Saving in New Zealand: measurement and trends

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A U T H O R S

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Abstract

This paper examines the trends in saving in New Zealand. It considers different sources of information about saving and highlights issues with the measurement of saving. Illustrations are provided of the impact of adjusting saving for both the effects of inflation and the inclusion of some items of expenditure, which are typically counted as consumption. The difficulty of drawing clear implications for policy on the basis of our existing knowledge and data on saving and wealth levels in New Zealand is highlighted. An appendix to the paper includes a comprehensive set of data on New Zealand saving and related variables.

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Saving in New Zealand: Measurement and Trends

1   Introduction

There have been repeated calls for increasing the level of saving in New Zealand. In his budget speech in 1959, the Hon. A. Nordmeyer, Minister of Finance stated: "To maintain and increase our growth it is important that savings continue at a high level. It is the strong desire of the government to provide further incentives for saving". In a 1984 address to the Economic Summit Conference, Sir Frank Holmes noted: "We have been relying too heavily on overseas sources to supplement our savings in financing our investment. The more we can increase savings, the less we shall need to cut back that investment".

The sense of disquiet over the rate of saving has a number of origins. First, as reflected in the statement by Sir Frank Holmes, is the concern that an inadequate level of domestic saving will constrain investment, and by implication reduce capital accumulation and the subsequent growth of income. Second, low levels of domestic saving may lead to increased use of foreign saving, and, at some point, the concomitant cumulative increase in the current account deficit may be a cause for concern. Third, if households fail to save adequately, they will be less able to meet the costs of health, education and above all retirement, without greater reliance on the state.

In general, domestic saving has not been sufficient to meet the total demand for investment in New Zealand. Despite an increase in public saving, national saving in total has still fallen short, requiring an increased reliance on foreign saving. This has its expression in the size of the deficit on the current account of the balance of payments. Naturally the outstanding stock of external liabilities rises as the counterpart to these annual deficits.

There are several sources of information about saving in New Zealand. The purpose of this paper is (i) to document and compare the various measures of saving and (ii) to draw attention to some of the measurement issues regarding saving. The paper does *not* attempt to assess the adequacy of saving in New Zealand, but rather highlights the difficulties of drawing clear implications for policy on the basis of our existing knowledge of saving. It is part of a series of Treasury papers on saving. Other papers that try to assess saving in New Zealand include: an empirical analysis of individual household saving behaviour (Gibson and Scobie, 2001), a discussion of saving and growth in an open economy (Claus, Haugh, Scobie and Törnquist, 2001), an international comparison of household net wealth (Claus and Scobie, 2001), an analysis of foreign investment

(Haugh, 2001) and the current account (Kim, Hall and Buckle, 2001), a discussion of superannation (McCulloch and Frances, 2001) and an evaluation of saving incentive options (The Treasury, 2001).

The remainder of this paper proceeds as follows. The next two sections discuss how saving is measured (section 2) and available measures of saving in New Zealand (section 3). Section 4 examines the New Zealand data, while section 5 compares key saving (related) variables across selected OECD countries. Section 6 discusses measurement issues surrounding measures of saving from the national accounts. Section 7 constructs and reports some adjusted measures of saving for New Zealand and other OECD countries, while section 8 summarises and concludes.

2   How is saving measured?

Saving is generally defined as foregoing current consumption and providing funds (directly or indirectly) to capital markets for productive investment in financial, real or human capital (Boskin, 1988). Saving decisions by individuals, households and firms, or, by society collectively in the case of public saving are the outcome of intertemporal choices between consuming today or consuming in future that depend on a large array of interrelated economic choices and factors. These include expected future income flows from assets, labour supply, demographics, economic growth, government policy, preferences, the rationality of expectations, the degree of economic risks, the completeness of insurance markets, and the role of credit institutions.

There are two fundamental approaches to the measurement of saving. It can be measured in terms of "flows" as the difference between current income and expenditure. Alternatively, saving can be measured as the change in the "stocks" of accumulated net wealth (assets minus liabilities) from one period to the next. By observing the change in net wealth, the amount that was saved can be inferred. A change in net wealth can occur due to either "active" saving, when some of current income is withheld from consumption, or "passive" saving as a result of real increases in the value of existing assets (capital gains).

Saving rates in New Zealand (and elsewhere) are generally measured in terms of flows, derived from the System of National Accounts (SNA). It is a convention of national income accounting that total domestic saving must be equal to total investment, where investment refers to net domestic investment in domestic and foreign assets. If total investment in domestic assets exceeds the amount of domestic saving, the balance will come from drawing on the saving of foreigners. This inflow of foreign saving over a given time path corresponds to the current account balance for that time span and represents an increase in the net claims by foreigners on the future output of the economy.

The relation between aggregate saving and investment is depicted in Figures 2.1 and 2.2 for the years 1981 and 2001.[1] In 1981, about 45 percent of total investment needs were met by foreign saving. Over the ensuing two decades, total investment (in nominal terms) more than quadrupled, while domestic saving rose by less than two and a half fold. As a result the contribution from foreign saving rose to account for about 73 percent of all investment in 2001.

The derivation of the link between the current account, domestic saving and investment from the national accounts identities is contained in Appendix A1.

Figure 2.1 - Saving-investment identity for 1981 (dollar millions)

	Current account deficit 792	Foreign saving 792	Investment 1,739
Total saving 1,748	Net national saving 956	Government saving -535	
		Business saving 1,079	
		Household saving 412	Statistical discrepancy 9

Sources: Statistics New Zealand, The Treasury and authors' estimates.

Figure 2.2 - Saving-investment identity for 2001 (dollar millions)

	Current account deficit 5,338	Foreign saving 5,338	Investment 7,339
Total saving 7,678	Net national saving 2,340	Government saving 1,922	
		Business saving 2,781	
		Household saving -2,363	Statistical discrepancy 339

Source: Statistics New Zealand, The Treasury and authors' estimates.

3 Available measures of saving in New Zealand

Aggregate (national) saving is the sum of private (household and business) and public (government) saving. It can be measured in terms of flows as the difference between current income and expenditure or in terms of stocks as the change in net wealth. Table 3.1 provides a summary of the different measures of saving available for New Zealand.

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[1] The data used in Figures 2.1 and 2.2 are described in more detail in the next section.

Table 3.1 - Summary of the different measures of saving in New Zealand

	Flows	Stocks
Total	System of National Accounts (Statistics New Zealand)	N/A
	SNA based Institutional Sector Accounts (Statistics New Zealand)	
Household	System of National Accounts (Statistics New Zealand)	Household Net Wealth (Reserve Bank of New Zealand)
	SNA based Institutional Sector Accounts (Statistics New Zealand)	WestpacTrust Household Savings Indicators (WestpacTrust)
	Household Economic Survey (Authors' estimates using Statistics New Zealand data)	
Business	SNA based Institutional Sector Accounts (Statistics New Zealand)	Annual Enterprise Survey (Authors' estimates using Statistics New Zealand data)
Government	SNA based Institutional Sector Accounts (Statistics New Zealand)	Crown Accounts (The Treasury)
	Central government's net cash flows from operations (The Treasury)	

3.1   Flow measures of saving

National (aggregate) saving is contained in the National Income and Outlay Account of the System of National Accounts 1993 (SNA93).[2] It can be divided into saving by sectors, i.e. household, business and government saving. The System of National Accounts also provides a measure of household saving, in the Household Income and Outlay Account (HIOA), but not for business or government saving. SNA93 national and household saving rates are only available from 1987 onwards. Data prior to 1987 were constructed by splicing the growth rates of the SNA68 series to the levels of the SNA93 series. This approach was used for other series as well, whenever possible. A detailed description of the data is contained in Appendix A2.

Often used as a proxy for the government's contribution to national saving are the central government's net cash flows from operations (see, for example, Buckle, Kim and Tam, 2001).[3] Net cash flows from operation can be derived from the government's financial statements prepared by The Treasury. They are based on the Generally Accepted Accounting Pratice (GAAP).[4] Business saving can then be calculated as the residual between national saving and household and government saving.[5] These measures are called "sectoral" saving measures henceforth.

The New Zealand Institutional Sector Accounts (NZISA) are a second source for saving rates by sectors in terms of flows (Statistics New Zealand, 2001).[6] The latest Institutional Sector Accounts data are based on the System of National Accounts 1993 and available from 1987 to 1998. The accounts for institutional sectors include:

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[2]   Annual national accounts data in New Zealand are on a March year basis.

[3]   Another, and possibly better, measure of government saving is the operating balance. However, no long term data are available.

[4]   Net cash flows from operations are on a June year basis.

[5]   Any unidentified amount of saving and any measurement errors in household and government saving are included in business saving.

[6]   The NZISA are reported in March years.

- producer enterprises
- financial intermediaries
- general government
- private non-profit organisations serving households
- households
- rest of world

The NZISA are not official Statistics New Zealand series and are labelled experimental. The primary reason is that the data sources (which produce data on value added, or production related income and expenditure) are not entirely appropriate for the corporate and financial sector accounts (see Statistics New Zealand, 1999).[7]

The NZISA household sector account is consistent with household saving from the Household Income and Outlay Account, and total NZISA saving with the National Income and Outlay Account. Moreover, the rest of world saving is in line with the current account data from the balance of payments. In this paper, we calculate NZISA business saving as the sum of saving by producer enterprises, financial intermediaries and private non-profit organisations serving households. However, the sum of household, business and government saving in the Institutional Sector Accounts do not add up to total saving because of measurement problems of the producer enterprise and financial sectors (see footnote 7). As a result an unallocated amount is attributed to an unidentified sector in the NZISA.

General government in the Institutional Sector Accounts includes central and local government and rünanga iwi. Government net cash flows from operations only in part account for local government and rünanga iwi saving. This is because the operating balance captures transactions between the central government and local governments and rünanga iwi, but not transactions between local governments and rünanga iwi and with other sectors. Moreover, the NZISA measure of government saving is an accrual based measure whereas the net cash flows from operations measure is cash based.

A measure of household saving in terms of flows can also be derived from the Household Economic Survey (HES), which consists of a series of cross-sectional surveys. Data are available for the June years 1984 to 1998 and 2001. Household saving can be constructed as disposable income minus consumption expenditure. Disposable income is calculated from estimated taxable income minus net tax plus non taxable social assistance payments.

It should be noted that the Household Economic Survey was not designed to measure household saving. Moreover, the measure of saving we use in this paper is different from Gibson and Scobie (2001), who derive household saving by subtracting *current* consumption expenditure from disposable income. Current consumption expenditure is total household expenditure less expenditures that provide consumption benefits over more than one year (e.g. consumer durables, educational fees). Gibson and Scobie also remove observations where household disposable income is reported as negative or the age of the household head is less than 19 years or greater than 74 at the time of the survey. These adjustments probably produce a more relevant measure of saving in an economic sense, but would make the measure less comparable to saving as measured in

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[7] The Annual Enterprise Survey provides the main source of information for the producer enterprise and financial sectors. The intention is to make NZISA an official Statistics New Zealand series and work is currently ongoing at Statistics New Zealand to utilise the recently redesigned Annual Enterprise Survey for the Institutional Sector Accounts.

the Household Income and Outlay Account. For this reason, we simply calculate household saving as disposable income minus consumption expenditure.

3.2   Stock measures of saving

A stock measure of saving can be derived for households from the net wealth data constructed by the Reserve Bank of New Zealand (see Thorp and Ung, 2000 and 2001). The data, which are in December years and available for 1979 to 2000, are obtained from regular quarterly and monthly surveys conducted by the Reserve Bank and an annual December survey. Net wealth is the value of households' assets (financial and real) less household debt. Saving can then be measured as the change in the stock of accumulated net wealth.

Household net wealth is likely to be understated. Household liabilities, which mainly consist of home mortgages, are almost certainly overstated.[8] This is because some home mortgages are in effect loans to small businesses (secured by residential mortgages).[9] Assets, on the other hand, are likely to be understated. Financial assets are understated as direct investment in non-financial substitutes, like forestry and farms, are not captured in the data. Moreover, the value of household investment in businesses not priced through the stock market is not captured.[10] Real assets are also understated. Household real assets comprise house values alone and, for example, exclude consumer durables.

A household balance sheet measure of saving can also be constructed from WestpacTrust's Household Savings Indicators (HSI), compiled by Morningstar and NZIER. The HSI series are available on a quarterly basis from 1989 onwards. The HSI largely relies on Reserve Bank of New Zealand data and some estimates from other sources.

A measure of business saving can be derived from the Annual Enterprise Survey as the change in business net wealth, assets minus liabilities (current and other). Consistent time series are available for the years 1995 to 2000 but exclude some industries. These are farming, water supply, commercial property, central and local governments, public order and safety, creative arts, sports and interest groups organisations. Including these industries, firms' net wealth is about 62 percent higher in 1999 and 57 percent higher in 2000.[11]

A stock measure of government saving can be derived as the difference between the opening and closing net wealth position of the crown. Crown balance sheet data, which are collected by The Treasury, are available for the June years 1992 to 2001. No balance sheet data are available at the national level.

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[8]   Over 90 percent of household liabilities are mortgages.

[9]   Some banks estimate that possibly between 10 and 20 percent of household loans secured on housing are for business purposes.

[10]   In 1997, about 35 percent of companies in New Zealand were publicly listed (Day, 1997).

[11]   The Annual Enterprise Survey does not include superannuation, residential property operators, foreign government representation and defence.

4 Trends in New Zealand saving rates

This section compares the different measures of saving discussed in the previous section. We begin with the flow measures of saving and then examine the balance sheet data.

4.1 Flow measures of saving

Figure 4.1 plots the sectoral measures of household, government and business saving together with the Institutional Sector Accounts, all as a percent of (nominal expenditure) gross domestic product (GDP). The sectoral measure of household saving is the same as in the Institutional Sector Accounts (apart from small discrepancies because of revisions), but the two government and business measures are different.

Figure 4.1 shows that the household saving rate was relatively stable during the 1970s and 1980s. But it has been declining over the 1990s and negative since 1994.

The government saving rate declined from the early 1970s and was negative for a long period of time. It improved from 1992 and has stayed positive since 1994. By 2001, government saving represented 82 percent of total national saving. A comparison of net cash flows from operations and NZISA saving in Figure 4.2 shows that the two measures are largely consistent.

Figure 4.1 - Household, government and business saving (as a percent of GDP)
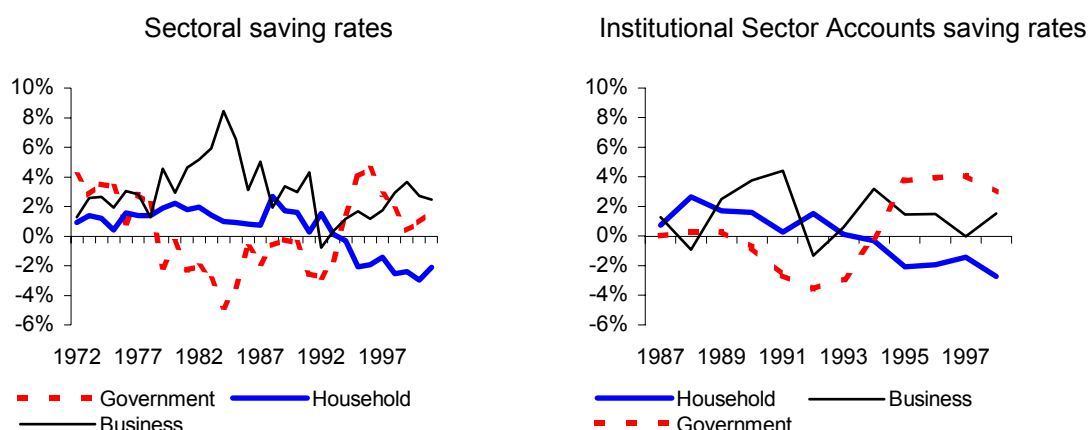
Source: Statistics New Zealand (official and experimental series), The Treasury and authors' estimates.

Business saving has contributed a relatively large proportion to national saving and generally has been positive. A comparison of the NZISA and sectoral saving rates for businesses shows large level differences for several years that data for both measures are available. This is in part because any unidentified amount of saving, reported separately in the Institutional Sector Accounts, is included in the sectoral measure of business saving (see Figure 4.2).

Figure 4.2 - Government and business saving (dollar millions)

Government saving
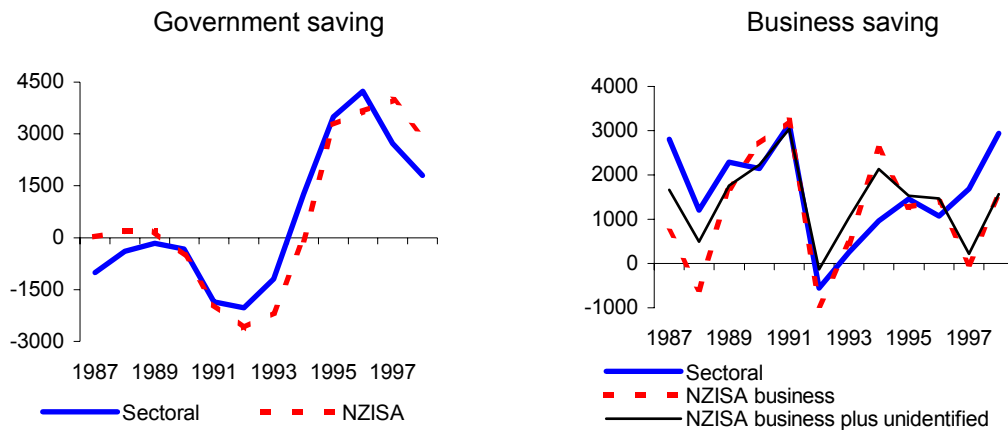
Business saving

Source: Statistics New Zealand (experimental series), The Treasury and authors' estimates.

Household, government and business saving add up to aggregate, national saving, which is plotted in Figure 4.3, as a percent of GDP and disposable income. Sectoral and Institutional Sector Accounts national saving are the same (apart from small discrepancies because of revisions) and Figure 4.3 thus only plots the longer sectoral saving rate from the National Income and Outlay Account. National saving as a percent of GDP has an "apparent" downward trend over the whole period, but has remained positive apart for two years, 1992 and 1993. A similar picture arises from national saving as a percent of disposable income.

Household and government saving from the Institutional Sector Accounts are plotted as a percent of disposable income and GDP in Figure 4.4. As a percent of disposable income, both measures of saving show larger swings than as a percent of GDP. This suggests that disposable income rises less and falls more than GDP.

Figure 4.3 - Net national saving
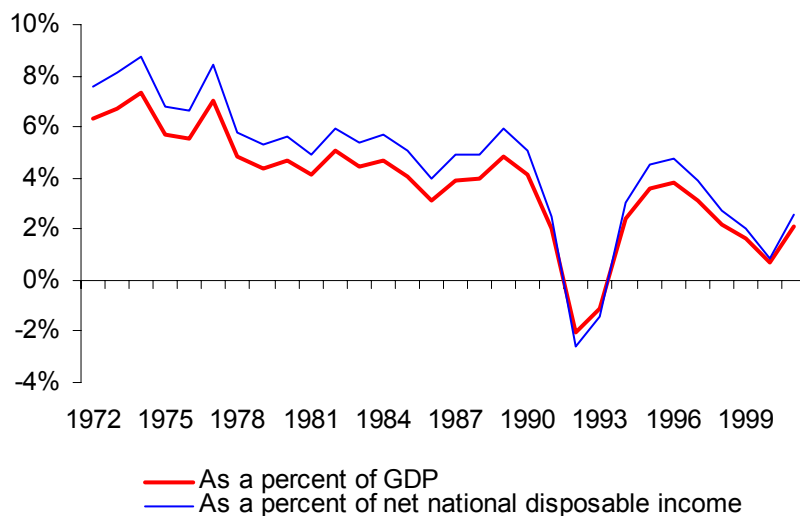
Source: Statistics New Zealand and authors' estimates.

Figure 4.4 - Institutional Sector Accounts

Household saving

As a percent of household disposable income

As a percent of GDP

Government saving

As a percent of government disposable income

As a percent of GDP
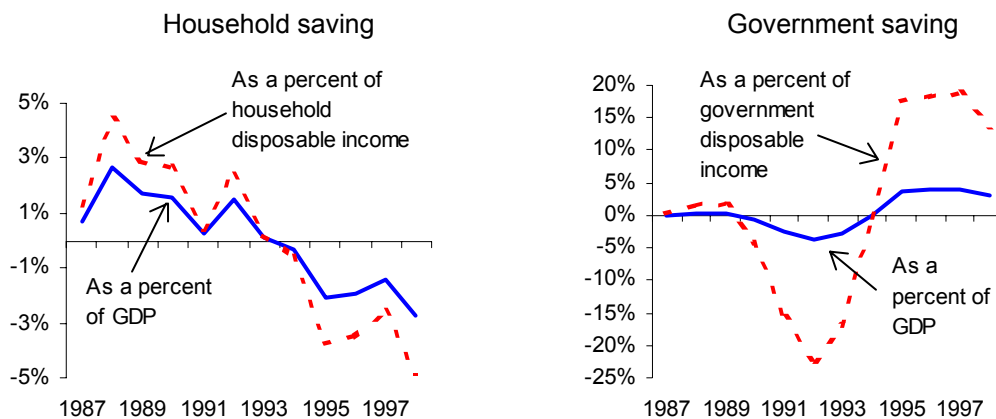
Source: Statistics New Zealand (official and experimental series).

Household saving constructed from the Household Economic Survey as disposable income minus consumption expenditure is plotted in Figure 4.5 together with saving from the Household Income and Outlay Account. Both are in percent of disposable income. Figure 4.5 shows that the HES and HIOA data provide a rather different picture of the household saving rates, both in terms of levels and trends. The HES saving rate has generally been trending upwards, increasing from around -4.3 percent in 1984 to about 4.9 percent in 2001.[12] Over the same period, the HIOA saving rate fell from around 1.7 percent to about -3.7 percent of disposable income.

A project is currently ongoing at Statistics New Zealand to reconcile the HES and HIOA data. We attempt to explore a few issues and reasons that could potentially explain the differences between the two data sources.

The System of National Accounts seeks to track all incomes and expenditures regardless of source. Annual saving is then computed as the difference between disposable income and expenditure. The financial model of household behaviour that underlies the Household Economic Survey is implicitly a cash flow one and identifies cash flows into and out of consumer units. As a result, the Household Economic Survey (HES) and the Household Income and Outlay Account (HIOA) do not use all of the same variables. For example, the HIOA imputes a value for interest that is derived from superannuation schemes whereas the cash based HES does not, because people would not know how to impute a value for the interest that they have earned on their superannuation schemes. Another example is imputed rent or surplus from operation of owner-occupied dwellings, included in the HIOA but not the HES.

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[12]   Note that no data were collected for the HES for 1999 and 2000.

Figure 4.5 - HIOA and HES household saving rates (as a percent of disposable income)
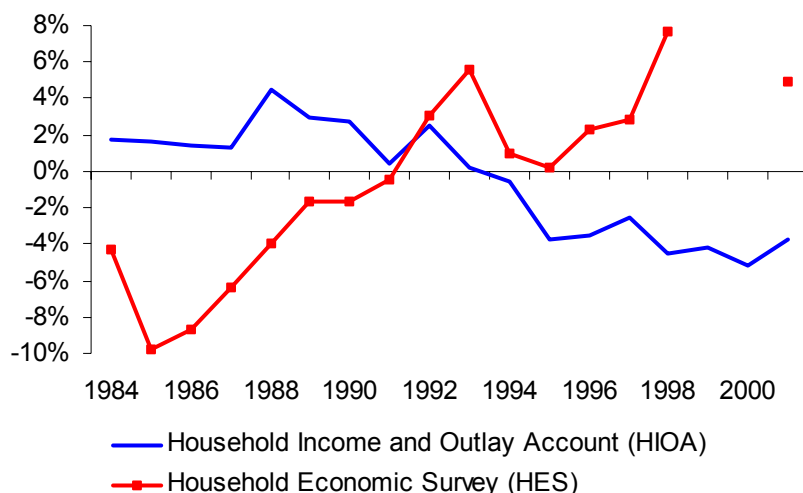
Source: Statistics New Zealand and authors' estimates.

Another example would be incomes paid but not received such as employer pension and health contributions. In HES, these items are not included as part of income. HES only collects data about taxable income and does not refer to anything on which the fringe benefit tax is liable. On the other hand, these items are included in SNA income for households. They are covered under compensation of employees, which is remuneration of employees including employers' contribution to superannuation schemes and fringe benefits provided. Employers' Accident Compensation Corporation (ACC) levies paid on behalf of the employee are also included in the SNA measure of income but not the HES.

On the consumption side, SNA household consumption includes payments made by the government on behalf of households (e.g. free medical care for under-six year-olds). HES does not account for this item.

These differences help explain the discrepancies in levels between the two measures. However, it remains that the HES data show a rising trend when saving is measured in a consistent manner over time. This stands in marked contrast to the HIOA data.

In the absence of more information regarding the reliability and credibility of either data source, it is appropriate to place more reliance on the published saving estimates of the Household Income and Outlay Account. There are three main reasons for this. First, the SNA based HIOA is the official Statistics New Zealand data source for household saving. Second, the national accounts are derived from a variety of data sources. In contrast, the Household Economic Survey is only one data source so there is the possibility that not all items have the same reliability if some questions are traditionally not answered well. For instance, social assistance grants in the Household Income and Outlay Account (e.g. unemployment benefits) that households receive from the government are sourced directly from the government records. This is the exact total that the government pays out to households. In contrast, the HES is a sample survey and therefore only a sample of social assistance grants would be surveyed - thus not giving the exact total. Third, the SNA based HIOA is compiled in an international framework, the System of National Accounts 1993, which is comparable to other countries.

4.2   Stock measures of saving

The link between stock and flow measures of saving can be derived from households', businesses' and the government's budget constraints. We provide a stylised example for the household sector.

Suppose households value alternative streams of consumption and leisure over their lifetime according to some utility function, which they maximise subject to a budget constraint. At the beginning of each period, households must decide how much to hold in demand deposits (d_t), which they use for consumption during the period. Demand deposits consist of deposits with banks and other forms of financial assets with a stable capital value that can be accessed without penalty on demand. At the beginning of each period, households must also decide how to save for next period consumption. They can either purchase shares in firms (financial assets, fa_t) or buy houses (real assets, ra_t). Alternatively, households can "purchase" human capital (h_t) in the form of education or health care.

For simplicity, it is assumed that households don't borrow. This implies that households' liabilities are zero and household net wealth (assets minus liabilities) equals households' total wealth (assets). Moreover, it is assumed that there is no government sector. Households do not pay taxes and do not receive any transfer payments from the government.

The value of financial assets at time t is given by $p_t^{fa} fa_t$, where p_t^{fa} denotes the market price of financial assets. The value of real assets and human capital is given by $p_t^{ra} ra_t$ and $p_t^h h_t$ respectively, where p_t^{ra} and p_t^h denote the market price of real assets and education or health care at time t.

During each period, households derive income from four sources. First, households earn wage income, $w_t p_t^h h_t$, from supplying human capital to firms, where w_t denotes the nominal wage rate. Second, households receive interest income, $i_t d_t$ on demand deposits held with banks, where i_t is the rate of interest paid on deposits. Third, they receive a return on financial assets $r_t^{fa} p_t^{fa} fa_t$, in the form of dividend payments from firms, where r_t^{fa} denotes the yield on financial assets. Finally, households receive a return on real assets, in the form of imputed rent for housing, i.e. $r_t^{ra} p_t^{ra} ra_t$, where r_t^{ra} is the yield on real assets.

Households use their income to purchase consumption, $p_t^c c_t$, where p_t^c denotes the price of the consumption good c_t. Households also purchase financial and real assets and human capital to provide income next period. The price they pay for financial and real assets and human capital depends on next period's expected value of these assets and human capital. The household budget constraint can then be written as follows

$$(1 + w_t) p_t^h h_t + (1 + i_t) d_t + (1 + r_t^{fa}) p_t^{fa} fa_t + (1 + r_t^{ra}) p_t^{ra} ra_t \qquad (4.1)$$

$$- p_t^c c_t - E_t(d_{t+1}) - E_t(p_{t+1}^h h_{t+1}) - E_t(p_{t+1}^{fa} fa_{t+1}) - E_t(p_{t+1}^{ra} ra_{t+1}) = 0$$

where $E_t(.)$ is the conditional expectation operator with respect to information available at time t.

Suppose for the moment that there is no uncertainty and that households have perfect information. Equation (4.1) can then be written as

$$(1 + w_t)p_t^h h_t + (1 + i_t)d_t + (1 + r_t^{fa})p_t^{fa}fa_t + (1 + r_t^{ra})p_t^{ra}ra_t - p_t^c c_t$$
$$- d_{t+1} - p_{t+1}^h h_{t+1} - p_{t+1}^{fa}fa_{t+1} - p_{t+1}^{ra}ra_{t+1} = 0 \qquad (4.2)$$

Households' budget constraint can be interpreted as follows. Each period, households receive a return on deposits and financial and real assets. They also receive income from their human capital in the form of wage income. Households then "sell" all their deposits, financial and real assets and human capital to purchase consumption, human capital and new financial and real assets. The budget constraint is binding and household expenditure equals household income.

The link between the stock and flow measures of saving becomes clear when re-writing equation (4.2) as follows

$$(d_{t+1} - d_t) + (p_{t+1}^h h_{t+1} - p_t^h h_t) + (p_{t+1}^{fa}fa_{t+1} - p_t^{fa}fa_t) + (p_{t+1}^{ra}ra_{t+1} - p_t^{ra}ra_t) =$$
$$w_t p_t^h h_t + i_t d_t + r_t^{fa}p_t^{fa}fa_t + r_t^{ra}p_t^{ra}ra_t - p_t^c c_t \qquad (4.3)$$

The left hand side of equation (4.3) is the change in household net wealth, or the stock measure of household saving. The right hand side measures saving in terms of flows as the difference between current income ($w_t p_t^h h_t + i_t d_t + r_t^{fa}p_t^{fa}fa_t + r_t^{ra}p_t^{ra}ra_t$) and current expenditure ($p_t^c c_t$). Equation (4.3) then implies that, in the absence of uncertainty and under the assumption that households have perfect information, the *stock measure of saving should be identically equal to the flow measure of saving*.

In reality, the two measures are not the same. There are several reasons for this. The two measures of saving can differ because of incomplete coverage. Most estimates of household net wealth do not include human capital. This means that *measured* changes in household net wealth are understated by ($p_{t+1}^h h_{t+1} - p_t^h h_t$).

The flow measure of saving will be understated relative to the *measured* stock saving rate that excludes human capital. This is because the flow measure includes expenditure on education and health care, but they are treated as consumption. Saving measured in terms of flows will also be understated relative to the stock measure if consumer durables are not included in net wealth but counted as consumption in the flow measure.

Another reason why the stock and flow measures of saving differ is because the assumptions of no uncertainty and perfect information do not hold in the real world. The (expected) cash flow of future earnings of financial and real assets, and hence their price, are subject to unforeseen shocks. In the above example, households must decide at the beginning of each period how much of their wealth to hold in bank deposits, financial and real assets and how much to add to their human capital. The prices paid depend on next period's expected values of these assets and human capital. If assets are subject to random shocks that occur during the period and affect future earnings, then the value of assets at the beginning of the period will differ from the end of period value. Thus, ex post the change in household net wealth may not equal the flow measure of saving.

If the shocks affecting the price of financial and real assets are normally distributed, then asset prices are subject to positive and negative shocks, which, on average, are zero. This implies that the two measures of saving will diverge during some periods, but would tend to move together over time. However, they will not move together over time if shocks

to asset prices are persistent. Generally, shocks to asset prices are persistent and the stock and flow measures of saving are likely to diverge.[13]

Figure 4.6 plots the stock measures of household saving from the Reserve Bank of New Zealand's net wealth data and the WestpacTrust HSI (both in December years) together with the flow measure from the Household Income and Outlay Account. All three measures are calculated as a percent of household disposable income. The WestpacTrust HSI are annual averages.

Figure 4.6 shows that the flow and stock measures of saving are indeed subject to substantial differences. In particular, the stock measure of saving is significantly larger than the flow measure in New Zealand (and other OECD countries, discussed further in the next section). Note that the two measures are plotted on scale of 10:1. Saving, measured as changes in net wealth or as the difference between the flow of current income and expenditure, differ because of unforeseen asset price movements and measurement.[14] The stock measure of household saving continued to increase over the second half of the 1990s in part because of surprisingly strong increases in house prices. The consequent gain in the value of housing stock may actually have contributed to the decline in the flow measure of saving. This is because an unexpected (permanent) increase in assets prices (or discounted future cash flows) is a real income gain that is likely to encourage more consumption today and in the future and would tend to reduce current saving as measured by the difference between current income and expenditure.[15]

Overall, the trend in the SNA measure of household saving has been downward. The implied saving rate from the Reserve Bank of New Zealand net wealth data has also fallen. However, its decline has not been as gradual as it has been for the flow measure. Household saving measured by the change in household net wealth appear to have shifted to a lower level following the financial market liberalisation during the second half of the 1980s.

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[13] Tests for a unit root suggest that in New Zealand house and stock prices are non-stationary, i.e. shocks to asset prices have permanent effects. The augmented Dickey and Fuller (Said and Dickey, 1984) test was performed on the Quotable Value New Zealand quarterly house price index and the New Zealand stock exchange capital 40 price index. The null hypothesis of a unit root could not be rejected at conventional levels of significance.

[14] The stock and flow measures of saving would move closer together if we adopted a Hicksian definition of income for the flow measure, which implicitly includes capital gains, or if we removed the capital gain effects from the stock measure.

[15] Factors that likely contributed to the divergence of the stock and flow measures because they are incorporated in the flow measure of saving as consumption expenditure, but are not counted in the stock measure, include: (i) a higher ratio of household expenditure on health care to total consumption expenditure in the early and mid-1990s in part due to increased medical care costs, (ii) rising household expenditure on tertiary education over the second half of the 1990s, and (iii) strong growth in consumer durables due to the elimination of tariffs on motor vehicles, parallel importing, and increasing importance of computers.

Figure 4.6 - Stock and flow measures of household saving (as a percent of disposable income)
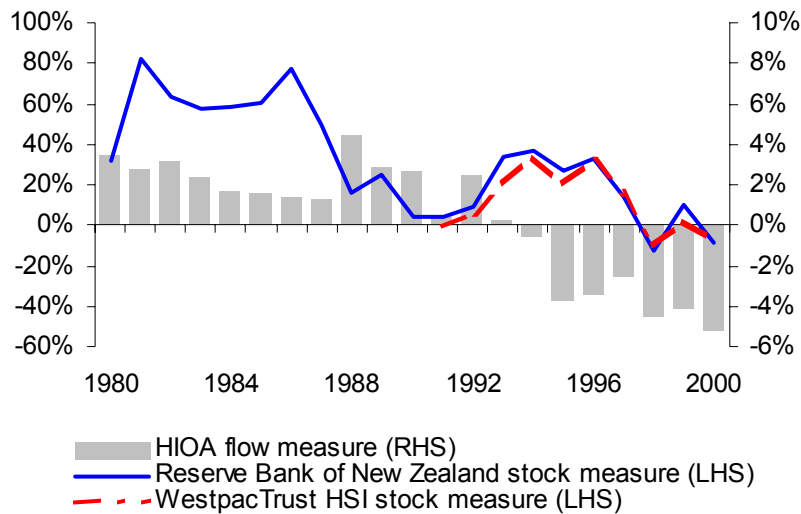
Source: Statistics New Zealand, Reserve Bank of New Zealand, WestpacTrust and authors' estimates.

To test whether or not the stock measure of saving shifted from a high saving state to a low saving state, we fitted the following Hamilton (1989) Markov switching model by maximum likelihood

$$sav_t - \mu_{s_t} = \rho\left(sav_{t-1} - \mu_{s_{t-1}}\right) + \varepsilon_t \tag{4.4}$$

where sav_t denotes the saving rate, ρ is a coefficient, μ_{s_t} is the mean of the high and low saving states and $\varepsilon_t \sim$ i.i.d. $N\left(0, \sigma^2\right)$.[16] The Hamilton model estimates the probability of a regime shift from a high mean saving rate to a low mean saving rate or vice versa.[17]

The results show two regime shifts. Household saving switched from a low saving state to a high saving state in 1981 and back to a low saving state in 1988. Over the high saving period 1982-87, households, on average, saved almost four times more than in the low saving state, as measured by changes in households' net wealth as a percent of disposable income. However, despite the fall in household saving in 1988, the average saving rate from household balance sheets, at about 16.5 percent, remains significantly larger than the average saving rate from the national accounts over the period 1987-2001 of -1 percent.

A stock measure of business saving can be derived from the Annual Enterprise Survey as the change in firms' net wealth (assets minus liabilities). Business saving in terms of stocks is plotted in Figure 4.7 together with the sectoral and NZISA flow measures, all as a percent of GDP. The stock and flow measures of business saving show even larger level differences than household saving (note that they are plotted on a scale of 20:1), with the discrepancy mainly arising because of asset price movements. Figure 4.7 also shows that the stock and NZISA flow measures of business saving move in the same direction for the three years that data are available for both series. This is probably

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[16]   For an application of the Markov switching model to New Zealand GDP see Buckle, Haugh and Thomson (2002). We would like to thank the authors for providing us with their code.
[17]   The variance is assumed constant.

because the Annual Enterprise Survey provides the main source of information for the corporate sector in the Institutional Sector Accounts.

Figure 4.7 - Stock and flow measures of business saving (as a percent of GDP)
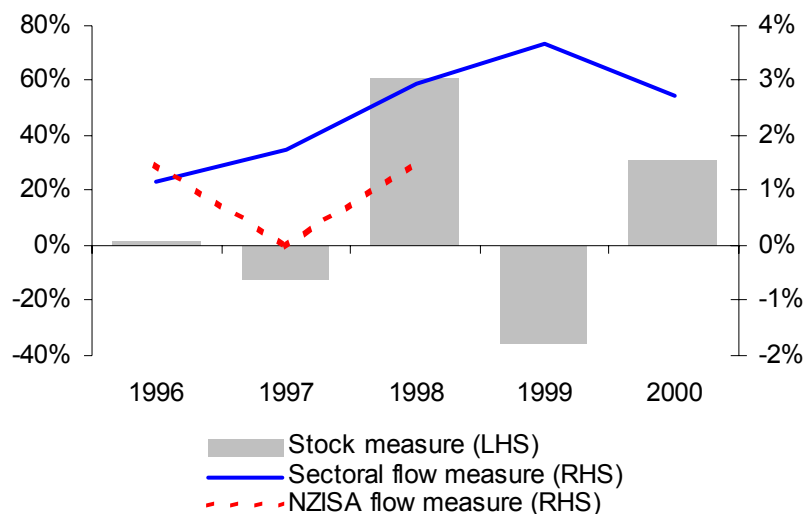
Source: Statistics New Zealand and authors' estimates.

Figure 4.8 plots the stock and flow measures of government saving as a percent of GDP. Unlike for the household and business sectors, the stock and flow measures of government saving are very similar. The main reason for this is because the crown's balance sheet is less subject to asset price movements than firms' and households' balance sheets.

Movements in the market value of households' and firms' assets and liabilities can be caused by a whole range of factors. These include changes in economic conditions or monetary policy, investor sentiment, exogenous shocks affecting specific sectors. As a result, it is often difficult to identify what are the main factors leading to the swings and hence changes in private net wealth.

Figure 4.8 - Stock and flow measures of government saving (as a percent of GDP)
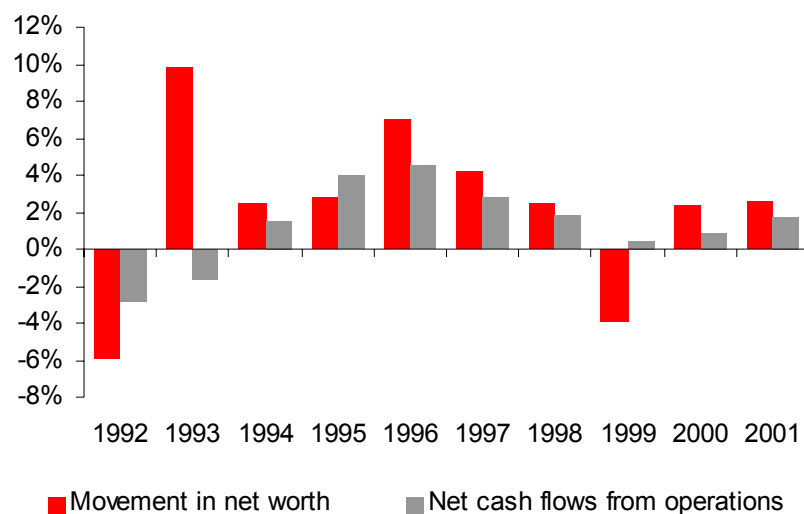
Source: The Treasury and Statistics New Zealand

Many of the crown's assets and liabilities (e.g. schools and state owned enterprises) are not priced in an actively trading market and hence are less affected by factors driving market valuation. Moreover, the value of some of the crown's assets and liabilities has remained fairly stable in recent years, like notes and coins issued by the Reserve Bank of New Zealand. Consequently, movements in the crown's balance sheet can often be related to the specific factors driving them, re-evaluation and measurement changes. For example, in 2001 crown net wealth increased largely because of the inclusion of the state highway network.

5 Comparing New Zealand to other OECD countries

In this section we compare saving's outcomes across selected OECD countries at the aggregate, national level and the household level.

5.1 Current account, national saving, gross fixed capital formation and investment

Figure 5.1 plots the current account, net national saving, gross fixed capital formation (GFCF) and investment (gross fixed capital formation less consumption of fixed capital) all as a percent of GDP for 12 OECD countries: Australia, Canada, Finland, Germany, Ireland, Japan, Korea, New Zealand, Norway, Sweden, the United Kingdom and the United States.[18] Data are plotted from 1972 to 2001 where available. The series were obtained from the OECD national accounts database, except for New Zealand. For New Zealand we use the data discussed in the previous sections.

National saving

Figure 5.1 shows that net national saving rates have varied substantially across OECD countries. Saving has been lowest in Finland, with an average rate of 1 percent of GDP, while Korea and Japan experienced the highest average rates, at around 21 and 18 percent respectively. Saving has also been relatively high in Norway, at around 12 percent of GDP. In the rest of the countries, saving rates have averaged between around 4 percent (New Zealand) and 9 percent (Germany).

Gross fixed capital formation and investment

While New Zealand's measured saving rate appears to be lower than in other OECD countries (apart maybe from Finland), this does not seem to have affected gross fixed capital formation or investment rates. In fact, New Zealand's average GFCF (investment) rate at around 22 (8) percent ranks in the middle of OECD rates. GFCF rates range from around 30 percent in Korea and Japan to slightly less than 19 percent for the United Kingdom and the United States, while investment ranges from about 5 percent in Sweden to around 33 percent in Korea.

Overall, gross fixed capital formation and investment rates have been fairly stable in Australia, Canada, Germany, Japan, New Zealand, the United Kingdom and the United

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[18] The choice of countries was dictated by data availability.

States. In contrast, in Finland and Sweden, they appear to have dropped to a lower level in 1993. Moreover, gross fixed capital formation and investment have been subject to quite large swings in Ireland, Korea and Norway, steadily declining in Norway and trending upward in Korea. In Ireland, the (gross) investment rate fell over much of the 1980s, but rose over the 1990s.

Current account

Although Korea has had high (and rising) gross fixed capital formation and investment rates, domestic saving has generally been (close to) sufficient to meet strong (gross) investment demand. As a result, its current account as a percentage of GDP, on average, has been zero. The current account has also fluctuated around zero in Germany, Finland and Sweden. In Finland and Sweden, the current account was in deficit until 1993; however, since then, current account surpluses have offset previous deficits. The relatively small current account deficit in Finland prior to 1993 and balanced current account over the period as a whole is somewhat surprising, given Finland's relatively high rates of (gross) investment and low saving rates.

The current account in Australia, Canada, Ireland, New Zealand, the United Kingdom and the United States, on average, has been in deficit. Ireland's current account reached a trough at -13 percent of GDP in 1981; however, since 1987 it has shown a small surplus. In Australia, Canada and New Zealand, the current account has been in deficit, associated with relatively low rates of net national saving. In the United Kingdom and the United States, both (gross) investment and saving rates have been relatively low.

Japan and Norway, on average, have had current account surpluses. High rates of gross fixed capital formation and investment have been more than offset by high rates of net national saving.

Although New Zealand saving rates have been among the lowest in OECD countries, (gross) investment rates have been comparable to those abroad. This means to meet domestic investment needs, New Zealand has been able to access foreign saving as reflected in the persistent current account deficit. Kim, Hall and Buckle (2001) find that this accumulation of current account deficits has not be unsustainable when viewed in the context of intertemporal consumption smoothing. The link between saving, investment and growth is discussed in more detail in Claus, Haugh, Scobie and Törnquist (2001).

Figure 5.1 - Current account, net national saving, gross fixed capital formation and investment in selected OECD countries (as a percent of GDP)

Source: OECD, Statistics New Zealand and authors' estimates.

5.2   Household saving

International comparisons of saving across sectors are limited by data availability. One sector for which data are generally available is the household sector and much attention of the theoretical and empirical literature has focused on household saving.

Balance sheets or net wealth data are also available for Australia, Canada, France, Germany, Italy, Japan, the United Kingdom and the United States. Net wealth data for Australia are from the Reserve Bank of Australia, while the data for Canada, France, Germany, Italy, Japan, the United Kingdom and the United States were obtained from the OECD. The data should be more or less comparable across countries. However, one known difference is that the New Zealand data do not include other tangible assets, which are included in the other countries' measures. Also, household assets in Australia include unincorporated enterprises. As a result, New Zealand household net wealth will be understated in absolute terms and relative to the other countries.

Figure 5.2 plots the flow and stock measures of household saving for the 9 countries that household net wealth data are available from 1986 to 2000. It shows that household saving measured by the difference between the flow of income and expenditure (bars) has been declining in all countries apart from France, at least over the 1990s.

A different picture emerges from the household saving rate implied by changes in household net wealth. As in New Zealand, the absolute differences between the flow and stock measures of saving are large. Countries that have less deregulated financial markets and where households are more credit constrained (France, Germany, Italy and Japan) appear to have a higher saving rate measured in terms of flows than in countries where financial liberalisation was largely completed by the mid to late 1980s (Australia, Canada, New Zealand, the United Kingdom and the United States).[19]

In the United States, the United Kingdom and Australia, the decline in the flow measure of saving was particularly sharp over the second half of the 1990s. In marked contrast, measured in terms of stocks, household saving increased over this period. In Canada and Germany, saving measured by the difference between the flow of income and expenditure also declined over the 1990s, while the stock measure remained virtually unchanged. The opposite occurred in Japan. The stock measure of saving fell and the flow measure remained basically unchanged.

The stock and flow measures of saving imply quite different pictures of household saving. Which of the two is the "right" measure to use depends, in part, on one's beliefs about the determinants of households' saving. There are three main theories of household saving behaviour: (i) the life cycle model of Modigliani and Brumberg (1954) and Ando and Modigliani (1963), (ii) the Barro (1974) model, and (iii) the Keynesian model.

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[19]   Financial deregulation is discussed in more detail in Claus and Scobie (2001).

Figure 5.2 - Stock and flow measures of household saving in selected OECD countries (as a percent of disposable income)

Flow measure (RHS)   ——— Stock measure (LHS)
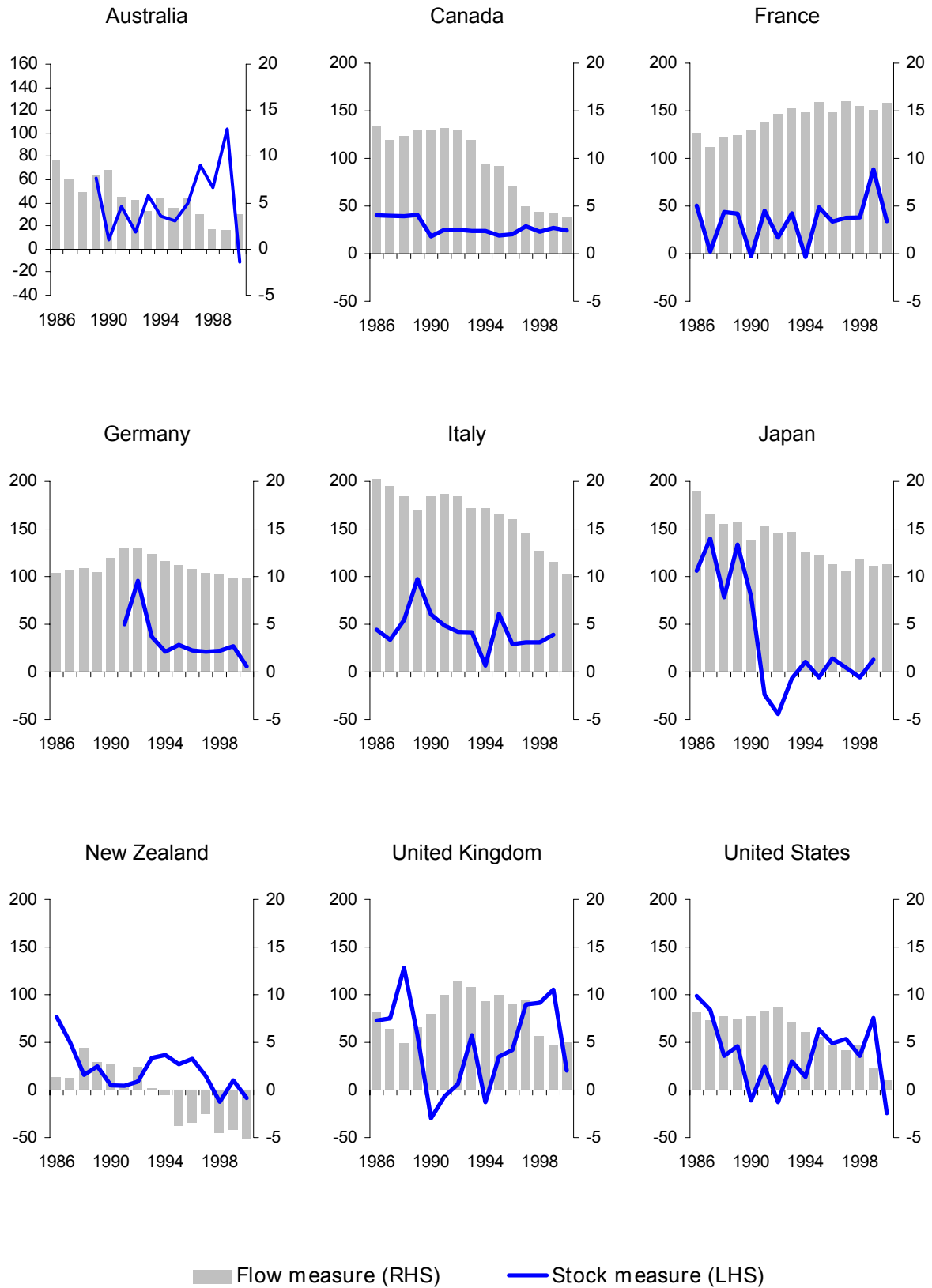
Source: OECD, Reserve Bank of Australia, Reserve Bank of New Zealand, Statistics New Zealand and authors' estimates.

Note: The flow measures of household saving for France, Italy and the United Kingdom are gross.

In the life cycle and Barro models, households choose how much to save and how much to work over their lifetimes. In order to equalise the discounted marginal utility of consumption from one period to the next, optimising households smooth consumption over time. Households save when income is high (during their middle years) and dis-save when income is low (during youth and retirement).[20]

The Keynesian model, in contrast to the life cycle and Barro models, is not based on an optimisation problem. Instead it simply assumes that households consume some fraction of their current income and some other fraction of their assets. While there is no formal justification for the Keynesian model, the informal argument rests on some combination of liquidity constraint and myopia.

Stock measures of saving take into account expected future earnings and are thus conceptually more closely related to the optimising-agent, life cycle and Barro models. Flow measures of saving, which only take into account current income and expenditure, are probably an accurate description of saving behaviour in the Keynesian model, where households simply consume some fraction of their current income and assets without regard for the future.

When considering whether households might be "adequately prepared" for retirement, the level of household net wealth (and associated stock measure of saving) is typically regarded as the more useful indicator than the current flow of household saving.

6 Measurement issues with national accounts saving rates

The remainder of the paper considers measurement issues of saving. The focus is on national accounts measures as these are the official saving measures that are generally used in the analysis and discussions about saving. Measurement issues can be grouped into two broad categories: (i) the difficulty of measuring saving, and (ii) the economic meaningfulness of conventional measures of saving. We will discuss these in turn after a few observations about the New Zealand data.

6.1 The measurement of saving in New Zealand

National saving

National saving in New Zealand is effectively calculated from two sources of data (i) from the National Income and Outlay Account as the difference between disposable income and total consumption expenditure, and (ii) from the flows of investment and net lending in the Capital Finance Account. While national saving may be inaccurately measured in particular years, it is unlikely subject to systematic errors through time. However, it is conceivable that New Zealand saving will be consistently different from that in other countries because of given characteristics of the New Zealand economy.

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[20] The difference between the life cycle and Barro models is that in the Barro model, individuals care about their own welfare (as in the life cycle model), but they also care about their children's welfare. Since children care about their children and they care about their families, etc., caring about one's children translates into caring about all future descendants.

Retained earnings are a case in point. Retained earnings of foreign direct investment (FDI) are *included* in the current account (and hence are not counted in national saving). But they are *excluded* from the current account for portfolio investment (and thus included in national saving).[21] As a result, the current account will be larger (and national saving lower) in countries with a relatively larger proportion of foreign direct investment (all else equal).

In New Zealand, the share of foreign direct investment is higher than in other OECD countries. Foreign direct investment tends to be higher in New Zealand, in part, because companies are smaller here and the ownership threshold to qualify as FDI is more easily reached. The higher proportion of FDI will lead to a relatively lower measured saving rate because of two effects. First, saving will be lower because non-residents hold a larger proportion of FDI. Secondly, saving will be lower because New Zealand residents hold a relatively larger proportion of foreign portfolio investment than non-residents hold portfolio investment in New Zealand.

Definitional changes can have large effects as can be seen from the revisions to net national saving from SNA68 to SNA93, plotted in Figure 6.1. The likely magnitude of the discrepancy between New Zealand and other countries' saving rates because of given characteristics of the New Zealand economy and the use of particular definitions is currently unknown. It needs further investigation before conclusions can be drawn about the adequacy of saving in New Zealand.

Figure 6.1 - Net national saving SNA68 and SNA93 (dollar millions)
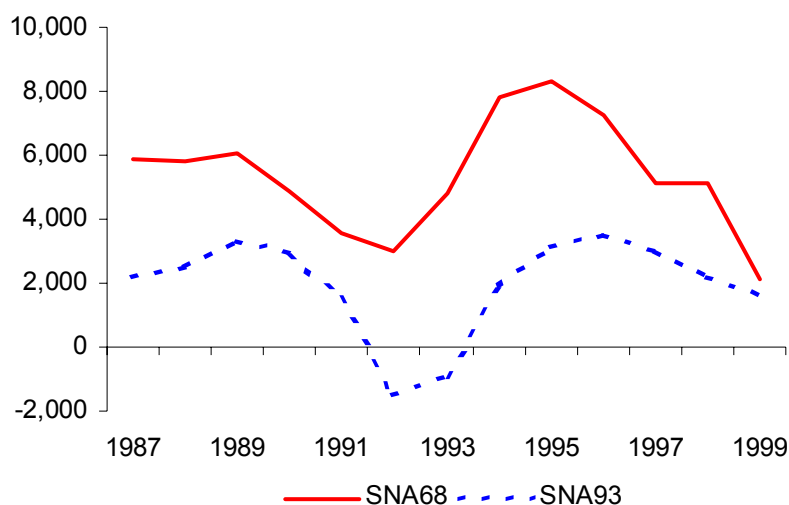
Source: Statistics New Zealand.

Household saving

Household saving is obtained from the income and outlay accounts only and does not have the same degree of accuracy as the national saving rate, which is effectively derived from two sources. Measured as the difference between two large numbers (current income and expenditure), household saving rates are thus subject to potentially wide margins of error. This is because any errors in other series will be reflected in the saving

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[21] Foreign direct investment includes all capital transactions, both equity and debt, where a non-resident owns 10 percent or more of a New Zealand enterprise. Portfolio investment consists of non-resident purchases of domestically issued securities, other long-term bonds and corporate equity, not included in FDI.

estimate. For example, in 2001 household disposable income was about $63.8 billion and household consumption $66.1 billion. This implies a "dis-saving" of $2.4 billion or -3.7 percent of disposable income. If income was under-estimated by, say 2 percent, and consumption was over-estimated by 2 percent, then the saving rate would have been +0.4 percent instead of -3.7 percent.

6.2   The difficulty of measuring saving

Coverage

National product and income accounts only partially capture illegal and hidden economy activities and the saving rate is probably biased downward. This is because underground economic activity is likely to be larger on the income side than the consumption side. Moreover, national accounts measures of saving do not account for household production and only partly include natural resources.

Estimates of the size of the hidden economy in New Zealand suggest that over the period 1968 to 1994 underground economic activity varied between 6.8 and 11.3 percent of measured (real) GDP (see Giles, 1999). These estimates are derived from a latent variable model and information from a currency-demand model.

Figure 6.2 - Net national saving unadjusted and adjusted for hidden economy activity

Net national saving as a percent of GDP

Adjusted net national saving as a percent of adjusted GDP
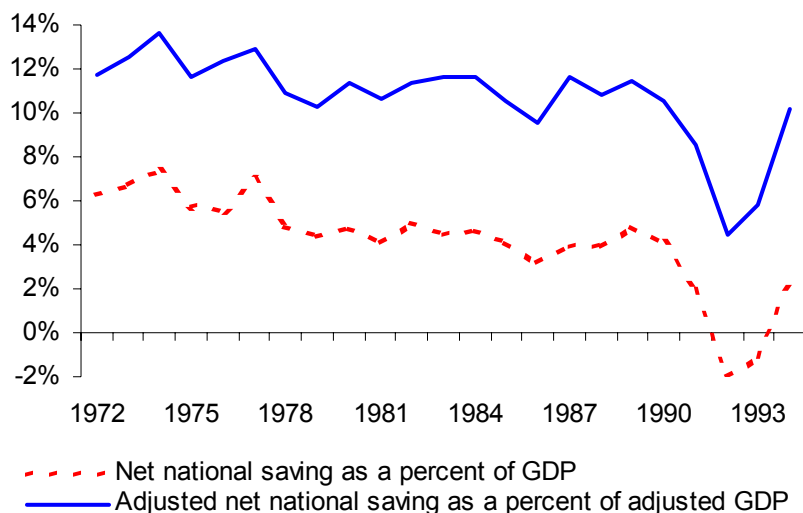
Source: Statistics New Zealand, Giles (1999) and authors' estimates.

Taking into account hidden economy activities raises measured saving. Figure 6.2 plots net national saving as a percent of GDP together with saving adjusted for the hidden economy. To calculate the adjusted saving rate we first multiply Giles' hidden/measured GDP ratio by national disposable income and by measured GDP. We then calculate the adjusted saving rate by subtracting final consumption expenditure from the adjusted national disposable income measure and divide by adjusted GDP.

On average, the adjustment adds less than 9 percent to disposable income and GDP but changes the saving rate dramatically. On average, the saving rate is twice as high. It should be noted, however, that the adjusted measure of saving rate is likely to be biased

upward as it does not include the hidden economy on the consumption side, like the consumption of illegal drugs, for example.[22]

Depreciation

The economic notion of saving as an accretion to net wealth means that *net* saving, i.e. gross saving adjusted for depreciation, is the relevant measure. Depreciation cannot be measured directly and is approximated by consumption of fixed capital. In New Zealand, consumption of fixed capital is compiled within the capital stock model, based on a mixture of sources. It represents an estimate of the average useful life of an asset and may or not coincide with tax depreciation rates.

By definition net national saving will be lower than gross saving, with the difference possibly increasing. In a study of seven (large) OECD countries Shafer, Elmeskov and Tease (1992) show that over time net national saving rates have been falling faster than gross ratios. This has also occurred in New Zealand to some extent. Gross and net national saving as a percent of GDP, plotted in Figure 6.3, appear to have diverged more over the 1990s than in earlier years.

Figure 6.3 - Gross and net national saving (as a percent of GDP)
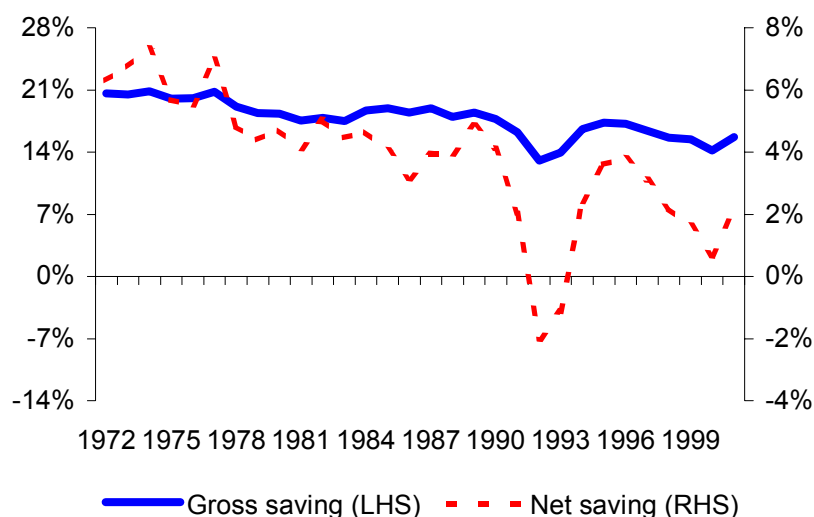
Source: Statistics New Zealand and authors' estimates.

The larger fall in net national saving rates can, in part, be attributed to a change in the mix of investment goods toward a higher proportion of components with shorter service lives. In other words, falling net saving rates may in part be a function of the nature of the capital stock (and depreciation rates) and not necessarily a reflection of a decline in the propensity to save.

Sectoral saving rates

Household saving includes retained earnings by unincorporated businesses, such as partnerships, farms and family owned enterprises. These retained earnings more properly belong in the category of business saving, and it may be more appropriate to use private

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[22]   We would like to thank Phil Briggs for suggesting this adjustment.

saving, the total of household and business saving, rather than distinguishing between the two.

Another argument for focusing on the total of household and business saving is that households are the ultimate recipients of business earnings and there is a tendency for variations in business saving to be offset by changes in household saving. Households are indifferent between dividends and retained earnings as both represent equivalent accretions to shareholder wealth.

Using pooled time series and cross section data for a sample of OECD countries, Dean, Durand, Fallon and Hoeller (1989), for example, find that a one dollar increase in business saving is offset by a fall of 80 cents in household saving. Edey and Britten-Jones (1991) find similar results for Australia.

6.3 The economic meaningfulness of conventional measures of saving

Saving as measured in the national accounts does not correspond very closely to theoretical concepts of saving because of classification, valuation and because they neglect the effects of inflation.

Classification

Conventional measures of saving include some items as current consumption or business expenses that economic measures of saving would classify as investment expenditure. Examples include:

(i) Final consumption expenditure generally includes outlays on consumer durables such as appliances, furniture and motor vehicles.

(ii) All investment in the intangible capital of health and education, whether by the government or household sector, is treated as current consumption expenses, whereas clearly a very significant part of both these items represent saving in an economic sense.

(iii) Expenditure on research and development (R&D) by businesses is treated as a current expense rather than part of business saving.

(iv) Some items of capital expenditure made by central and local governments are treated as current consumption expenditure. Significant items of defence expenditure (such as the purchase of frigates), which are arguably investment as they provide a flow of defence services over time, are included as current government outlays and hence reduce the measured level of saving.

(v) Some investment in land and natural resources, especially by unincorporated businesses counted within the household sector, is treated as current outlays, reducing measured saving by the household sector.

Re-defining national accounts measures of saving to include expenditure on items that provide consumption benefits over time as investment raises measured saving. Moreover, the difference between conventional and extended measures of saving will increase if the components causing the difference assume greater importance over time. Also, the discrepancy will be larger in countries where these factors are relatively more

important. For example, when allowances are made for educational investment, energy, mineral and net forest depletion and carbon dioxide damage, New Zealand's national saving rate in 1998, according to the World Bank, would have been almost six percentage points higher.[23] This adjustment for New Zealand is higher than for Australia, Canada, the United Kingdom, the United States or the average of high-income countries. This issue comes back to internationally accepted conventions. Excluding natural resources may be appropriate for many countries, but maybe not for economies where they contribute a relatively important proportion to economic activity.

Valuation

Flow measures of saving typically do not incorporate capital gains and losses as part of income and hence saving. A comprehensive concept of income is the maximum value of consumption that is consistent with a sustainable financial position. Lester (1996), for example, corrects household income in Australia for changes in the real value of household assets (excluding housing) and finds that the adjustment removes the downward trend in household saving. Gale and Sabelhaus (1999), constructing extended measures of household saving for the United States, find similar result. When an allowance is made for capital gains "the current adjusted household saving rate is the highest in at least forty years" (p. 210).

Inflation

Interest payments in the national accounts are included fully as a component of current income, without accounting for the erosion of the *real* value of financial assets and gains on debt due to inflation. This issue is discussed further in the next section.

7 Adjusted measures of saving

This section constructs and reports some adjusted measures of saving for New Zealand in an attempt to produce measures that more closely reflect the economic concept of saving.

7.1 Inflation adjustment

As discussed in section 3, measured household saving in New Zealand has been trending downward for most of the 1990s, while business saving has remained fairly stable, leading to an overall decline in private (household plus business) saving. Part of the fall in the private saving rate has arisen because it was overstated in the past due to inflation. The corollary to this is that government saving was understated.

High and rising inflation often coincides with low and falling *real* interest rates of (unindexed) financial assets as prices and inflation expectations, and hence nominal interest rates, only adjust sluggishly. This leads to a re-distribution of real wealth from net lenders to net debtors.

During the 1970s and 1980s, the period of high and rising inflation in New Zealand, the government was a net borrower and nominal public debt outstanding was probably overstated as debt was declining in real terms with rising inflation. At the same time,

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[23] See http://www.worldbank.org/data/wdi2000/pdfs/tab3_15.pdf.

private sector income and saving were also likely overstated as households and businesses were net lenders and the value of their assets declining as inflation rose.

Figure 7.1 - Unadjusted and inflation adjusted private saving rates (as a percent of GDP)
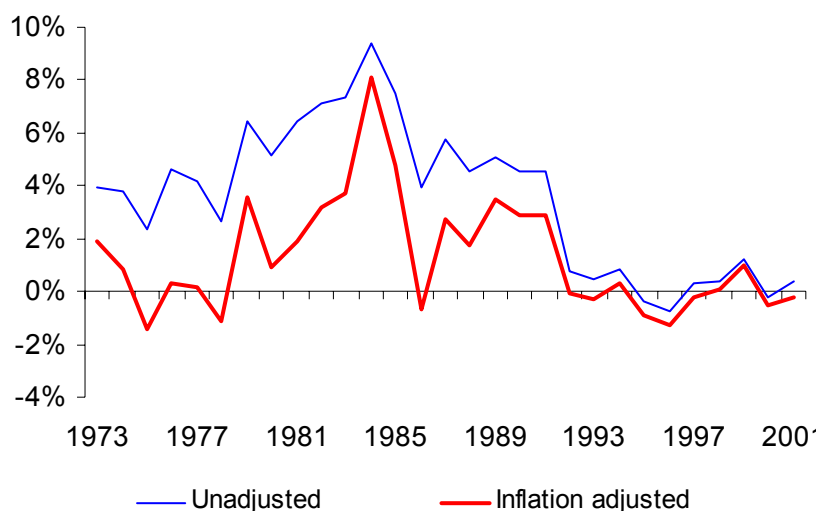
Source: Statistics New Zealand and authors' estimates.

To adjust private saving for the effects of inflation we follow Edey and Britten-Jones' (1991) approach for Australia. Details on the inflation adjustment are contained in Appendix A3. Edey and Britten-Jones correct private saving for inflation and its redistributive effects by adjusting private holdings of claims on the public sector. Private holdings of claims on the public sector are estimated as the sum of notes and coins held by the public plus public holdings of government debt. The effect of this adjustment for Australia is to reduce the level of private saving during the period of high inflation.

Adjusting private saving for the effects of inflation produces similar results in New Zealand, as can be seen from Figure 7.1, which plots measured and inflation adjusted private saving as a fraction of GDP. There are two striking results that emerge from Figure 7.1. First, the recent phenomenon of around zero or negative private saving is not without precedent. The saving rate has been negative on several occasions in the past, once the inflation effect of the redistribution of income away from holders of claims on the public sector is allowed for. Second, the inflation adjusted private saving rate does no longer exhibit a downward trend over the 1990s.

To test for a changing mean in the unadjusted and inflation adjusted saving rates we apply the Markov switching model used in section 4 (equation 4.4). The probability that the economy has remained in the same (low) saving state is plotted in Figure 7.2 for the unadjusted rate and in Figure 7.3 for the inflation adjusted series. Figure 7.2 shows that the estimates for the unadjusted saving rate suggest two regime shifts. The probability of having remained in the same saving state is low for the years 1979 to 1991 and the first regime shift thus occurred in 1979 and the second in 1992. The private saving rate shifted to a higher average in 1979 (from around 1.8 percent of GDP to about 5.6 percent). Measured private saving remained at this higher level for 13 years until 1991 and then shifted back to the lower average in 1992, where it has remained since.

Figure 7.2 - Probability that saving remained at the same (low) level using unadjusted private saving (in percent)
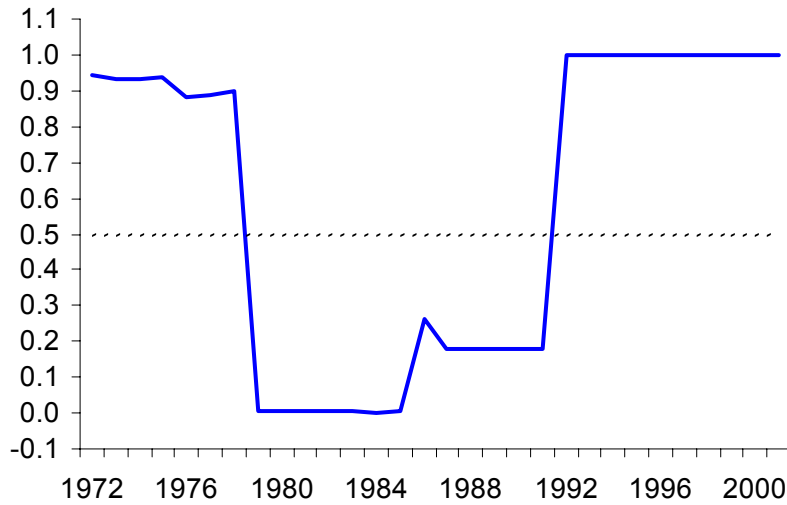
Figure 7.3 - Probability that saving remained at the same (low) level using inflation adjusted private saving (in percent)
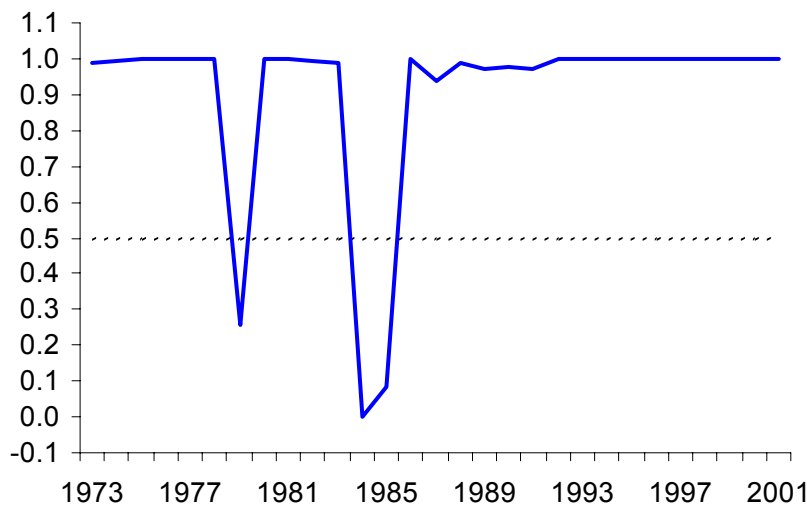
In contrast, a different picture emerges from the test for regime shifts of the inflation adjusted private saving rate (Figure 7.3). Over the estimation period, the inflation adjusted private saving rate switched to a higher saving state twice, for one year in 1979 and for two years in 1984-85. Apart for those three years the model suggests that the saving rate, on average, has remained at around 0.9 percent of GDP.

Figure 7.4 - Probability, adjusted saving rate and inflation (in percent)

Probability that saving did not shift to a higher level (LHS)
Private saving adjusted (RHS)
Inflation (RHS)
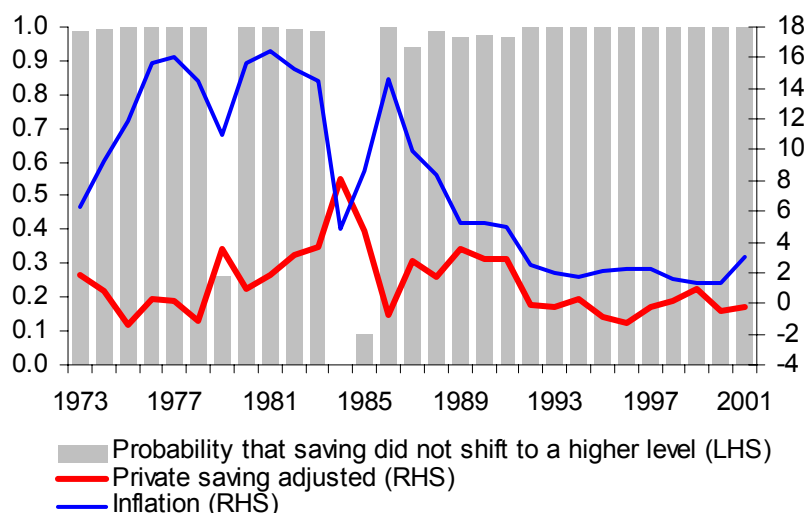
Source: Statistics New Zealand and authors' estimates.

Interestingly, the regime switches in the inflation adjusted saving rate occurred during the period of high inflation when inflation was temporarily low because of regulatory restrictions (see Figure 7.4). In 1979, inflation fell from around 15 percent to about 11 percent, largely as a result of wage guidelines and selected price freezes ahead of the election in 1978.[24] Inflation fell even more during the wage, price and rent freeze that lasted from June 1982 to March 1985, coinciding with a temporary increase in the inflation adjusted saving rate for two years in 1984-85.

The results for New Zealand and Australia are borne out by similarly adjusted saving rates in other countries that had both high inflation rates and a large stock of government debt (see Shafer, Elmeskov and Tease, 1992). In the United Kingdom, Belgium and Italy, for example, adjusted saving rates were up to 10 percentage points of GDP below their measured (unadjusted) rates.

The adjustment of private saving for inflation induced gains and losses on net holdings of government debt does not account for all the effects of inflation and the magnitude of the correction in New Zealand (and elsewhere) is likely to be understated. Clements (1985) constructs a more fully adjusted measure of private saving for New Zealand for the years 1962 to 1983. In addition to correcting for gains and losses on net holdings of government debt, Clements also adjusts private saving for net capital gains from foreign held debt and the effects of inflation on stock valuation and depreciation.[25] During periods of high and rising inflation the measured saving rate for the private sector will be inflated because of historical cost accounting practices that overstate inventory investment and understate depreciation allowances. Clements finds that over the period 1962-71 the private saving rate fully adjusted for inflation was, on average, about 7.5 percentage points lower than the measured, unadjusted rate and about 12 percentage points lower for the years 1972-83.

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[24] Inflation is reported in March years.

[25] Edey and Britten-Jones (1991) also correct for net capital gains to the private sector from foreign held debt but find the adjustment to be small.

7.2   Augmented measures of saving

National saving

As discussed in section 6.3, conventional measures of saving do not take account of a range of public and private expenditure that would be counted as saving from an economic perspective. An economic definition of expenditure would regard expenditure that generates a flow of services over time, extending beyond the current accounting period, as part of foregone current consumption (or saving).

To construct a measure of saving that is more closely related to the economic definition of saving we make the following adjustments to the gross national saving rate. 30 percent of all health expenditures are allocated to saving, as are all education expenses.[26] Research and development expenditure and consumer durables are counted as an investment and 80 percent are added back into saving. The results are reported in Table 7.1. With these adjustments, the gross national saving rate for 2001 increases from 15.7 percent to about 37 percent of GDP.

To calculate the net national saving rate we subtract depreciation adjusted for the fact that consumer durables are now counted as investment.[27] This leads to net national saving rate of about 13 percent, which is substantially higher than the rate from the national accounts of 2.1 percent.

Table 7.1 - An extended national saving rate for New Zealand in 2001 (as a percent of GDP)

Gross national saving rate in 2001	15.7
Adjusted for:	
Government education expenditure	6.0
Government health expenditure (30 percent)	2.0
Household education expenditure	0.9
Household health expenditure (30 percent)	0.3
Research and development (80 percent) *	0.8
Durable consumer goods (80 percent)	11.2
Augmented gross national saving rate	36.8
Adjusted depreciation	-23.9
Augmented net national saving rate	12.9

Source: Statistics New Zealand, The Treasury, Ministry of Research Science & Technology and authors' calculations.

* Gross national expenditure on research and development are for 1999/2000.

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[26]   Re-allocating 30 percent of health expenditure to saving is in line with estimates of the ratio of health expenditure on the elderly to the young.

[27]   We assume a straight line depreciation and an average five year write-off period for consumer durables.

Economic measures of national saving are likely to be much higher than the widely cited figures from the national accounts that are often used to imply a "poor" saving performance in New Zealand. Furthermore, it seems probable that augmented measures have not declined to the same extent as the measured rate because, for example, education and health expenses as a share of GDP have been increasing.

The finding that extended measures of national saving are likely to greatly exceed measured rates is borne out by similar estimates for other OECD countries. Results for four countries are given in Table 7.2 for the 1980s.

Table 7.2 - Extended national saving rate for four OECD countries, 1980-89 average (as a percent of GNP)

	United States	United Kingdom	Canada	France
Gross national saving rate in 1980-89	16.3	16.6	20.7	20.4
Adjusted for:				
Total education expenditure	4.6	5.2	7.4	5.5
Research and development	2.4	2.0	1.2	1.8
Durable consumer goods	5.5	4.7	6.3	3.8
Augmented gross national saving rate	28.8	28.5	35.6	31.5
Adjusted depreciation	-12.6	-11.2	-11.2	-11.9
Augmented net national saving rate	16.2	17.3	24.4	19.6

Source: Shafer, Elmeskov and Tease (1992).

Household saving

In the life cycle model of saving, individuals will try to smooth consumption over their life times. As incomes vary over a lifetime, this implies that the saving rate should also be expected to vary. Typically, saving rates will be low in early adulthood when earnings are low, and then increase with higher earnings, becoming negative in retirement as people "dis-save", drawing down on previous accumulations. This would lead to a hump pattern in lifetime saving rates.

Ideally, data is needed for each age cohort through time in order to follow the actual lifetime saving patterns. A proxy for this is the cross sectional pattern of saving rates at a point in time. The raw saving rates by age groups from the Household Economic Survey are shown in the second column of Table 7.3. The unadjusted rates rise as predicted by the life cycle model of saving. However, they remain higher than predicted in retirement. If an adjustment is made for health and superannuation, then the pattern is markedly changed.

New Zealand has a pay-as-you-go system of taxes and transfers to meet superannuation payments to retirees. In contrast, the tax contributions paid by the working age population could be regarded as forced saving, and the pension payments received by the retirees as decumulation of previous pension contributions.

If the tax paid is treated as forced saving, then the saving rate of the working age population would increase by about six percentage points. If the pension is treated as a decumulation of assets by retirees, their saving rates will become negative.

As the bulk of health expenditure is incurred by the elderly, total consumption by retirees is understated in the HES. If public health expenditure is included as part of the consumption by the retired age groups, then they become substantial dis-savers.

Table 7.3 - Adjusted saving rates by age cohorts in 1998 (as a percent of disposable income)

Age group	Unadjusted saving rate	Adjustment for superannuation	Adjustment for health	Total adjusted saving rate
19-24	7.6	6.0	4.0	17.6
25-29	7.9	6.0	4.0	17.9
30-39	8.3	6.0	4.0	18.3
40-49	12.7	6.0	4.0	22.7
50-59	19.4	6.0	4.0	29.4
60-64	12.6	0.0	0.0	12.6
65-74	15.3	-56.3	-44.0	-85.0
75+	28.8	-37.8	-108.0	-117.0

Source: Coleman (1999)

The effect of both these adjustments (for superannuation and health expenses) is shown in the last column of Table 7.3 (details of the adjustments are given in Coleman, 1999). Two features of these adjusted saving rates are noteworthy. In the first place the absolute level of saving is much higher than the HES or Household Income and Outlay Account data would suggest. Secondly, the life cycle model of saving receives much stronger support, with the distinctly humped pattern of saving rates now strongly evident.

8   Summary and conclusions

The total saving in an economy is by definition equal to total investment. Investment is financed by domestic and foreign saving. The domestic component is the sum of saving by households, firms and the government. The foreign saving component has its counterpart in the current account deficit. For example, an extreme case where net domestic saving was zero, an economy could still be investing solely financed by foreign borrowing and direct investment. New Zealand has relied more heavily on foreign saving in the last decade, financing up to 75 percent of total investment in this manner. This borrowing can expand the capital base and allows the economy to smooth its level of consumption through time. Like a household, the associated debt is "sustainable" provided it can be serviced from future income.

There are two fundamental approaches to the measurement of saving: the flow and the stock approach. The flow approach measures saving as a residual, by subtracting consumption spending from total income. In New Zealand, the net national saving rate, as measured by the conventional flow approach in the national accounts, has been trending downward for the last 30 years. While business saving shows no clear trend, there has been an apparent decline in household saving, offset to some extent by a marked rise in government saving over the 1990s. Flow data on household saving from the Household Economic Survey paint a rather different picture, in part due to definitional differences.

The stock approach to measuring saving is based on the changes in net wealth of households, businesses and the government. In the case of households and businesses, the net wealth measure of saving produces quite different estimates, as the stock approach includes changes in both the quantity and the price of assets in the portfolio. Rising equity prices in the 1990s meant that household net wealth in countries such as Australia, the United Kingdom and the United States was rising strongly, while the flow measure showed a continued decline.

Arguably, when concerns arise about the adequacy of retirement saving, it is the stock (and distribution) of household wealth, which is the more relevant variable, rather than the aggregate rate of the flow of household saving.[28] In fact, nothing about retirement saving adequacy can be inferred from the current levels of household saving. As the population ages, more and more people are retired relative to the working age population. During their working lives people might be saving a high proportion of their incomes, and then drawing down those saving in retirement. It is quite conceivable therefore that an economy could have a high level of private saving for retirement and yet show household saving in aggregate to be zero.

In both the government and household accounts of the System of National Accounts, many items of expenditure are counted as current consumption. Expenditure by individuals and the public sector on education is a case in point. A strong argument can be made that educational expenditure is an investment (as is expenditure on vehicles, defence hardware, consumer durables and some parts of health). The paper illustrates that when these adjustments are made, the net national saving rate could be as high as 13 percent compared to 2.1 percent in the national accounts.

Moreover, adjusting for the effects of inflation removes the so widely cited downward trend in private (household plus business) saving. In fact, we find no evidence that private saving has moved to a lower rate in the past decade when correcting for inflation.

Much of the debate about saving is based on estimates that do not reflect the true, in an economic sense, level of national or household saving. This paper clarifies some of the issues surrounding the measurement and interpretation of the data on saving.

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[28] At this time New Zealand has very limited information about the stock of assets and liabilities of individual households. The Household Savings Survey being undertaken by Statistics New Zealand for the Office of the Retirement Commissioner will be a major initial step to filling this gap. See http://www.stats.govt.nz/domino/external/web/aboutsnz.nsf/e8c536ed07c05396cc256b1400009cb0/0372ae1a c111a9de4c2567ff0077c953?OpenDocument.

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Appendix A1: Link between the current account, domestic saving and investment[29] [30]

In an open economy, total spending by residents comprises the absorption of domestically produced goods and services *and* goods and services produced abroad, where total absorption (A) consists of consumption expenditure (C), government expenditure (G) and private gross fixed capital formation (GFCF). The difference between residents' spending on domestically produced goods and services and total absorption is imports (M). Exports (X) are foreign spending on domestically produced goods and services.   If the trade balance is in deficit, i.e. imports exceed exports, absorption (A) exceeds the gross domestic product (GDP), i.e.

$$GDP - A = X - M \tag{A1.1}$$

where A = G + C + GFCF.

The current account balance (CAB) is defined as the sum of the trade balance (X – M), net income paid abroad (NIPA) and net transfers paid abroad (NTPA)

$$CAB = X - M + NIPA + NTPA \tag{A1.2}$$

where net income paid abroad (NIPA) plus consumption of fixed capital (CFC) is the difference between the gross domestic product (GDP) and gross national income (GNI).

The link to saving and investment is as follows. Gross domestic saving (GDS), which consists of household, business and government saving, is the difference between GDP and consumption plus government expenditure (C + G)

$$GDP - (C + G) = GDS \tag{A1.3}$$

Gross fixed capital formation (GFCF) is the difference between total absorption (A) and consumption and government expenditure (C + G)

$$A - (C + G) = GFCF \tag{A1.4}$$

Using equation (A1.1) this implies

$$GDS - GFCF = X - M \tag{A1.5}$$

Equation (A1.5) hence implies that when the trade balance is in deficit, imports exceed exports and gross fixed capital formation exceeds gross domestic saving. Moreover, it can be shown that the difference between net national saving (NNS) and investment (I) (gross fixed capital formation less consumption of fixed capital) is equal to the current account balance

$$NNS - I = CAB \tag{A1.6}$$

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[29]   For more details see Makin (2000).
[30]   The notation is summarised in Table A1.1.

where net national saving (NNS) is the difference between net national disposable income (NNDI) and consumption and government expenditure, and net national disposable income (NNDI) is the difference between gross national income (GNI) less net transfers paid abroad (NTPA).[31]

In an open economy, the difference between net national saving and domestic investment is the current account balance. When the current account balance is in deficit, the excess of investment over domestic saving is financed by foreign funds or net capital inflows as measured by net foreign investment or the capital account surplus. In other words, an economy with access to foreign capital can augment its capital stock through foreign investment.

The current account balance, by definition, corresponds to the change in net foreign assets (NFA)

$$CAB = \Delta NFA \qquad\qquad\qquad (A1.7)$$

Table A1.1 - Definition of variables

GDP	=	Gross domestic product; income earned from production in New Zealand by New Zealand firms and foreign firms operating in New Zealand
C	=	Consumption expenditure
GFCF	=	Gross fixed capital formation
I	=	Investment; GFCF less consumption of fixed capital (CFC)
G	=	Government expenditure (including both consumption and investment)
X	=	Exports of goods and services to the rest of the world
M	=	Imports of goods and services from the rest of the world
A	=	Absorption or gross national expenditure (GNE); sum of C, GFCF and G
GNI	=	Gross national income; previously referred to as gross national product (GNP); GDP less net income paid abroad (NIPA) and consumption of fixed capital (CFC)
NNI	=	Net national income; GNI minus consumption of fixed capital (CFP)
NNDI	=	Net national disposable income; GNI less net transfers paid abroad (NTPA)
NNS	=	Net national saving; NNDI less C and G
GDS	=	Gross domestic saving; GDP less C and G

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[31]   This follows from GDS – GFCF – NIPA – NTPA = GDP – C – G – GFCF – NIPA – NTPA = GNI + NIPA + CFC – C – G – GFCF – NIPA – NTPA = NNDI + CFC – C – G – GFCF = (NNDI – C – G) – (GFCF – CFC) = NNS – I = X – M – NIPA – NTPA = CAB for CAB < 0.

Appendix A2: Data

All data are in New Zealand dollar millions unless otherwise indicated.

	Sectoral saving				Institutional sector accounts (5)						
	Net national saving	Household saving	Government saving	Business saving	Net national saving	Household saving	General government saving	Business saving	Unidentified saving	Household disposable income	Government disposable income
	(1)	(2)	(3)	(4)							
1971			281								
1972	449	65	293	91							
1973	554	113	230	211							
1974	697	114	334	250							
1975	591	45	346	200							
1976	664	190	107	368							
1977	1012	201	404	407							
1978	736	212	331	193							
1979	756	329	-356	784							
1980	943	441	-90	592							
1981	956	412	-535	1079							
1982	1412	552	-586	1445							
1983	1439	458	-929	1910							
1984	1661	354	-1706	3013							
1985	1644	378	-1386	2652							
1986	1469	371	-361	1459							
1987	2198	405	-1010	2803	2201	404	17	715	949	32011	10564
1988	2474	1671	-396	1199	2471	1670	190	-574	1063	37659	11823
1989	3294	1168	-164	2290	3293	1167	201	1713	52	40141	12745
1990	2957	1148	-332	2141	2962	1148	-521	2696	-471	42866	12732
1991	1482	196	-1861	3147	1477	195	-1926	3224	-184	44019	12131
1992	-1470	1108	-2021	-557	-1466	1106	-2615	-953	816	44713	11702
1993	-855	95	-1201	251	-850	93	-2174	450	591	44557	12691
1994	1968	-255	1259	964	1969	-256	-71	2582	-448	46235	15038
1995	3139	-1813	3490	1462	3138	-1815	3260	1281	255	48372	18597
1996	3515	-1795	4233	1077	3513	-1794	3645	1392	77	51730	20023
1997	3011	-1394	2720	1685	3014	-1395	3973	-10	226	55034	21012
1998	2194	-2551	1803	2942	2137	-2716	2977	1515	46	55751	21578
1999	1650	-2429	392	3687							
2000	704	-3147	963	2888							
2001	2340	-2363	1922	2781							

(1) 1987-2001 Statistics New Zealand: SNCA.S2NB08Z
       1978-1986 Authors' estimates by splicing SNBA.SDH and SNCA.S2NB08Z
       1972-1977 Authors' estimates by splicing the 1978-2001 series with "savings" from New Zealand System of National Accounts, 1998, Table 8.5

(2) 1987-2001 Statistics New Zealand: SNCA.S2NB8000E
       1972-1977 Authors' estimates by splicing SNBA.S1AM and SNCA.S2NB8000E

(3) 1971-2001 The Treasury: net cash flows from operations

(4) 1972-2001 Authors' estimates: (1)-(2)-(3)

(5) 1987-1998 Statistics New Zealand (2001)

Year	GDP (6)	National disposable income (7)	Household disposable income (HIOA) (8)	HES household saving (9)	HES household disposable income (10)	Net national disposable income (11)	Current account (12)	Gross fixed capital formation (13)	Consumption of fixed capital (14)	Investment (15)	Gross saving (16)	Private saving (17)	Hidden economy as a percent of measured real GDP (18)
1972	7127	5924	4148			5924	2	1868	1021	848	1469	156	7.6%
1973	8224	6827	4830			6827	147	2088	1132	956	1686	325	8.3%
1974	9491	7986	5494			7986	-81	2710	1281	1429	1978	364	9.0%
1975	10385	8685	5952			8685	-1315	3834	1485	2349	2076	245	8.3%
1976	12042	9985	7293			9985	-978	3808	1753	2055	2417	557	9.7%
1977	14480	12052	8311			12052	-756	4469	2002	2466	3014	608	8.4%
1978	15242	12657	9238			12657	-668	3780	2173	1607	2909	405	8.5%
1979	17226	14298	10732			14298	-453	3734	2415	1318	3171	1112	8.0%
1980	20048	16796	12726			16796	-794	4663	2734	1929	3677	1033	9.2%
1981	23222	19587	14587			19587	-792	4853	3114	1739	4070	1491	8.8%
1982	28029	23846	17335			23846	-1566	6949	3587	3363	4999	1998	8.5%
1983	32203	26696	19239			26696	-1841	8244	4184	4060	5623	2368	10.0%
1984	35725	29122	20482	-735	17099	29122	-1850	9236	5007	4229	6668	3367	10.0%
1985	40525	32217	23235	-1763	17978	32217	-3230	11414	6035	5378	7679	3030	9.4%
1986	46610	36757	27200	-1762	20397	36757	-3895	12152	7125	5027	8594	1830	9.2%
1987	55848	44855	32013	-1530	23882	44855	-2717	13310	8365	4945	10563	3208	11.3%
1988	62655	50676	37661	-1072	27151	50676	-2280	13490	8797	4693	11271	2870	9.8%
1989	68017	55443	40142	-507	31205	55443	-504	13534	9244	4290	12538	3458	9.5%
1990	71865	58647	42866	-567	34521	58647	-2982	16145	9783	6362	12740	3289	9.1%
1991	73152	60181	44019	-147	34096	60181	-2380	14268	10365	3903	11847	3343	8.9%
1992	72936	57343	44714	1059	34255	57343	-2376	11884	10961	923	9491	551	8.7%
1993	75246	59360	44559	2033	36546	59360	-2756	13196	11322	1874	10467	346	9.6%
1994	81387	64512	46236	342	34794	64512	-3087	16467	11527	4940	13495	709	11.3%
1995	87052	69653	48373	65	37939	69653	-4107	18913	11932	6981	15071	-351	
1996	92679	74413	51730	917	40714	74413	-5014	21073	12407	8666	15922	-718	
1997	96911	77539	55035	1173	41899	77539	-6014	21890	12865	9025	15876	291	
1998	100076	80327	55997	3432	44836	80327	-5581	21601	13441	8160	15635	391	
1999	100837	82349	58295			82349	-4385	19904	13928	5976	15578	1258	
2000	105687	85283	60228			85283	-7391	22405	14262	8143	14966	-259	
2001	111900	89841	63767	2785	56993	89841	-5338	22544	15205	7339	17545	418	

(6)   1987-2001   Statistics New Zealand: SNCA.S1NB15
       1978-1986   Authors' estimates by splicing SNBA.SBN and SNCA.S1NB15
       1972-1977   Authors' estimates by splicing the 1978-2001 series with "GDP" from New Zealand System of National Accounts, 1998, Table 8.4

(7)   1987-2001   Statistics New Zealand: SNCA.S2NB22Z
       1978-1986   Authors' estimates by splicing SNBA.SNNDIO and SNCA.S2NB22Z
       1972-1977   Authors' estimates by splicing the 1978-2001 series with "National disposable income" from New Zealand System of National Accounts, 1998, Table 8.4

(8)   1987-2001   Statistics New Zealand: SNCA.S2NB6000E
       1972-1986   Authors' estimates by splicing (SNBA.S1AM + SNBA.S1AA) and SNCA.S2NB6000E

(9)   Authors' estimates using Statistics New Zealand data, household disposable income minus expenditure

(10)   Authors' estimates using Statistics New Zealand data

(11)   1987-2001   Statistics New Zealand: SNCA.S2NB22Z
       1978-1986   Authors' estimates by splicing SNBA.SNNDIO and SNCA.S2NB22Z
       1972-1977   Authors' estimates by splicing the 1978-2001 series with "national disposable income" from New Zealand System of National Accounts, 1998, Table 8.5

(12)   1988-2001   Statistics New Zealand: BOPA.S5AC3
       1972-1987   Authors' estimates by splicing BOPA.S4AC3 and BOPA.S5AC3

(13)   1987-2001   Statistics New Zealand: (SNCA.S3NP52T4 + SNCA.S3NP51T1 + SNCA.S3NP51T2 + SNCA.S3NP51T3)
       1978-1986   Authors' estimates by splicing (SNBA.SDA + SNBA.SDB + SNBA.SDC + SNBA.SDD) and (SNCA.S3NP52T4 + SNCA.S3NP51T1 + SNCA.S3NP51T2 + SNCA.S3NP51T3)
       1972-1977   Authors' estimates by splicing the 1978-2001 series with "value of the physical increase in stocks" plus "gross fixed capital formation" from New Zealand System of National Accounts, 1998, Table 8.4

(14)   1987-2001   Statistics New Zealand: SNCA.S3NK10T4
       1978-1987   Authors' estimates by splicing SNBA.SDI and SNCA.S3NK10T4
       1972-1977   Authors' estimates by splicing the 1978-2001 series and SNAA.SKF

(15)   1972-2001   Authors' estimates (11)-(12)

(16)   1972-2001   Authors' estimates (1)+(12)

(17)   1972-2001   Authors' estimates (1)-(3)

(18)   1972-1994   Giles (1999), http://web.uvic.ca/econ/uedata.html

	Movement in crown net worth (19)	Business net wealth (20)	Change in business net wealth (21)	Household net wealth (22)	Change in household net wealth (23)	WestpacTrust HSI (24)	Change in WestpacTrust HSI (25)
1972							
1973							
1974							
1975							
1976							
1977							
1978							
1979				38			
1980				42	4		
1981				54	12		
1982				65	11		
1983				76	11		
1984				88	12		
1985				102	14		
1986				123	21		
1987				139	16		
1988				145	6		
1989				155	10		
1990				157	2	151674	
1991				159	2	151284	-390
1992	-4367			163	4	154008	2724
1993	7385			178	15	163545	9537
1994	2067			195	17	179066	15521
1995	2469	168136		208	13	189129	10063
1996	6503	169364	1228	225	17	205526	16397
1997	4126	157448	-11916	233	8	214188	8662
1998	2451	218788	61340	226	-7	208865	-5323
1999	-3899	182909	-35879	232	6	210219	1354
2000	2561	216129	33220	227	-5	205557	-4662
2001	2880						

(19) 1992-2001 The Treasury, Crown Accounts

(20) 1992-200 Authors' estimates using Statistics New Zealand data

(21) 1993-2000 Authors' calculations, (20t)-(20t-1)

(22) 1979-2000 Reserve Bank of New Zealand, in dollar billions

(23) 1980-2000 Authors' calculations, (22t)-(22t-1), in dollar billions

(24) 1990-2000 WestpacTrust

(25) 1991-2000 Authors' calculations, (24t)-(24t-1)

Appendix A3: Inflation adjustment

All data are in New Zealand dollar millions unless otherwise indicated.

	Notes and coins held by the public	New Zealand government gross public debt	Official overseas debt	Private claims on the public sector	Inflation	Loss due to inflation	Private saving	Inflation adjusted private saving
	(1)	(2)	(3)	(4)=(1)+(2)-(3)	(5)	(6)=(5)/100*(4t-1)	(7)	(8)=(7)-(6)
1972	171	3,130	654	2,647	9.9			
1973	192	3,443	564	3,071	6.3	168	325	157
1974	211	3,605	465	3,351	9.2	284	364	80
1975	254	4,140	1,081	3,313	11.8	396	245	-151
1976	296	5,501	2,164	3,633	15.7	521	557	37
1977	326	6,226	2,563	3,988	16.0	583	608	25
1978	366	7,409	3,256	4,519	14.4	575	405	-170
1979	404	8,733	3,676	5,460	11.0	496	1,112	616
1980	453	10,246	4,297	6,402	15.7	855	1,033	178
1981	500	11,505	4,809	7,196	16.4	1,049	1,491	442
1982	524	14,244	6,688	8,080	15.2	1,095	1,998	903
1983	594	18,556	9,178	9,971	14.5	1,175	2,368	1,193
1984	642	21,673	9,367	12,947	4.8	480	3,367	2,886
1985	653	27,982	13,916	14,719	8.6	1,109	3,030	1,921
1986	723	31,704	15,595	16,831	14.7	2,158	1,830	-328
1987	797	42,078	21,822	21,053	9.9	1,671	3,208	1,537
1988	803	38,711	19,269	20,244	8.3	1,749	2,870	1,121
1989	809	39,352	16,777	23,384	5.2	1,061	3,458	2,397
1990	885	43,937	20,041	24,782	5.2	1,216	3,289	2,073
1991	988	43,533	20,198	24,323	4.9	1,225	3,343	2,118
1992	1,051	46,674	20,036	27,689	2.5	604	551	-53
1993	1,063	47,478	23,523	25,018	2.0	561	346	-215
1994	1,092	46,429	26,829	20,692	1.7	424	709	285
1995	1,122	44,096	23,418	21,800	2.1	429	-351	-780
1996	1,231	41,500	21,896	20,835	2.3	493	-718	-1,211
1997	1,348	35,972	20,649	16,671	2.3	470	291	-179
1998	1,414	37,892	19,969	19,337	1.6	274	391	117
1999	1,507	36,712	17,384	20,835	1.4	264	1,258	994
2000	1,609	36,041	16,368	21,282	1.3	268	-259	-527
2001	1,747	36,761	16,949	21,559	3.0	640	418	-222

(1) 1972-2001   Reserve Bank of New Zealand and authors' estiamates

(2) 1992-2001   The Treasury, June years
     1972-1991   Authors' estimates by splicing The Treasury's March year and June year series

(3) 1970-1982   Reserve Bank of New Zealand
     1983-1989   Statistics New Zealand: OSDQ.SB
     1990-1992   Statistics New Zealand: OTDQ.SAZ2
     1993-2000   Statistics New Zealand: OVDA.SAZ2
     2001   Statistics New Zealand: (IIPQ.S5AL8B + IIPQ.S5AL8A)

(5) 1972-2001   Authors' estimate, year-over-year inflation ex GST and interest cost, in percent, March years

(7) 1972-2001   Authors' estimates, see Appendix A2