



32nd Annual Conference of Economists

29th September - 1st October 2003, Canberra, Australia

Alternative measures of income and saving

Tanuja Doss

National Accounts Research Section

Australian Bureau of Statistics

Abstract

Australia's net saving is a key economic aggregate as it is the primary means by which the nation's real wealth increases over time. Wealth in the national accounting sense consists of holdings in produced assets (buildings, machinery and equipment, livestock, etc), non-produced assets (land, sub-soil assets, native standing timber) and financial assets less liabilities. No accommodation for human capital or consumer durable accumulation is made in the national balance sheet proper. In Australia's national accounts, net national saving as a proportion of gross domestic product has fallen from an average of 9 per cent in the 1960s to less than 2 per cent in the 1990s - a trend observed in the UK and USA as well as other developed countries. Alternative measures of income and saving to those in the national accounts can be developed, helping to provide a different perspective on wealth accumulation and consumption decisions. They can also exhibit a different time trend to the official measures. This paper draws out the accounting relationships between income, consumption, saving, investment and wealth generation in the national accounts and provides some alternative constructs of income and saving that could be preferred for some types of economic analysis.

Note

The views expressed in this paper are those of the author and do not necessarily represent the views of the Australian Bureau of Statistics. Where quoted or used, they should be clearly attributed to the author.

Acknowledgments

The author would like to thank Carl Obst, Tony Johnson, Alan Tryde, Philip Lichtwark, David Bain, Peter Comisari, Joseph Chien and Mathew Thomas for their help with this paper. Responsibility for any mistakes or omissions remains with the author.

Introduction

Australia's net saving relative to gross domestic product (GDP) has declined from an annual average of approximately 9 per cent in the 1960s to less than 2 per cent in the 1990s. This trend has also been occurring in the United States of America, the United Kingdom and other developed countries. Net saving is a key economic aggregate as it is the primary means by which the nation's real wealth increases over time.

This paper draws out some of the relationships between the saving, investment, borrowing and lending flows in the income, capital and financial accounts and the stocks of assets and liabilities in the balance sheet accounts published in the Australian System of National Accounts (ASNA) (ABS Catalogue No. 5204.0), with particular emphasis on their impact on the measurement of net saving.

The first section of this paper covers these relationships and discusses the concepts and frameworks used to measure saving, borrowing and lending and investment. The second section examines the impact of alternative definitions of consumption expenditure on gross and net saving. The third section analyses alternative concepts of income. In particular, it focuses on the treatment of changes in net worth as saving and the benefits and limitations of that approach when used in economic analysis. This section presents new saving and income estimates derived by treating real holding gains from the balance sheet as income and compares them with the existing estimates.

I. Definitions, derivations and limitations

What is saving?

The 1993 System of National Accounts (SNA93), defines saving as:

"...that part of disposable income that is not spent on final consumption goods and services. It may be positive or negative depending on whether disposable income exceeds final consumption expenditure, or vice versa."

(SNA93, paragraph 9.19)

Consistent with this definition, the ASNA derives saving as a residual, with gross saving being the difference between gross disposable income and final consumption expenditure, and net saving being the difference between gross saving and consumption of fixed capital (COFC) (See Table One). Consequently, measured saving is dependent on the definitions of income and final consumption expenditure. Of gross and net saving, the net concept is more relevant for the analysis of sustainability and wealth change as it is derived after deducting COFC from gross saving and is a measure of what is available for capital formation over and above that required for capital replacement. Net saving is of economic interest because it determines the funds available for further investment and the potential to maintain or increase growth. The capital account includes the economic aggregates necessary to analyse this relationship (See Table Two).

Derivation of income, saving, investment and net lending

Table One : ASNA Derivation of net national saving

	1999-00	2000-01	2001-02
	<i>\$m</i>	<i>\$m</i>	<i>\$m</i>
Compensation of Employees	302,385	321,731	338,514
plus Gross operating surplus	197,414	205,782	217,747
plus Gross mixed income	55,510	59,479	67,817
plus Taxes less subsidies on production and imports	73,312	82,315	88,305
plus Net primary income from non-residents	-18,150	-19,077	-20,220
Gross national income	610,471	650,230	692,163
plus Current taxes on income, wealth, etc.	1,135	1,100	1,002
plus Other current transfers	-917	-1,068	-1,020
Gross disposable income	610,689	650,262	692,146
less Total final consumption expenditure	489,432	524,864	556,029
Gross saving	120,889	125,398	136,117
less Consumption of fixed capital	97,821	104,927	112,507
Net saving	23,068	20,471	23,610

Source: National Income Account, from ABS Catalogue No. 5204.0

The capital account records the net additions to gross fixed capital, non-produced non-financial assets (e.g., land, sub-soil assets, native standing timber, trademarks and patents) and changes in inventories. It also shows the means by which these additions are financed; through gross saving, net capital transfers and/or net lending or borrowing. The gross saving and capital transfers and total capital accumulation and net lending/net borrowing aggregates are reconciled by the statistical discrepancy. This discrepancy arises due to differences in methods and sources of data used to compile the income and expenditure based measures of GDP. There are no discrepancies between the financial years 1994-95 and 2001-02 as the accounts have been fully balanced in supply-use tables.

Table Two : National gross saving and capital transfers, and capital accumulation and net lending

	1999-00	2000-01	2001-02
	<i>\$m</i>	<i>\$m</i>	<i>\$m</i>
Net saving	23068	20471	23610
plus Consumption of fixed capital	97821	104927	112507
plus Net capital transfers	1136	1182	1120
equals Gross saving and capital transfers	122393	126580	137238
Gross fixed capital formation	150994	143589	158413
plus Changes in inventories	2483	-22	621
plus Acquisitions less disposals of non-produced non-financial assets	83	73	82
plus Statistical discrepancy	0	0	-1081
plus Net lending to non-residents	-31168	-17061	-20797
equals Capital accumulation and net lending	122393	126580	137238

Source: National Income Account, from ABS Catalogue No. 5204.0

If gross saving is less than capital accumulation, additions to inventories and net acquisition of non-produced, non-financial assets, the difference must be financed by borrowing from non-residents or by capital transfers. Conversely, if there is an excess of saving over that required for investment, the nation becomes a net lender. Net lending/net borrowing can also be interpreted as the net result of financial transactions derived from the 'change in financial position' published in the national and sectoral financial accounts. The financial account records details of transactions in financial assets and liabilities between Australia and the rest of the world and between resident sectors. This is illustrated in the following table:

Table Three : National change in financial position

	1999-00	2000-01	2001-02
	<i>\$b</i>	<i>\$b</i>	<i>\$b</i>
Acquisition of financial assets	273	498	484
less Incurrence of liabilities	583	641	687
equals Change in financial position	-309	-143	-203
less Net errors and omissions	2	27	5
equals Net lending (+) / net borrowing (-)	-312	-171	-208

Source: National Financial Account, from ABS Catalogue No. 5204.0

Conceptually, the capital account's 'net lending/net borrowing' and the financial account's 'change in financial position' estimates should be the same, but in practice there are discrepancies in both accounts due to differences in the source data used and differences in the methods of estimation. The discrepancy is shown as 'net errors and omissions' in the financial account to distinguish it from the discrepancy between the unbalanced income and expenditure measures of GDP in the capital account. The 'net errors and omissions' item is relatively small at the national level, however, at the sectoral level it can be quite significant. There are ongoing efforts by the ABS to minimise these differences.

Relationships within the national accounting framework make it possible to derive a measure of net saving by an alternative route that starts from the change in financial position in the financial account. This is shown in table four below.

Table Four : National net saving derived using the change in financial position

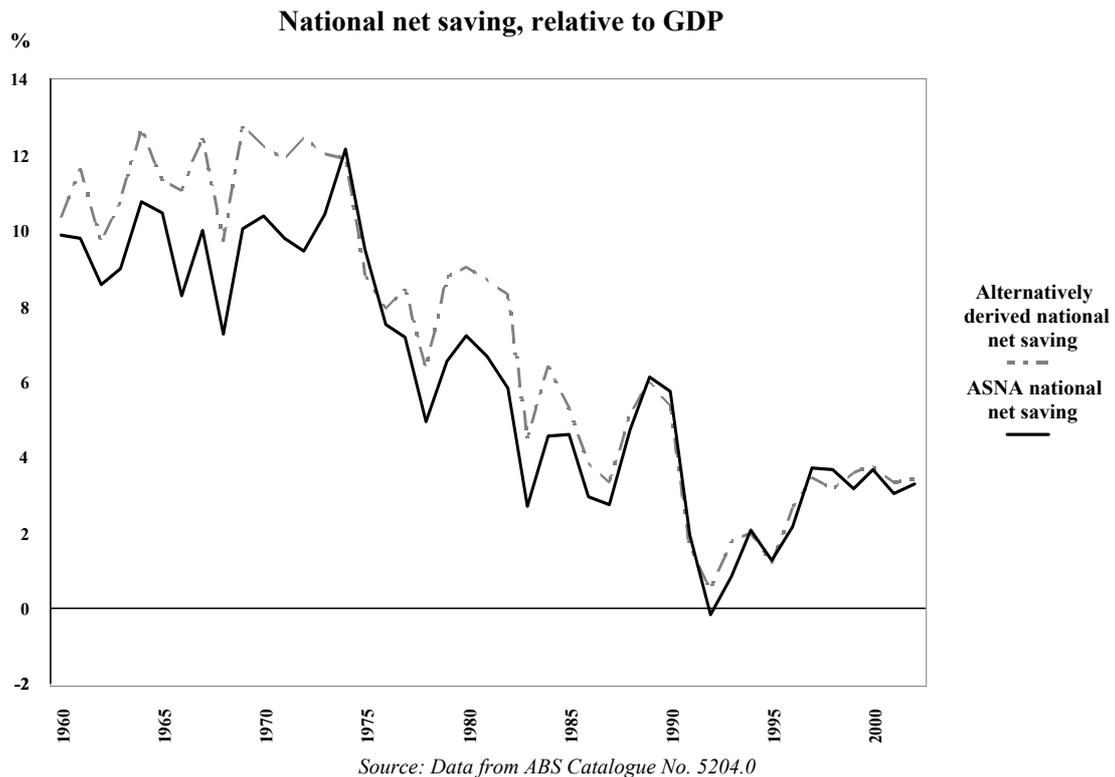
	1999-00	2000-01	2001-02
	<i>\$b</i>	<i>\$b</i>	<i>\$b</i>
Change in financial position	-30.9	-14.3	-20.3
less Consumption of fixed capital	97.8	104.9	112.5
less Net capital transfers	1.1	1.2	1.1
plus Gross fixed capital formation	151.0	143.6	158.4
plus Changes in inventories	2.5	-0.0	0.6
plus Acquisitions less disposals of non-produced non-financial assets	0.1	0.1	0.1
Alternatively derived national net saving	23.7	23.2	25.2

Source: National Financial Account and National Capital Account, from ABS Catalogue No. 5204.0

These two measures provide largely independent measures of saving. Errors in the estimates of change in financial position, gross fixed capital formation (GFCF), capital transfers, changes in inventories and acquisitions less disposals of non-produced non-financial assets

will not affect the national accounts measure of saving. On the other hand, errors in the estimates of income or final consumption expenditure do not affect the value of saving derived using the alternative method.

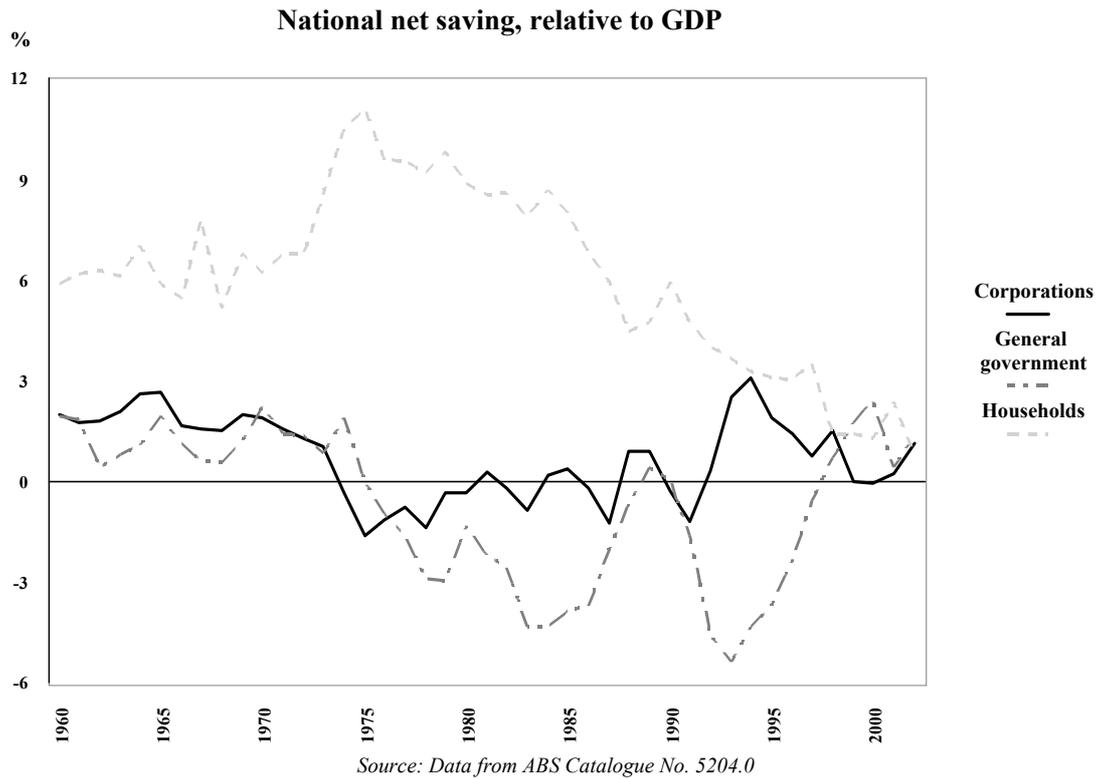
A longer term comparison of the national accounts and financial transactions approach to the measurement of saving indicates that the measure of national saving in the national income account is a fairly robust measure of medium to longer term trends, although there is some uncertainty surrounding year to year movements.



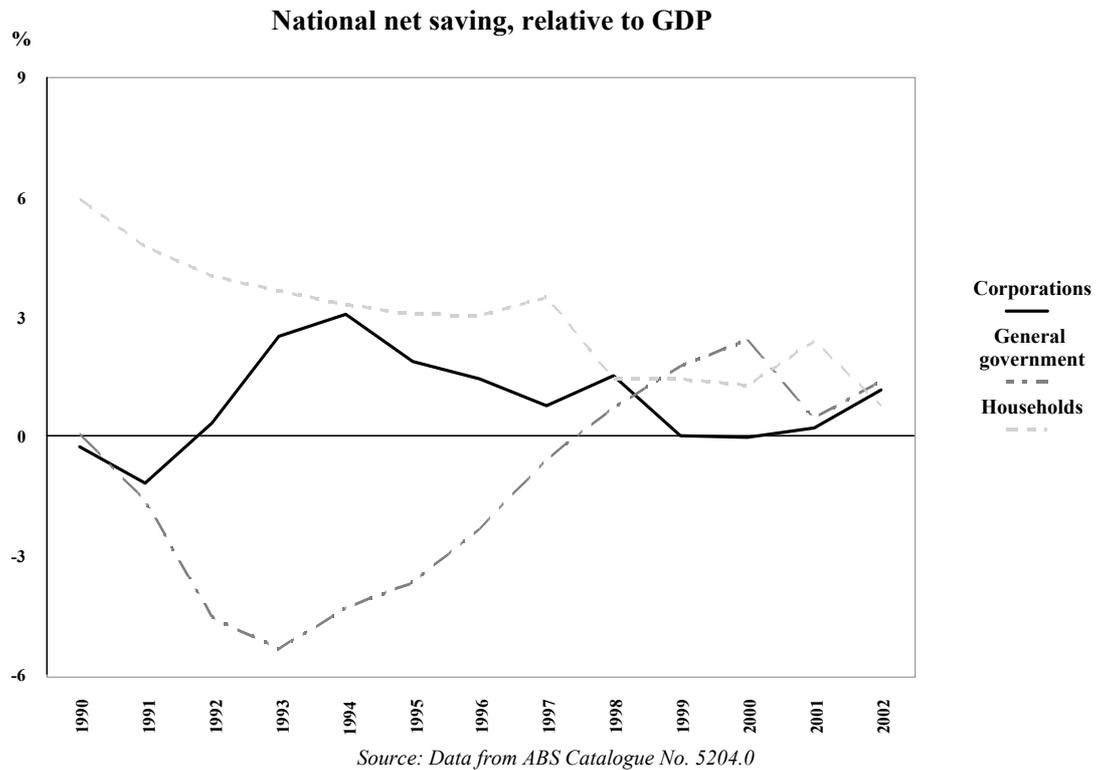
Saving by institutional sector

So far this article has concentrated on measures of saving, investment and borrowing/lending for the nation as a whole. However, the national accounts also provide a more detailed breakdown into institutional sectors, namely non-financial corporations, financial corporations, general government and households (including unincorporated enterprises). Calculation of saving and change in financial position for institutional sector transactions are the same as described for the nation, although certain components of sector income more or less consolidate out at the national level (e.g. social security transfers are payments by governments and receipts for households).

It can be seen from the following graph that, over the long term, the household sector has been the main contributor to national saving. The general government sector on the other hand has been a dissaver for much of the period from the 1970s.



The next graph focuses on the 1990s. It shows that while net saving of the household sector relative to GDP has declined, this has been more than offset by an increase in government sector saving (decline in dissaving) and corporate sector saving. Corporate sector saving has been significantly positive for much of the 1990s.



Limitations and alternative concepts of saving

As saving estimates are calculated as residuals, their quality is subject to any errors in the estimation of the disposable income, final consumption expenditure and COFC aggregates from which they are derived. Since these are large aggregates, this means that even slight inaccuracies in their estimation can have a large impact on estimates of saving. For example, in 2001–02 total gross disposable income was \$692 billion, total final consumption expenditure was \$556 billion and total net saving was \$24 billion. If final consumption expenditure was over-estimated by 1 per cent, it would reduce the value of net saving by 23 per cent. In any case, even without any measurement error, the estimation of saving is integrally linked with the definitions of income, investment and final expenditure used in ASNA.

II. Saving adjusted for alternative consumption expenditure concepts

The SNA93 definition of saving, stated earlier, requires estimates of final consumption expenditure to be subtracted from estimates of disposable income. The distinction between final consumption, intermediate consumption and capital formation is clearly stated in SNA93.

"Consumption is an activity in which institutional units use up goods or services. There are two different kinds of consumption. Intermediate consumption consists of inputs into processes of production that are used up within the accounting period. Final consumption expenditure consists of goods and services used by individual households or the community to satisfy their individual or collective needs or wants. The activity of gross fixed capital formation, on the other hand, is restricted to institutional units in their capacity as producers, being defined as the value of their acquisitions less disposals of fixed assets. Fixed assets are produced assets (mostly machinery, equipment, buildings or other structures but also including some intangible assets) that are used repeatedly or continuously in production over several accounting periods (more than one year)."
(SNA93, paragraph 1.49)

For purposes of analysing the saving ratio, there are three elements of final consumption expenditure that can be classified differently, namely expenditure on consumer durables, education and research and development. All three can be treated in a fashion analogous to capital formation, although this is not the conventional treatment applied in the ASNA or recommended by SNA93.

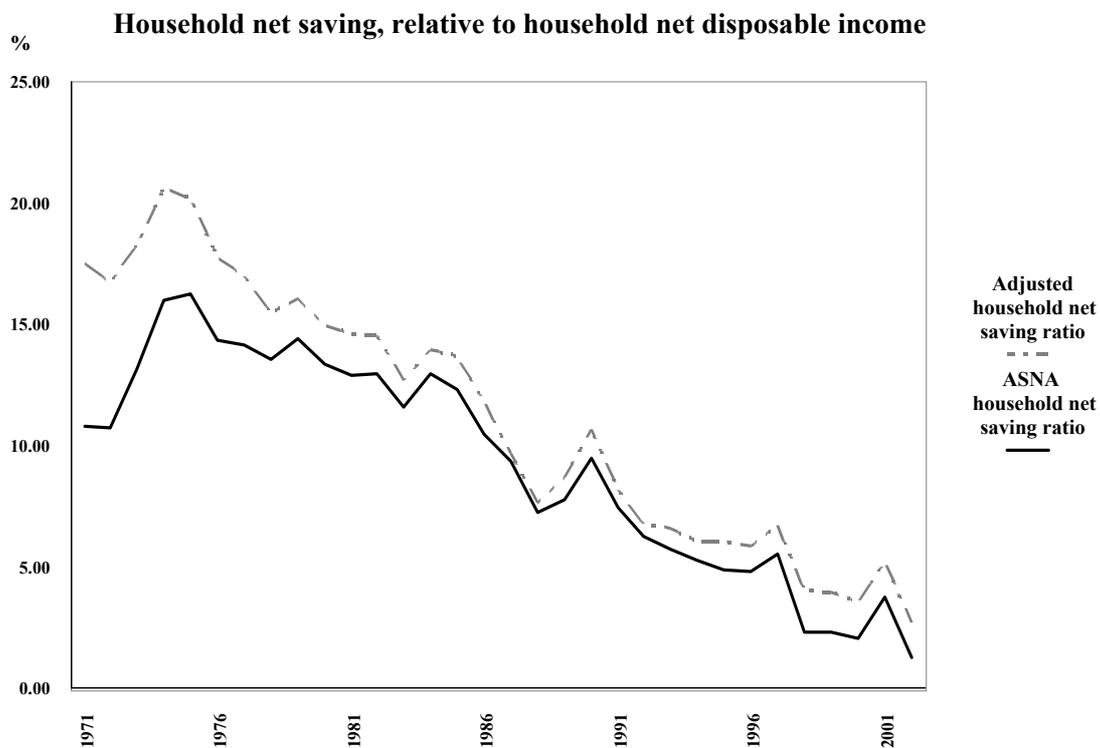
Alternative treatment of final consumption expenditure on consumer durables

Consumer durables are not always consumed in the same period in which they are bought. Rather than treating them as final consumption expenditures, they can be treated as capital. The services they provide to households in a year can be subtracted from disposable income, rather than the entire amount of the purchase, similar to the derivation of COFC. Using the perpetual inventory method, the final consumption expenditure flow can be used to derive a stock of consumer durables as well as "depreciation" flows. Subtracting expenditure on consumer durables and replacing it with services from consumer durables results in the following alternative estimate of net household saving:

Table Five : Household net saving adjusted for alternative treatment of consumer durables

	1999-00	2000-01	2001-02
	\$m	\$m	\$m
Gross disposable income	417,266	457,138	474,811
less Final consumption expenditure	374,922	403,875	428,260
plus Expenditure on consumer durables	33,793	34,425	36,283
less Services from consumer durables	28,582	30,018	31,826
less Consumption of fixed capital	34,372	37,286	41,094
equals Net saving adjusted for alternative treatment of consumer durables	13,184	20,384	9,915

Source: Household Income Account, from ABS Catalogue No. 5204.0



The graph above shows the impact of the alternative treatment of consumer durables on the household saving ratio. Incorporating an adjustment for expenditure on and services from consumer durables produces an adjusted net saving ratio that is slightly different to the ASNA estimate, although the downward trend is still apparent.

Alternative treatment of final consumption expenditure on education

Economic growth theory is built on the idea of saving being the major driver of investment in a country's stock of capital. Several more recent theories treat expenditure on education, or investment in human capital, as equally important. This is on the basis that "since human capital is embodied knowledge and skills, and economic development depends on advances in technological and scientific knowledge, development presumably depends on the accumulation of human capital" (Becker et. al. 1990, p. 13).

The benefits from expenditure on education can also be enjoyed many years after they are initially consumed. Currently, expenditure on education is treated as final consumption expenditure in the ASNA, consistent with the SNA93 recommendation.

"...expenditures on training and research or development do not lead to the acquisition of assets that can be easily identified, quantified and valued for balance sheet purposes. Such expenditures continue to be classified as intermediate consumption, therefore, even though it is recognised that these may bring future benefits."

(SNA93, paragraph 1.51)

If final consumption expenditure on education is given an alternative treatment due to the fact that it has long as well as short term benefits, it is difficult to see where to draw the line on what to continue to treat as final consumption expenditure, and what to treat alternatively. The following argument is made in the SNA93:

"[Education services]...are not the only services consumed by individuals to bring long as well as short term benefits. For example, the consumption of health services brings long-term benefits and even the consumption of basic items such as food and housing is necessary in order to keep an individual in good health."

(SNA93, paragraph 1.53)

For the purposes of explaining the declining saving ratio, it is useful to know whether people value current consumption more, or if they are investing in education with the expectation of a higher future income. Further research into the area of human capital accumulation and estimates of human capital stocks are being developed within the ABS. Estimates of net saving adjusted for an alternative treatment of education expenditure are not developed or discussed further in this paper.

Alternative treatment of intermediate expenditure on research and development

Expenditure on research and development (R&D) is not treated as an investment flow in the ASNA. For corporations, it is treated as intermediate consumption in the value added process, and for the general government sector, it is treated as final consumption expenditure. The rationale for the exclusion of expenditure on R&D as an investment flow is stated in SNA93 paragraph 1.51 (quoted above). There has been international debate recently over changing the SNA93 treatment of expenditure on some types of research and development and future editions of the SNA may be altered to include the recommendations of these discussions.

For the purposes of analysing the decline in the saving ratio, it is difficult to know whether or not an alternative treatment of R&D would help. Presently, ABS estimates of research and development are not published on a continuous or timely basis for inclusion in ASNA. The most recent published observations are for 2000-01. Until a more regular data series is available, the analysis of the impact of including expenditure on R&D in the capital account on net saving cannot be gauged. Estimates of net saving adjusted for an alternative treatment of R&D expenditure are not developed or discussed further in this paper.

III. Saving adjusted for alternative income concepts

The concept of disposable income is directly linked to the measurement of production in the economy. Disposable income can be generated either directly by participating in the process of production or indirectly through the redistributive process (taxation, social security benefits, income flows with the rest of the world). Holding gains and losses (whether realised or unrealised), capital transfers and other changes in volume are excluded from the national accounts income measure as they are not directly generated from production activity.

An alternative to income being measured based on payments to factors or redistributions is the definition proposed by John R.Hicks, where income is defined as "the maximum amount of money which an individual can spend this week and still expect to spend the same amount in real terms in each ensuing week" (Hicks, in Jump 1980, p. 994). This definition is alternatively worded in SNA93:

'From a theoretical point of view, income is often defined as the maximum amount that a household, or other unit, can consume without reducing its real net worth.'
(SNA93, paragraph 8.15)

SNA93 qualifies the above statement, acknowledging that the production based measure of income is consistent with this definition only when changes in net worth exclude holding gains, capital transfers and other changes in volume. Treating the change in the balance sheet definition of net worth as an alternative estimate of income requires that the estimates of stocks of net worth in the national and sectoral balance sheets are integrated with the flow estimates in the national and sectoral capital and financial accounts.

Changes in net worth

Net worth for Australia (national wealth) is shown in the national balance sheet. It is the difference between the value of Australia's financial and non-financial assets and its liabilities to the rest of the world. In 2001–02 the national balance sheet recorded opening net worth of \$2735 billion and closing net worth of \$2934 billion. The difference between these two balances (\$199 billion) represents the change in net worth, the composition of which is shown in Table Six.

Net capital formation is the transaction associated with the stock of non-financial produced assets. It is calculated as GFCF less COFC plus changes in inventories. The other changes in volume account is the flow associated with the stock of non-financial, non-produced assets. This category consists of assets such as land, sub-soil assets, native standing timber and so on. Net financial transactions is the flow associated with the stock of financial assets and liabilities. It is consistent with the change in financial position series published in the financial account.

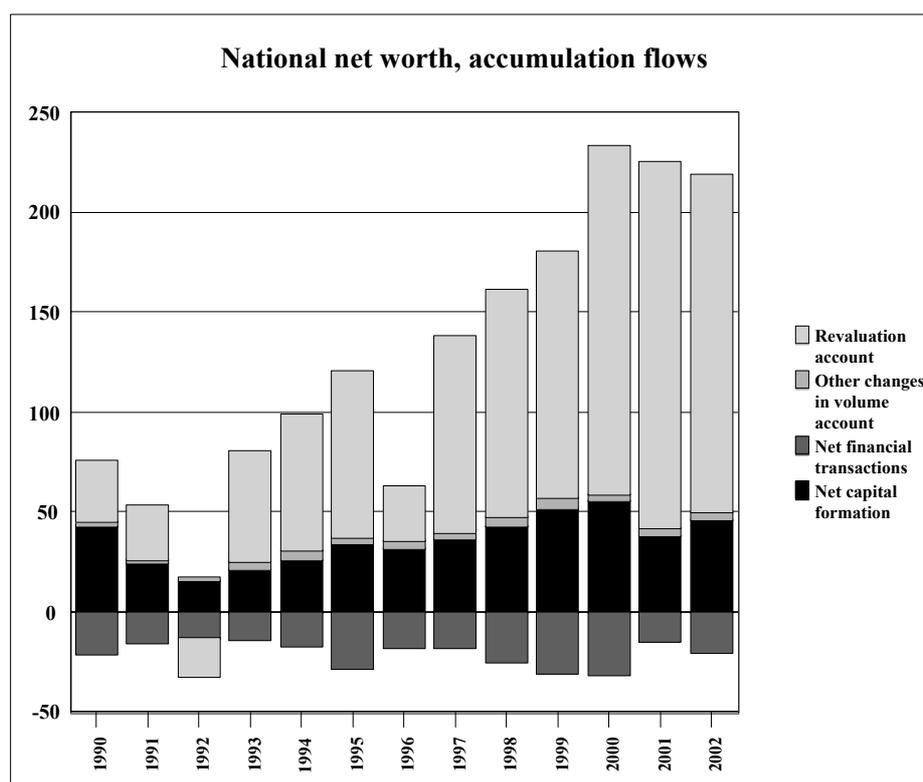
Table Six : Composition of the change in net worth

	1999-00	2000-01	2001-02
	<i>\$b</i>	<i>\$b</i>	<i>\$b</i>
Closing balance sheet	2,524	2,735	2,934
less Opening balance sheet	2,321	2,524	2,735
equals Change in net worth	203	211	199

Table Six : Composition of the change in net worth *continued*

Net capital formation	56	38	47
plus Financial transactions	-31	-14	-20
plus Other changes in volume account	4	4	4
plus Revaluation account	175	183	168
equals Change in net worth	203	211	199

Source: Balance Sheet and Accumulation Accounts, from ABS Catalogue No. 5204.0



Source: Balance Sheet and Accumulation Accounts, from ABS Catalogue No. 5204.0

The revaluation account is the balancing item; any difference between opening and closing stocks not attributable to transactions during the period is attributed to a revaluation of the underlying asset or liability. The above graph shows the relative magnitudes of the flows making up the change in net worth.

More recently, the largest contribution to the change in net worth has come from the revaluation account. The price effects driving the revaluation account can be due to either inflationary pressure, or changes in the prices of capital and financial assets relative to final consumption goods and services. Change in net worth, in real terms, is the theoretical definition of saving consistent with the Hicksian concept of income. When estimating the real change in the value of an agent's net worth, the more meaningful price effect to include is the relative price effect. SNA93 refers to the inflationary and relative price effects in the revaluation account as neutral and real holding gains respectively.

Nominal holding gains

Total holding gains in the revaluation account are equal to the sum of real and neutral holding gains. In the ASNA, total holding gains are derived as a balancing item once opening and closing stocks, net capital formation, other changes in volume and net financial transactions have been taken into account. SNA93 allows for total holding gains to be estimated both directly and as a residual. The direct estimate (referred to in this paper as "nominal holding gains" (NOM)) is calculated as:

$$\text{NOM} = q^* (p_c - p_o) \quad (1)$$

Where q^* is a fixed quantity,

p_c is the price of the asset at the end of the period

and p_o is the price of the asset at the beginning of the period.

In order to separately analyse the change in price on a fixed quantity, q^* needs to be defined. The definition chosen in this paper is the quantity at closing, which is equal to quantities at opening, plus the net of quantities acquired and disposed of during the period. It is necessary to separate the price and volume components of the transaction flows in order to reconcile the revaluation account with nominal holding gains. This can be achieved with the following assumptions:

1. Transactions that occur during the period are continuous and equal with respect to volumes. Effectively, if we knew that the opening and closing quantities were different by twenty units, this assumption allocates the twenty units equally across the four quarters, with five units in each quarter. This allows for the price component in the transaction flows that occur during the period to be removed and replaced with the prices prevailing at the opening of the period.
2. The various assets and liabilities available at opening are also available at closing and vice versa. Effectively, this means that no asset or liability variety is entirely destroyed during the period and that no new asset or liability variety is introduced during the period. This assumption serves to control the quality of assets and liabilities. It is unlikely to hold in practice, but it is considered that violations of this assumption are not significant enough to warrant special treatment.
3. Prices are either monotonically increasing or decreasing through time. This facilitates the conversion of average period prices to prices at opening and closing.

A formal derivation of q^* can be found in appendix A.

Neutral and real holding gains

Once nominal holding gains are derived, they can be allocated between their real and neutral components. SNA93 defines neutral holding gains (NHG) as

"...the value of the holding gain that would accrue if the price of the asset changed in the same proportion as the general price level -i.e, merely kept pace with the general rate of inflation or deflation. It is the value of the holding gain needed to preserve the real value of the asset in question intact over time." (SNA93, 12.64, p. 273)

and real holding gains (RHG) as

"...the value of the additional command over real resources accruing to the holder of the asset as a result of a change in its price relatively to the prices of goods and services in the general economy." (SNA93, 12.64, p. 273).

Neutral holding gains are calculated as:

$$\text{NHG} = q^* p_0 (r_t / r_0 - 1) \quad (2)$$

Where p_0 represents opening period prices,

q^* is derived

and r_t / r_0 represents the movement in the general price level.

Once neutral holding gains have been calculated, real holding gains can be residually derived as:

$$\text{RHG} = \text{NOM} - \text{NHG} \quad (3)$$

The revaluation account and the calculated nominal holding gains are not identical in value, because the former is calculated as a residual, while the latter is calculated directly, however the two methods derive estimates that are very similar (see Tables Seven and Eight, below).

The tables below shows estimates of nominal, neutral and real holding gains for national and household net worth:

Table Seven : Composition of holding gains on national net worth

	1999-00	2000-01	2001-02
	<i>\$b</i>	<i>\$b</i>	<i>\$b</i>
Neutral holding gains	62	74	65
Real holding gains	111	107	107
Revaluation account	173	182	172
Nominal holding gains (calc)	174	178	170

Source: ABS Catalogue No. 5204.0

Table Eight : Composition of holding gains on household net worth

	1999-00	2000-01	2001-02
	<i>\$b</i>	<i>\$b</i>	<i>\$b</i>
Neutral holding gains	50	61	57
Real holding gains	87	121	3
Revaluation account	137	181	60
Nominal holding gains (calc)	140	187	60

Source: ABS Catalogue No. 5204.0

The derivation of neutral and real holding gains depends upon the choice of index used to represent the movement in the "general price level". In this paper, the domestic final demand implicit price deflator (DFD IPD) is used in order to maintain consistency with the deflator used for estimates of real income measures. At the sector level, the choice of deflator that

should be used as a broad inflation measure is less obvious.

In this paper, the DFD IPD has also been used to derive estimates of real and neutral holding gains in the institutional sectors. The alternatives for the general government and the households and unincorporated enterprises sector were the government final consumption expenditure and the household final consumption expenditure implicit price deflators (GFCE and HFCE IPDs). These alternatives were not implemented, as sector specific deflators imply that the real holding gains on identical assets may differ depending the sector in which they are held.

The argument in favour of using sector specific deflators is that real holding gains measure gains accruing to asset holders over and above the amount necessary to compensate them for inflationary effects. Inflationary effects erode the holder's purchasing power, and the extent to which it does depends on the combination of goods and services consumed by the holder. After all, a household's purchasing power is not reduced if the index of "general price movement" is dominated by increases in the prices of goods that households do not consume (e.g., wages and salaries for teachers, fighter planes or mining exploration).

Even if a sector specific deflator is the optimal choice, the question of the scope of the deflator arises. Household income is divided between consumption and saving activity. The real holding gain "income" could be allocated to either spending or saving, or some combination of the two. If it is assumed that real holding gains are only used as final consumption expenditure, then the appropriate deflator to use would be the HFCE IPD. If, on the other hand, it is argued that the real holding gain can be spent on final consumption activity or saved through purchases of dwellings, financial instruments and so on, then the choice of deflator is less certain. As there is no household specific deflator that incorporates all of these things, the DFD IPD has been used to calculate real holding gains for households.

The relationship between changes in net worth and net saving

In the ASNA framework, unrealised holding gains/losses are included in the balance sheet when arriving at the value of closing assets and liabilities, but excluded from the income accounts and therefore from estimates of saving. SNA93 recognises that real holding gains are an economic variable in their own right, that could be taken into account alongside income for the purposes of analysing consumption or capital formation. It goes on to state:

"It can be argued that real holding gains ought to be assimilated with income as defined in the System to obtain a more comprehensive measure of income, but there is no consensus on this. Apart from the practical difficulty of estimating real holding gains and losses, it is likely that their impact on economic behaviour is not the same as that of income received in cash or in kind." (SNA93, paragraph 12.81)

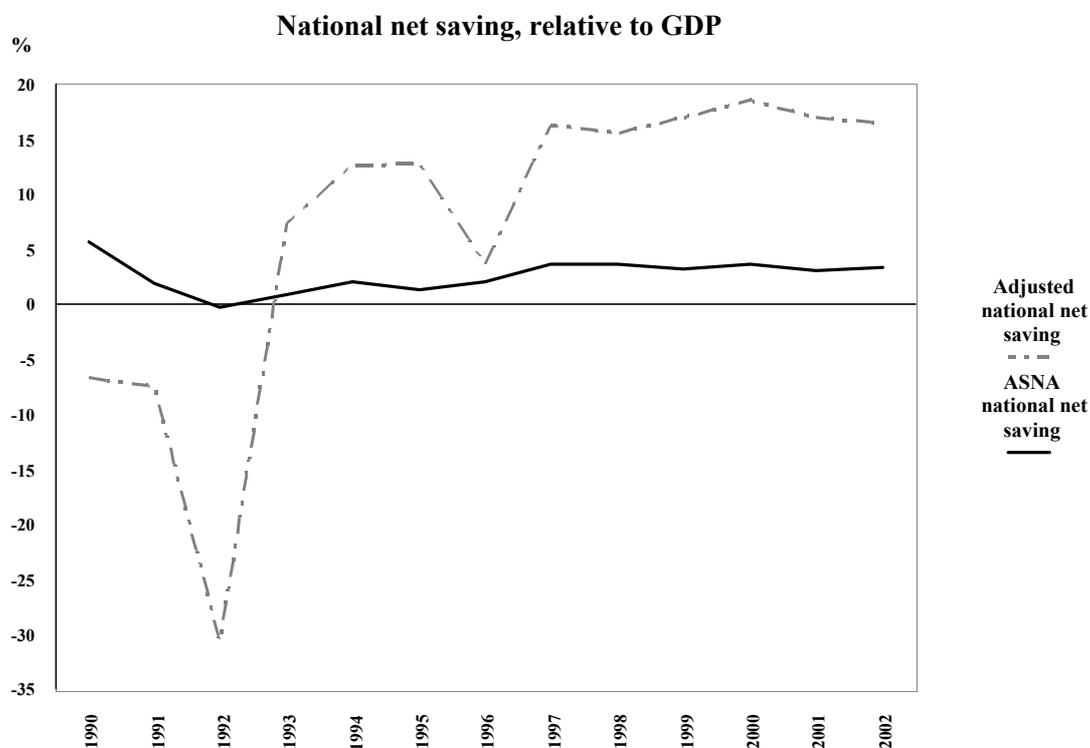
Despite this lack of consensus, the inclusion of holding gains in the income account clarifies the links between real changes in net worth and net saving. Using the above definition of income, the maximum a household can consume without altering its real wealth, a broad analytical concept of saving is the change in net worth less the neutral holding gains. The linkages between the broad measure of net saving and the real change in net worth are shown in the following table:

Table Nine : Alternative national income and saving estimates

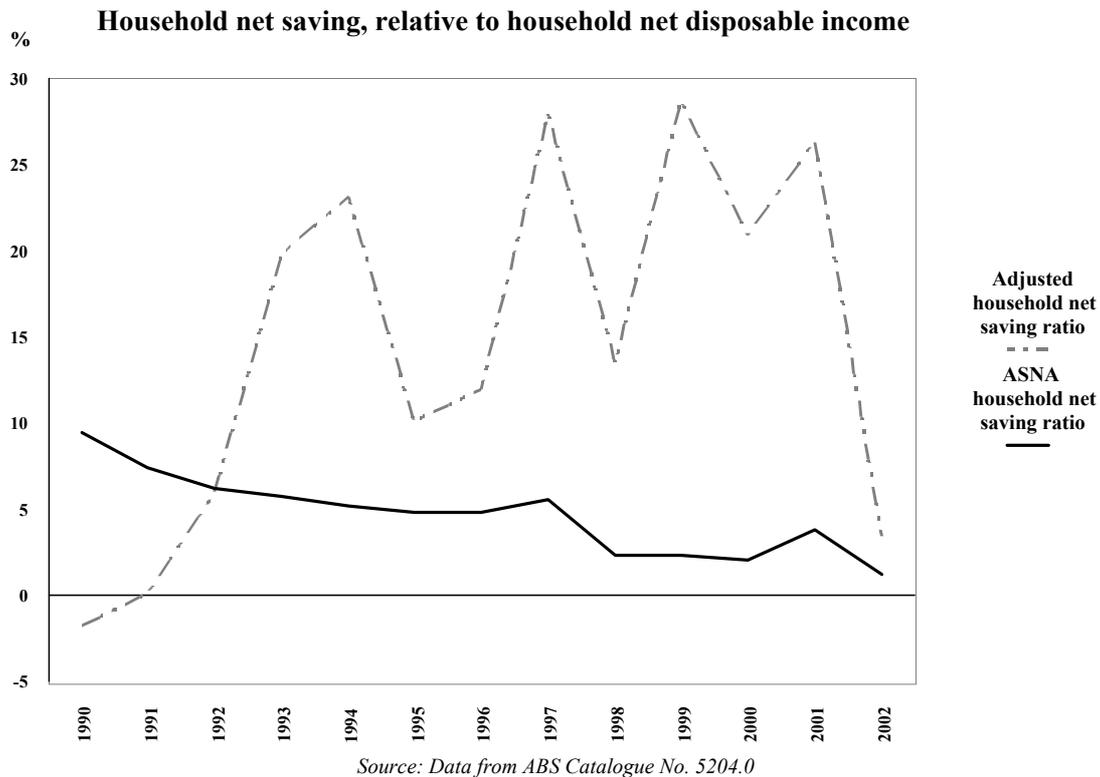
	1999-00	2000-01	2001-02
	\$b	\$b	\$b
Gross disposable income (GDI)	611	650	692
plus Real holding gains	111	108	107
plus Net capital transfers	1	1	1
plus Other changes in volume	4	4	4
equals GDI plus total real changes in assets	726	763	804
less Total final consumption expenditure	489	525	556
less Consumption of fixed capital	98	105	113
equals Net saving plus total real changes in assets	139	133	136
Closing net worth	2,523	2,732	2,932
less Opening net worth	2,321	2,523	2,732
equals Change in net worth	202	210	200
less Neutral holding gains	62	74	65
less Other differences	-1	-3	-1
equals Net saving plus total real changes in assets	139	133	136

Source: ABS Catalogue No. 5204.0

The following graph shows the effect of adding holding gains and deducting holding losses from national net saving.



The graph below shows the comparison between the ASNA definition of net saving and the broad measure.



The broad measures are far more volatile than the current ASNA national net saving series. The negative real holding gains up until 1991-92 were caused by capital and financial asset prices growing more slowly than inflation. For the rest of the period, financial and capital asset prices have grown faster than inflation, until more recently. The early 2000s have been characterised by falling financial asset prices although this has been off set to some extent by rising capital asset prices.

While this analysis links changes in net worth with net saving, treating these estimates as income should be regarded with caution. The impact of real holding gains on economic activity is not equivalent to income received in cash or in kind. Arguably, if a real holding gain accrues due to an increase in the price of a particular asset, then if many agents wish to realise this gain and attempt to "cash out" at the same time, the price may fall and the size of the realised gain may be smaller than the imputed real holding gain. In addition, the estimates of real holding gains are not adjusted for any capital gains tax that may be payable on unrealised holding gains.

Empirical studies which have attempted to measure the effect on consumption of changes in wealth have generally found a weak response. An RBA research paper published in July this year using Australian data found that the household sector's marginal propensity to consume out of permanent stock market wealth was six to nine per cent, and three per cent out of permanent housing wealth (Dvornak 2003, pp. 2-3). Another paper, by Poterba (2002), quotes a study conducted by Laurence Meyer and associates that found the long-run impact of a dollar increase in stock market wealth led to a four cent increase in consumption expenditure, using US data.

These studies examine the impact of either levels of deflated wealth or changes in wealth on consumption, both of which are different concepts to real holding gains. Changes in wealth include volume changes in addition to the price effects that real holding gains capture. While the results of an empirical study measuring the impact of real holding gains on consumption may be similarly weak, it would be misleading to draw that conclusion from empirical studies conducted incorporating either levels of wealth or changes in wealth, which are likely to include volume changes.

Conclusion

The relationships between production, income, consumption, saving, investment, borrowing and wealth are integral to the Australian System of National Accounts. They underpin the transactions shown in the income accounts, the capital accounts, the financial accounts and the assets and liabilities shown on the balance sheets. As gross saving is calculated as a residual between two very large aggregates, it is sensitive to inaccuracies in the estimates and also to the particular definitions of disposable income and consumption used. Net saving is even more sensitive and this needs to be borne in mind when using the data for analysis.

Of the alternative measures discussed in this paper, only the broad measure of net saving derived from the real change in net worth shows an increase in the saving ratio. However, this result should be treated with caution because of the relatively short time series. There is a lack of detailed financial data for the period before 1988-89, and the significance of the result will become clearer as more data becomes available. The adjustments made to final consumption expenditure alter the rate of the decline, but otherwise there is no fundamental change to the series and more pertinently, no new insight towards explaining its decline.

The ABS is giving consideration to including estimates of real and neutral holding gains with estimates of the balance sheet and accumulation accounts in the next release of the ASNA (ABS Catalogue No. 5204.0). Also being considered for inclusion are the estimates of broad measures of net saving derived from real changes in net worth for Australia and the household and unincorporated enterprises sector, and estimates of expenditure on and services from consumer durables in the household and unincorporated enterprises sector.

Comments on this article may be directed to Tanuja Doss on (02) 6252-6104, or e-mail tanuja.doss@abs.gov.au.

APPENDIX A

$$\text{NOM} = q^* (p_c - p_o) \quad \text{(i)}$$

Where q^* is a fixed quantity,

p_c is the price of the asset at the end of the period

and p_o is the price of the asset at the beginning of the period.

Nominal holding gains as defined above can be obtained using the information available in the balance sheet and accumulation accounts:

The opening balance ;	$p_o q_o$
The closing balance ;	$p_c q_c$
and Transactions occurring during the period;	$\sum p_i q_i$

where $p_i q_i$ are transactions recorded at the value at which they occur at the time at which they occur ($i = 1, 2, \dots$) during the period.

Holding gains can accrue to quantities held at opening as well as quantities acquired during the period. In order to capture the full price effect ($p_c - p_o$) on assets held during a period, the value of the transactions that are acquired during the period are deflated to opening period prices. This is so that quantities acquired during the period can be treated *as if* they were acquired at opening. This alters the expression for nominal holding gains to being:

$$\text{Closing Balance} - (\text{Opening Balance} + \text{Deflated Transactions}) = \text{Nominal Holding Gains}$$

The information available in the balance sheet and accumulation accounts can then be manipulated to reflecting the SNA93 formula for the direct estimation of nominal holding gains. Deflating the value of the transactions by an average price index (p_a), and then reflating them to opening period prices (p_o) removes the individual transaction prices (p_i).

$$p_c q_c - (p_o q_o + [p_o/p_a \times \sum p_i q_i]) = q^* (p_c - p_o) \quad \text{(ii)}$$

$$p_c q_c - (p_o q_o + p_o \sum q_i) = q^* (p_c - p_o) \quad \text{(iii)}$$

$$p_c q_c - p_o (q_o + \sum q_i) = q^* (p_c - p_o) \quad \text{(iv)}$$

If the following assumption is made for q^* :

$$q^* = q_c = q_o + \sum q_i \quad \text{(v)}$$

then it can be substituted into equation (v) to give:

$$p_c^* - p_o^* = q^* (p_c - p_o) \quad \text{(vi)}$$

$$q^* (p_c - p_o) = q^* (p_c - p_o) \quad \text{(i)}$$

References

1. Becker, G. S., Murphy, K. M. and Tamura, R. (1990), *Human capital, fertility and economic growth*, Journal of Political Economy, 98, (5), pp. 12-37.
2. Commission of the European Economic Communities, International Monetary Fund, Organisation for Economic Cooperation and Development, World Bank, United Nations, (1993) System of National Accounts 1993, Brussels/Luxemburg, New York, Washington.
3. Jump, G. V. (1980) *Interest rates, inflation expectations and spurious elements in real income and saving*, American Economic Review, 70,(5), pp.990-1004.
4. Poterba, J. (2000) *Stock market wealth and consumption*, Journal of Economic Perspectives, 14, (2), pp. 99-118.
5. Dvornak, N., and M. Kohler, (2003), *Housing wealth, stock market wealth and consumption: A panel analysis for Australia*, Sydney, Reserve Bank of Australia Research Discussion Paper.