the borrowing opportunities facing the household sector. The other major lenders are the building societies and the savings banks. In Figure 8 the levels of new lending to the household sector by each type of institution are given. It should be noted that a problem of definition occurs late in the 1980's when some building societies and savings banks became part of trading banks, or operated as trading banks in their own right. Given that much of the lending by both building societies and savings banks has been in the form of lending for house purchase, the growth in their lending has been affected by the regulation governing the ceiling on the interest rates that could be charged on mortgages. Much of the substantial growth in the share of the household lending market that the building societies and savings banks have acquired in the late 1980's is associated with the rise in house prices in urban Australia at that time. These developments are, of course, closely related.

It is reasonable to expect that the changes to the regulation of financial markets since 1975 have affected the availability of credit to finance consumption. The empirical analysis below attempts to capture the impact of the constraints in two ways. First, given that the supply of credit by the banks has depended directly on the net surplus of the household sector, the availability of credit could be expected to be related to the ratio of household liquid assets to the level of household debt. Second, the level of credit offered by the banks could also be a function of the spread between interest rates on bank lending and deposits. This can be justified in two ways. First, deregulation of interest rate levels, especially bank lending rates, made retail loans a more profitable activity than had previously been the case. This can be expected to result in increased availability of retail loans. Second, other more fundamental imperfections in the market for credit will result in the volume of available credit being closely related to the differential, or wedge, between lending and deposit rates. The importance of these wedges can be explained by a number of market clearing, and non market clearing, models. The models developed by King (1986) and Scott (1990) both produce the result that risk averse banks will create a positive wedge between the lending rate charged on loans and the deposit rate offered to depositors. This wedge is used to offset the expected cost of default on loans and their effect on the banks balance sheet. These considerations imply that the wedge and the amount of available credit are positively correlated. Below we consider the empirical impact of these effects within the rational expectations version of the lifecycle model of consumption.

Demographic effects

The model used to describe the consumption and savings behaviour of aggregated individuals is based upon the idea of a representative consumer. However, we can expect that the predicted differences in savings patterns across age groups will result in an aggregate relationship which will be affected by the age structure of the population. A recent investigation into the structure of savings rates by age group is reported in *Trends in Private Saving* (EPAC, 1988). In that analysis of the 1984 Household Expenditure

Survey it was found that the savings ratios of the 30-39 and 50-59 year old head of households were the highest at about 12.5 per cent.⁹ Given that the latter group has the higher income and expenditure per head, any change in the relative size of this group could be expected to have the largest effect on the aggregate savings rate.

The authors of the EPAC study use their estimates of age-specific savings rates to simulate the implied change in the aggregate saving rate from the actual and predicted changes in the age structure of the population. They find that this would result in a very small (less than half a percentage point) reduction in the aggregate saving rate between 1971 and 1991. Although, their calculations can be expected to understate the impact of the demographic changes as they assume incomes are constant. Further evidence on the savings rates of various age groups is provided for the United States by Carroll and Summers (1989) and for Australia by Edey and Britten-Jones (1990). Both studies reveal that relative income, and relative consumption, of each of the age groups are highly correlated in a particular cross-section of individuals. These results suggest little tendency for consumption smoothing of the type suggested by the lifecycle model.

In the following estimation the relative size of the 45 to 54 age group is concentrated upon. Figure 9 shows that this group has fallen by one percentage point as a proportion of the population over the last fifteen years. (There has been a corresponding rise in the number of both the young and the old aged as a proportion of the population.) A fall in the savings ratio could be expected, *ceteris paribus*.

Evidence from other countries provides some support for this explanation of recent declines in aggregate savings ratios. Indeed, demographic trends in the UK and US have some similarities to changes in Australia. Scott et al. (1990) show that the proportion of 45 to 65 year olds in the UK population fell by nearly three percentage points between 1968 and 1987. Their results suggest that this led to a fall in the consumption ratio of between one and two percent (although, these results are sensitive to the exact specification of the equation estimated).¹⁰ Bateman et al (this volume) analyse a panel of twelve countries across three time periods. They argue that the proportions of under-15 year olds and over-65 year olds in the population significantly reduce the savings rate. Given that over the 1970's and 80's the dependency rate (the sum of these two proportions) in Australia has risen by some 10 percentage points, it might be expected that there would be a fall in the overall savings rate over that period.¹¹

⁹ The other figures were: 15-19 years, 1 per cent; 20-29 years, 10.5 per cent; 40-49 years, 7.5 per cent; 60-69 years, -10.5 per cent; 70+ years, -2 per cent. The figures generally support the simple form of the life-cycle model of consumption. Savings in old age seem high which is, however, probably due to saving for bequests.

¹⁰ Muellbauer and Murphy (1990) present results which suggest that these demographic effects may not be very well founded. Their most persuasive results are for the effects of the relative size of the 15-29 year old age group:

¹¹ Bateman et al show that Australia is not an outlier in their cross-section of countries, which suggests that the estimation results are representative for Australia.

4. Empirical Analysis

The analysis above suggests a number of different formulations for the consumption relationship. In this section each of these approaches is examined using quarterly data from 1970 to 1988. The precise definitions of the variables are contained in the data appendix.

The first model that is examined is the Anstie et al. model, described above in equation (3). The estimated equation is:

$$C_t/Y_t^d = a_0 + a_1C_{t-1}/Y_t^d + a_2\Delta Y_t^d/Y_{t-1}^d + a_3(cg_t - \Delta p_t)(A_{t-1}/Y_t^d) + a_4N_t/Y_t^d + \epsilon_t \quad (10)$$

where the formulation in equation (3) has been modified to include a lagged dependent variable and some short-run dynamics in disposable income. This is the equation which is estimated in Anstie et al.. An additional term to equation (3) is the ratio of the total population to disposable income, which has the effect of formulating the equation in per-capita terms. It is generally insignificant as Anstie et al also found. The only variables omitted from their original formulation are seasonal dummy variables and the participation rate. The first because seasonally adjusted data is used here due to the limited availability of data on private sector wealth. The second was found to be entirely insignificant and of less interest from the point of view of the theory. It should be noted that in comparison with Anstie et al., the estimating equation includes the nominal capital gain on private sector domestic wealth,

$$cg_t(A_{t-1}/Y_t^d),$$

as well as the nominal loss due to inflation. This is in line with the derivation of the model. Anstie et al used a measure of net household financial wealth excluding equities and omitted nominal capital gains from their empirical analysis due to data difficulties. The results of the estimation are given in Table 1(a) and 1(b), where household disposable income is used as the income definition.

In column 1 of Table 1(a) ordinary least squares estimates are given for comparability with Anstie et al. Given the likely endogeneity of all of the right hand side variables, instrumental variable (IV) estimates are given in column 2 and thereafter.¹² The test statistics for misspecification, z_1 to z_5 , given in the lower part of the Table do not suggest any significant forms of misspecification, once the endogeneity of the right hand side variables is dealt with.¹³ From column 2 it is clear that the equation performs satisfactorily: apart from the population/income term all the other variables are of the sign predicted by the theory and are significantly different from zero. Comparing the results with Anstie et al; the coefficient on the real

¹² An LM test for the weak exogeneity of the right hand side variables rejects at least at the 10 per cent level.

¹³ These statistics are described in more detail in an appendix.

Table 1a

Table 1(a) : The Anstie et al Consumption Function

C_t/Y_t^d	1	2	3	4
C_{t-1}/Y_{t-1}^d	0.9210 (31.07)	0.8515 (17.87)	0.8332 (19.28)	0.8199 (22.41)
$(cg-\Delta p)_t(A_{t-1}/Y_t^d)$	0.002826 (1.99)	0.01188 (3.49)		
$(Y_t^d - Y_{t-1}^d)/Y_t^d$	-0.6670 (14.42)	-0.831 (4.07)	-0.768 (4.31)	-0.7295 (5.03)
N_t/Y_t^d	-0.00007 (0.35)	0.0001 (0.28)	-0.00015 (0.38)	-0.000446 (1.66)
$cg_t(A_{t-1}/Y_t^d)$			0.00738 (1.36)	
$\Delta p_t(A_{t-1}/Y_t^d)$			-0.0258 (1.71)	-0.0450 (5.13)
constant	0.0782 (2.58)	0.1358 (2.65)	0.1692 (3.10)	0.2018 (4.69)
se	0.643	0.836	0.677	0.572
z_1	4.77	1.90	3.05	1.84
z_2	8.73	3.45	3.87	4.07
z_3	0.185	1.89	0.417	0.0440
z_4	0.322	1.14	1.29	0.358
z_5	0.057	2.62	1.30	0.0433

Estimation methods : (1) OLS; (2)–(4) Instrumental Variables

Instruments used : constant, C_{t-1}/Y_{t-1}^d , C_{t-2}/Y_{t-2}^d , $(cg-\Delta p)_{t-1}(A_{t-2}/Y_{t-1}^d)$, $(Y_{t-1}^d - Y_{t-2}^d)/Y_{t-1}^d$,

N_{t-1}/Y_{t-1}^d , $\Delta p_{t-1}(A_{t-2}/Y_{t-1}^d)$, A_{t-1}/N_{t-1} , A_{t-2}/N_{t-2} , time.

Estimation period : 1970q1 – 1988q2

Asymptotic t ratios in brackets

Table 1(b)

Table 1(b) : The Anstie et al Consumption Function

C_t/Y_t^d	(1)	(2)	(3)	(4)
C_{t-1}/Y_{t-1}^d	0.5878 (6.16)	0.6575 (7.92)	0.7606 (11.45)	0.7524 (11.4)
$(Y_t^d - Y_{t-1}^d)/Y_t^d$	-0.5231 (3.38)	-0.5494 (3.29)	-0.6509 (3.62)	-0.6381 (4.01)
N_t/Y_t^d	0.00253 (2.16)	0.00109 (1.45)		0.00006 (0.11)
$\Delta p_t(A_{t-1}/Y_t^d)$	-0.0309 (3.19)	-0.0349 (3.54)	-0.0416 (4.13)	-0.0408 (4.27)
time _t	0.000722 (2.60)			
AGED _t		0.9363 (2.16)	0.3225 (1.86)	
PROP56 _t				-0.8209 (1.20)
constant	0.2014 (5.11)	0.1320 (2.50)	0.1848 (4.41)	0.3963 (2.39)
se	0.524	0.553	0.561	0.571
z ₁	2.21	3.97	4.82	2.92
z ₂	2.69	5.13	5.36	5.14
z ₃	0.060	0.226	0.017	0.05
z ₄	1.02	1.52	0.944	1.27
z ₅	0.150	0.02	0.0074	0.08

Estimation method : Instrumental Variables

Instruments : See Table 1(a) and additional instruments (2,3) aged_t, (4) prop56_t.

Estimation period : 1970q1 — 1988q2

Table 1(c)

Table 1(c) : The Anstie et al Consumption Function

C_t/Y_t^P	(1)	(2)	(3)
C_{t-1}/Y_{t-1}^P	0.9389 (21.2)	0.6461 (4.59)	0.827 (9.00)
$(Y_t^P - Y_{t-1}^P)/Y_t^P$	-0.7952 (20.7)	-0.5465 (4.56)	-0.7009 (8.94)
N_t/Y_t^P	0.00172 (2.52)	0.00863 (2.70)	0.00447 (2.06)
$\Delta p_t(A_{t-1}/Y_t^P)$	-0.0288 (2.33)	-0.00276 (0.15)	-0.0143 (0.86)
time _t		0.00122 (2.23)	
AGED _t			1.0120 (1.34)
constant	-0.00833 (0.13)	-0.1880 (1.74)	-0.1941 (1.27)
se	0.757	0.857	0.776
z ₁	0.855	0.737	0.060
z ₂	2.22	1.45	0.159
z ₃	0.008	1.55	0.540
z ₄	0.548	0.290	0.446
z ₅	0.858	3.44	0.707

Estimation method : Instrumental Variables

Instruments used : constant, C_{t-1}/Y_{t-1}^P , C_{t-2}/Y_{t-2}^P , $(cg-\Delta p)_{t-1}(A_{t-2}/Y_{t-1}^P)$, $(Y_{t-1}^P - Y_{t-2}^P)/Y_{t-1}^P$,

N_{t-1}/Y_{t-1}^P , $\Delta p_{t-1}(A_{t-2}/Y_{t-1}^P)$, A_{t-1}/N_{t-1} , A_{t-2}/N_{t-2} , time; plus AGED_t in column (3).

Estimation period : 1973q1 - 1988q2

capital gains in column 2 is a tenth of the size in the short and long runs, whilst the effect of the current growth rate of real income is somewhat greater. These differences may well be due to the treatment of capital gains or to the differences in the definitions of wealth. The measure used here is described in Horn (1987). To examine the first possibility, estimates of the equation separating the two terms in the nominal capital gain and the inflation loss are given in column 3 of Table 1(a). It is clear from these results that the inflation loss effect is much better determined than the nominal capital gain effect, although both have the expected sign. The size of the coefficient on the inflation loss is now double the estimate in column 2. If we ignore the nominal capital gain term then the results in column 4 show that the coefficient on the inflation loss is about half that estimated by Anstie et al. This remaining difference appears to be due to the difference in the definition of wealth. The measure used here includes real assets such as dwellings and land and net domestic holdings of business assets. These two assets are large components of net wealth. It may well be that real capital gains on these assets are not treated as income by households to the same extent as those from more narrowly defined financial assets. This would lead to the coefficient measuring this effect to be lower in these results.

The results given by Anstie et al were for the period 1966q3 to 1980q2. They also presented a test for the stability of their results over the last year of the estimation period along with a Cusum test for the stability of the equation over the entire estimation period. Some tests for the stability of the results in column 4 of Table 1(a) were calculated. First a dummy variable for the period 1980 onwards was included to test for a significant shift in the relationship. Although this test is not strictly appropriate for this estimation method, the Wald test for its exclusion gives a value of 4.47 which should be compared with the $\chi^2(1)$ critical values. This implies that the dummy variable is significant at about the 3 per cent level, suggesting that there may be a lack of constancy of this relationship. This appears to affect the value of the constant in the equation rather than the estimates of key slope coefficients. Recursive estimation shows no evidence of significant movement of the coefficients on real capital gains or income growth over the 1980's.

This hypothesis is examined further through the introduction of some additional variables. In column 1 of Table 1(b) a linear time trend is introduced and found to be positive and significant. In the discussion above two possible explanations for an upward drift in the consumption ratio over the post 1974 period were discussed, namely financial deregulation and demographic developments. Demographic effects are considered first. The dependency ratio of the over 65 year old population group is included in column 2 of Table 1(b). It is significant and positive, as would be expected. In column 3 the possibility of collinearity with the population/income ratio is examined by omitting that term from the previous estimated equation. The aged dependency ratio becomes much less significant, with a smaller coefficient. This suggests the two have offsetting effects. The proportion of the population in the age range 45-54 is included in column 4 and has the

expected significant and negative coefficient. In both columns 2 and 4 the additional variables were found to be collinear with the linear time trend but to be preferred. Non-nested tests choose the model in column 2 in preference to the other two, although the distinction between them on these grounds is fairly marginal. The size of the coefficient on the aged dependency rate does raise some questions about the magnitude of the difference between the consumption ratios of various age groups. The consumption ratio measured in disposable income terms rose from 82.8 per cent in the mid 1970's to 94 per cent in the mid 1980's. The equation suggests that the rise in the aged dependency rate of some 2.5 per cent over the same period contributed a 5.8 per cent increase in the ratio, when measured at long-run coefficients. This implies large differences between the consumption ratios of those aged over 65 and the rest of the population. The precise calculation of these differences and their behaviour over time is difficult without data on age-specific consumption ratios over time and age-specific income levels over time. The figures here seem somewhat high though. Given the discussion above of the qualitative effects of financial deregulation on the availability of credit we might attribute part of the drift, not explained by the demographic effect, to financial deregulation. This issue is discussed further below.

In Table 1(c) estimates using private sector disposable income are presented. Comparison with the previous results above suggests that the broad conclusions are the same. It has been demonstrated above that there has been a trend upwards in the consumption ratio using private disposable income as the denominator. Part of this trend is explained by the model, but the results in column 2 of Table 1(c) show that, in common with the results above, there also remains an unexplained drift. In column 3 of the table the results show that part of this drift can be explained by the increase in the proportion of aged people. Any residual drift could be attributed to the effects of financial deregulation.

It was shown in Section 2 that a preferable theoretical approach to modelling the aggregate consumption decision is provided by the Ando-Modigliani lifecycle consumption function. Next we examine estimation results for that model. This analysis also allows us to confirm that the results concerning the unexplained upward drift in the consumption ratio using the Anstie et al consumption function are not just an artifact of the particular model used. The basis for the empirical work is equation (5) above. In this case the appropriate income variable to be used is labour income as all income from wealth is assumed to be accumulated in the stock of wealth. Given that the market value of private wealth is used here, this would seem to be an appropriate assumption. The dynamic form of the equation estimated is as follows:

$$\Delta(c_t - n_t) = \alpha_0 + \alpha_1(c_{t-1} - y_{t-1}) + \alpha_2(A_t/Y_t) + \alpha_3\Delta(y_t - n_t) + \alpha_4Z_t + \varepsilon_t \quad (11)$$

where $\Delta x_t = x_t - x_{t-1}$ and variables in lower case are in logarithms. The results of the estimation of this equation are given in Table 2(a) and (b). In all cases the instrumental variables method is used in the estimation to

Table 2(a)

Table 2(a) : The Lifecycle Consumption Function

$\Delta(c_t - n_t)$	(1)	(2)	(3)	(4)
$c_{t-1} - y_{t-1}$	-0.051 (1.60)			
A_t/Y_t	0.00129 (1.48)	0.00274 (2.09)	0.00343 (3.23)	0.00123 (1.70)
$\Delta(y_t - n_t)$	0.0669 (0.40)	-0.0512 (0.19)	0.0572 (0.26)	0.3424 (1.64)
$y_{t-1} - n_{t-1}$		0.0902 (1.68)	0.0989 (2.14)	0.1872 (3.61)
$c_{t-1} - n_{t-1}$		0.0195 (0.41)	0.0362 (0.89)	-0.1585 (4.02)
$cg_t A_{t-1}$		0.002 (1.49)		
$\Delta p_t A_{t-1}$		-0.031 (2.69)	-0.033 (3.41)	
Δp_t				-0.6612 (4.10)
constant	0.2183 (1.55)	0.3252 (1.50)	0.3393 (1.80)	0.8408 (3.69)
se	0.813%	0.890%	0.770%	0.661%
z_1	0.638	0.027	0.327	1.48
z_2	4.48	0.065	0.639	4.36
z_3	2.13	2.25	1.43	0.020
z_4	0.378	0.40	1.43	0.103
z_5	0.002	0.33	0.307	0.881

Estimation method : Instrumental Variables

Instruments used : constant, $(c-y)_{t-1}$, $(c-y)_{t-2}$, $(y-n)_{t-1}$, $\Delta(y-n)_{t-1}$, $(A/Y)_{t-1}$, $(\Delta p.A)_{t-1}$, $(cg.A)_{t-1}$, time.

Estimation period : 1970q1 — 1988q2

Table 2(b)

Table 2(b) : The Lifecycle Consumption Function

$\Delta(c_t - n_t)$	(1)	(2)	(3)	(3 cont)
$c_{t-1} - y_{t-1}$	-0.2082 (3.43)	-0.260 (3.62)	-0.3014 (1.89)	
A_t/Y_t	0.00136 (1.95)	0.00171 (1.98)	0.00309 (1.32)	
$\Delta(y_t - n_t)$	0.2992 (1.38)	0.5237 (2.28)	0.4266 (2.17)	
Δp_t	-0.6368 (4.42)	-0.6489 (4.09)	0.1574 (0.22)	
AGED _t	0.3178 (1.59)			0.0143 A_t^E/Y_t (0.80)
PROP56 _t		-1.2267 (2.28)	-1.849 (1.43)	-0.0035 $\Delta(y_t^E - n_t)$ (0.05)
constant	0.906 (3.59)	1.461 (3.41)	1.674 (1.84)	-0.0191 $(y_t^E - n)_{t-1}$ (0.23)
se	0.641%	0.735%	0.726%	
z_1	0.76	2.05	1.65	
z_2	3.52	3.89	2.54	
z_3	0.11	1.47	1.00	
z_4	0.07	0.33	0.13	
z_5	1.39	8.28	0.006	

Estimation method : Instrumental Variables

Instruments used : See Table 2(a) and additional instruments (1) AGED_t, (2) PROP56,

(3) PROP56, (A_t^E/Y_t) , $\Delta(y_t^E - n_t)$, $(y_{t-1}^E - n_{t-1})$.

Estimation period : 1970q1 — 1988q2

overcome the endogeneity of the right hand side variables. The results are presented starting with Table 2(a). In column 1 the simple form of the model is given. Further experimentation with the dynamic structure of the equation did not produce any significant improvements. In this equation, and where it was data-acceptable, the long-run coefficient on labour income is restricted to equal one, as the transformation to the logarithmic form in equation (5), above, showed should be the case. In columns 2, 3 and 4 in Table 2(a) the restriction was not acceptable at the 95 per cent level and consequently not imposed.

The estimates in column 1 of Table 2(a) show that the simplest form of the model is not well determined with no significant short or long-run relationship between per-capita consumption and income or financial wealth. This result is theoretically consistent with the simple form of the rational expectations version of the lifecycle hypothesis described in Hall (1978), which implies that the change in consumption should be unpredictable by the past values of any variables. We next examine the robustness of this result.

First we test whether the definition of income that has been used is appropriate, the nominal gains and losses on financial wealth are included in columns 2 and 3. We would expect these terms to be significant if disposable, rather than labour income, were the appropriate income definition. In both columns it is the losses due to inflation which appear to be important. It may be, however, that the definition of income is not the correct explanation for the presence of inflation effects. There is a further explanation. Following the analysis of Deaton (1977), it could be suggested that current period unanticipated inflation may depress consumption as consumers mistake nominal price inflation for real price increases. To analyse that possibility, inflation is included in column 4 of Table 2(a) instead of the inflation losses from wealth holdings. This formulation is preferred as nominal per head financial wealth is not significant in addition to inflation. In this equation a significant short and long-run relationship between consumption and income is established in contrast to the results in column 1.

The test for the constancy of the estimates in column 4 of Table 2(a) generates a Wald test value of 1.81. This is only significant at the 17 per cent level and it could be concluded that this formulation is constant over the break in 1980. As an alternative test, a time trend was included and found to be significant. It can be seen from the results in columns 1 and 2 of Table 1(b) that the aged dependency variable proves not to be the most effective at explaining the upward drift in the consumption ratio in this model. The proportion of prime-savers in the population is shown in column 2 to be the most effective way of capturing the impact of demographic change on the lifecycle model. The coefficients imply that of the 13.1 per cent increase in the consumption ratio between 1974-75 and 1987-88, some 4.7 per cent was due to this demographic change. Thus demographic change does not explain all of the drift and a substantial amount remains to be explained by excluded effects such as the consequences of financial deregulation.

One possible explanation for the increase in the private consumption ratio which has not been examined so far is that private individuals regard saving by the government through budget surpluses as a substitute for their own saving. This issue can be examined in the framework of the lifecycle hypothesis. The Ricardian equivalence hypothesis propounded by Barro, and most recently discussed in Barro (1989), makes this assertion. Consumers will behave as if the accounts of the private and public sectors are completely consolidated. If government runs surpluses or deficits then the net result will be that consumers will act to offset these imbalances, essentially regarding public saving or dissaving as their own. They will do this up to the point where total (public + private) saving is at the desired level. The desired level will be given by the lifecycle model as described in section 2, above.

The appropriate test of this hypothesis within the lifecycle model is to introduce two new variables: government net disposable income Y_t^g (which should have the same effect on consumption as labour income if Barro's hypothesis is correct); and the stock of government bonds held by the private sector. This stock will not be treated as net wealth by private individuals, following Barro, and therefore have a coefficient of zero in the estimated equation. Government bonds are included in the construction of net wealth A_t that we use here, hence for the Barro hypothesis to be accepted we require the term A_t^g/Y_t to have a significantly negative coefficient, when added to the consumption function. The additional government income terms should have significant positive coefficients, equal to those on private labour income. The Barro hypothesis is, consequently, the coefficient restrictions

$$\beta_1 < 0, \beta_2 = \beta_3 > 0$$

for the following additional terms to equation (11):

$$\beta_1(A_t^g/Y_t) + \beta_2\Delta(y_t^g - n_t) + \beta_3(y_{t-1}^g - n_{t-1})$$

If these additional terms are found to be insignificantly different to zero then we can reject the Ricardian equivalence hypothesis for this data set. The results are given in column 3 of Table 2(b); the additional terms are given as a continuation of column 3. The $\chi^2(3)$ test of the Barro hypothesis has a value of 1.21 in this case, which is not significant at any reasonable level of significance. This test provides some econometric support for the observation of Edey and Britten-Jones (1990) that the patterns of savings behaviour of public and private sectors in recent data for Australia have not been consistent with the Barro hypothesis.

Finally, we consider the estimation of the narrower form of the rational expectations, lifecycle model developed above. Estimation of equation (9) requires replacing the rational expectations on the right-hand with observable variables. The standard method for achieving this transformation is to use forecasting equations for these variables. To the extent that the current values of these variable are exogenous to the

consumption ratio, we can substitute for the future expected values of these variables with the forecasts from these equations. Initially very simple assumptions are made. First, given that we cannot measure $\log(1+\mu_t)$ directly, we replace it by

$$(LA_t/D_t) \text{ and } (R_t^1 - R_t^d)$$

our measures of the incidence of constrained lending. Second it is assumed that forecasts of the future values of these variables are produced by univariate equations. If the right-hand side variables followed first-order autoregressive processes then the model is of a simple form. Efficient estimates of the parameters of this model can be obtained by jointly estimating both the structural equation for the consumption ratio and the forecasting equation for the exogenous variables by the method of Full Information Maximum Likelihood. As a first approximation, however, we can examine the reduced form equation generated by the model in (9). The order of the dynamics in that equation depends on the order of the dynamics in the forecasting equations. Some limited experimentation suggests that R_t and $R_t^1 - R_t^d$ are well described by restricted second order autoregressive processes and LA_t/D_t by a first order autoregressive process.¹⁴ This suggests that the reduced-form equation for the consumption ratio should have the dynamic form:

$$c_t - y_t = a_0 + a_1(A_t/Y_t) + a_2R_{t-1} + a_3(LA_t/D_t) + a_4(R_{t-1}^1 - R_{t-1}^d) + a_5t + \varepsilon_t \quad (12)$$

where LA_t is the current level of nominal liquid assets held by households, D_t is the level of debt, and R_t^1 and R_t^d respectively are the lending and deposit rates offered by the banks. Finally, a linear time trend has been included to attempt to capture any omitted drift.¹⁵ The results of estimating the reduced form equation on the data set described above are given in Table 3. The first column contains ordinary least squares estimates, the second column lists instrumental variables estimates. We might expect the second column results to be more robust since the ratio of wealth to current income is endogenous by construction. The results suggest that the variables that were proposed above as possible measures of the impact of liquidity constraints have significant effects of the size and sign that we may have expected. Of particular interest is the negative coefficient on the after-tax real interest rate and the positive coefficient on the interest rate differential. The

¹⁴ The restriction is that the coefficient on the first autoregressive term is equal to zero in both cases.

¹⁵ There is some evidence that a linear trend is present in the forecasting equation for the interest rate differential, consequently any systematic omissions of this type may support the use of a time trend in the reduced form equation.

Table 3

Table 3 : The Rational Expectations Consumption Function

$c_t - y_t$	1	2	3
A_t/Y_t	0.0413 (12.87)	0.0365 (6.68)	0.0399 (7.62)
R_t	-0.8747 (3.37)	-1.4644 (3.00)	-0.991 (2.03)
LA_t/D_t	0.1442 (2.63)	0.1727 (2.50)	0.1118 (1.52)
$R_t^l - R_t^d$	0.0081071 (3.19)	0.0080386 (2.89)	0.0032587 (0.83)
Time	0.0025334 (10.12)	0.0027533 (9.11)	0.0034628 (6.47)
PROP56 _t			3.8097 (1.58)
constant	-0.7535 (8.22)	-0.7192 (5.31)	-1.435 (3.10)
se	0.8617%	0.9337%	0.8289%
z_1	0.0758	0.965	1.43
z_2	6.537	8.581	10.382
z_3	0.0152	0.00004	0.1395
z_4	1.433	1.449	1.4544
z_5	0.2882	0.00230	0.0432

Estimation method: Instrumental Variables

Estimation period: 1977q2 — 1988q2

model shows that the coefficient on R_t will be negative for $\alpha < 1$, given that R_t is positively autocorrelated. This is substantially greater than estimates that have been obtained from forms of the Euler equation. The coefficient on the interest rate differential has the positive sign that is suggested by asymmetric information models of bank behaviour, King (1986). Finally, there is a strong contribution to the equation by the deterministic time trend, although measurement error and drift in the forecasting of the expected variables may explain its significance. The summary diagnostic statistics suggest that there is no systematic behaviour in the residuals and that the instruments used are predetermined. In particular, despite the absence of any backward-looking dynamics in the equation, there is no evidence of significant serial correlation. These results, whilst tentative, suggest that it is possible to successfully model the impact of financial deregulation and that at least one of the observable effects of deregulation on the financial system has had a significant effect on consumption behaviour.

5. Conclusions

In this paper a number of different approaches to the modelling of consumer spending have been examined. In all cases the evidence clearly points to a substantial rise in the consumption ratio of the household and private sectors from 1974-75 to 1987-88. This rise cannot be explained by the standard theoretical models when applied to Australian data over this period. In particular, the model tested by Anstie et al (1983), which emphasised the importance of inflation and capital gains for explanation of the consumption ratio, has been shown to fail to explain the rise in the ratio. Further analysis has shown that this result is not an artefact of that particular model. Application of models based on the lifecycle approach with more appealing theoretical properties also fail to explain the shift in consumption behaviour.

Examination of supplementary data on the financial behaviour of the household sector, in addition to estimation results, suggests three main causes for this increase in consumption. First, the fall in consumer price inflation over much of the period has contributed, both by increasing the actual, rather than officially measured, disposable income of private sector holders of government debt, and by reducing uncertainty associated with confusion of relative and absolute price changes. Second, demographic developments resulting in a monotonic rise in the aged dependency ratio and fall in proportion of prime savers in the population have contributed to a rise in the average per capita consumption ratio. Finally, the deregulation of financial markets has made it easier for consumers as a group to avoid the constraints placed on borrowing.

The results in this paper demonstrate that of these three types of explanation, the effects of financial deregulation are the hardest to model successfully. In the final part of the empirical results some initial analysis of the effects of constraints in the rational expectations version of the lifecycle

Smith

model produces some encouraging results. Further research in this area would significantly improve our understanding of consumer behaviour.

REFERENCES

- Ando, A. and F. Modigliani (1963) 'The Life Cycle Hypothesis of Saving: Aggregate Implications and Tests', *American Economic Review*, 53, 55-84.
- Anstie, R., M.Gray and A.R.Pagan (1983) 'Inflation and the Consumption Ratio', in Pagan and Trivedi (eds), (1983).
- Barro, R. (1989) 'The Ricardian Approach to Budget Deficits', *Journal of Economic Perspectives*, 3, 37-54.
- Battellino, R. and N. McMillan (1989) 'Changes in the Behaviour of Banks and Their Implications for Financial Aggregates', in I. Macfarlane and G. Stevens (eds), *Studies in Money and Credit*, Reserve Bank of Australia, Sydney, 124-146.
- Campbell, J. and N. G. Mankiw (1989) 'Consumption, Income and Interest Rates: Reinterpreting the Time Series Evidence', in O.Blanchard and S.Fischer (eds), *NBER Macroeconomic Annual 1989*, M.I.T. Press, Cambridge.
- Carroll, C. and L.H. Summers (1989) 'Consumption Growth Parallels Income Growth: Some New Evidence', NBER Working Paper No. 3090.
- Deaton, A. (1977) 'Involuntary Saving Through Unanticipated Inflation', *American Economic Review*, 67, 899-910.
- Edey, M. and M.Britten-Jones (1990) 'Saving and Investment in the 1980s', Research Discussion Paper No. 9004, Reserve Bank of Australia, Sydney.
- EPAC (1988) *Trends in Private Saving*, Office of EPAC, AGPS, Canberra.
- Flavin, M. (1981) 'The Adjustment of Consumption to Changing Expectations About Future Income', *Journal of Political Economy*, 89, 974-1007.
- Hall, R.E. (1978) 'Stochastic Implications of the Life-cycle Permanent Income Hypothesis', *Journal of Political Economy*, 86, 971-87.
- Hansen, L. and K.Singleton (1983) 'Stochastic Consumption, Risk Aversion and the Temporal Behaviour of Asset Returns', *Journal of Political Economy*, 91, 249-265.
- Horn, P. (1987) 'Private Non-human Wealth of Australian Residents in the NIF88 Model', Treasury Background Paper No.9, Canberra.
- Jappelli, T. and M.Pagano (1989), 'Consumption and Capital Market Imperfections: An International Comparison', *American Economic Review*, 79 (5), 1088-1105
- King, M.A. (1986) 'Capital Market Imperfections and the Consumption Function', *Scandinavian Journal of Economics*, 88, 59-84.

- McKibbin, W.J. and A.J.Richards (1988) 'Consumption and Permanent Income: The Australian Case', Research Discussion Paper No. 8808, Reserve Bank of Australia, Sydney.
- Merton, R.C. (1969) 'Lifetime Portfolio Selection Under Uncertainty: The Continuous Time Case', *Review of Economics and Statistics*, 50, 247-257.
- Muellbauer, J. and A. Murphy (1990) 'Why has UK Personal Saving Collapsed?', *mimeo*, University of Oxford.
- Pagan, A.R. and P.K.Trivedi, (eds) (1983) *The Effects Of Inflation: Theoretical Issues and Australian Evidence*, Centre for Economic Policy Research, Australian National University, Canberra.
- Pesaran, M.H. and R.A.Evans (1984) 'Inflation, Capital Gains and U.K. Personal Savings: 1953-1981', *Economic Journal*, 374 (94), 237-257.
- Scott, A. (1990) 'Optimal Consumption when Capital Markets are Imperfect', Centre for Economic Forecasting, London Business School, Discussion Paper No. 90-14.
- Scott, A., D.Currie and S.Holly (1990) 'A Lifecycle, Seasonal Error-correction Model of UK Consumption 1955-1988', Centre for Economic Forecasting, London Business School, Discussion Paper No. 90-16.
- Smith, P.N. (1991) 'The Consumption Ratio, Theory and Australian Evidence', *mimeo*, Australian National University, Canberra.

DATA APPENDIX

C	Total consumption expenditure, 1985 constant prices	NA
P	Implicit price index of total consumers expenditure, 1985 = 100	NA
Y	Labour income, 1985 constant prices	NIF
Y ^d	Household disposable income, 1985 constant prices	NA
Y ^P	Private sector disposable income, 1985 constant prices	NA
Y ^G	Government sector disposable income, 1985 constant prices	NA
A	Real current market price value of private sector net financial wealth. Details of the construction of this series are given in Horn (1987). 1985 constant consumer prices	NIF
LA	Liquid asset component of A, including holdings of currency and short term instruments	NIF
AB	Real current market price value of government bond stock held by the private sector. 1985 constant consumer prices	NIF
cg	Gross nominal capital gains on A	NIF
D	Outstanding stock of household sector debt including housing debt. This series was adapted from the official series. An estimate of debt associated with lending for investment housing was transferred from the corporate to the household sector	RBA
R	Real interest rate. Average of bank borrowing and lending rates less expected inflation.	RBA
R ¹	Interest rate at which banks lend to households. Average rate charged on overdrafts under \$100,000	RBA
R ^d	Interest rate at which households make deposits in banks. Average of interest rates on bank fixed deposits	RBA
N	Population of Australia	ABS
AGED	Aged dependency ratio. Ratio of the population aged over 65 years to the population aged between 15 and 65 years	ABS
PROP56	Prime saver ratio. Proportion in the total population of those aged between 45 and 54 years	ABS

All data is available from 1969q1 to 1988q2 on a quarterly, seasonally adjusted basis. The data set is available from the author. All lower case variables are in natural logarithms.

Sources: ABS Australian Bureau of Statistics Publications
 NA National Accounts
 NIF NIF Data Base
 RBA Reserve Bank of Australia Bulletin

Estimation Diagnostic Statistics

- se standard error of the regression
- z_1 LM (Lagrange multiplier) test for first-order serial correlation : distributed $\chi^2(1)$
- z_2 LM test for up to fourth-order serial correlation : distributed $\chi^2(4)$
- z_3 LM test for functional form : distributed $\chi^2(1)$
- z_4 LM test for normality : distributed $\chi^2(2)$
- z_5 LM test for heteroskedasticity : distributed $\chi^2(1)$
- 95% critical values : $\chi^2(1) : 3.84, \chi^2(2) : 5.99, \chi^2(4) : 9.49$

SAVING AND TAXATION

Matthew Benge and Robert Albon*

1. Introduction

There appears to be widespread concern that taxes may adversely affect both the quantity and 'quality' of savings in Australia. The Federal Opposition has recently announced that it is considering the introduction of a consumption tax with the aim of allowing income tax rates to be cut. The goal is to 'boost savings and reduce disincentives'. Business groups, including the National Farmers' Federation and the Confederation of Australian Industry, have announced their support for such a tax. Business leaders have also argued that this policy would provide more incentive for people to save and, more contentiously, that it would reduce work disincentives. Support for a consumption tax also comes from abroad—the OECD in reviewing the Australian economy has argued for a broad-based consumption tax to reduce savings disincentives and savings distortions.

The concern voiced by the OECD about savings distortions has also been echoed by a number of other commentators. For example, Andrew Dilnot argues that:

The biggest problem with savings in Australia is the tax system—not because it is discouraging savings overall, but because it is enormously distorting the allocation of savings between different forms. (*Australian Financial Review*, 21 November 1989.)

Concern about the unevenness of taxes on different forms of saving is also expressed by the Economic Planning Advisory Council in *Trends in Private Savings* (EPAC, 1988).

The public debate has heated-up with the intervention of the Treasurer, Mr. Paul Keating. Reversing his stand of 1985, the Treasurer now opposes a consumption tax. His reasons, released in a special statement at the National Press Club on 9 May 1990, were: that the costs of compensation would outweigh the money it raised by about \$2.5 billion; that this would not necessarily increase national savings and that, in any case, there were better ways of achieving this objective; and that Australia could not sustain a boost to its overall price level. The Treasurer's statement received widespread condemnation from business groups and economists.

There has also been significant concern about the 'equity' aspects of the consumption tax. Of course, this was an important element in 1985 and remains an understandable concern. Our brief is to place primary focus on the efficiency aspects of the tax debate. Nonetheless, we do address, in Section 4, the distributional consequences of moving to a consumption tax, and reflect on the fairness of such a move.

* We are grateful to our discussant, Geoff Carmody, for useful comments and to Ted Sieper and Ben Smith for discussions of this topic.

This paper considers how differing tax systems may affect savings decisions. It has two main aims. The first is to provide a review of recent international economic research on taxes and savings. This includes consideration of both the issue of the relative economic efficiency of income and expenditure taxes, and the issue of how these tax bases are likely to affect aggregate savings behaviour. The second aim is to analyse the efficiency consequences of Australia's discriminatory tax treatment of different forms of savings.

The structure of the paper is as follows. Section 2 analyses the economic effects of income and consumption taxes on savings and economic efficiency, and examines the implications of a compensated change from a comprehensive income to a consumption tax. Section 3 examines the economic consequences of Australia's 'hybrid' income tax base. Section 4 explores some options for, and obstacles to, tax reform which would allow different forms of saving to be taxed on a more consistent basis.

2. The Economics of Taxes and Savings

It is often asserted that a tax on labour income only, or a consumption tax, is preferable to a comprehensive income tax because a comprehensive income tax distorts consumption and savings decisions by 'double-taxing' savings. This double taxation may discourage savings and encourage consumption, especially in times of inflation, when individuals may be taxed on more than their real capital income.

The simplest way of explaining the double taxation argument and the important similarities and differences between taxes on comprehensive income, on labour income only and on consumption is by means of a numerical example. In this section we start by presenting this numerical example and then proceed to analyse the economic effects of these three tax bases in more depth. For simplicity we start by assuming that labour income is exogenous and is not affected by taxes. We then extend the analysis to the case where labour supply is endogenous and may be affected by taxes.

Numerical example

To understand the double taxation argument and the important similarities and differences between these three tax bases, consider an infinitely-lived individual who earns \$1,000 of labour income in year 0. Assume that the interest rate is 10 per cent per annum and, for simplicity, ignore inflation so that there is no distinction between the real and nominal interest rate. In the absence of taxes the individual could spend the \$1,000 on consumption goods in year 0. Alternatively, he could purchase a perpetuity and finance consumption of \$100 in each subsequent year.

Suppose that the individual faces a tax rate of 50 cents in the dollar, that income is comprehensively taxed and that taxes have no effect on earnings. Now the individual would be required to pay tax of \$500 and could afford consumption of \$500 in year 0. Alternatively, he could purchase a \$500 perpetuity which would provide income of \$50 per annum. Because this income would also be taxed, he could afford to finance consumption of only \$25 per annum. The income tax has converted a stream of consumption of

\$100 per annum in the absence of the tax to \$25 per annum after the tax and in this sense savings have been 'double taxed'.

Under a labour-income or a consumption tax, savings would not be double taxed. Moreover, in this simple example, these two tax bases would have identical effects on potential consumption if levied at equivalent rates. For example, under a labour-income tax also at the rate of 50 cents in the dollar, the individual would once more earn \$1,000 in year 0 and pay income tax of \$500 at that time. If he decided to consume in period 0, he could once more purchase \$500 of consumption goods. If, however, he were to save this income and purchase a perpetuity, he could afford to purchase \$50 per annum of consumption goods because under the labour-income tax interest would be exempt.

Under an indirect consumption tax at a rate of 50 per cent of the tax-inclusive price (or 100 per cent of the tax-exclusive price) there would be no income tax to pay in year 0. If the individual were to spend his income on consumption goods in year 0, he would pay \$500 in tax and purchase \$500 of consumption goods. If the individual were to defer consumption, he could spend the full \$1,000 on a perpetuity which earned \$100 per annum. In this case, after the payment of consumption tax, he could afford to purchase \$50 per annum of consumption goods.

Thus under any of these tax bases potential consumption in year 0 falls from \$1,000 to \$500. All three tax bases tax *labour income*. In the absence of any change in the pre-tax wage or in prices, an individual would need to work double the hours to attain his initial level of consumption in year 0. The critical difference between a comprehensive income tax and either a tax on labour income only, or a tax on consumption, is that a comprehensive income tax taxes capital income as well as labour income. It drives a wedge between the pre- and post-tax interest rate. The pre-tax interest rate is 10 per cent but the individual's post-tax interest rate is only 5 per cent. By forgoing consumption of \$500 in year 0, the individual gains consumption of \$25 per annum in subsequent years. Under either the labour-income tax or the consumption tax by forgoing consumption of \$500 in year 0 the individual would gain consumption of \$50 per annum in subsequent years.

In this example the labour-income and consumption taxes are completely equivalent. This is true only if an individual has no initial wealth when the tax is introduced. The main difference between a labour-income tax and a consumption tax is that the latter includes a lump-sum tax on wealth on the day the tax is introduced, while the former does not. If an individual had \$1,000 of wealth on the day a labour-income tax was introduced, the individual could purchase \$1,000 of goods the next day. If instead a consumption tax were introduced at a tax-inclusive rate of 50 cents in the dollar, the individual could only purchase \$500 of consumption goods the next day. Provided tax rates remain constant through time, a consumption tax is equivalent to a labour-income tax plus a lump-sum tax on wealth on the day that the tax is introduced.

Economic effects - exogenous labour income

Virtually all microeconomic analyses of the effects of taxes on savings and consumption decisions begin by examining the case of a representative consumer who makes rational intertemporal consumption decisions aimed at maximising utility. For other discussions see, for example, Bradford (1980), Boadway and Wildasin (1984), Kotlikoff (1984) and Sandmo (1985). We will start by considering a representative individual who lives for two periods with exogenous wage income y_1 in period 1 and y_2 in period 2. Suppose that the individual can borrow or lend as much as he wants at an interest rate r subject to the constraint that he must be able to repay any loan in period 1 out of wage income in period 2. We will ignore inflation so that r is both the real and nominal interest rate and, for simplicity, we will start by also ignoring taxes. Figure 1 shows the individual's intertemporal consumption possibility set, viz. OAB. If the individual were to consume nothing in period 2, he could consume OB in year 1. This is the present value of his wage income stream, viz, $y_1 + y_2 / (1 + r)$. Given the interest rate r , the maximum amount that the individual can borrow in period 1 and afford to repay with interest in year 2 is $y_2 / (1 + r)$. If the individual were to consume nothing in period 1, he could afford to consume $OA = y_1 (1 + r) + y_2$ in period 2. This is the future value in year 2 of his wage income stream.

In Figure 1 we assume that the individual is a saver. Given the shape of his indifference curves he chooses to consume x_1 in period 1 and x_2 in period 2. Savings in period 1 will be

$$S_1 = y_1 - x_1$$

In period 2 the individual will consume his period 2 income plus the period 1 savings and the interest on these savings. Thus,

$$x_2 = y_2 + (y_1 - x_1)(1 + r)$$

Now suppose that the interest rate rises to r' . Assuming that the utility function is strictly quasi-concave (which implies smoothly shaped indifference curves) and that consumption in each period is a normal good, period 2 consumption will increase for two reasons. Firstly, there will be a substitution effect in favour of period 2 consumption ($E_0 \rightarrow E_1$). Secondly, there will be an income effect in favour of period 2 consumption ($E_1 \rightarrow E_2$). Thus, under plausible assumptions, there will be an unambiguous increase in period 2 consumption if the individual is a net saver. The effect on period 1 consumption, however, is uncertain. The substitution effect will tend to decrease period 1 consumption while the income effect will tend to increase it. As drawn, the net effect is for period 1 consumption to decrease, but it is clearly also possible that consumption increases. Savings are equal to $y_1 - x_1$ and so the effect of an increase in r on private savings is equal and opposite to its effect on period 1 consumption. Thus, the effect of an interest rate increase on private savings is ambiguous because the income and substitution effects will tend to work in opposite directions.

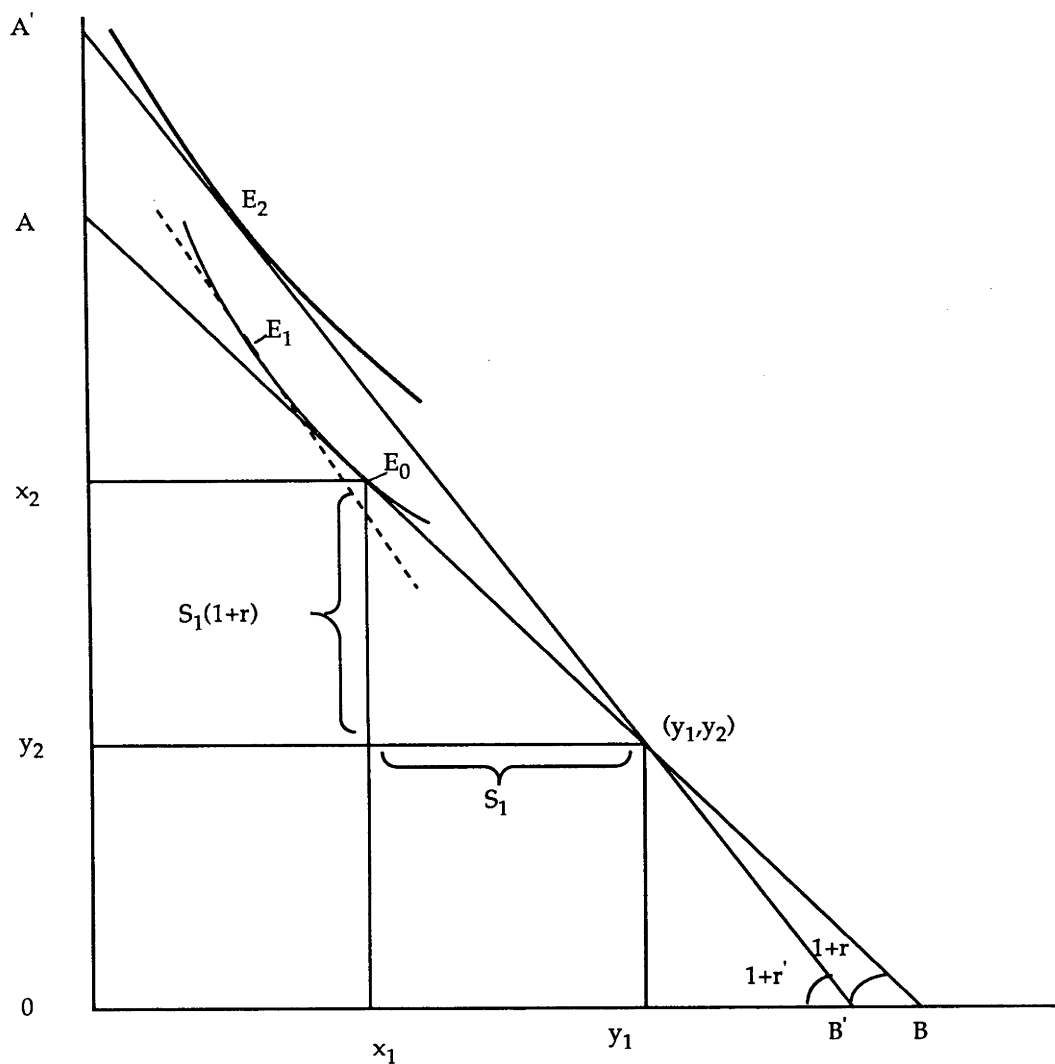


Figure 1

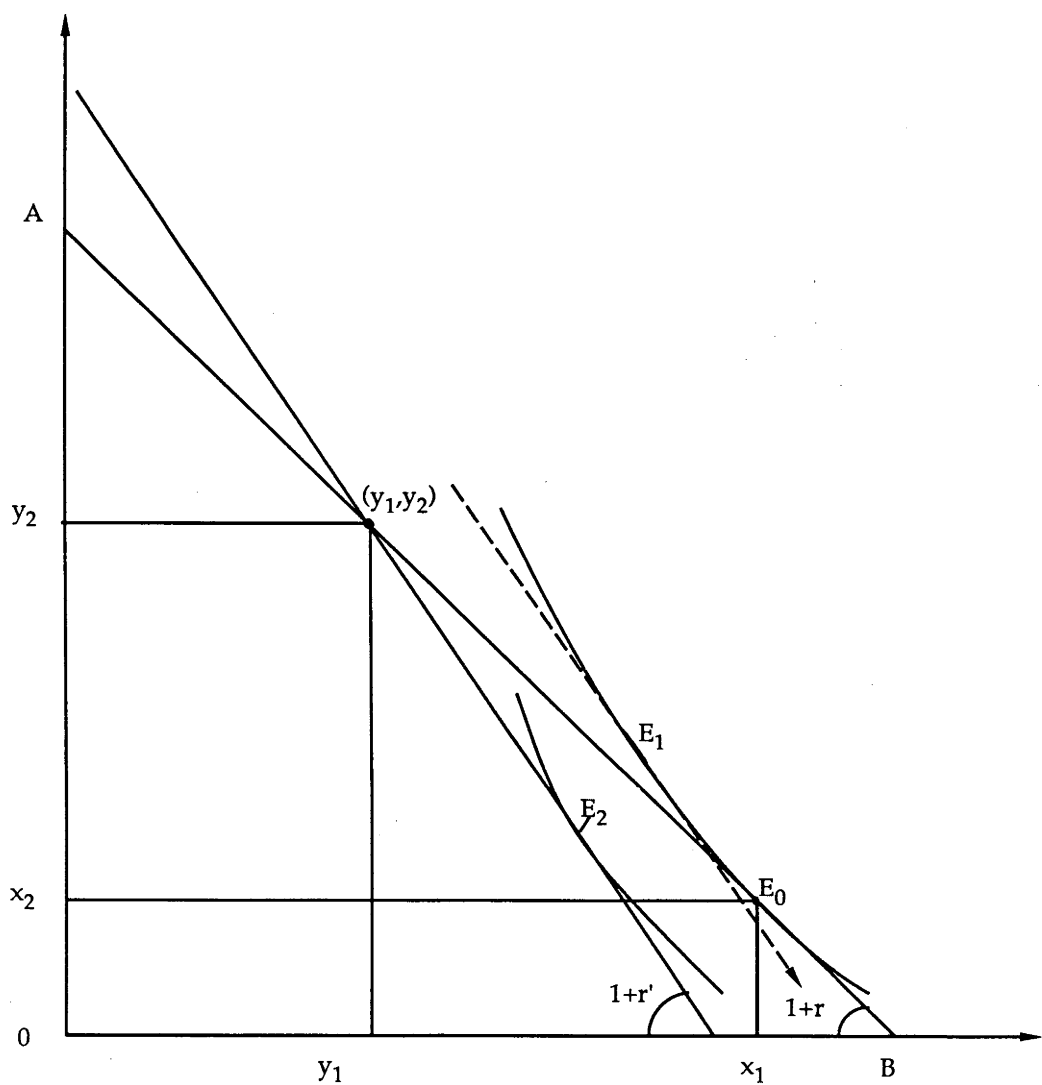


Figure 2

The case of a borrower is examined in Figure 2. Once more the individual earns exogenous wage income of y_1 in period 1 and y_2 in period 2. When the interest rate is r the consumer chooses consumption of x_1 in period 1 and x_2 in period 2. If the interest rate rises, from r to r' , and consumption in each period is a normal good, this time the substitution effect ($E_0 \rightarrow E_1$) and the income effect ($E_1 \rightarrow E_2$) will both tend to reduce period 1 consumption and increase savings. The income effect will reduce consumption in both periods. This time the net effect of the interest rate rise on period 2 consumption is ambiguous.

Now let us extend the analysis to consider the case of a comprehensive income tax at rate m . Figure 3 shows the two effects of the tax on the consumer's budget constraint on the assumption that the tax does not affect the interest rate. This assumption is probably reasonable for a small open economy such as Australia, provided foreign investors are able to get credit in their countries for any Australian withholding taxes. Once again we assume, for simplicity, that there is no inflation and so the real and nominal interest rates are identical. Pre-tax wage income (y_1, y_2) is shown by point C.

In the absence of taxes the individual's consumption possibility set would be OAB. After-tax wage income would be $y_1(1-m)$ in period 1 and $y_2(1-m)$ in period 2. This is shown by the point C'. If only wage income were taxed, the consumption possibility set would become OA'B'.

B'B = C'E would be the present value of the wage income tax revenue.

C'D is the wage income tax revenue collected in period 1 (i.e. $C'D = y_1m$).

DC is the wage income tax revenue collected in period 2 (i.e., $DC = y_2m$).

DE is the present value in period 1 of the period 2 wage income tax revenue.

Thus,

$$B'B = y_1m + \frac{y_2m}{1+r}$$

A'A is the amount of consumption goods that the government could afford to finance by means of this tax revenue in period 2. Thus, A'A is the future value in period 2 of the tax revenue:

$$A'A = y_1m(1+r) + y_2m$$

The tax on capital income will have a second effect on the individual's budget constraint. For every dollar saved in period 1, while the pre-tax interest rate will be r , the post-tax interest rate will be only $r(1-m)$. If an individual saves S_1 in period 1, these savings will increase consumption in period 2 by only $S_1(1+r(1-m))$. If interest on personal borrowings were deductible, the after-tax interest cost would also fall to $r(1-m)$ and the individual's consumption possibility set would become OIJ. If interest on personal borrowings were not deductible (as in Australia), the after-tax cost

of borrowed funds would continue to be r . The individual's consumption possibility set would become $OIC'B'$.

In Figure 3 we assume that the individual saves in period 1. Given the shape of his indifference curves, he will choose to save NC' and will purchase the consumption bundle E_0 . Total tax revenue in period 2 terms will be E_0L (i.e., ML minus ME_0). In the absence of taxes the individual could purchase OM in period 1 and ML in period 2. Now when he purchases OM in period 1 he can only purchase ME_0 in period 2. Total tax revenue is the difference between these two amounts. E_0K is capital income tax revenue. In the absence of capital income taxation, savings of NC' would finance consumption of NK in period 2. Because of the taxation of capital income this amount of savings finances only NE_0 . The difference, viz. E_0K , is therefore the capital income tax revenue. Wage income tax revenue is $KL = A'A$ as we noted earlier.

Now suppose that the tax on capital income is eliminated without raising other taxes to preserve tax revenue. The effects on savings would be ambiguous for the reasons we noted earlier when examining the effects of an interest rate increase. The interest rate increase will cause the individual to substitute away from consumption in period 1 but the income effect will tend to increase consumption in this period (assuming that consumption in period 1 is a normal good). The net effect on savings would be uncertain. Moreover, the reduction in tax revenue will, *ceteris paribus*, lead to a fall in government spending which may affect the shape of an individual's indifference curves and produce a second ambiguous effect on savings.

This may be why the Treasurer in his address to the Press Club on 9 May 1990 stated that the objective of recent proponents of a consumption tax is to

...cut the tax rate on savings, thus promoting more saving. However, that result is by no means clear-cut—even in the abstract. The increase in disposable income via the tax cut would tend to add to the level of consumption and it is a moot point whether consumption in the end would be lower or higher than previously. (Keating, 1990)

This statement misses the point because the advocates of a consumption tax have not been suggesting that there should be no other forms of tax to replace the revenue lost by reducing taxes on savings. The suggestion is that a broad-based value-added or retail sales tax be introduced to replace the revenue lost by reducing income tax rates. Such a tax switch will not give rise to a positive income effect and so only the substitution effect will be relevant. Substitution away from period 1 consumption will have an unambiguous tendency to increase savings.

The effect of a compensated shift to a consumption tax is analysed in Figure 4 using our simple two-period model. For simplicity, we assume that all wage income is earned in period 1. Wage income is OB . Under a comprehensive income tax at rate m , after-tax wage income is OB' and wage income tax revenue will be $B'B$. The individual chooses to consume x_1^0 in period 1 and x_2^0 in period 2. The individual saves DB' in period 1 which finances all consumption in period 2. In period 2 terms tax revenue is FA ,

of which FA' is capital income tax revenue paid in period 2, and $A'A$ is the period 2 value of wage income taxation.

Now suppose that the income tax is replaced with a consumption tax which raises exactly the same amount of revenue in period 2 terms. Thus, the tax rate must be chosen so that tax revenue remains FA . We will assume that the consumption tax is levied at a rate t on the tax-exclusive price of consumption in each period. As was illustrated by the numerical example at the beginning of this section, a consumption tax would not drive a wedge between the pre- and post-tax interest rate. By forgoing one unit of consumption in period 1, an individual would gain $1+r$ units in period 2. Thus, the slope of the individual's intertemporal budget constraint will continue to be $1+r$. With an equal-revenue consumption tax, the individual's consumption possibility set must be OFI in Figure 4.

The initial consumption point E_0 is on the individual's new intertemporal budget constraint. At E_0 the slope of the consumer's indifference curve is less than the slope of this constraint. Thus, by sacrificing a little period 1 consumption the consumer is able to gain more period 2 consumption than is required to leave him indifferent. The consumer will choose the new consumption bundle E_1 with less period 1 consumption and more period 2 consumption than previously. Thus, for this compensated change, the effect on period 1 consumption is unambiguous.

In his speech to the Press Club, the Treasurer argued that 'a compensated indirect tax switch cannot be accomplished in a revenue-neutral manner'. It is clear from Figure 4 that it is possible in principle for a switch from income to consumption to be accomplished in a manner which is revenue neutral in present value terms. This switch, however, would alter the timing of revenue collections.

To analyse the effects of this tax switch on the timing of the government's revenue, initially suppose that, after the tax switch, the individual were to continue to consume at E_0 . Thus, after-tax consumption would be OD in period 1 and OK in period 2. Pre-tax consumption would be at U . Pre-tax consumption would be OG , viz., $(1+t)OD$ in period 1 and OJ , viz., $(1+t)OK$ in period 2. The present value of pre-tax consumption would be equal to income in period 1, OB . Thus, tax revenue in period 1 would be DG , the difference between pre- and post-tax consumption in this period. This must be less than $B'B$, the level of period 1 tax revenue under the income tax. If the consumption tax rate were set sufficiently high for tax revenue to be unchanged in period 1, then savings would also be unchanged. This would require that the tax inclusive tax rate, DG/OG , must be greater than m because consumption in period 1 is less than income. However, in period 2 the individual is dissaving and so consumption is greater than income. If the tax inclusive consumption tax rate were greater than m , this would imply that tax revenue in period 2 would increase under the consumption tax. The only way for the present value of tax revenue to remain unchanged is for period 1 consumption tax revenue, DG , to be less than period 1 income tax revenue, $B'B$.

The substitution away from period 1 consumption produces a second reason for period 1 tax collections to fall. Under the consumption tax, tax revenue in period 1 is t multiplied by consumption in that period. The lower the level of period 1 consumption the lower is tax revenue.

The Treasurer is correct in observing that at first the budget surplus may decrease when there is a switch from an income to a consumption tax. He would appear to be wrong, however, when he concludes that 'the net effect on national saving would certainly be negative'. Suppose, for simplicity, that government spending in period 1 were zero. Under the income tax, the budget surplus would be $B'B$. Private savings would be DB' and national savings would be DB . Under the consumption tax the budget surplus would be LH . Private savings would be HB and national savings would be LB . In moving from the income tax to the consumption tax, national savings increase by LD (i.e. the amount by which private consumption falls).

If wage income were exogenous, there would be an unambiguous increase in utility when there is a switch from an income tax to a consumption tax which yields the same revenue in present value terms. This is because a comprehensive income tax distorts savings and consumption decisions and a consumption tax does not. At first sight this might appear to provide strong reason for preferring a consumption tax on the grounds of economic efficiency. Once we drop the assumption that labour supply is exogenous, however, we can no longer be certain that a comprehensive income tax would be less efficient than an equal-yield consumption tax.

We have discussed the effects of a switch from a comprehensive income to an equal-revenue consumption tax at some length because this proposal has been hotly debated. Very similar statements could have been made about a switch from a comprehensive income tax to an equal-revenue tax on labour income only. For a discussion of this issue, see Boadway and Wildasin (1984). The main difference is that a switch to a consumption tax includes a lump-sum tax on wealth on the day that the tax is introduced while a labour income tax does not. A second difference is in the timing of tax collections. Whereas an equal-revenue consumption tax tends to defer the profile of tax collections, an equal-revenue labour income tax tends to advance it. Once again, however, eliminating the wedge between the pre- and post-tax interest rate will cause an individual to substitute away from present consumption. National savings will increase by the fall in period 1 consumption.

Economic effects - endogenous income

Taxes on income and consumption will generally distort labour/leisure decisions. Because of this distortion a consumption tax will not necessarily be more efficient than a comprehensive income tax. Feldstein (1978) showed that whether a comprehensive income or a consumption tax is more efficient depends on the values of the cross elasticity between consumption in periods 1 and the price of leisure, and the cross-elasticity between consumption in period 2 and the price of leisure. These elasticities are unknown and so the more efficient tax base is uncertain. Feldstein's

analysis is a modification of a three good model which had been developed earlier in an atemporal context. Our discussion is a modification of Sandmo (1976).

Suppose that an individual works in period 1 to pay for consumption in periods 1 and 2. Utility is a function of leisure in period 1 and consumption in periods 1 and 2. For notational simplicity we will use x_0 to describe period 1 leisure and x_1 and x_2 to describe consumption in periods 1 and 2 respectively. Thus, we can write

$$U = U(x_0, x_1, x_2)$$

Without restricting the analysis, suppose that the producer price of the good in each period is unity. Producers can borrow and lend at the interest rate r so the present value to producers at time 1 of a unit of production at time 2 is $1/(1+r)$. The government's goal is to maximise the individual's utility while raising a given amount of revenue by means of taxes t_1 and t_2 on consumption in periods 1 and 2 respectively. These may be thought of as specific taxes or, equivalently, as tax-exclusive tax rates given that the producer price of the good is unity in each period. The government is unable to tax leisure which is unobservable. Tax revenue is

$$R = t_1 x_1 + \frac{t_2 x_2}{1+r}$$

By solving the government's optimisation problem, we can derive the familiar Ramsey result that

$$\sum_i t_i S_{ij} = -v x_j \quad (1)$$

where S_{ij} is the compensated cross-price derivative of demand for good i with respect to the price of good j , and v is a constant. For an algebraic derivation, see the Appendix. Equation (1) may also be derived graphically given that efficiency demands that the marginal deadweight loss of raising an additional dollar of tax revenue by taxing period 1 and period 2 consumption be the same.

Suppose, as in Figure 5, producer prices are fixed, and we initially have a tax of t_1 on period 1 consumption and t_2 on period 2 consumption. First, let us analyse the deadweight loss of this set of taxes. Harberger (1964) explains how we can do this when taxes are imposed in more than one market. Suppose that the individual's level of utility after both taxes are imposed is u . The deadweight loss of the tax may be described as the amount the consumer would be prepared to pay to be rid of the tax less the amount of tax revenue the government would lose by eliminating the tax.

The consumer would be prepared to pay $ABCE$ to be rid of the tax on good 1. The government would lose $ABDE$ of tax revenue in this market. However, by changing the price of good 1, removing the tax will shift the consumer's compensated demand curve for good 2. Thus, if the government removes the tax on good 1 and compensates (by taxing the consumer in a lump-sum manner), this will have a second effect on its tax

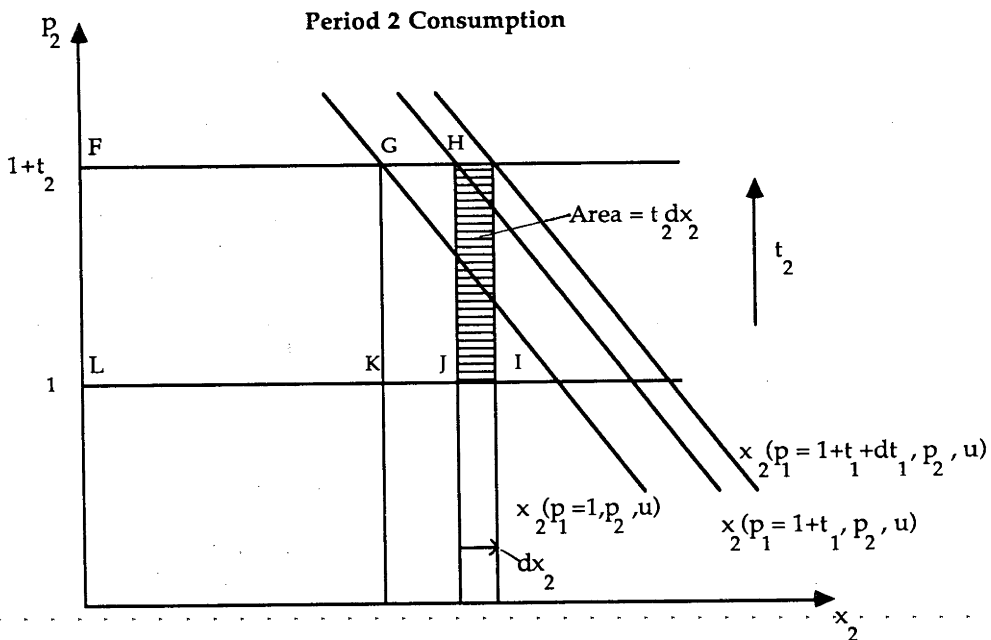
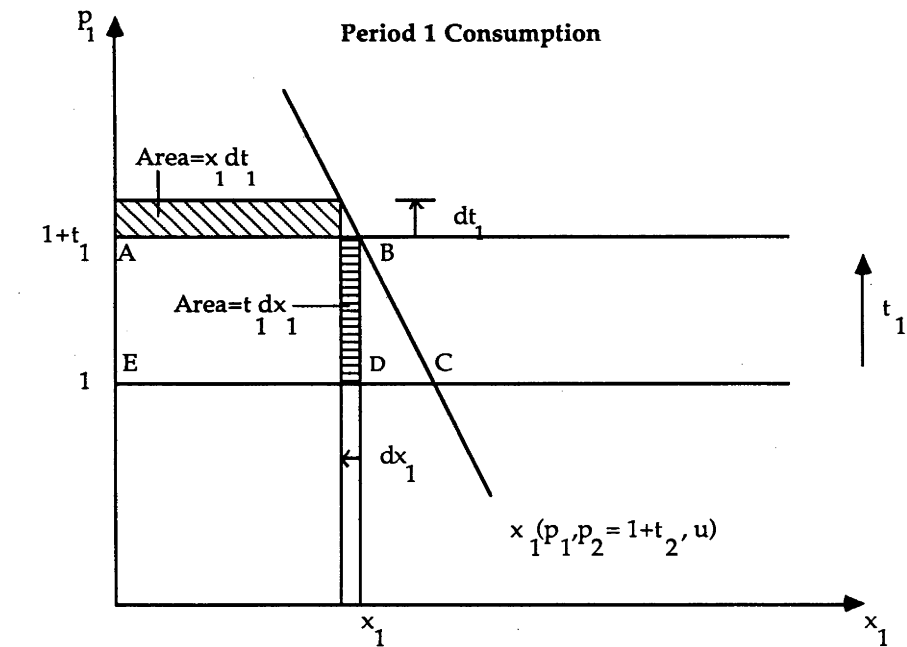


Figure 5

revenue. Assuming that goods 1 and 2 are substitutes, removing the tax on good 1 will cause the consumption of good 2 to fall and reduce tax revenue in this market. As consumption falls in market 2, the consumer needs no additional compensation because the marginal valuation of this good (i.e., $1+t_2$) is exactly equal to the additional spending power the consumer has by not purchasing this good. Thus, given the tax on good 2, the deadweight loss of the tax on good 1 is BCD - GHJK.

If the government also were to remove the tax on good 2, the consumer would be prepared to pay FGIL and the government would lose FGKL in tax revenue. Thus, the total deadweight loss of the taxes in both markets is:

$$GIK + BCD - GHJK.$$

Now suppose that we raise the tax rate on period 1 consumption by the infinitesimal amount dt_1 . Deadweight loss increases by

$$dDWL = -t_1 dx_1 - t_2 dx_2 = -\sum_i t_i S_{i1} dt_1$$

Tax revenue increases by

$$dTax = x_1 dt_1 + t_1 dx_1 + t_2 dx_2 = x_1 dt_1 + \sum_i t_i S_{i1} dt_1$$

Therefore, the additional deadweight loss associated with raising an additional dollar of tax revenue from taxing consumption in period 1 is

$$d_1 = \frac{-\sum_i t_i S_{i1}}{x_1 + \sum_i t_i S_{i1}}$$

Similarly, the additional deadweight loss associated with raising an additional dollar of tax revenue from taxing consumption in period 2 is

$$d_2 = \frac{-\sum_i t_i S_{i2}}{x_2 + \sum_i t_i S_{i2}}$$

If the marginal deadweight loss of raising an additional dollar of tax revenue in either market is the same, then

$$-1 - 1/d_1 = -1 - 1/d_2$$

This implies

$$\frac{\sum_i t_i S_{i1}}{x_1} = \frac{\sum_i t_i S_{i2}}{x_2}$$

which is another way of expressing equation (1). Note that as the marginal deadweight loss of raising tax is positive,

$\sum_i t_i S_{ij}$ will be negative for $j = 1, 2$.

This implies that the constant v in equation (1) is positive.

A labour-income or consumption tax would imply the same tax rate on consumption in each period (i.e. $t_1 = t_2$). This would only be optimal in special circumstances. If $t_1 = t_2 = t$

$$\frac{S_{11} + S_{21}}{x_1} = \frac{S_{12} + S_{22}}{x_2}$$

Given the fact that

$$\sum p_i S_{ij} = 0 \text{ and } p_i = (1 + t) \text{ if } i = 1, 2,$$

this implies

$$\sigma_{10} = \sigma_{20}$$

where

$$\sigma_{ij} = (\delta x_i / \delta p_j) \cdot p_j / x_i$$

which is the compensated cross-elasticity of demand for good i with respect to the price of good j . Equal taxes will only be optimal if the cross-elasticity of period 1 consumption with respect to the price of leisure is the same as that of period 2 consumption with respect to the price of leisure (i.e., period 1 and 2 consumption are equally good complements for the untaxed good). It is straightforward to show that it is desirable to tax at a higher rate the good which is a better complement for leisure. This result was derived by Corlett and Hague (1953) and is discussed in Sandmo (1976). An income tax at rate m is equivalent to taxing consumption at the tax-exclusive rates t_1 in period 1 and t_2 in period 2 where

$$t_1 = \frac{m}{1-m} \text{ and } t_2 = \frac{m}{1-m} + \frac{rm}{(1-m)(1+r(1-m))}$$

The tax rate on period 2 consumption will exceed the tax rate on period 1 consumption because of capital income taxation. Income taxation could be more efficient than consumption taxation if consumption in period 2 were a sufficiently better complement for leisure than consumption in period 1 was. There is no presumption, however, in favour of taxing period 2 at a higher rate than period 1 consumption. Indeed, King (1985) argues that future consumption should probably be taxed at lower rather than higher rates.

If labour income is endogenous, we cannot be sure whether an income or a consumption tax would be more efficient. If we were to extend our simple two-period model to multiple periods and allow individuals to work or consume leisure in each of these periods, the analysis would become more complex still. For a discussion of multiple period models see, for example, King (1985) and Sandmo (1985). Few economists would argue that

a compelling case for switching to a consumption tax is that a comprehensive income tax is theoretically less efficient than a consumption tax. Probably the more important issue is that it is very difficult in practice to make the income tax base comprehensive. This gives rise to the savings distortions discussed in Section 3, which are exacerbated in times of inflation if the tax system is not inflation-indexed.

3. A Review of Distortions in the Australian Tax Structure

There has been considerable concern about the distortions between different forms of savings in Australia. This has been a major issue in various inquiries and reports including those of the Taxation Review (Asprey) Committee (1975) and the Australian Financial System Inquiry (1981). More recently the Office of the Economic Planning Advisory Council (EPAC, 1988) looked at savings in Australia. In addition to its observations on the overall level of savings, EPAC reflects on the 'important objective of tax reform in the eighties... to bring about a "level playing field" with respect to different savings instruments' (p.21). As we noted in the introduction, many others have focussed on this aspect of the savings debate.

In a paper analysing the United States tax treatment of savings, Andrews (1974) described it as a hybrid mixture of income and expenditure (or consumption) tax principles. The same is true of the current Australian provisions. As we discussed in Section 2, an identifying feature of an income tax is that it drives a wedge between the pre- and post-tax interest rate. If there were no inflation and bank accounts yielded a pre-tax interest rate r , a saver on a tax rate m would gain a post-tax interest rate of $r(1-m)$. If there were no risk or uncertainty, the market interest rate were constant, and there were no pure profits (i.e. the market value of any assets were equal to the present value of its net cash flows), a similar statement could be made about non-interest bearing assets as well. Any asset providing a real pre-tax rate of return of r would provide a real post-tax of return $r(1-m)$, provided income were comprehensively defined for tax purposes. Under such an ideal real comprehensive income tax (often referred to as a Haig-Simons income tax) an individual would be taxed on the amount he could consume in a period while leaving real wealth unchanged.

By comparison, we have seen that under a consumption tax the pre- and post-tax interest rates would be identical, provided the tax rate remains constant through time. Similarly, for non-interest bearing assets, the pre- and post-tax rates of return would be equal. As discussed, for example, by Meade (1978), there are two ways of achieving this outcome which would be equivalent if there were no pure profits and the tax rate remained constant through time. The first is to exempt the yield from an investment. The second is to allow an immediate deduction (often referred to as expensing) for the acquisition cost of an asset and to tax its cash flows. This equivalence is easy to see if one considers an asset which costs A_0 in year 0 and produces the revenue stream $a_1, a_2, \dots, a_T$ in years 1, 2, ..., T. The pre-tax rate of return will be r where

$$A_0 = \frac{a_1}{1+r} + \frac{a_2}{(1+r)^2} + \dots + \frac{a_T}{(1+r)^T}$$

If the yield is exempt, it is obvious that in any year the pre- and post-tax revenue will be the same. An investor will pay A_0 in year 0 and receive the post-tax revenue stream $a_1, a_2, \dots, a_T$ in years 1, 2, $\dots$, T . The post-tax rate of return will also be r .

If an investor is allowed immediately to deduct the cost of the asset, its net cost will be $A_0(1-m)$ where m is the taxpayer's marginal tax rate. If the cash flows in subsequent years are taxed, the taxpayer will receive the net cash flows $a_1(1-m), a_2(1-m), \dots, a_T(1-m)$ in years 1, 2, $\dots$, T . As both the cost of the asset and its subsequent cash flows fall by the proportion $1-m$, its pre- and post-tax rates of return will be identical.

We therefore have two paradigms (or organising principles) against which we can examine the tax treatments of different forms of savings. Individuals can hold their stock of savings in a variety of forms. For some forms of savings there will be no wedge driven between pre- and post-tax rates of return. This may be described as consumption tax treatment. For other types of savings, taxes may lower a real pre-tax rate of return of r to a real post-tax rate of return of $r(1-m)$, where m is the saver's tax rate. This may be described as income tax treatment.

Of the major forms of savings, consumer durables, owner-occupied housing and the enhancement of human capital tend towards consumption tax treatment. In the absence of inflation: bank deposits, bonds and debentures would be taxed broadly in line with income tax principles. The treatment of savings held in superannuation funds or used to purchase company shares is more complex. The tax treatment depends on the tax base being applied to assets acquired by the superannuation funds and companies, as well as the rates of tax applied to these organisations. It is beyond the scope of this paper to analyse the vast spectrum of differing tax treatments applying to the assets acquired by these organisations. For simplicity, we will assume that these organisations purchase interest-bearing assets and are taxed on the full nominal interest income. This will tend to overstate the taxation of superannuation savings and savings used to acquire company shares.

The standard tax treatment of savings under a comprehensive income tax would be exemplified by the tax treatment of bank deposits in the absence of inflation. Bank deposits are purchased out of post-tax income (i.e., their purchase is not deductible against income tax); receipts of interest income are taxable in the hands of depositors; and no tax is payable on the proceeds of deposits at maturity. This general treatment also applies to other debt instruments such as bonds and debentures. Longer term fixed-rate bonds or debentures may, however, generate capital gains or losses if interest rates change. Under the comprehensive definition of income outlined above, these gains would be taxable and losses would be deductible, irrespective of whether or not the debt instruments were sold. Under the Australian provisions these gains or losses are recognised only if the instruments are sold, in which case realised real capital gains are included in

the taxable income of the seller and nominal capital losses are deductible subject to the provisions of the capital gains tax legislation. Because nominal interest returns are taxed, the effective rate of tax depends on both the statutory tax rate applicable to the saver and the rate of inflation.

Saving through shares would also be consistent with comprehensive income tax treatment if there were no inflation and all profits were distributed to shareholders as dividends or bonus issues. As with bank deposits, shares are acquired with after-tax income. Dividends and bonus share issues are taxable in the hands of shareholders, but an imputation credit is allowed for any tax paid at the corporate level. Provided dividends and bonus share issues are fully franked by the corporation, income passed through to shareholders bears tax only once at the marginal personal tax rates of individual shareholders.

However, so long as income is retained and accumulated within a company, tax is levied at the company tax rate of 39 cents in the dollar. For those on the top marginal tax rate of 47 cents in the dollar (or 48.25 cents in the dollar including the medicare levy), this can provide a significant tax shield. While these profits will eventually be taxed at shareholders' marginal tax rates when they are distributed, the present value of tax is reduced for shareholders on the top marginal tax rate if profits are retained for a number of years. Conversely, shareholders on tax rates below the company tax rate will be disadvantaged if companies do not pay dividends or make bonus issues.

In the case of superannuation, the major changes in 1983 moved the treatment from being roughly subsidised at the marginal tax rate of the saver (see Sieper, 1983) towards consumption tax treatment. This was facilitated through a gradual move (based on the post-1983 component of the contributor's entitlement) to much higher taxation of lump-sum superannuation payments. Whereas only 5 per cent of the pre-1983 lump-sum was subject to tax, the 1983 changes meant that the entire post-1983 entitlement would be taxable. Rates were 15 per cent of the first \$50,000 and 30 per cent over that amount, if taken after the age of 55. If taken prior to age 55 the rate was 30 per cent on the entire post-1983 component of the lump-sum. However, the next round of changes, in 1988, involved a move towards income tax treatment. In that round, the tax rate on the post-1983 component of lump-sum benefits was reduced, and a tax on employer contributions to, and earnings within, the fund was imposed. This was the direction of change advocated by the Australian Financial System Inquiry in 1981.

Regarding owner-occupied housing and consumer durables the tax treatment is broadly consistent with a consumption tax because the yield is exempt. No deduction is allowed at time of purchase, but there is also no taxation of the flow of imputed consumption benefits. Capital gains are not taxable and capital losses are not deductible on these categories of assets.

The case of saving in the form of human capital conforms quite closely with expenditure tax treatment. When an individual undertakes training, the costs of the investment are the direct pecuniary expenses (i.e. tuition

fees, course materials, etc.) plus the earnings forgone. If, rather than entering into a training scheme, an individual had worked, he would have been taxed on his income. If this income would have been taxed at the rate m , the net cost of his investment is the fraction $(1-m)$ of gross earnings forgone. This is equivalent to allowing the cost of the investment to be expensed. This can be illustrated by a simple example. Suppose that an individual forgoes income of \$10,000 in year 1 to earn an additional \$11,000 in year 2. This investment provides a 10 per cent pre-tax rate of return. If income is taxed at a flat rate of 40 cents in the dollar, the net cost of the investment would be \$6,000 in year 1. The net benefit in year 2 would be \$6,600. As the tax system lowers net costs and net benefits in the same proportion, this is consumption tax treatment.

Often an individual will not be able to expense the direct pecuniary costs of education and training. However, government subsidies will often mean that individuals engaged in education and training incur lower net costs than they would have if they had borne the full cost and were allowed to claim an immediate deduction for this expense. Looked at in this way, the treatment of human capital is consistent with a consumption tax, except that the overall expensing may generally be too generous.

This review of the tax treatment of different avenues for savings reveals a lack of neutrality, even in the absence of inflation. The basic tax rules were devised for a non-inflationary circumstance, but even then did not result in equal treatment of different savings forms. The advent of inflation exacerbated these distortions, and the taxation structure was not indexed for these effects. In some cases (e.g. bank deposits), the interaction of inflation with the taxation rules results in an implicit wealth tax. This lowers after-tax rates of return. Because of the power of compound interest, even relatively minor differences in after-tax rates of return over lengthy periods of time can have substantial effects on after-tax wealth accumulation.

The non-neutrality of tax treatment of different forms of savings has usually, but not always, been condemned. Often this is for 'non-economic' reasons, but the Taxation Review Committee (1975) suggested a type of 'second-best' case for concessions. The Committee recognised the inherent bias against savings in the income tax laws, but was not prepared to recommend a consistent approach to eliminate the bias - 'The Committee is not prepared to go this far' (p.349). Asprey's Committee argued for 'special provisions in the income tax law.... to correct the bias' (p.349). This argument needs to be evaluated.

In general, an equal tax rate across savings channels is likely to be more efficient than one concessional rate 'offsetting' another with a bias. We consider a simple situation where total wealth (W) is held fixed, and can be held in two forms - bank deposits (B) and superannuation (S). Both bank deposits and funds deposited in superannuation funds earn the market rate of interest, r . We will assume that in the absence of taxes the only difference between superannuation and a bank deposit is that money invested in a superannuation fund cannot be withdrawn before retirement age. We assume that the marginal valuation to a representative wealth holder of

superannuation savings is downward sloping. As more and more of the individual's wealth is tied up in superannuation, its marginal value will decrease because he will not be able to draw on superannuation savings to meet unforeseen expenses incurred before retirement. Wealth held in superannuation funds is locked in and, except for the extreme miser, this is costly. As we have drawn the diagram, our representative individual would have positive amounts of wealth in superannuation funds in the absence of taxes. For this to be the case, he would need to see some positive value in locking himself into superannuation. Altering this assumption would not affect the general conclusions of our analysis.

Our simple model is represented by Figure 6. The pre-tax equilibrium is where the MV_s schedule intersects the horizontal line, at r , representing the constant rate of return on bank deposits. B^0 will be held in bank deposits and S^0 in superannuation. Now suppose that bank deposits are subject to a tax at rate m , lowering the return on them to $r(1-m)$. This will induce an increase in holdings of wealth in superannuation until the marginal value of a unit of superannuation is worth $r(1-m)$. This is at B^1 , S^1 , and tax revenue of mrB^1 ($=abfg$). There is a deadweight loss of bcd which arises because the value to contributors of the additional superannuation funds is less than their value as bank deposits.

The Asprey approach cannot be given a rationalisation in this framework, resulting as it does only in a deadweight loss. A more efficient approach would be to place an equal tax, raising an equal revenue, on both bank deposits and superannuation. Such a tax is $m'(0 < m' < m)$ which raises a revenue of $m'r(B_0 + S^0)$ ($=adeh$), equal to the previous revenue, and restores the pre-tax amounts of bank deposits and superannuation. This tax has a zero deadweight loss consequent upon it.

The analysis here is highly partial, giving rise to the possibility that there may be general equilibrium considerations which dictate a deviation from the partial rule. However, while it is not possible to be dogmatic about the level of taxation on income from capital, it is not obvious that an efficiency case can be made for non-neutral treatment of income from different types of capital. One possibility—which we do not explore—is that the existence of publicly-provided pensions which abate with wealth or income may result in a 'second-best' case for a tax concession on superannuation. Where an individual would choose to consume when young and take the pension in the absence of a tax concession on superannuation, both the saver and the government might be better-off by offering the tax concession provided savers can be locked-in to superannuation (i.e. cannot both spend super benefit and take-up the age pension).

4. Policy Options

In this paper we have identified two potential problems with the taxation structure as it relates to savings. Firstly, there are distortions between different types of savings which are heightened by inflation. Secondly, there is a distortion of the consumption-savings choice with a bias against savings. The problem in analysing the economic efficiency consequences of this second distortion is that virtually all taxes are likely to distort some decisions. It is not clear that this second distortion leads to taxes on capital income being raised at a higher marginal deadweight loss than taxes on labour income. Probably as important as the savings distortions, but beyond the scope of this paper to discuss in any depth, are distortions between different forms of investment that companies and other business enterprises can undertake.

The main efficiency argument for changing the current income tax base is to alleviate these distortions. There are two broad policy initiatives which would achieve this objective—indexation of the income tax base and a move in the direction of consumption taxation combined with a lowering of marginal income tax rates. The move in the direction of consumption taxation could be achieved either through a direct personal consumption tax or an indirect tax of the retail sales tax (RST) or value-added tax (VAT) kind.

In this section, we start with a discussion of the allocative and administrative efficiency implications of these two policy initiatives. Another facet of the efficiency discussion has a bearing on the aggregate level of savings. While we do not advocate policies simply because they promote savings, the reforms we suggest do have the likely consequence of increasing national savings. This puts us at odds with the Treasurer and his advisers. Finally, we broach the question of distributional and fairness consequences of our proposals. This has been a major factor in the debate and it is one we cannot ignore. However, our attention to this question is limited primarily to a positive economic analysis. Such an analysis must underlie the normative consideration of the consumption tax.

Efficiency, indexation and the consumption tax

The first method of reducing the distorting influence of taxes on savings decisions is to index the tax base for the effects of inflation. It should be noted that this is a quite separate issue from indexing tax thresholds to eliminate fiscal drag. The indexation of tax thresholds is a relatively straightforward exercise to achieve. However, even if there were a uniform marginal tax rate and, therefore, no need to index tax thresholds, inflation would affect the way that income is calculated for tax purposes. A number of prestigious bodies have looked at indexation, including, *inter alia*, the Meade Committee (1978) and the US Treasury (1984). It has been discussed in Australia by Swan (1981) and Sieper (1986). A scheme of partial indexation was proposed by the Opposition in 1989. It suggested indexing interest income and expense but not other elements of the tax structure. This partial approach makes little sense on either theoretical or practical grounds. If moving to index the tax base, it is hard to see any grounds for

not extending this to all forms of income unless this is inappropriate on administrative and compliance grounds. Indexing other forms of income is relatively straightforward. It is the indexation of interest which is likely to give rise to the biggest administrative and compliance costs.

The Treasurer was critical of the partial nature of the indexation proposals. He went further, however, and argued that comprehensive indexation was also an unattractive option. While there was some merit in a number of his arguments, others were specious such as the twin claims that, on the one hand, indexation would be impossibly costly and, on the other, that it would give the false impression that the government was not committed to eliminating inflation. Clearly, if the government has this commitment, this could be no less costly than indexing the income tax base.

In principle, indexation of the tax base is straightforward. It involves four elements:

- (i) indexation of capital gains and losses. Under Australian tax law gains are already inflation indexed. This would need to be extended to capital losses;
- (ii) indexation of depreciation allowances;
- (iii) indexation of inventories;
- (iv) indexation of interest.

There are a number of practical suggestions for indexing the base. The main issue is whether or not the administrative and compliance costs are excessive. There appears to have been relatively little public debate of this issue in Australia. In the absence of any strong evidence that the administrative and compliance costs of indexation would be excessive, it is the authors' view that indexation should be restored to the set of possible tax base reform options. There are a number of options that have been tabled overseas including the earlier references, Meade (1978) and the US Treasury (1984), and more recently the New Zealand Treasury (1990).

A second issue is the appropriate inflation index. As is generally understood and clearly discussed in all the references cited above, the inflation index should be a single, general index, such as the CPI, rather than a set of specific indexes for different capital goods. At the limit, if indexes were specific enough, there would be no capital gains or losses arising from relative price changes. This is in spite of the fact that these are clearly important forms of income or loss and would be so in the absence of any inflation.

We now turn to a consideration of the consumption tax itself. Here there are two broad options—a direct personal consumption tax and an indirect consumption tax of either the RST or VAT type. We tend to favour the indirect type of consumption tax, although there are merits in the direct approach.

The direct personal consumption tax option has been lucidly discussed in a number of places including the US Treasury (1977), Meade (1978) and Kay and King (1983). This would involve taxing individuals on income that is not saved, and could be calculated on the basis of individual tax returns in

much the same way as income is calculated at present. Different marginal rates of tax could be levied on those with different levels of personal consumption in much the same way as different marginal rates of income tax are applied to those with different levels of income at present. This form of taxation was seriously contemplated by a number of countries in the early 1980s before the United Kingdom and then the United States, New Zealand and Australia began a systematic process of eliminating expenditure tax features in the tax base and making the income base more comprehensive. There are some obvious advantages in such a move: the absence of any need to index the tax base for inflation; the elimination of timing problems because all business income and expense would be taxed on a cash-flow basis; it is a natural way of overcoming the thorny problem of taxing capital gains, and it is a simple way of ensuring that retirement savings and other forms of saving are taxed on a more consistent basis. The main difficulty is in assessing exactly what problems would arise from such a radical shift. There are clearly some potential problem areas including the treatment of the savings of those who emigrate and immigrate, and the treatment of savings accumulated prior to the new regime. These two topics are clearly discussed in Meade. There would also appear to be the risk of increased international tax avoidance and evasion problems if, for example, capital subscribed for company shares could be expensed and then the capital sent to tax havens overseas to finance future untaxed consumption.

As far as the policy debate in Australia goes, the main option would be an indirect consumption tax. This is perhaps the simplest way of allowing marginal income tax rates to be reduced and alleviating some of the savings distortions identified previously.

To the extent that the switch to consumption taxation allows the top marginal tax rate to be reduced, the switch is also likely to reduce investment distortions. The amount of overinvestment in a tax-preferred activity is likely to be determined predominantly by the level of the top marginal tax rate. Those on the highest marginal tax rate have the greatest incentives to invest in tax-preferred activities and will tend to do so until net-of-tax (risk-adjusted) rates of return are the same as those for other activities. Reducing the top marginal tax rate would also reduce the extent to which companies can be used as tax shields. The ease with which those on the top marginal tax rate can use companies to reduce the level of tax on income that they are willing to save is a strongly unattractive feature of the present tax structure.

A further attraction of introducing a broad-based indirect consumption tax is that it would allow the current Australian wholesale sales tax (WST) to be repealed. The WST is likely to be an allocatively inefficient way of raising taxes on consumption goods. It is levied at multiple rates of 10 per cent, 20 per cent, 30 per cent and now, with the luxury car tax, 50 per cent. At the same time a wide range of goods and services are exempt. The Draft White Paper identified the inevitable anomalies which arise when different goods are taxed at different rates. At the same time, as noted, *inter alia*, by

Warren (1989), it is doubtful whether the differential rate structure has a significant effect on making the tax system more progressive.

The same tax rate across all taxable goods is not necessarily efficient if some goods (such as leisure) cannot be taxed. However, as Harberger (1988) argues, there are strong arguments in favour of levying any indirect consumption tax at a uniform rate. Firstly, forms of consumption which may be captured by economists in the term 'leisure' include a wide variety of different activities. These vary from inaction to sporting activities, and the consumption of home-produced goods ranging from home-grown vegetables to the use of a nicely painted house. Calculating Ramsey-optimal taxes would require determining the cross-elasticities of demand for different goods with the price of this vast amalgam of activities which are commonly referred to as 'leisure'. We do not have the data which would allow these cross-elasticities to be calculated with any tolerable degree of accuracy. Our theoretical analysis is too sophisticated for our data. Secondly, even if we were to calculate these cross-elasticities, practical difficulties of defining which goods should be taxed at which rates are likely to make differential taxation far less efficient in practice than in theory.

The main attraction of introducing a broad-based indirect consumption tax at a uniform rate, rather than a direct consumption tax, is that many other countries have broad-based indirect consumption taxes and so this option is not novel. In spite of there being more collection points, we favour the VAT version of the indirect consumption tax as applies in New Zealand's goods and services tax (GST). A VAT has the technical advantage of ensuring that taxes are not paid on business inputs. This prevents cascading layers of tax and ensures that the costs of producing exports are not increased by incomplete offsets for taxes on business inputs. Moreover, the VAT has the attraction of being self-policing because each agent in the value-added chain has a pecuniary interest in the tax having been paid at the previous stage.

Effects on aggregate savings

The effects of an uncompensated tax on capital income on the level of an individual's savings is ambiguous. It is much easier to be confident about the qualitative effects of compensated shifts in taxes. One such compensated shift would be to index the income tax base for inflation, financing the move if necessary by raising income tax or consumption tax rates. The second is to introduce a broad-based consumption tax with the revenue raised (over and above that required for the replacement of the WST) being used to reduce rates of income tax. Either of these moves under plausible assumptions will increase aggregate savings although the likely magnitude of the effects are uncertain. This was discussed, for an economy with a single consumer, in Section 2. In reality the positive effect on savings is likely to be reinforced because of the differential impact on those with different levels of wealth and in different stages of their life. The tax will fall disproportionately on the wealthy and the elderly who have high propensities to consume:

A number of studies have attempted to analyse the quantitative effects of a cut in capital income taxes on savings, for example, Boskin (1978), Summers (1981) and Evans (1983). For a helpful review of these and other papers see Beach, Boadway and Bruce (1988). There is no consensus on the interest elasticity of savings. As argued by Kotlikoff (1984) exactly what is meant by 'the interest elasticity' is uncertain. The interest elasticity of savings in response to a cut in capital income tax will depend on how long the tax cut is expected to continue and on whether the tax cut is financed by reduced government expenditure, concomitant increases in other tax rates or by future increases in other tax rates. Kotlikoff (1984) and a number of Kotlikoff's other papers which analyse the possible determinants of saving are collected in Kotlikoff (1989).

Distributional and fairness considerations

Much of the opposition to a consumption tax results from concerns about the possible distributional consequences, and judgements about their fairness. Arguably, it was such concerns that sank the Treasurer's broad-based consumption tax (BBCT) proposal in 1985. In contrast to his 1985 position, the Treasurer is now worried by what he sees as a 'blatantly unfair tax package' (Keating, 1990, p.9).

There are at least three issues in the public debate about the fairness of a switch from income to consumption taxation. The first is whether income or expenditure is intrinsically the fairer tax base. The second stems from the fact that those with very low incomes currently pay no income tax: the issue is if and how to compensate these individuals for the introduction of a consumption tax, given that they pay no income tax. The third issue is if and how to compensate the wealthy and especially the elderly for the lump-sum tax on wealth the day that the consumption tax is introduced.

It is sometimes asserted that a switch to consumption taxation would be unfair because those on higher incomes tend to save more and a consumption tax will therefore fall disproportionately on lower-income individuals. This argument ignores the fact that, in the absence of inheritances, gifts and bequests, over a person's lifetime the present value of labour income will be equal to the present value of consumption expenditures. If those on relatively high incomes tend to save a higher proportion of their income, this is because they are paying-off debts incurred in earlier periods, saving for consumption in later periods or saving in order to provide gifts or bequests. In any of these cases, consumption tax would be collected, either when the saver consumes or when the beneficiary of any gift or bequest consumes. It is not true that a consumption tax tends to benefit those who are well-off in terms of lifetime income.

An income tax will, however, tend to collect a different present value of receipts from those with the same amounts of labour income who choose a different pattern of consumption over their lifetimes. Suppose that there were a comprehensive income tax at the rate m . Consider an individual who earns labour income of y_1 in period 1 and no income in period 2. If the individual were to consume only in period 1, he would pay tax of only $y_1 m$. If the individual were to save, as well as paying labour-income tax of $y_1 m$,

he would pay capital income tax. The present value of tax collections would increase, the greater the proportion of his income the individual chooses to save. As it seems difficult to argue that an individual who chooses to save is better off than an individual with the same amount of labour income who chooses to spend, some would argue that an income tax is horizontally inequitable. On the other hand, a consumption tax at a uniform and unchanging rate will levy the same present value of tax collections on individuals with the same present value of lifetime labour income irrespective of when they choose to spend this income. It would seem difficult to argue that consumption taxation is intrinsically less fair than income taxation.

The second equity argument is that the government cannot compensate those on incomes below the tax-free threshold for the consumption tax by lowering marginal income tax rates. It is by no means clear cut that the government would wish to compensate everyone whose income is less than the tax-free threshold for the effects of the switch. For example, at the time of the Draft White Paper, the government appeared willing to contemplate not compensating secondary income earners in a family. However, there may be a number of lower-income earners which the government wishes to compensate. In principle, this might be achieved by providing income-tested payments to individuals in the relevant circumstances. It does not appear to be a compelling argument against a consumption tax switch.

Possibly the most complex equity issue is if and how to compensate the wealthy and the elderly for any switch which increases consumption taxation and thereby reduces the value of existing wealth. Again there may be some wealthy individuals whom the government does not wish to compensate for the effects of such a tax switch. Moreover, for those who intend to spend their wealth on consumption in the distant future, a significant offset for the consumption tax will be a lower level of capital income tax as the wealth accumulates. However, for those who wish to spend their wealth on consumption in the near future (and especially the elderly) this offset may not be large. While it is easy to increase government-provided pensions and other social security benefits to compensate beneficiaries with no existing wealth for the effects of a switch to consumption taxation, it is difficult to see any practicable way of providing compensation for the loss in purchasing power of existing wealth.

Whether the taxation of existing wealth is 'fair' or 'unfair' is a matter of personal judgement on which we make no comment. If it were considered that no tax switch should increase the tax on existing wealth, then this would appear to be an argument against any move towards a broad-based consumption tax (over and above the replacement of the existing wholesale sales tax). However, this would appear to us to be an extreme position to take. Many of the government's tax initiatives, including the taxation of income from gold mining and the abolition of 5/3 accelerated depreciation, will affect the wealth of individuals with capital tied into specific activities. If the government allows inflation to occur at an unexpectedly high rate,

this will affect the wealth of those who have savings held as term deposits or who have purchased long-term bonds.

In our view, decisions on any final package should take account of the likely efficiency implications as well as a careful examination of who might gain and who might lose, after all aspects of the particular package are considered. Some move in the direction of consumption taxation would appear to be attractive on efficiency grounds. Nevertheless, equity concerns may obviously constrain the amount of movement in this direction that a government is willing to contemplate.

Appendix

In the text we saw that the government's optimisation problem was to choose t_1 and t_2 to maximise the utility of the representative consumer subject to the constraint that it raises a given amount of tax revenue r_0 . This problem can be solved using the Lagrangian

$$\mathcal{L} = U(x_0, x_1, x_2) + \mu(R_0 - t_1 x_1 - t_2 x_2)$$

This leads to the first order conditions

$$\sum_i U_i \frac{\partial x_i}{\partial p_j} = \mu(x_j + \sum_i t_i \frac{\partial x_i}{\partial p_j}) \quad j = 1, 2$$

Given that the consumer is maximising utility, $U_i = \lambda p_i$ where λ is the marginal utility of income. This implies

$$\sum_i \frac{\partial x_i}{\partial p_j} (\lambda p_i - \mu t_i) = \mu x_j$$

From the Slutsky decomposition we know that

$$\frac{\partial x_i}{\partial p_j} = S_{ij} - x_j \frac{\partial x_i}{\partial M}$$

where S_{ij} is the compensated cross-price derivative and M is income.

Using the Slutsky decomposition and the fact that

$$\sum_i p_i S_{ij} = 0$$

we derive the Ramsey (1927) rule that

$$\sum_i t_i S_{ij} = -v x_j$$

where

$$v = 1 + \frac{1}{\mu} \sum_i \frac{\partial x_i}{\partial M} (\lambda p_i - \mu t_i)$$

REFERENCES

- Andrews, W.D. (1974) 'A Consumption-Type or Cash Flow Personal Income Tax', *Harvard Law Review*, 87, 1112-1188.
- Atkinson, A.B. and J.E. Stiglitz (1976) 'The Design of Tax Structure: Direct versus Indirect Taxation', *Journal of Public Economics*, 6, 55-75.
- Australian Financial System Inquiry (K. Campbell, Chairman) (1981) *Final Report*, Australian Government Publishing Service (AGPS), Canberra.
- Australian Government (1985) *Reform of the Australian Tax System: Draft White Paper*, AGPS: Canberra.
- Beach, C.M., R.W. Boadway and N. Bruce (1988) *Taxation and Savings in Canada*, Ottawa: Canadian Government Publishing Centre.
- Boadway, R.W. and D.E. Wildasin (1984) *Public Sector Economics*, Second Edition, Boston: Little, Brown and Company.
- Boskin, M.J. (1978) 'Taxation, Saving and the Rate of Interest', *Journal of Political Economy*, 86, S3-S28.
- Bradford, D.F. (1980) 'The Economics of Tax Policy Toward Savings', in G. von Furstenberg (ed), *The Government and Capital Formation*, Cambridge, Mass.: Ballinger.
- Corlett, W.J. and D.C. Hague (1953) 'Complementarity and the Excess Burden of Taxation', *Review of Economic Studies*, 21, 21-30.
- Evans, O.J. (1983) 'Tax Policy, the Interest Elasticity of Saving, and Capital Accumulation: Numerical Analysis of Theoretical Models', *American Economic Review*, 73, 398-410.
- Economic Planning Advisory Council (EPAC) (1988) *Trends in Private Saving*, Council Paper No. 36, Canberra.
- Feldstein, M.S. (1978) 'The Welfare Costs of Capital Income Taxes', *Journal of Political Economy*, 86, S29-S51.
- Freebairn, J.W., M. Porter and C. Walsh (1988) *Spending and Taxing II: Taking Stock*, National Priorities Project, Sydney: Allen and Unwin.
- Harberger, A.C. (1964) 'Taxation, Resource Allocation and Welfare', in J. Due (ed), *The Role of Direct and Indirect Taxes in the Federal Reserve System*, Princeton: Princeton University Press, 25-70.
- Harberger, A.C. (1988) 'Reflections on Uniform Taxation', paper presented at the 44th Congress of the International Institute of Public Finance, Istanbul, August.
- Institute for Fiscal Studies (1978) *The Structure and Reform of Direct Taxation*, Report of a Committee Chaired by J.E. Meade, London: Allen and Unwin.

- Kay, J.A. and M.A. King (1983) *The British Tax System*, Third Edition, Oxford: Oxford University Press.
- Keating, P.J. (1990) 'Consumption Tax and Other Myths', Address by the Treasurer, The Hon P.J. Keating MP to the National Press Club, Canberra, 9 May.
- King, M.A. (1985) 'The Economics of Saving: A Survey of Recent Contributions', in K.J. Arrow and S. Honkapohja (eds), *Frontiers of Economics*, Oxford: Basil Blackwell, 227-294.
- Kotlikoff, L.J. (1984) 'Taxation and Savings: A Neoclassical Perspective', *Journal of Economic Literature*, 22, 1576-1629.
- Kotlikoff, L.J. (1989) *What Determines Savings?*, Cambridge, Mass: The MIT Press.
- New Zealand Government (1989) *Consultative Document on the Taxation of Income from Capital*, Wellington: NZGPO.
- Ramsey, F.P. (1927) 'A Contribution to the Theory of Taxation', *Economic Journal*, 37, 47-61.
- Sandmo, A. (1976) 'Optimal Taxation: An Introduction to the Literature', *Journal of Public Economics*, 6, 37-54.
- Sandmo, A. (1985) 'The Effects of Taxation on Savings and Risk Taking', in A.J.Auerbach, and M.S.Feldstein (eds.) *Handbook of Public Economics*, Amsterdam: North Holland, 265-311.
- Sieper, E. (1983) 'Campbell on Taxation', *Economic Papers*, Special Edition on Campbell Report, 2-23.
- Sieper, E. (1986) 'Business Tax Reform', in J.G. Head (ed), *Changing the Tax Mix*, Sydney: Australian Tax Research Foundation, 279-314.
- Sieper, E. (1990) 'Keating v. Access Economics', *mimeo*, Australian National University, June.
- Summers, L.H. (1981) 'Capital Taxation and Accumulation in a Life Cycle Growth Model', *American Economic Review*, 71, 533-544.
- Swan, P.L. (1981) 'An Optimum Business Tax Structure for Australia', in *Australian Financial System Inquiry - Commissioned Studies and Selected Papers*, Canberra: AGPS.
- Taxation Review Committee (K.W. Asprey, Chairman) (1975) *Full Report*, Canberra: AGPS.
- United States Treasury (1977) *Blueprints for Tax Reform*, Washington DC: USGPO.
- United States Treasury (1984) *Tax Reform for Fairness, Simplicity, and Economic Growth*, Washington DC: USGPO.

Warren, N.A. (1989) 'Changes in Australian Tax Incidence Between 1975-76 and 1984-85, in J.G. Head (ed), *Australian Tax Reform in Retrospect and Prospect*, Sydney: Australian Tax Research Foundation, 445-478.

DEMOGRAPHICS, RETIREMENT SAVING AND SUPERANNUATION POLICY: AN AUSTRALIAN PERSPECTIVE

Hazel Bateman, Jack Frisch, Geoff Kingston, John Piggott*

1. Introduction

Australia, in common with a number of other developed countries, is currently exhibiting two related but distinct trends which are likely to affect saving performance in the long term. The first of these, demographic transition, will see the aged dependency ratio increase from 16 per cent to 24 per cent over the next thirty or so years. The second, in part a response to the first, is policy reform designed to place much greater reliance on private saving for retirement provision than has hitherto been the case.

Any comprehensive enquiry into the economic implications of these phenomena must do at least three things. Firstly, it must undertake some analysis of the link between demographic transition and saving—perhaps the economic aggregate most directly influenced by population structure. Secondly, it must come to grips with the policies which have been developed to effect the trend toward a greater reliance on private saving. Thirdly, it must investigate the nature of the institutions which will mediate this new private saving, and explore the investment opportunities they face, with special attention paid to the policy environment.

There is little Australian economic research which addresses any of these topics. This paper might therefore be seen as an early progress report on a research project into the economics of pensions and saving in this country. As such, it reaches few firm conclusions. However, we hope that it is useful in gathering and reporting relevant information from different sources, and in offering some preliminary analyses of those aspects of the question identified above. We also set out a possible research agenda, and point to some policy implications.

The first part of the paper focuses on demographic transition, under the assumption that policy parameters are held constant. Demographic

* Rohan Ekanayake and Margi Wood provided excellent research assistance. Ron Bewley, Bruce Chapman, Owen Covick, Fred Gruen, Bob Gregory, and other conference authors offered much helpful discussion and comment. Seminar participants at La Trobe and the Australian National University provided useful feedback. Research support under an Australian Research Council grant awarded to Piggott and a University of New South Wales Faculty grant awarded to Kingston and Piggott is gratefully acknowledged. Kingston and Piggott would like to thank AMP for their generosity with time and expertise. Frisch would like to thank Adrian O'Domhnaill of ASSIRT (Investment Research and Technology, Perth) and Kevin Donovan of the Insurance and Superannuation Commission (ISC).

projections are reported, and the issue of numerical impact of demographic transition on saving rates is discussed. We suggest that demographic transition could lead to a substantial decline in savings rates during the first decades of the twenty-first century.

The second substantive part of the paper focuses on policy reforms designed to impact upon private retirement savings behaviour. Over the last seven or so years, a number of tax and regulatory reforms have been enacted to encourage households to rely more heavily on private retirement saving than has been the case in the past. These reforms are discussed, and implications for resource allocation and equity are developed.

The reforms analysed in Part 3 have the effect of placing heavy reliance on the superannuation industry as the major grouping of financial intermediaries responsible for the management of retirement savings. Part 4 of the paper begins by providing an overview of the superannuation industry, and offers some comments on the extent to which the industry currently meets this challenge.

The final part of the paper draws these threads together to develop a research agenda for the economic analysis of long term saving performance and retirement provision. The basic thesis of the paper is that demographic transition may indeed dictate that policies to encourage private retirement saving are required if it is to be managed without undue budgetary stress; that the reforms of the last several years have gone some distance towards rationalising the policy framework for private retirement saving; but that the scale of resource reallocation is such that much more detailed research is required into the economic implications of the policy changes so far observed.

2. Demographic Transition and Saving Performance

Demographic transition is upon us. Table 2.1 reports changes in demographic patterns for the 'big seven' industrialised countries and Australia, for the next fifty years. The transition will bring about a substantial, if not dramatic shift in aged, young and total dependency ratios.¹

The implications of this transition for aggregate saving are not altogether clear, however. Two distinct mechanisms may link demographic change with changes in saving. The first is that to the extent that the aged are a drain on the consolidated revenue, national saving may decrease. Obvious examples of aged-related public outlays include aged public pension payments and aged-related health expenditures. The second is that to the extent that lifetime consumption smoothing occurs, the aggregate private

¹ Standard definitions of these terms are :

$$\text{Aged dependency ratio} = \frac{\text{No. of persons aged 65 or over}}{\text{No. of persons aged 15-64}}$$

$$\text{Young dependency ratio} = \frac{\text{No. of persons aged 0-14}}{\text{No. of persons aged 15-64}}$$

$$\text{Total dependency ratio} = \text{Young dependency ratio} + \text{Aged dependency ratio}.$$

Table 2.1

Table 2.1: Dependency Ratios in Selected OECD Countries, 1980-2050

	1980	1990	2000	2010	2020	2030	2040	2050	% Change 1980-2040 2010-2040	
Aged										
Canada	14.1	16.8	19.0	21.4	28.9	37.3	37.8	35.8	168	77
France	21.9	20.9	23.3	24.5	30.6	35.8	38.2	37.6	74	56
Germany	23.4	22.3	25.4	30.6	33.5	43.6	48.2	41.6	106	58
Italy	20.8	20.1	22.6	25.7	29.3	35.3	41.0	37.9	97	60
Japan	13.5	16.2	22.6	29.5	33.6	31.9	37.8	37.0	180	28
United Kingdom	23.2	23.0	22.3	22.3	25.5	31.1	33.1	30.0	43	48
United States	17.1	18.5	18.2	18.8	25.0	31.7	32.3	31.4	89	72
Average of the above	19.1	19.7	21.9	24.7	29.5	35.2	38.3	35.9	108	57
Australia	14.8	16.6	17.5	18.7	23.6	29.0	32.1	31.7	117	72
Total										
Canada	48.1	47.4	47.9	46.6	55.3	66.5	68.4	67.7	42	47
France	56.8	51.8	52.6	50.8	57.3	64.4	68.3	68.2	20	34
Germany	50.8	44.0	48.3	50.5	54.3	68.7	74.8	69.9	47	48
Italy	54.9	46.1	47.9	48.6	51.5	61.1	69.9	67.6	27	44
Japan	48.4	42.2	48.6	58.6	60.6	59.5	66.8	65.7	38	14
United Kingdom	56.2	51.9	53.8	52.7	56.7	61.9	62.1	60.2	10	18
United States	51.1	51.6	49.8	47.2	54.6	62.4	63.1	62.5	23	34
Average of the above	52.3	47.9	49.9	50.7	55.8	63.5	67.6	66.0	29	34
Australia	53.5	49.9	49.5	48.2	52.9	59.5	63.0	63.0	18	31

Source: OECD (1988), Tables 13 and 14.

saving ratio will decline. Given the changes in dependency ratios reported in Table 2.1, the simplest life cycle model will generate dramatic reductions in this ratio—to less than half its current figure.

The simplest variants of the life cycle model are not widely supported by the evidence, however. Learned opinion is divided on the extent to which life cycle consumption smoothing takes place. Quantitative estimates tend to have difficulties associated with them, mainly because data on saving are generated as the residual difference between income and expenditure. Both these variables take large values relative to the difference between them.

There are two broad groupings of studies which attempt to quantify the significance of demographic variables for saving ratios. The first makes use of expenditure survey data, such as the Australian Bureau of Statistics (ABS) Household Expenditure Survey (HES) to measure savings rates by age group. EPAC (1988) reports the results of such an exercise for Australia. We have some misgivings concerning this approach, the focus of our attack being the acceptance of reported estimates of income for the purpose of calculating saving. It is straightforward to show that aggregate household saving implied by HES estimates is only a fraction of the value reported in the National Accounts, and that consumption of the elderly is underestimated in the HES. Piggott (1990) carries out this exercise.²

The second group of studies uses data across countries to investigate econometrically the relationship between savings ratios and demographic variables. The basic economic construct for examining the implications of demographics for aggregate saving is some form of life cycle model. The approach is very ad hoc, however, and is perhaps more appropriately seen as a sophisticated method of curve fitting, than as a test of the life cycle hypothesis. A number of such studies have appeared since the pioneering work of Modigliani (1970). We conducted a preliminary exercise of this kind, using data across twelve countries, pooled into three time periods, roughly covering the sixties, seventies, and eighties (to 1987), and employed the SHAZAM package described in White (1978). The estimated equation is

$$S = \beta_0 + \beta_1 \text{AGEDEP} + \beta_2 \text{YDEP} + \beta_3 \text{LFRET} + \beta_4 \text{INFL} + \beta_5 \text{T2} + \beta_6 \text{T3} \quad (1)$$

where	S	=	gross private saving ratio
	AGEDEP	=	aged dependency ratio
	YDEP	=	young dependency ratio
	LFRET	=	labour force participation rate of the retired
	INFL	=	inflation rate
	T2 and T3	=	time dummies

Results and methodology are discussed in detail in Bateman et al (1990).

² It is worth pointing out that the ABS shares these misgivings. The published statistics emphasise that the HES data are not adequate for this purpose stressing that income data are collected for classification purposes only. This position has been reinforced in conversations with Bureau officials.

**Table 2.2: Saving Projections for Australia Based on
Demographic Transition 1980-2040
(Changes in Gross Private Saving as percentage of GDP)**

	1980- 1990	1990- 2000	2000- 2010	2010- 2020	2020- 2030	2030- 2040
Equation 1 (Unweighted)	0.2	-0.2	-0.1	-2.6	-3.1	-1.7
Equation 1 (Weighted)	0.9	0.0	0.2	-2.0	-2.6	-1.4
Equation 2 (Unweighted)	-0.7	-0.3	-0.4	-1.8	-2.0	-1.2
Equation 2 (Weighted)	-0.7	-0.3	-0.4	-1.8	-1.9	-1.2

Source: Table 1 and the regression results.

We now turn to the next step in the exercise—the use of the estimated equations to generate projections for the savings rate. These are reported in Table 2.2. In all cases, Australian projections suggest little change for the next twenty years, followed by a significant decline. In some cases, our savings rate actually marginally improves over the next twenty years, as our young dependency ratio declines sharply from its 1980 value of 38.7 per cent to 29.5 per cent in 2010. If demographics are important in the determination of saving rates, then their impact in Australia will not be experienced for many years—after most major OECD countries, and long after Japan where the impact will be felt within a decade.

The results reported here are, as we have already indicated, highly preliminary, and more work is needed on both the econometric analysis and the projections. Nevertheless, the robustness of the aged dependency ratio in particular, suggests both that demographic factors may have a significant role to play in determining the future trends of Australia's saving performance, and that their long term influence will be negative. This is so not only because of the processes underlying the estimates of Table 2, but also because of the greater demands on public sector outlays, particularly public pension and health expenditures, that an increased aged dependency ratio will generate.

In a number of countries, there has been a shift in policy emphasis in recent years towards greater reliance on households to provide for their own retirement. This alteration in policy stance has been brought about partly by the general trend toward greater reliance on market forces, but also by concern about the implications of the demographic trends discussed above. Australia has developed a quite complex policy response of this kind over the last seven years, and we turn our attention to this in the next section.

3. Government Policy Towards Private Retirement Saving

3.1 Introduction

The 1980s have seen the evolution of policies designed to place increasing reliance on private saving for retirement provision. For a period in the early 1970s, age pensions were not means tested. They were restricted in 1976 through the introduction of an income test applying up to the age of seventy; and from 1983 the over seventies were also income tested. An assets test was introduced in 1985. In the late 1980s, only 60 per cent of the aged were drawing a full age pension (set at about 25 per cent of average weekly earnings), and 20 per cent were not receiving any government pension entitlements at all.

These changes have been accompanied by a concerted effort to promote superannuation as the favoured vehicle for retirement provision. Prior to 1983, superannuation covered only a small minority of wage and salary earners; while access was limited, the tax treatment accorded those with superannuation was extremely concessionary. The last seven years have seen substantial reform of superannuation legislation, which has moderated the concessional tax treatment of superannuation saving, while broadening its coverage as a retirement provision vehicle for the working population. The expansion of coverage has been fostered by the introduction of productivity award superannuation. The government has explicitly stated that it wishes to encourage retirees to take superannuation benefits in the form of annuities, and to encourage funds to increase their holdings of Australian equities. In the long term, those reforms will have a major impact on the sources of income for the retired. (See Bateman et al. 1990, for a chronology and description of the current arrangements for the taxation of superannuation.)

In this part we focus on the way in which the reforms of the 1980s impact directly upon fund members. We will throughout consider only 'complying'³ funds, and will ignore transitional arrangements.

We begin in section 3.2 by presenting the current tax treatment of a superannuation contributor to a private fund.⁴ (Members of unfunded or constitutionally protected public schemes are treated differently.) In section 3.3 we discuss the adequacy of these arrangements for financing retirement, and provide some numerical examples. Section 3.4 takes up the issue of annuities in greater detail, while section 3.5 discusses productivity-linked award superannuation. Finally, section 3.6 identifies some effects of inflation and partial indexation on the new arrangements.

³ A complying fund is one which falls within the definition of superannuation fund in the occupational superannuation Standards Act 1987 and satisfies the conditions for concessional tax treatment specified in the occupational superannuation standards regulations.

⁴ The same tax treatment would apply in respect of a funded (and taxed) public scheme.

3.2 Tax treatment of superannuation

It is useful to think of the taxation of superannuation in three parts: (i) the taxation of contributions in the hands of the contributor; (ii) the taxation of fund income, including both contributions and fund earnings; and (iii) the taxation of benefits. This approach is reflected in the structure of Chart 1, which we will use as the basis for our exposition. Chart 1 refers primarily to employees in private schemes.

As column 1 of Chart 1 indicates, employee contributions to a scheme supported by the employer are typically made out of net-of-tax income, while employer contributions are deductible. This asymmetry motivates many subsequent provisions.

Turning to fund income, employer contributions are taxed in the hands of the fund at the rate of 15 per cent on receipt. Employee contributions are not taxed, where they are 'non-deductible' in the hands of the contributor. However, all earnings, from both employer and employee contributions, are taxed at 15 per cent.

The exact form of taxation of fund earnings depends on the legal classification of the income. Income in the form of interest, dividends, and rent attracts full taxation. However, gains from asset trading are assessed under the capital gains tax, which allows for the CPI indexation of gains and the offset of (nominal) realised losses.⁵ Importantly, Australian equities generating franked dividends earn the fund a tax credit to offset the company income tax paid on the profits represented by the dividend. Imputation credits may be set off against tax on any income (including capital gains and taxable contributions). Because the corporate tax rate is 39 per cent this generates significant tax savings for the typical fund; prior to 1988, these tax savings were not available.

Benefits taken from age 55 also receive special tax treatment. On benefits taken as a lump sum, retirees face a separate tax, again at 15 per cent (plus the medicare levy) and here, too, a variety of special concessions applies. Firstly, the first \$60,000 (indexed)⁶ of the benefit is exempt from the tax. Secondly, the historical (non-indexed) sum of undeducted employee contributions (but not the fund's earnings thereon) are excluded from the tax base as well, again because they were not deductible in the hands of the contributor.

If some of the benefit is taken in the form of a complying annuity, separate conditions apply to the taxation of the annuity income, which would normally be taxed as ordinary income. Firstly, a tax rebate is generated equal to 15 per cent of the annual annuity payment, available each

⁵ All asset sales by superannuation funds are subject to capital gains tax (at the reduced rate of 15 per cent), not just those acquired after 19 September, 1985. On the other hand, complying funds are not classified as 'traders' in assets. Institutions so classified would be liable for income tax on the net gains from asset trading. By avoiding the 'traders' classification, complying funds do not become liable for the nominal (inflation) component of gross gains.

⁶ The index is average weekly ordinary time earnings, with the base period at July 1988.

Chart 1

CHART 1: TAX TREATMENT OF SUPERANNUATION - FOR A FUNDED (GENERALLY PRIVATE) SCHEME^(a)

CONTRIBUTIONS	FUND INCOME	LUMP SUM	BENEFITS :	PENSION/ANNUITY
Employer: Deductible if within contribution limits $\sum_{i=0}^{N-1} C_i^{er}$	Contributions: Taxed at 15% ^(c) $\sum_{i=0}^{N-1} C_i^{er} (1-t)$ Earnings: Taxed at 15% ^(c) $\left\{ \sum_{i=0}^{N-1} C_i^{ee} (1-t) \times [1+r(1-t)]^{N-i} - \sum_{i=0}^{N-1} C_i^{er} (1-t) \right\}$ Total: $\sum_{i=0}^{N-1} C_i^{er} (1-t) \times [1+r(1-t)]^{N-i}$	< Age 55 Taxed at 20% (+ medicare levy) $\geq$ Age 55 $\leq$ threshold ^(d) 0% $>$ threshold ^(d) 15% Undeducted contributions $\left(\sum_{i=0}^{N-1} C_i^{ee} \right)$ are free of tax	< Age 55 Taxed at MTR (+ medicare levy) $\geq$ Age 55 Taxed at MTR (+ medicare levy) less 15% rebate A component of the pension/annuity representing the undeducted purchase price is free of tax ^(e)	
Employee: Generally not deductible ^(b) $\sum_{i=0}^{N-1} C_i^{ee}$	Contributions: Unaxed unless deductible $\sum_{i=0}^{N-1} C_i^{ee}$ Earnings: Taxed at 15% ^(c) $\left\{ \sum_{i=0}^{N-1} C_i^{ee} [1+r(1-t)]^{N-i} - \sum_{i=0}^{N-1} C_i^{ee} \right\}$ Total: $\sum_{i=0}^{N-1} C_i^{ee} [1+r(1-t)]^{N-i}$		The RBL applies to all benefits (less undeducted contributions or the undeducted purchase price)	
$i = 0$ in first period	$t =$ tax rate of super fund	$N =$ years in scheme	$r =$ rate of return of super fund	

- (a) The same tax treatment would apply to a contributor to a funded (and taxed) public scheme. The contributions may be from employees and/or employers.
 (b) There is limited deductibility where the level of employer support is less than 6.5% of salary.
 (c) The effective tax rate of the super fund would be less than 15% due to the access to full imputation and the application of the CGT only to real gains.
 (d) The threshold is indexed annually to AWOTE.
 (e) The undeducted purchase price for an annual annuity/pension payment is generally $\sum_{i=0}^{N-1} C_i^{ee}$ + the life expectancy at the time the annuity/pension commenced.

year. This clearly reinforces other provisions outlined above in providing incentives to take annuities over lump sums.

However, a second provision operates to at least partially reverse this. If an annuity is purchased outside current superannuation arrangements, only that part of the periodic annuity payment deemed to be interest is taxed. That part of the periodic annuity which is deemed to be repayment of principal is not taxable. Suppose for example, a twenty-year annuity was purchased for \$100,000, and paid \$10,000 per year. A typical tax arrangement would be that the purchase price of the annuity would be assumed to be repaid evenly over the annuity term. That is, each year, the Tax Commissioner would deem \$5,000 of the annuity payment to be repayment of principal, and this would not be taxable. The other \$5,000 would be taxable as interest. This can be seen as generous to the annuitant, in that, at constant interest rates, the principal repayment schedule is upward sloping.

If, however, the same annuity is purchased with superannuation benefits, only that part of the annuity price which is 'undeducted' (the 'undeducted purchase price' (UPP)) is allowed as principal repayment. The rationale for not allowing the full return of purchase price is that previously deducted contributions, and the earnings thereon, have already enjoyed tax concessions.⁷ Under plausible assumptions, however, the UPP, which in terms of the employee superannuation arrangements we have been discussing is equal to the historical sum of employee contributions, is only a small proportion of the full price of the annuity. This proportion is very sensitive to inflation. It will be discussed further in section 3.6.

The final crucial element in the taxation of superannuation benefits are the 'reasonable benefits limits' (RBLs).⁸ RBLs place a cap on the value of superannuation benefits which are eligible for concessional tax treatment. They are based on the average value of the three consecutive highest earning years of a fund member, sometimes indexed by average weekly ordinary time earnings (AWOTE). RBLs are progressive in the sense that the higher the base earnings figure relative to AWOTE, the lower the multiple which is used to determine the maximum concessional payout. They also provide an incentive to purchase annuities—higher RBLs apply if at least half the benefit is used for annuity purchase.

Although there has been a good deal of popular discussion about RBLs, under plausible assumptions they are only likely to have much impact when the ratio of the earnings base to AWOTE is more than 2.5, or when fund membership is unusually long, and this will be the case for only a small minority of fund members.

⁷ The major criteria are that the annuity be of the term-of-life type and that it be indexed by either the inflation rate or 5 per cent, whichever is the lower.

⁸ RBLs are: legislated multiples of highest average (3-year-consecutive) salary that place a ceiling on the lump sum payout that can be received from the fund without losing tax concessions; or legislated percentages of highest average salary that place a ceiling on the private pension that can be received from the fund without losing tax concessions.

3.3 Simulations

The significance of superannuation arrangements for retirement provision can perhaps be best appreciated by examining some numerical examples. Before doing so, however, we briefly present our methods of calculating the values of benefits, with particular emphasis on annuities.

Valuation methods

The calculation of contributions, earnings, and final accumulation are straightforward, and are given by applying the standard formulae reported in Chart 1. The calculation of an actuarially fair indexed annuity stream is somewhat more complex.

Consider the case of a T-year certain annuity paid annually in arrears. Assume the income flow is contracted to be increasing at a fixed rate. For this case there is a textbook formula linking the year-one income flow d_1 to the purchase price P , the escalation factor g , and the market nominal interest rate R , assumed for simplicity to be constant across different terms to maturity. The formula in question is

$$P = d_1 \{1 - [(1+g)/(1+R)]^T\} / (R-g) \quad (2)$$

Thus for example, where:

$$P = \$100,000$$

$$R = 14 \text{ per cent per annum}$$

$$T = 3 \text{ years, and}$$

$$g = 5 \text{ per cent per annum}$$

the year-one annuity payment d_1 is given by:

$$(.14 - .05) \times 100,000 - [1 - (1.05/1.14)^3] = \$41,164.$$

The year-one interest component of this payment is $.14 \times 100,000 = \$14,000$ and therefore, the return-of-purchase-price (RPP) component in year one is given by $41,164 - 14,000 = \$27,164$.

When the income flow is indexed to the CPI, equation 2 continues to hold once the nominal interest rate R is replaced by its real counterpart r . Income flows after year one are reinterpreted as constant-price magnitudes, measured in terms of the purchasing power of money at the purchase date. Where:

p stands for the rate of inflation, and

$$P = \$100,000$$

$$T = 3 \text{ years}$$

$$r = 4 \text{ per cent per annum}$$

$$g = \text{zero, and}$$

$$p = 9 \text{ per annum}$$

the year-one annuity payment in terms of year-two dollars is given by

$$1.09 \times (.04 - 0) \times 100,000 - [1 - (1.00/1.04)^3] = \$39,278.$$

Its interest component in year-two dollars is $(1.09) \times .04 \times 100,000 = \$4,326$, implying an RPP of $\$34,918$. Note that in this and the preceding example, the RPP sequence that really matters is the one recognised by the Tax Office and the Department of Social Security.

Numerical examples

Numerical examples can provide a strong indication of the sensitivity of final retirement benefit to various parameters. A problem in using such examples, however, is that a large number of potentially interacting influences may be raised, resulting in a large array of outcomes which serve to confuse rather than to enlighten.

With this in mind, we confine attention to two cases, one where the fund member is on average weekly ordinary time earnings (AWOTE), valued at \$26,247 on July 1, 1989, and one where the fund member receives $AWOTE \times 2.5$ (\$65,617.5 on July 1, 1989). The age earnings profiles are assumed to be flat. Unless otherwise stated, the following assumptions apply. We assume the inflation rate to be zero, the real rate of return on accumulated funds to be 5 per cent and on indexed annuities 4 per cent. Life expectancy is as stipulated in the legislation. The effective tax rate faced by the fund is set at 10 per cent. Employees join the fund at the age of thirty-five on 1 July 1989, and contribute 5 per cent of gross salary. The employer contributes 6.5 per cent of gross salary for the worker on AWOTE and 13 per cent of gross salary for the worker on $AWOTE \times 2.5$. We assume two values for real wages growth, 0 and 2 per cent. For the annuities, we assume that there is no reversion or guarantee and that there are no management fees or transactions costs. The income tax is assumed to be indexed to wages growth. We also assume that all changes to the tax treatment of superannuation announced since May 1988 are effective from 1 July 1989. The 3 per cent award superannuation is ignored.

Table 3.1 offers estimates of the benefits to a worker on AWOTE, given the above assumptions, for the cases of zero real wages growth and 2 per cent real wages growth. The calculations illustrate a number of points.

Firstly, the indexed annuity replacement rate (that is, the value of the annual indexed annuity payment as a proportion of final salary) increases dramatically when retirement is delayed. In the no wages growth case, retirement at age fifty-five and taking benefits immediately (retirement decision A) yields an annuity paying about 25 per cent of final salary, compared with a 66 per cent replacement rate for those retiring at age sixty-five (retirement decision C). This effect is driven by two factors: the accumulation period and the residual life expectancy at retirement. (Note that the reported replacement rates are calculated on gross of tax incomes, and do not factor in the tax rebate.)

Secondly, the lump sum benefits tax as a proportion of the benefit paid increases the longer retirement and benefits are deferred. This occurs because of the diminishing importance of the exemption threshold for higher accumulation and, in the case of a deferred annuity (retirement decision B), the diminished importance of the (untaxed) sum of undeducted employee contributions relative to earnings. The effective tax rates are 0.5 per cent under retirement decision A, 6 per cent under B, and 7 per cent under C.

Next consider the same set of outcomes, under the assumption that the economy experiences annual real wages growth of 2 per cent. Firstly indexed

Table 3.1: Illustrative Superannuation Benefits for Worker on Average Weekly Ordinary Time Earnings (\$26,247 in July 1989)

Retirement Decision	Final Salary	0 per cent real wages growth \$26,247	2 per cent real wages growth \$38,237 (Age 55) \$46,611 (Age 65)
A			
Retires at 55 and takes benefits immediately	Lump Sum:		
	pre tax	\$93,360	\$110,201
	post tax	\$92,935	\$110,201
	Indexed annuity	\$6,408	\$7,564
	Tax rebate	\$961	\$1,135
	Replacement rate	24.3%	19.8%
B			
Retires at 55 and defers benefits to 65)	Lump sum:		
	pre tax	\$144,985	\$171,139
	post tax	\$136,171	\$167,124
	Indexed annuity	\$13,515	\$15,953
	Tax rebate	\$2,072	\$2,393
	Replacement rate	51.5%	34.2%
C			
Retires at 65 and takes benefits immediately	Lump sum:		
	pre tax	\$181,554	\$230,214
	post tax	\$168,930	\$220,069
	Indexed annuity	\$16,924	\$21,460
	Tax rebate	\$2,539	\$3,219
	Replacement rate	64.5%	46.0%

**Table 3.2: Illustrative Superannuation Benefits for Worker on
2.5 Times Average Weekly Ordinary Time Earnings**

Retirement Decision	Final Salary	0 per cent real wages growth \$65,617	2 per cent real wages growth \$95,592 (Age 55) \$116,526 (Age 65)
A			
Retires at 55 and takes benefits immediately	Lump Sum:		
	pre tax	\$359,242	\$424,047
	post tax	\$318,796	\$383,362
	Indexed annuity	\$24,657	\$29,104
	Tax rebate	\$3,699	\$4,366
	Replacement rate	37.6%	30.4%
B			
Retires at 55 and defers benefits to 65)	Lump sum:		
	pre tax	\$557,891	\$658,532
	post tax	\$421,597	\$562,650
	Indexed annuity	\$48,685	\$61,388
	Tax rebate	\$7,303	\$9,208
	Replacement rate	74.2%	52.7%
C			
Retires at 65 and takes benefits immediately	Lump sum:		
	pre tax	\$698,606	\$885,848
	post tax	\$510,247	\$706,043
	Indexed annuity	\$51,743	\$82,578
	Tax rebate	\$7,761	\$12,387
	Replacement rate	78.9%	70.9%

annuity replacement rates are substantially lower, because the average salary on which contributions have been based is lower than the final salary on which the replacement rate is calculated. Secondly, the average benefits tax rate on lump sums is much lower, because the \$60,000 exemption is indexed to AWOTE.

Table 3.2 reports corresponding simulations for a worker earning 2.5 times AWOTE, with higher (13 per cent) employer contributions. Consider the zero wages growth case first. Compared with Table 3.1, replacement rates are higher in all cases in spite of RBLs binding in decisions B and C. The effective tax rates on lump sums are also higher, partly because of the diminished importance of employee contributions, and partly because RBLs are binding in all cases. Thus, for retirement decision C, an average tax rate of 27 per cent applies in the zero wages growth case if the benefit is taken as a lump sum. This reduces to about 20 per cent if 2 per cent real wages growth is assumed.

The general impression given by these numerical examples is that under existing rules, reasonable levels of retirement provision can be anticipated for a worker who joins a fund relatively early in his working life, and who postpones retirement until he is 65. This outcome, however, depends on actuarially fair annuity pricing based on life expectancies prevailing in the population at large. There are reasons for expecting that these conditions will not generally be satisfied and we now turn to an examination of this issue.

3.4 Life Annuities

Despite the attractive longevity insurance feature of annuities, these have not been successful in attracting significant numbers of buyers. To examine some of the reasons for this, it is important to understand how annuities are priced. An actuarially fair single-life annuity is defined as one where the premium charged for each contracted t -period-ahead dollar of payment is calculated by the formula:

$$q_t / (1+R)^t \quad (3)$$

where q_t is the annuitant's probability of survival t periods out from the purchase date. For example, where:

$$P = \$100,000$$

$$R = 14 \text{ per cent per annum}$$

$$g = 5 \text{ per cent per annum}$$

$$q_1 = 1.00; q_2 = .75, \text{ and } q_3 = \text{zero}$$

the actuarially fair value of d_1 is given by the solution to

$$100,000 = d_1 / 1.14 + (.75 \times 1.05 \times d_1) / (1.14)^2$$

$$\text{i.e., } d_1 = \$67,424.$$

In the absence of actuarially fair life annuities—or a substitute, such as the family or the public aged pension—individuals would be exposed to *longevity risk*—in retirement the typical consumption path would be low on average, and declining through time (Kotlikoff and Spivak (1981)).

Note here that early payments are large, and 'term to maturity' is short. More generally, the *duration*, or degree of back-end loading is given by the textbook formula

$$D = (1/P) \sum_{t=1}^T td_t \quad (4)$$

where D is duration, and d_t is the annuity's (nominal) payment at date t . In equation 5, applied to our three-year term certain annuity above, duration is

$$\frac{41164}{100000} [1 + 1.05 + (1.05)^2] = 1.3 \text{ years} \quad (5)$$

In Australia, long duration will be shown to deliver a potential tax advantage to annuitants yet long duration also creates a problem to the investment managers of issuing companies unable to offset their long duration liabilities flow with long duration securities.

Most research on economic aspects of annuities has been undertaken in the US, where social security can be thought of as compulsory annuity insurance. In addition, US occupational superannuation (pension) benefits in general must be taken as an annuity to retain concessional tax status. Beyond this, the demand for annuities is low. It would be possible to argue that subsidised annuity purchase of the above types has led to a pattern of retirement provision where further market price purchases of annuities are not worthwhile. Nevertheless, US commentators generally feel that the low demand for additional annuities is surprising, and worthy of investigation

The traditional explanation for this phenomenon is *adverse selection*. That is, individuals with reason to believe that their personal survival probabilities exceed the probabilities implied by general-population mortality tables will be disproportionately high demanders of life annuities, in this way driving down yields. In the case of the US, Friedman and Warshawsky (1990) present striking evidence of self selection using comparisons of general population and annuitant mortalities. They estimate, for example, that a typical male aged sixty-five would have enjoyed a premium of 4.21 per cent per annum, had he purchased a government bond rather than a life annuity.⁹

3.5 Productivity award superannuation

We pointed out in section 3.4 that Australia, unlike other comparable countries such as the US, Canada and the UK, does not have any national earnings related pension. In 1986, however, the national wage case judgement included an agreement on productivity superannuation. Essentially, employees forgo a 3 per cent pay increase. In return, the employer agrees to contribute 3 per cent of salary to a complying superannuation scheme. The government has announced that another 3 per cent deal of this kind is in prospect for 1990-91. This can be seen as a first step towards a social security scheme of the US-UK kind, although in the

⁹ An examination of the Australian market for annuities is discussed in Gratton (1985).

Table 3.3

Table 3.3: Benefits to a Worker on Average Weekly Ordinary Time Earnings of 6 per cent
Productivity Award Superannuation

	Worker Joins Fund at 35 years		Worker Joins Fund at 25 years	
	0% real wages growth	2% real wages growth	0% real wages growth	2% real wages growth
Retirement Decision	Final Salary	\$26,247 \$38,237 (Age 55) \$46,611 (Age 65)	\$26,247 \$46,611 (Age 55) \$56,818 (Age 65)	
A (Retires at 55 and takes benefits immediately)	Lump sum: pre tax	\$46,465	\$54,847	\$114,577
	post tax	\$46,465	\$54,847	\$114,577
	Indexed annuity Tax rebate Replacement rate	\$3,819 \$573 12.2%	\$3,764 \$565 9.2%	\$7,864 \$1,180 16.9%
B (Retires at 55 and defers benefits to 65)	Lump sum: pre tax	\$72,158	\$85,175	\$177,934
	post tax	\$70,914	\$85,175	\$171,709
	Indexed annuity Tax rebate Replacement rate	\$6,727 \$1,009 25.6%	\$7,940 \$1,191 17.0%	\$16,587 \$2,488 29.2%
C (Retires at 65 and takes benefits immediately)	Lump sum: pre tax	\$90,359	\$158,525	\$213,774
	post tax	\$86,157	\$143,246	\$201,725
	Indexed annuity Tax rebate Replacement rate	\$8,423 \$1,263 32.1%	\$10,681 \$1,602 22.9%	\$19,928 \$2,989 35.1%

Australian case the government has not guaranteed any benefits, and coverage is restricted to workers employed under award conditions.

In Table 3.3 we report numerical examples, using the valuation techniques developed in sections 3.2 and 3.3 to illustrate the impact of 6 per cent productivity award superannuation. With 2 per cent real wages growth, an employee working full time from age thirty-five to age sixty-five will receive an indexed annuity roughly equivalent to the aged pension. Since annuities are indexed to the CPI, while the age pension is related to average weekly earnings, the value of the annuity will gradually fall relative to the pension. With forty years service, the indexed annuity replacement rate is 36 per cent at retirement, which is in line with the replacement rates offered by national social security arrangements in other comparable OECD countries.

3.6 Indexation issues

This last subsection identifies some issues thrown up by inflation and the partial indexation of the revised superannuation arrangements. Lack of time has prevented us from fully analysing them.

The impact of inflation on the effective tax rate on fund earnings

Inflation leads to the generation of nominal capital income simply to compensate for the erosion of the real value of the underlying asset, were its price to remain constant in nominal terms. Where the price of the asset itself adjusts, nominal capital gains are recorded. Because complying superannuation funds are not classified as traders, such gains are accrued under the capital gains tax, and if the gain reflects inflation only, would attract no tax. It should be noted, however, that only *nominal* losses can be offset or carried forward against capital gains tax liability. Real losses which take the form of nominal gains generate no tax relief, and any nominal loss offsets which are carried forward are not themselves indexed, and thus have their value eroded by the inflation rate.

A substantial proportion of the assets of superannuation funds, however, is allocated to fixed interest securities. The inflation component of this interest income is taxable. The effective tax rate on real fund earnings—and thus the value of benefits—will therefore be sensitive to inflation rate changes.

The employee contribution exemption on the 15 per cent benefit tax

Because employee contributions are made out of net-of-tax income, they are exempt from benefit taxation. However, as inflation rises, so do the nominal earnings of the fund, and these are taxable. The unindexed historical sum of employee contributions thus represents a smaller proportion of the benefit paid, and its exempt status is diminished in importance.

The impact of inflation on the taxation of annuities

Tax relief for the repayment of principal on annuities purchased with superannuation fund payouts is confined to the proportion of the purchase price accounted for by undeducted contributions—in our example employee contributions. Again, this proportion falls with inflation. Preliminary calculations suggest that under our standard assumptions, an employee

would be able to deduct about 30 per cent of the total purchase price of the annuity in the absence of inflation. This decreases to 20 per cent with 5 per cent inflation, 14 per cent with inflation at 10 per cent, and 11 per cent with 15 per cent inflation.

4. The Superannuation Industry in its Policy Context

This section examines superannuation in Australia from the perspective of structure, conduct and performance of the superannuation industry.

4.1 Fund size distribution

The superannuation industry is highly concentrated with many small funds controlling a small percentage of total funds, and a few large funds responsible for the bulk of investment. The Insurance and Superannuation Commission (1989) reported that in 1986-87 (the first and latest year for which data are currently available) there were 95,109 retirement-oriented superannuation funds with approximately 3,136,000 members and with total assets of \$37.8 billion.¹⁰ These funds included the funds of employees from both the private and public sectors. Of these funds, 73,451 had total investments of less than \$100,000 and accounted for only \$2.3 billion in assets while 450 funds had assets valued at more than \$10 million and controlled \$25.0 billion. Put another way, 77 per cent of funds controlled 6 per cent of assets while .05 per cent of funds controlled 66.1 per cent of the assets. Concentration is even more extreme when only the largest half-dozen funds are considered.

There was a similar concentration among Approved Deposit Funds (ADFs).¹¹ These were still in their infancy in 1986-87 with 96,433 depositors in 227 funds holding assets of \$3,907 million.¹² Although most funds had assets of less than \$200,000, as with the superannuation funds, most of the assets were with the 11 large funds whose assets were over \$100 million.

4.2 Superannuation funding¹³

Funds flow

The ISC reported that the aggregate superannuation fund income of \$12,372 million in 1986-87 was made up of net investments (\$7,472 million), employer contributions (\$2,548 million) and member contributions (\$1,708 million). Total expenses of \$3,907 million were made up principally of

10 ISC (1989), Tables 2.1 and 2.2, p.137. According to MINTEL Australia (a superannuation consultant), by 1989 the total of assets held by superannuation funds had increased to \$107 billion, of which 37.8 per cent were in public sector schemes, 22.9 per cent were in private sector schemes, 33.2 per cent were with life offices and the remainder (6.1 per cent) was with other financial institutions.

11 Approved deposits funds (ADFs) manage both employee payouts from superannuation funds and redundancy payments paid to employees. These are managed on the employee's behalf until retirement. There is no tax on either the payout or the earnings.

12 ISC (1989), Tables 3.1-3.3. According to MINTEL Australia, by 1990 the value of assets held in ADFs had increased to \$15 billion.

13 See ISC (1989), pp.133 ff.

benefit payouts (\$3,392 million). The \$8,465 million net increase in funds represented a growth rate of 22.4 per cent for the year, a figure consistent with MINTEL Australia's estimate of a 22 per cent annualised compound growth over the decade to 1989.

With investment returns less non-benefit expenses at \$6,957 million and net contributions at only \$864 million, the data suggest that the bulk of the increase in fund size in 1986-87 was due to investment returns rather than to increased membership. It will be interesting to see how this proportion changes following the post-1987 decreases in equity performance and the 3 per cent superannuation awards.

Contributions

More than half (60.5 per cent) of superannuation fund members were in funds which were supported primarily by employers, 34.6 per cent were in funds which were best described as unsupported by any employer, and only 4.7 per cent were in funds which had both employer-support and non-employer-support. These numbers are consistent with the income data which show that 59.9 per cent of annual contributions are from employers and 40.1 per cent from fund members themselves.

Payouts

The ISC report shows that 88.9 per cent of members expect to receive their benefit payouts in the form of a lump sum, 1.6 per cent in the form of an annuity, and that 9.2 per cent of members expect a combination of an annuity and a lump sum. The low proportion taking their superannuation in the form of annuities is discussed more fully elsewhere.

The ISC also reports that 22 per cent of fund members are in defined benefit schemes while 78 per cent are in accumulation or defined contribution schemes. This latter proportion appears to be at odds with industry estimates which suggest that the proportions are the reverse of those reported by the ISC. This apparent discrepancy requires further investigation.

In either case however, there appears to be widespread acceptance of the view that there has been a shift towards accumulation schemes and away from defined benefit schemes. Reasons cited for the shift towards accumulation schemes include:

- (i) their being easier to understand and monitor;
- (ii) regulations requiring portability of benefits between funds and vesting regulations which require funds to pay interest on contributions when a member leaves a defined benefit scheme. The effect of these regulations has been to make defined benefit schemes less attractive to those employees who used to be advantaged by defined benefit payouts because they were being subsidised by employees with less steady employment;
- (iii) the drawing into the superannuation net of industry and union funds and more small businesses. The new entrants have inadequate access to a capital base which may be needed in the event that an actuarial review revealed inadequate funding of a defined

benefit scheme. The corporations which initially offered superannuation could easily step up contributions in the event of such a shortfall.

4.3 Superannuation fund performance

Table 4.1 shows that in 1986-87 the average return on the assets of superannuation funds was 19.2 per cent and that the earnings of smaller funds were substantially less than those of the larger funds. The average return on funds increased from 9.5 per cent for those with assets of less than \$100,000 to 21.1 per cent for funds with total assets greater than \$10,000,000. The difference of 11.6 per cent is substantially greater than the 1 per cent difference in annual fees. The differential might be due to various factors, including:

- (i) economies of scale
- (ii) employee mobility from poorly-performing funds to above-average performance funds;
- (iii) a tendency of small funds to invest in safe assets;
- (iv) differential returns between market segments, with the wholesale end of the funds management industry bringing higher returns than the retail end.

Table 4.2 shows that the average return on the assets of ADFs was 13.3 per cent. There was no evidence of bias due to fund size as there was for superannuation funds, even though the two types of funds are similar in terms of legal requirements, computer and personnel needs and marketing. This lack of bias for ADFs tends to negate the economies of scale argument for superannuation funds, since the existence of economies should be evident in either both types of fund or neither. The lower return earned by ADFs could alternatively be explained by:

- (i) greater risk-aversion and lower return-orientation due to ADF fund members' being closer to retirement than superannuation fund members
- (ii) the ADFs location at the retail end of the funds management sector (see below).

ISC data on portfolio allocation are not reliable on their own because of the broadness of the categories used, and because values are based on a combination of book values and market values. However, in showing 11.4 per cent of assets invested in public securities, 18.2 per cent at interest (including mortgages), 30.6 per cent in shares and other equity investments, 5.9 per cent in real estate, 22.4 per cent in insurance policies, and 11.5 per cent in other investments, the data are broadly consistent with Reserve Bank Flow-of-Funds data for 1985-86.¹⁴

¹⁴ The ABS will be releasing comprehensive data on superannuation funds and their portfolios later this year.

Table 4.1 Superannuation Funds Industry Structure, 1986-87

Size by Total Value of Assets	Number of Firms	Total Assets \$m	Average Return % p.a.
<\$100,000	73,451	2,261	9.5
\$100,001 - \$299,000	11,263	1,560	12.1
\$200,001 - \$500,000	6,303	1,881	13.0
\$500,001 - \$1,000,000	1,720	1,181	15.4
\$1,000,001 - \$10,000,000	1,922	5,908	18.8
>\$10,000,000	450	24,996	21.1
Total	95,109	37,786	19.2

Source: Insurance and Superannuation Commission (1989), Tables 2.1 and 2.2, pp. 137

Table 4.2 Approved Deposit (Rollover) Funds

Size	No. of Funds	No. of Depositors	Total Assets \$	Average Return %	Assets/ Depositor
<100	47	2,118	2,621	3.3	1,237
100-200	69	133	9,556	10.4	71,850
200-500	42	197	13,821	14.9	70,157
500-1,000	11	258	9,081	9.8	35,198
1,000-10,000	34	4,708	99,951	7.9	21,230
10,000-100,000	13	14,692	371,940	10.2	25,316
>100,000	11	72,527	2,890,949	13.9	39,860
Total	227	94,633	3,907,329	13.3	41,289

Source: Insurance and Superannuation Commission (1989), Tables 3.1 and 3.2.

Table 4.3 Mean Returns
(per cent per annum)

	Aust. Equities	Overseas Equities	Aust. Property	Aust. Bonds	Overseas Bonds	Aust. Bills
Nominal	20.2	20.9	16.2	11.5	14.7	13.2
Real	12.1	12.8	8.1	3.4	6.5	5.1

Note: Annualised percentage rates of return were generated by the formula $400 \ln F$, where F denotes quarterly return factor.

Source: Raw data are quarterly return factors kindly supplied by John Beggs of Daiwa Securities.

Table 4.4: Standard Deviations
(per cent per annum)

	Aust. Equities	Overseas Equities	Aust. Property	Aust. Bonds	Overseas Bonds	Aust. Bills
Nominal	27.2	16.9	2.9	6.0	16.0	1.3
Real	26.7	16.7	3.2	6.0	15.7	1.7

Note: Annualised percentage volatilities were generated from their quarterly fractional counterparts by the formula $200 \hat{\Delta}$ where $\hat{\Delta}$ denotes quarterly fractional standard deviation.

Source: See Table 4.3.

Table 4.3, showing nominal and real mean returns during the period 1978.2 to 1988.2, places performance in 1986-87 into the context of the recent behaviour of the main classes of assets available to Australian superannuation funds. By and large, the only surprise is that Australian bills outperformed Australian (Treasury) bonds. Volatilities as measured by standard deviations for the period 1978.2 to 1982.2 are also broadly in line with expectations. See Table 4.4.

Consistent with a finding emphasised by Ball and Bowers (1986) for their 1974-1985 sample, Table 4.4 reveals real volatilities not to be substantially lower than their nominal counterparts. As these authors point out this result suggests that an institution seeking a good inflation hedge from the traditional broad asset classes would have been hard pressed to find one.

A complete treatment of the question of hedging risky assets would require a lengthy multivariate analysis. The pairwise correlations shown in

Table 4.5: Correlations Between Risky Assets

	Aust. Equities	Overseas Equities	Aust. Property	Aust. Bonds	Overseas Bonds
Aust. Equities	1				
Overseas Equities	.5	1			
Aust. Property	-.06	-.19	1		
Aust. Bonds	.24	.13	.17	1	
Overseas Bonds	-.25	.54	-.25	.02	1

Note: These are correlations between real (rather than nominal) returns.

Source: See Table 4.3.

Table 4.5 are merely suggestive. These results indicate that international diversification would have been worthwhile during our 1978.2-1988.2 sample period. For example, overseas bonds had a negative correlation of -.25 with both Australian equities and Australian property.

4.4. The Funds management industry

Financial intermediation since 1985

Before changes in the law in 1985, most superannuation funds were invested 'in-house'. The smallest superannuation funds were one or two person funds centred around a small family-owned business. The funds were principally aimed at minimising tax. There was little funds flow, as the funds capitalised the owner's income as equity to be re-invested in the business. Regulations in 1985 limited new superannuation funds to a maximum of 10 per cent of assets in related firms, and required existing firms to bring their proportion invested 'in-house' down to the 10 per cent limit by 1995. As a result, small superannuation funds are increasingly having their funds managed by professional managers in pooled funds operated by life offices, banks, merchant banks, and specialist fund managers.

The large superannuation funds based on the corporate sector also invest directly in assets (including those of the 'parent') instead of investing indirectly through managers. This is partly because the superannuation fund management is often integrated into the parent Treasury which invests funds directly as part of the normal course of business. The Treasury

in turn invests on behalf of the superannuation fund at a negligible fee to the superannuation fund.

The corporate-based superannuation funds have also moved increasingly into having funds managed externally:

- (i) as the cost of funds management fell with the competition at the wholesale end of the newly emerging financial services sector;
- (ii) due to the 1985 changes in regulations which limit direct investment in the parent company; and
- (iii) because of member demands to limit potential conflict of interest between employees and the parent—in strategic investments for example.

Fund management products

The intermediation has spawned a new industry of funds managers offering a wide range of investments. The choice of pooled funds include:

- (i) *managed* funds which have discretion with regard to both the allocation of funds between sectors and investments within the sectors;
- (ii) *capital guaranteed* and *capital stable* funds where discretion is limited to investments in bills, bonds and mortgages;
- (iii) *growth* funds where investments are biased towards equities and/or property;
- (iv) *specialist* funds where the fund manager's investments are limited to specific sectors, e.g. cash, fixed interest, property, domestic or offshore equity, or resources, and where the manager's discretion is limited to investments within the sector.

Some fund managers offer a wide range of managed funds—thirty-two superannuation and sixteen ADF funds are offered by MLC for example—while others offer only a single 'managed' fund. Table 4.6 shows that despite the wide choice, the overwhelming demand is for stability and professional management as opposed to volatility and discretion. As at March 1990, only 11 per cent of the superannuation funds and 7 per cent of the ADFs were invested in 'risky' assets, i.e. in equity, resources, property or international funds as opposed to managed, fixed interest, cash or capital-stable funds. Whether the preference for management and low risk is a function of the current investment climate or whether it is a demand for stability warrants further investigation.

Funds management market segmentation

Hard data relating to the funds management industry are uneven at best, but it appears that the industry can be characterised as segmented between retail, wholesale and 'boutique'.

- i) *Retail superannuation*: the retail end of the market is made up of almost 300 managers who cater to small business funds, the self-employed, and employees who contribute from their own wages. The

Table 4.6: Distribution of Retail Fund Assets Between Types of Pooled Funds, March 1990

Type of Fund	Superannuation Funds:		Rollover Funds/ADFs:	
	No. of funds	Size \$m	No. of funds	Size \$m
Personal Managed	67	2,680	87	2,357
Corporate Managed	43	2,265	0	0
Cash	21	65	24	2,704
Capital Stable	76	1,645	60	4,811
Fixed Interest	32	209	21	713
Equity	33	413	22	199
Resource	3	1	2	1
Property	22	209	21	713
International	20	248	16	68
Total	317	8,033	287	14,084

Source: Calculated from *Money Management* (1990) and from data supplied by ASSIRT Investment Research and Technology.

sector makes up 20 per cent of the market by value; amounts taken are as low as \$1000; and there is an entry fee of around 4 per cent of the capital invested together with annual fees of 1.5 per cent of the capital value of the fund.

The ADF sector of the funds management industry is at the retail end of the market, basing itself on individuals choosing the fund into which employers 'roll' payouts. Members may switch fund managers before retirement, but only at great expense. Entry fees for ADFs vary from zero to 6 per cent while annual management fees may amount to 1.5 per cent of capital value; the minimum accepted investment can be as low as \$1,000.

ii) *Wholesale superannuation*: the wholesale end of the industry is made up of about 50 managers catering to larger funds coming out of medium size entities. These funds make up about 20 per cent of the industry by value; do not accept amounts less than \$250,000; and charge annual fees of .6-9 per cent of capital value in addition to a front-end fee from zero to 1.5 per cent of capital.

iii) *'Boutique' wholesale superannuation management*: There are also between fourteen and twenty funds which contract managers to manage the fund as a separate pool, and in close consultation with trustees. These funds are few in number but they make up 60 per cent of the funds management market by value; the minimum fund size is \$20,000,000; there is no front-end fee and the annual management fee is only 0.3-0.6 per cent per annum. This market segment represents the employees of the largest private and public sector corporations and public services.

The inverse relationship between fees and minimum investment size suggests some increasing returns to scale due to marketing costs at the retail level. This marketing cost factor is further evidenced by the existence of 'discount specialists' who offer rebates of up to 2 per cent of the 6 per cent up-front fee to retail clients.

Funds management industry concentration

The funds management industry is highly concentrated.¹⁵ Within each segment the largest fifteen managers accounted for at least 80 per cent of the funds in its segment. A high degree of specialisation is evidenced by the fact that only four managers (National Mutual, AMP, BT and Westpac) were among the largest fifteen in each of the three segments. However, these four managers did make up 49.7 per cent of the \$36 billion accounted for in the survey.

Table 4.7: Concentration Ratios in Funds Management
(measured by asset values %)

	Retail	Wholesale	ADFs	Total
Largest 2	40.4	43.4	27.1	35.4
Largest 5	63.1	72.1	49.6	55.8
Largest 10	79.5	87.1	71.6	72.5
Largest 15	86.1	95.7	81.8	83.6
No. of managers	63	32	73	87

Source: Calculated from *Money Management* (1990) and from data supplied by ASSIRT Investment Research and Technology.

¹⁵ Complete and consistent long-term data are not available, but most fund managers participate in performance surveys that are conducted by actuarial and industry consultants, with results published in the financial press. The data are relatively complete for ADFs and retail superannuation funds; less complete for wholesale superannuation funds; and lacking for the wholesale funds managed by the boutique wholesale managers. The concentration ratios of Table 4.7 are drawn from magazine surveys which in April 1990 accounted for \$7,989, \$12,979 and \$15,315 million of the retail, wholesale and ADF markets.

4.5 Principal-agent issues

Aggregating preferences

One principal-agency issue is becoming increasingly important as defined benefit funds increase relative to accumulation funds. For the former, the employee's benefit at retirement is tied to various factors such as age, years of service, wage/salary etc. The main risk to an employee in the case of defined benefit funds relates to the employer's credit risk: will the employer be able to fund the benefits expected on the employee's retirement. For accumulation funds, the employee's benefit at retirement is equal to equity in the fund, which is in turn based on both the member's contribution and the fund's performance. The employee now faces both a credit risk and a performance risk, since the value of the payout will depend on how well his fund performs.

Problems arise for accumulation funds mainly because there is a difference between the nominal incidence of superannuation and its real incidence. Nominally, the employer chooses a fund manager and contributes to the fund on the employee's behalf. The fund manager in turn manages a pool of funds with the aim of maximising the rate of return consistent with a level of risk and consistent either with instructions the manager may have received or with pledges the manager may have made. In this framework, the employee is passive, the employer is the client or principal, and the fund manager is the agent of the employer.

In real terms however, the employee pays for the superannuation contribution either directly or through income foregone, and the employer pays for it only nominally. The employer's role should be to merely provide the institutional mechanism for aggregating employee costs and demands and the fund manager should act as the employee's agent.

Since aggregation of employees' preferences is a necessary consequence of the employee taking advantage of the economies of scale provided by the employer, some form of aggregation will always be in the employee's interest. While aggregation at the employer level is the most common form of aggregation, nevertheless it needs to be established whether or not this is also the optimal institutional setting.

Although employees have some input when choosing a superannuation fund manager, this limited input is not likely to be of much consolation to the individual employee whose interest is quite different from the group interest. It is likely to be different where an employee is near retirement, and where aversion to risk is greater for that individual than for the group whose median age is substantially less than the age of the retiree.

The retiree would more than likely prefer to have a higher proportion of his or her portfolio in cash as compared to the group. He may theoretically do this by opting out of the group fund and investing in a cash-oriented retail fund while investing accumulated benefits in a cash-oriented rollover fund. Such a course is unrealistic however because it would involve substantial costs to the worker, and in many cases would not be permitted by the employer.

Other individual-group choice conflicts may arise where an employee is interested in taking on greater risk than that chosen by the group (younger workers for example); or where an employee wishes to retire overseas and may therefore wish to hedge the value of the payout by investing a high proportion of assets in an offshore currency.

Conflicts of interest may also arise where a manager takes instructions from the employer because the manager views the employer as the client. The Occupational Superannuation Standards Act is phasing out these potential conflicts of interest by requiring employer representation in superannuation management. Different types of conflicts of interest may emerge in the future with trade union funds where the union management is tempted to direct members' funds to political or industrial aims.

Performance incentives

A second principal-agent issue relates to the fund manager's incentive to perform. In theory the fund manager has a long-term interest in staying in business and expanding, and therefore its interest will be consistent with those of employee (principal). While this may be true in the long-run, there are a number of reasons for believing that even poorly performing managers can survive at least in the near-term in the current Australian environment.

Because the industry is in a rapid growth phase, supernormal profits may be earned by mediocre and even poor performers if they can mount a strong and effective marketing campaign. With marketing as the cornerstone to earnings, the agent's desire for long-term survival and growth cannot be considered a sufficient condition for ensuring that agents act in investors' long-term interests.

In Australia the industry is still in its infancy and there is not enough information available to permit a distinction to be made between funds on the basis of their relative performance. The 'newness' of the information about performance has been compounded by the October 1987 equity market crash which has dramatically affected performance measures (even suggesting a crude inverse efficient-market risk-return relationship) and created a good deal of confusion about how the crash should be treated in performance evaluations. Some funds view the crash as a once-off event which can be ignored for long-term evaluation purposes, while others view it as an integral part of the financial system which should be taken into account when evaluating fund managers. The resolution of this matter among funds will take place in the fullness of time, but the confusion compounds uncertainty about performance and makes marketing and image as important for a fund manager's survival as investment skill.

The 6 per cent entry fees to retail and smaller wholesale superannuation funds also means it is costly to change fund managers, thereby locking-in fund managers. The administrative and time costs of switching also serve to lock funds in at the margin, with a consequent dilution of performance incentives to fund managers.

Performance-based fees would stimulate performance. Some fund managers in the US and at the wholesale level in Australia base their

annual management fees on performance, but they are the exception rather than the rule.

Regulatory-supervision framework

By and large employees look to the government through the Insurance and Superannuation Commission to protect their interest. The Commission in turn sees its responsibility as helping 'to promote the sound working and orderly development of superannuation in accordance with legislation designed to ensure that superannuation schemes are managed prudently in the interest of their members and to encourage the use of superannuation benefits for genuine retirement need'.

The basis of the ISC's supervision is the Occupational Superannuation Standards Act which provides that, to be eligible for concessional tax treatment, funds must comply with the conditions of the Act. The first stage of the phasing-in of regulations came into effect in 1987, prescribing standards in respect to vesting, preservation of funds, portability of benefits and requirements regarding trustee control, reporting and investments. The second stage of the phasing-in process involves incorporating parts of the Income Tax Assessment Act into the superannuation legislation.

Compliance is on a self-assessment basis, with the trustee accepting responsibility for ensuring that funds comply with requirements, and with the auditor giving an opinion on the compliance of the fund with specific regulations. The ISC monitors compliance on the basis of the annual return and the audit certificate, but it may conduct investigations and undertake random audits.

Included among the standards for which the trustee and auditor take responsibility for compliance are requirements relating to:

- (a) equal representation for employers and employees and the appointment of independent trustees;
- (b) non-allowance of loans to members;
- (c)
 - i) investments being consistent with 'in-house' asset restrictions;
 - ii) investments being at arm's length;
 - iii) investments being directed towards achieving maximum returns consistent with the sound management of fund assets;
 - iv) investments being structured to provide benefits to members as they are required;
 - v) non-allowance of borrowing except to obtain temporary finance;
- (d) full vesting of member-financed benefits and employer-financed benefits which are the result of an industrial award;
- (e) preservation and portability of benefits; and
- (f) reasonableness (i.e. not excessive) of moneys to meet benefits and reasonableness (i.e. not excessive) of benefits.

Apart from restrictions on in-house assets and on borrowing, regulations do not prescribe the nature of a fund's investments, even though the Commission monitors the broad portfolio structure.

The ISC's only power to take action against a poorly performing fund lies in its monitoring of returns data and its ability to withdraw tax advantages from a fund which does not invest 'towards maximum returns consistent with sound management'.

The threat of an audit and the possibility of losing a tax concession is in theory expected to ensure compliance. With its limited resources however, it is doubtful whether the ISC's powers pose a credible or effective threat.

4.6 Supporting annuities

To avoid the need for mismatching reserves an annuity writer could follow a simple *dedication* (or pure hedging) strategy. That is, if mortality and other data suggested that \$X would be payable to annuitants in T years time, then a matching investment account would be created, consisting of securities with a certain T-period-ahead value of \$X. To avoid the need for mismatching reserves except against the contingency of non-parallel shifts in the yield curve, an *immunisation* strategy could be followed: annuity obligations would be backed by a portfolio of securities of the same duration as the annuity obligations. (This latter strategy would require active management, in order to counteract the automatic tendency for a passively managed fixed-interest portfolio to shed duration over time.)

Writing in 1985, Gratton presented examples of standard life annuities requiring supporting portfolios such that 23 per cent of assets for males aged sixty-five, and 50 per cent of assets for females aged sixty, would mature at dates beyond the year 2005. The problem for hedging has been that low-risk long-term securities have not been readily available in the market. Five years later, CPI indexation has become a mainstream annuity feature, yet the maturities available in Treasury Indexed Bonds still do not extend beyond the year 2005. Nor have they been issued in sufficiently large quantities to establish marketability, and outstanding stocks have been 'locked up' by institutions.

It follows that reserves against mismatching will continue to be needed, reducing yields. Furthermore Gratton suggests that investment managers will investigate low-yielding equity-type assets, in an effort to replicate long-duration fixed-interest securities.

For the purpose of supporting indexed annuities there have been some efforts to identify and acquire a portfolio of assets whose return is highly correlated with the target return, in this case the CPI inflation rate. The foregoing comparisons in Table 4.4 of the nominal and real volatilities of traditional broad asset classes selected by institutions show, however, that these classes at least would probably be unequal to the task.

5. Concluding Remarks

5.1 Demographic transition and aggregate saving

Our preliminary regressions aimed to shed light on the impact of demographic transition on Australia's long-term private saving. We found that saving is affected by demographic factors in the way predicted by the life-cycle hypothesis. In particular, if one controls for the young-age dependency ratio, then a high old-age dependency ratio is associated with a low private saving rate.

While we believe that demographics are important in determining saving performance, the evidence is far from conclusive. Future work along these lines needs to control for the effect of longer-term non-demographic factors such as the worldwide productivity decline of the mid-1970s, and both the worldwide increase in real interest rates and reduced business and personal income taxes. It may also be possible to refine estimates of demographic impact by using age cohort ratios in regression analysis on a more extended basis than that captured by dependency ratios. Finally, estimates of these kinds could be integrated with research focussing on the demographic implications of public expenditures—health costs in particular. Such work on the positive economics of life-cycle saving is important in providing a quantitative context for normative work on the adequacy of Australia's longer-term saving effort.

5.2 Government policy towards private retirement saving

Investigation of this topic can be placed within the perspective of two broader policy issues—the desirable level and structure of capital income taxation, and the desirable form of public provision for the retired.

It is possible to argue that the real agenda for much of the 1980s tax debate has been the likelihood of over-taxation of capital, with the possible exception of accumulation financed by heavy borrowings. The consumption tax debate has been one manifestation of this (see Bengtsson and Albon, 1990). Equally, while market outcomes have enjoyed a resurgence of popularity in the 1980s, few would be comfortable with a system in which the unlucky or improvident old were thrown on the mercy of private charity. On the other hand, the present system of heavy reliance on public age benefits by about four out of five retirees threatens problems that have already been discussed.

Our preliminary investigations suggest that the (more or less) current superannuation tax arrangements do make it possible to provide adequately for one's own retirement, but only if fund membership is sustained and long term. A 6 per cent productivity award superannuation scheme would alone come close to replacing the age pension for a single male on average weekly earnings, who enjoyed the 6 per cent contribution throughout his working life, and retired aged sixty-five.

However, major problems remain. Perhaps the most important of these relate to annuities. In spite of the announced intention of the 1980s superannuation tax reform thrust to make annuities more attractive, adverse selection difficulties, aggravated by the initial thinness of the

market, makes success unlikely under current provisions. Further, the industry itself is uncertain about the pricing of indexed annuities, partly because of the inherent volatility of inflation, and also because matching assets with an indexed return feature are not available under favourable tax rules. If annuities are not bought for superannuation beneficiaries, then double dipping will remain an important practice especially in the absence of tougher preservation measures. In these circumstances, the strategy of reducing future public pension payments by applying the income test to annuities flows will fail. An economic analysis of the annuity market in Australia, with an eye to the interaction between tax treatment and public pension entitlement, appears to be urgently needed.

A second major issue concerns indexation. To give an example relevant to annuities, our preliminary finding on the effect of non-indexation on the undeducted purchase price of annuities suggests that this alone may help explain why the Australian annuities market continues to languish, despite ostensible efforts in the 1980s to give it a more sympathetic tax treatment. A second example concerns the effective tax rate on fund earnings, which is also sensitive to the inflation rate.

Future work will further investigate the effects of superannuation on life-cycle labour supply and both personal and financial market portfolio structure. In particular, it will be necessary to examine how the current superannuation system affects retirement decisions, the structure of real and financial savings, and the structure of institutional investment.

5.3 The superannuation industry in its policy context

In section 4 we noted the difficulties faced by a retiree in choosing a good fund in the face of inadequate data on the performance of alternative managers. We found also that such concerns ought to be taken seriously because some funds, especially smaller funds, have shown a disturbing propensity to deliver low returns and high risk. Yet the Occupational and Superannuation Standards Act, while covering in detail many of the more obvious mismanagement possibilities, fails to address some important subtle issues.

One such issue is the need for age phasing of industry fund investments. That is, young workers need high equity weightings whereas workers near retirement need the opposite. This issue has special relevance in Australia, because of the lack of an earnings related social security scheme. Such schemes are (almost) universal in their coverage, and are of the defined benefits type, which implies that risk is borne by the sponsor, in most cases the government. In Australia the 6 per cent productivity award superannuation can be seen as a (fully funded) alternative. However, because members bear the investment risk, age phasing is crucial in this context.

The existing literature has not solved the problem of an operational formula for appropriate age phasing, although Bodie and Samuelson (1989) have laid the foundations for such a formula. Such work would be important in informing constructive regulation:

This issue is related to the appropriate means of aggregating individual risk-return and portfolio preferences within a fund. A difficult problem in designing the appropriate form of regulation concerns the large number of interested parties. Employer, employee, fund manager, trustee, investment advisor, Insurance and Superannuation Commissioner and other regulatory bodies, including the Tax Office, are all involved. A comparison with arrangements in other countries is warranted.

Australia's idiosyncratic factor endowment and mediocre post-war growth performance argue for international diversification. Our results in Part 4 provide some support for this proposition. Yet periods of excessive offshore exposure, especially on a wholly unhedged basis, may constitute over-active management of the kind discussed by Samuelson (1990). When expected ABS data on superannuation fund portfolio structure become available, the role of international diversification can be further analysed. Further work also needs to be done on how much superannuation funds ought to invest off-shore, and what proportion of this ought to be hedged.

REFERENCES

- Association of Superannuation Funds of Australia Limited (ASFA) (1987) *Major Survey of Superannuation Funds, 1985*, ASFA, Sydney.
- Ball, R. and J. Bowers (1986) 'Shares, Bonds, Treasury Notes, Property Trusts and Inflation: Historical Returns and Risks, 1974-1985', *Australian Journal of Management*, 11, 117-138.
- Bateman, H., J. Frisch, G. Kingston and J. Piggott (1990) 'Demographics, Retirement Saving, and Superannuation Policy: An Australian Perspective', Discussion Paper No. 241, Centre for Economic Policy Research, Australian National University.
- Benge, M. and R. Albon (1990) 'Saving and Taxation', paper presented to the Saving, Policy and Growth Conference, Centre for Economic Policy Research, Australian National University, 12-13 July 1990. Revised version appears in this volume.
- Bodie, Z. (1989) 'Inflation Insurance', NBER Working Paper No.3009, Boston.
- Bodie, Z. and W. Samuelson (1989) 'Labour Supply Flexibility and Portfolio Choice', NBER Working Paper No. 3043, Boston.
- EPAC (1988) *Trends in Private Saving*, Economic Planning Advisory Council, Council Paper No.36, AGPS, Canberra, December.
- Fischer, S. (1975) 'The Demand for Index Bonds', *Journal of Political Economy* 83, 509-34.
- Friedman, B.M. and M.J. Warshawsky (1990) 'The Cost of Annuities: Implications for Saving Behavior and Bequests', *Quarterly Journal of Economics*, 133-54.
- Gratton, W.K. (1985) 'Immediate Annuity Business in Australia', The Institute of Actuaries of Australia, *Sessional Meeting*.
- Horioka, C.Y. (1986) 'Why is Japan's Private Saving Rate so High?', *mimeo*, International Monetary Fund, Washington DC.
- Insurance and Superannuation Commission (1989) *Annual Report, 1988-89*, AGPS, Canberra.
- Kotlikoff, L.J. and A. Spivak (1981) 'The Family as an Incomplete Annuities Market', *Journal of Political Economy*, 89, 372-91.
- Modigliani, F. (1970) 'The Life Cycle Hypothesis of Saving and Intercountry Differences in the Saving Ratio', in Eltis, Scott and Wolfe (eds) *Induction, Growth and Trade: Essays in Honour of Sir Roy Harrod*, Clarendon Press, Oxford, 197-226.
- OECD (1988) *Ageing Populations: The Social Policy Implications*, Paris.

- Piggott, J. (1990) 'Discussion' of M. Edey and M. Britten-Jones 'Saving and Investment', in Stephen Grenville (ed) *The Australian Macro Economy in the 1980s*, Reserve Bank of Australia, 146-153.
- Samuelson, P.A. (1989) 'A Case at Last for Age-Phased Reduction in Equity', *Proceedings of the National Academy of Science*, Washington DC.
- Samuelson, P.A. (1990) 'Asset Allocation Could Be Dangerous to your Health', *Journal of Portfolio Management*, Spring, 5-8.
- Sturm, P. (1983) 'Determinants of Saving - Theory and Evidence', *OECD Economic Studies*, No.1, Autumn, 147-196.
- White, K.J. (1978) 'A General Computer Program for Econometric Methods - SHAZAM', *Econometrica*, January, 239-240.

COMMENT

Jeffrey Carmichael

While I liked this paper very much, my first reaction was that it was mislabelled. The authors provide an excellent survey of the Australian superannuation system: how it works; recent legislative changes; and the performance and composition of the industry. The focus on superannuation, however, is at least partly at the expense of analysis of their first-mentioned topic—namely, demographics. I do not wish to undervalue what they have provided. Indeed, I learned a lot from the descriptive sections on superannuation and recommend it as a clear and perceptive summary of the Australian system. In my comments I will take this as given and focus instead on what I regard as the areas of omission.

Demographic Transition

In the first major section of their paper the authors point out that, according to OECD projections, the aged dependency ratio in Australia will rise from 16 per cent to 24 per cent over the next thirty or so years.

They say that the implications of this transition for aggregate saving are 'not altogether clear'. While it is true that the survey data they consider suggest little or no impact on saving, *a priori* considerations suggest a negative impact. Indeed, the authors identify two theoretical impacts, both of which they argue should decrease saving. Their simulations also suggest an ultimate fall in Gross Private Saving of around two percentage points per decade for thirty years over which demographic transition takes place, although the decline does not start for some time.

While they acknowledge some roughness around the edges of their computations, the debate is, in my opinion, terminated too quickly.

First, they seem to accept uncritically the OECD projections. Indeed, these are not even referred to as forecasts or projections, but are simply stated as facts. I would have liked to see some discussion of the assumptions behind the projections and how sensitive they are to immigration and other such factors.

Equally important, we should know whether age dependency rises because of a baby boom type effect or because of a rise in longevity. It would appear, from the fall in the aged dependency ratio reported towards the end of the OECD project period, that the baby boom effect is the more important. Nevertheless, the two can have important differences for the analysis of the impact on aggregate saving. This could have been more fully explained.

For example, if the rise in dependency is due to the ageing of baby boomers then I agree with the authors that a standard life-cycle model will predict a fall in national savings.

Alternatively, the increase in dependency may be due to a rise in longevity. The impact on savings predicted by the life-cycle model in this case depends critically on whether or not the increase is anticipated. If it is

unanticipated, then savings are again likely to fall. If, as seems more likely, the rise in longevity is anticipated, then a standard life-cycle model will predict a rise in private savings to fund the longer retirement period. This is likely to occur both in transition and in the steady state.

Superannuation

An important question, not addressed by the authors, is what the introduction of compulsory, private superannuation, such as happened recently in Australia, implies for aggregate saving behaviour.

With or without full Ricardian equivalence we should expect a high degree of substitution between private savings and publicly-mandated superannuation. The extent of the substitution will be limited mainly by corner solutions and by the illiquidity of superannuation. Corner solutions arise where the superannuation exceeds existing private savings. Illiquidity arises from the nature of superannuation payments as long-term, non-negotiable investments. Thus, superannuation is a perfect (or near perfect) substitute for other forms of retirement saving but a poor substitute for precautionary saving.

The Australian situation is complicated by the relationship between superannuation and the age pension. The unique insurance nature of Australia's age pension means that private savings impose a substantial tax on pension income.

One of the interesting computations presented by the authors is the extent to which the recent rise in superannuation, mandated under the Accord, replicates the age pension. Thus, they examine the degree to which the Government's introduction of private superannuation by mandate should be accompanied by the withdrawal of public unfunded future pension liabilities.

To the extent that increasing public unfunded social security can decrease private savings, withdrawing it may, for the same reasons, increase private savings. Only full Ricardian Equivalence would leave private savings unaffected.

Adding these two effects (private/private substitution and private/government substitution) together suggests that the recent introduction of mandated superannuation should have either raised private savings or, at worst, left it unaffected, with a straight substitution of superannuation for other forms of private saving.

The evidence which can be found in Figure 11 of Stemp's paper (this volume) is quite startling. Since the mid-1980s, superannuation saving has risen from 4 per cent of household disposable income to around 11 per cent, while other forms of private saving have fallen from 4 per cent of household disposable income to minus 2 per cent. In other words, other forms of private assets have been run down, overcompensating for the rise in superannuation.

The first implication of this evidence is that, provided saving in the form of superannuation does not decrease relative to household disposable income (if anything, it is likely to increase as coverage increases) there is

likely to be a rise in the total household saving ratio, as households reach an equilibrium portfolio composition between superannuation and other forms of private saving.

The second implication is for the composition of finance in Australia. Regardless of whether forms of saving other than superannuation continue to decline relative to disposable income, or simply reach an acceptable portfolio share and level out, the mix of assets between these forms and superannuation will be permanently tilted in favour of the latter.

To the extent that superannuation funds are both large and risk averse, there could be implications for the availability of funds to small business and high-risk borrowers. In principle, the effects could go either way, although some analysis at this stage could be helpful, especially if regulatory changes for the industry are to be considered.

On a related note, I suspect the authors accept a little too readily that the superannuation industry will strike problems because of lack of availability of appropriate investments. While they confine their comments to long-term indexed securities, which are primarily an instrument of government, my guess is that, as the market expresses greater demand for annuities and indexed securities, supplies will be forthcoming from private sources. The stumbling block is more likely to be the price at which they are forthcoming rather than availability *per se*. The positive aspect is that moving this long-term insurance role from the government to the private sector should help identify the true cost of providing the insurance.

Finally, I commend the authors for their analysis of the principal/agent problems involved in superannuation and the need for age-phasing of super funds. These, along with the proper supervision of the superannuation industry, are likely to become major issues as the size and coverage of the industry grows.

Centre for Economic Policy Research
Australian National University
SAVING, POLICY AND GROWTH CONFERENCE

Thursday and Friday, 12 and 13 July 1990
Venue: Country Comfort Canberra Inn Conference Centre
102 Northbourne Avenue, Canberra

PARTICIPANTS

TERRY ALCHIN	University of Western Sydney
FRED ARGY	Office of EPAC
ROBERT ALBON	Australian National University
KAYE BARWOOD	New Zealand Treasury
HAZEL BATEMAN	University of NSW
MATT BENGE	Australian National University
PATRICIA BERGIN	C'wealth Dept of Finance
BARRY BOSWORTH	The Brookings Institution
PETER BOXALL	Treasury
NICK BROWN	Australian Bureau of Statistics
JEFFREY CARMICHAEL	Bond University
GEOFF CARMODY	Access Economics
IAN CASTLES	Australian Bureau of Statistics
BRUCE CHAPMAN	Australian National University
HARRY CLARKE	La Trobe University
RUSSEL COOPER	University of Western Sydney
JON CRAIG	Office of the Leader of the Opposition
OWEN COVICK	Australian National University
BRETT COX	Department of Finance
BILL CURRAN	Australian Bureau of Agricultural and Resource Economics (ABARE)
DAN DAO	C'wealth Dept of Finance
PHILLIPA DEE	Australian National University
JOHN DILLER	NSW Treasury
PETER DIXON	University of Melbourne
NIGEL DOUGLAS	AMP Society
JANE DRAKE-BROCKMAN	Dept of Foreign Affairs and Trade
MALCOLM EDEY	Reserve Bank of Australia
ALEX ERSKINE	Citibank
JOHN FALLON	Industry Commission
PETER FORSYTH	Australian National University
MALCOLM GRAY	Dept of Prime Minister and Cabinet

BOB GREGORY
 FRED GRUEN
 TONY HALL
 LINDSAY HOGAN
 L. FRASER JACKSON
 JAMES JORDAN
 TONY JOWETT
 RAJA JUNANKAR
 TOM KARMEL
 MICHAEL KEATING
 GEOFF KINGSTON
 MARK KONSTAS
 RALPH LATTIMORE
 MICHAEL LAWSON
 DONNA LEUNG
 JOHN MACLEOD
 TONY MAKIN
 WILL MARTIN
 GREGORY MAUGHAN
 IAN MCDONALD
 IAN MCLEAN
 CHRIS MURPHY
 TOM NGUYEN
 ADRIAN PAGAN
 JOHN PERRIN
 RON PERRY
 JOHN PIGGOTT
 ANDREW PODGER
 ALAN POWELL
 PETER SMITH
 GRAEME SNOOKS
 KATHY SPENCER
 PETER STEMPE
 JOHN TEMPLEMAN
 ERIC TODER
 PETER TOPPER
 GEOFF WEIR
 GRAEME WELLS
 RICHARD WHITELAW
 PETER WILSON
 ROBERT WRIGHT

Australian National University
 Australian National University
 Australian National University
 ABARE
 Victoria University of Wellington
 C'wealth Dept of Finance
 Department of Prime Minister and Cabinet
 Australian National University
 Dept of Employment, Education & Training
 C'wealth Dept of Finance
 University of NSW
 Department of Prime Minister and Cabinet
 Bureau of Industry Economics
 Bureau of Industry Economics
 New Zealand Treasury
 CRA
 University of Queensland
 Australian National University
 BT Australia
 University of Melbourne
 University of Adelaide
 Australian National University
 Griffith University
 University of Rochester and ANU
 Department of Prime Minister and Cabinet
 Department of Finance
 University of NSW and ANU
 Department of Finance
 University of Melbourne
 Australian National University
 Australian National University
 New Zealand Treasury
 Australian National University
 Department of Finance
 New Zealand Treasury
 University of Western Sydney
 Treasury
 Australian National University
 Office of EPAC
 Treasury
 ABARE