Measuring Saving Rates in New Zealand: An Update

Emma Gorman, Grant M. Scobie and Yongjoon Paek

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Measuring Saving Rates in New Zealand: An update

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AUTHORS

Emma Gorman
(formerly at the Treasury)

Grant M Scobie
The Treasury
Wellington 6140
New Zealand
Email: grant.scobie@treasury.govt.nz
Telephone: 64-4-917 6005

Yongjoon Paek
(a former summer intern with the Treasury)

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NZ TREASURY

New Zealand Treasury
PO Box 3724
Wellington 6008
NEW ZEALAND

Email	information@treasury.govt.nz
Telephone	64-4-472 2733
Website	www.treasury.govt.nz

Abstract

This paper reviews the flow approach (income less consumption) to measuring saving and the associated trends in sectoral saving rates for New Zealand, as derived from the national accounts. It also presents estimates for the household sector, of the stock measure of savings (changes in net wealth). The latter estimates are found to be consistently greater than the flow measures of household savings. Finally a series of adjustments are made to the flow measures of household and national saving rates. These include adjustment to the boundary between consumption and investment, the impact of inflation and the role of the New Zealand Superannuation Fund. As a result the adjusted measure of net national saving is found, on average to be some 10 percentage points of GDP higher than the raw measure. The associated estimate of the level of adjusted net foreign liabilities is on average 2 percent of GDP lower than the raw data.

JEL CLASSIFICATION E21 Consumption: Saving

KEYWORDS Savings; measurement; New Zealand

Executive Summary

Saving rates in New Zealand, both at the household and national level, are generally well below those of other OECD countries. This has given rise to long-standing concerns about the level of savings, and successive governments have introduced a range of measures to foster greater savings, both public and private.

A necessary condition for introducing sound policies towards savings that will be genuinely welfare enhancing, is to have a solid base of evidence. The starting point for that evidence lies with the measurement of savings. However, the measurement of saving is fraught with both conceptual and practical issues. An understanding of the implications of these issues is critical when using evidence on the savings record of households, firms and the government as a basis for policy decisions.

The most widely quoted measure of saving in New Zealand is the household saving ratio published by Statistics New Zealand. It is important to understand the issues of measurement and classification which inevitably arise in savings measurement, and how these could cloud the genuine underlying changes in household saving behaviour. Misperceptions about the level of saving, and the implications thereof, could potentially lead to policy interventions that reduce, rather than enhance economic welfare.

This paper documents the standard measures of saving from the national accounts. In the case of the household sector it contrasts these with estimates of saving rates derived from changes in the stock of household wealth. While the two are conceptually identical, a full reconciliation must await the development of more comprehensive data. However the results suggest that the long run average saving rates by households have in fact been considerably higher than the measure derived from the national accounts.

A second contribution of this paper is to present a series of adjustments to savings rates to reflect the impact of inflation, to reflect the boundary between consumption and investment, to consider the role of the hidden economy, and assess the impact of the New Zealand Superannuation Fund for household and national savings. Many items in the national accounts are treated as current consumption (including expenditure on health, education, consumer durables) with a result that savings are under stated. The impact of adjustments to investment and allowing for inflation is to raise the estimate of the average net household saving rate from -4.1% to 0.3% of disposable incomes between 1996 and 2011. Likewise, the estimate of the average net national saving rate is increased by those same adjustments from 2.8% to 11.8% of GDP over the same period.

Finally, when allowance is made for inflation, the measured net international investment position appears to be overstated. This has the consequence that the current account deficit is correspondingly overstated. This difference is about 2 percentage points of GDP. Once the adjustment is made for inflation the long run average level of net external liabilities (excluding equities) falls from 66.0% to 64.3% of GDP over the period of 1989 and 2011.

A potentially significant adjustment arises from the stock of wealth that has accumulated in the New Zealand Superannuation Fund. To the extent that this is viewed as funds contributed by households through taxation for the provision of retirement income in future, it represents savings by households. On average the stock measure of savings is some 2.1 percentage points of household disposable income higher between 2002 and 2011, when allowance is made for the net wealth accumulated in the NZSF.

Statistics New Zealand is constantly seeking improvement in the collection and coverage of the data it publishes. Important revisions have been made to the household saving rates. The consequence of these is that some of the very extreme levels of household dissaving seen between 2004 and 2009 have been revised such that the current estimates of negative saving by households from the household income and outlay account are very much more modest. Over this period the annual average change was an improvement in the saving rate of households of over 7 percentage points of disposable income. These revisions underscore the importance for the policy debate to be grounded in solid evidence, and for full cognizance of the limitations of the underlying data.

Overall the results presented here suggest that broader measures of saving might well be considered as complements to the official series when analysing the saving behaviour of firms and households, and the net saving of the nation as a whole.

Glossary

3YMA:	Three year moving average
CAB:	Current account balance
CPI:	Consumer price index
GDP:	Gross domestic product
GFCF:	Gross fixed capital formation
HDI:	Household disposable income
HES:	Household economic survey
HIOA:	Household income and outlay account
HPI:	House price index
ISA:	Institutional sector accounts
NFL:	Net foreign liabilities
NIIP:	Net international investment position
NNS:	Net national savings
NZSF:	New Zealand Superannuation Fund
OECD:	Organisation for Economic Cooperation and Development
R&D:	Research and development
RBNZ:	Reserve Bank of New Zealand
SNA:	System of national accounts
SNZ:	Statistics New Zealand
SoFIE:	Survey of Family Income and Employment

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Measuring Saving Rates in New Zealand: An update

> *"I often say that when you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind"*
>
> *Sir William Thomson (Lord Kelvin)*

1 Introduction

The purpose of this paper is to review and update the measurement of savings in New Zealand. There have been long-standing concerns about the level of savings, and successive governments have introduced a range of measures to foster greater savings, both public and private. New Zealand is far from unique in this regard; many countries have pursued pro-saving policies to counter a perceived savings gap.

These concerns about the level of saving arise at a number of levels. First, if the level of domestic saving is by some measure inadequate, this may lead to less investment and higher interest rates, resulting in lower rates of capital accumulation. The growth of productivity and incomes could then be constrained as a result of being "capital shallow". Second, if some individuals fail to save adequately they may be less able to meet the costs of health, education and retirement. Finally, low levels of domestic saving may be countered by heavier reliance on foreign savers; this manifests itself in greater capital inflows to fund current account deficits[1], leading to a greater stock of external liabilities. These in turn may expose the economy to greater vulnerability of unanticipated shocks. For example in the case of the USA:

> *"The declining saving rate has spawned much concern among economists and policymakers about the consequences of such low saving, which, in the view of some, include reliance on unsustainable levels of external financing for the Nation's investment needs and increased exposure of domestic financial markets to external factors."*
>
> Marshall B. Reinsdorf (2005)

[1] See Le and Wilkinson (2008) for an analysis of the relation between household savings and current account.

Clearly, a necessary condition for an adequate understanding of the savings "problem" is reliable evidence. That evidence must be built on the measurement of savings. The most widely quoted measure of saving in New Zealand is the household saving ratio published by Statistics New Zealand.[2] However given the manner in which this is constructed, it may well reflect issues of measurement and classification as much as genuine underlying changes in household saving behaviour. Misperceptions about the level of saving could potentially lead to policy interventions that reduce, rather than enhance economic welfare.

Generating appropriate policy responses in the absence of an accurate assessment of the actual level of savings becomes a task fraught with pitfalls. However in attempting to measure savings, the analyst is faced with a series of both conceptual and practical challenges. This paper attempts to clarify and illustrate some of these issues. Specifically it addresses the impact of inflation, the hidden economy and the distinction between consumption and investment.

It does not attempt to form a judgement about whether savings either at the individual or national level are adequate. Rather, it focuses on the different measures of saving, and provides a range of illustrative adjustments to the commonly cited measures. The results suggest that broader measures of saving might well be considered as complements to the official series when analysing the saving behaviour of firms and households, and the net saving of the nation as a whole.

The Treasury has undertaken an extensive series of studies relating to savings and continues to monitor closely current developments. The current paper is an extension of earlier work on measuring savings (Claus and Scobie, 2002). Other papers that address saving in New Zealand include: the theory and evidence on household saving (Coleman, 1998); savings and portfolio allocation (Joint Working Group, 1999); 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); financing superannuation (McCulloch and Frances, 2001); population ageing and the optimal national saving rate (Guest, Bryant and Scobie 2003; and Guest, Scobie and Bryant, 2003); saving for retirement (Scobie, Gibson and Le, 2004; and Gibson, Le and Scobie, 2004); household wealth (Scobie, Gibson and Le, 2005) housing and retirement savings (Scobie, Le and Gibson, 2006); savings in the context of financial markets (Cameron *et al*. 2007); an estimate of household saving rates based on net wealth data (Scobie and Henderson, 2009); an evaluation of saving incentive options (The Treasury, 2010); and the contribution of KiwiSaver to retirement saving (Law, Meehan and Scobie, 2011). In addition a major study of savings was contained in a report to the Minister of Finance by the Savings Working Group (2011).

[2] Le (2007) reviews the limitations of this measure.

This paper proceeds as follows. In the next section (Section 2), we set out the fundamental approaches to the measurement of saving, followed by an overview of the available New Zealand data for savings measurement. Measures of long term trends in savings for households, businesses and the government are presented in Section 3. We then introduce a series of adjustments and derive adjusted estimates of both household and national saving rates (Section 4). These adjustments address the impact of inflation, the boundary between consumption and investment, the so-called "hidden economy" and the role of the New Zealand Superannuation Fund. Conclusions are drawn in Section 5, and the paper presents an extensive series of appendices which document the data and the derivation of the adjustments.

2 Methods and data

> *"There is no one single 'correct' definition of saving. The definition of saving used is that which is most appropriate to the issue under investigation"*
>
> Crossley and O'Dea (2010), p.37.

In this section we briefly outline three different approaches to the measurement of saving, and review the sources of data.[3]

2.1 The flow measure

Savings can be measured as a flow, defined as the difference between income and consumption.

$$S_F = Y - C \tag{1}$$

where:

S_F = saving as measured by the flow measure

Y = disposable income

C = final consumption

Challenges arise in deciding exactly what should be included in the measures of income and consumption. These are addressed in Section 4.

2.2 The stock measure

A pure economic view of savings is the change in the stock of net wealth. The development of this approach is attributed to Haig (1921) and Simons (1938). Conceptually this can be applied at any level: to households, governments or nations. In practice the limitations of existing data systems means that estimates are typically restricted to households. The stock measure[4] is defined

$$S_S = \Delta NW = S_F + revaluations + other \tag{2}$$

where:

S_S = saving as measured by the stock measure

ΔNW = change in net wealth

$revaluations$ = the revaluation of real and financial assets

$other$ = other changes in net wealth, such as transfers from other sectors, loss or destruction and discovery.

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[3] For a comprehensive review of studies which estimate household saving rates based on a range of approaches see Browning and Lusardi (1996).

[4] For a discussion of the measurement of net private wealth and the associated implied saving rate see Australian Treasury (2000).

The flow and stock measures are conceptually equivalent after removing the effects of revaluations in real and financial assets, and other changes in net wealth arising from transfers from other sectors, discovery and destruction. In practice, data limitations mean it is very difficult to fully reconcile these two approaches. However, the net wealth approach remains a useful alternative to the flow measure.

2.3 An equity injection approach

Hodgetts, Briggs and Smith (2006) draw on an approach used by the Federal Reserve Board of Governors in the USA for estimating detailed flow of funds accounts. Saving can be derived from the net flows into and out of household assets and liabilities. They use aggregate data net acquisitions of financial assets (eg, currency, bank deposits, unit trusts, superannuation funds, direct purchases of equities) and net investment in tangible assets (eg residential fixed investment and land) to derive total net investment by households. From this they subtract net increases in financial liabilities (mortgages and other loans) as well as the consumption of fixed capital (depreciation) and net capital transfers.[5]

2.4 Data sources

In this section we review the available sources of data for measuring saving in New Zealand; Table 1 sets out those sources.

Table 1 – Approaches and sources of data for the measurement of saving

	Flow Approach: **Income less Consumption**	**Stock Approach:** **Change in net wealth**
Micro economic data (eg household)	***Household Economic Survey***	***SoFIE*** **Survey of Family Income and Employment:** **Asset and Liability modules**
Macroeconomic aggregates	***System of National Accounts:*** ***Institutional Sector Accounts*** Household Income and Outlay Account	***Reserve Bank of New Zealand:*** Household Financial Assets and Liabilities and Housing Values

2.5 Flow measures of saving

There are three sources of data available for constructing a flow measure of savings:

i) the System of National Accounts (SNA)

ii) the Institutional Sector Accounts (ISA) (a sectoral disaggregation of the national accounts), and

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5 We have not pursed this approach in the current paper; it remains for further research.

iii) the Household Economic Survey (HES).

The ISA disaggregate the national accounts into economic 'sectors' of similar agents. These sectors are non-financial corporations (producer enterprises), financial corporations, government, non-profit institutions serving households, households, and the rest of the world.

In a fully developed set of accounts, each sector has a self balancing accounting system that consists of:[6]

- A production account
- An income and outlay account
- A capital account
- A financial account
- A reconciliation account
- A balance sheet.

Each of these accounts are linked in order to achieve overall internal consistency. For example, from the production account can be obtained a measure of the operating surplus of firms in the economy. This in turn enters the income and outlay account as a source of income, which after including interest income and subtracting final consumption expenditures yields a measure of savings. Savings then enter the capital account as a key element which, along with the savings of foreigners (represented by net capital transfers) finance investment in the economy. National saving would then be calculated as the sum of each sector's saving, derived from the income and outlay accounts[7].

The sector accounts currently available consist of sectoral production accounts; income and outlay accounts and capital accounts, such that measures of saving are available for each sector.

The ISA spanning the period 1987 to 1988 were labelled 'experimental' by Statistics New Zealand, owing to data quality being inadequate for an 'official' release. The 1999 to 2009 release of the institutional sector accounts has incorporated various advances, including improved Annual Enterprise Survey data, taxation statistics, balance of payments and interest rate data. This more recent series is termed 'official'.

Claus and Scobie (2002) derived sectoral measures of saving (household, business and government) in two ways, one primarily using the aggregate SNA data, and the other relying on the institutional sector accounts.

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6 See Appendix A for SNA structure and content.

7 Note that at the time of writing, the sum of the institutional sector saving residuals do not match the published national saving figure, as this had been revised since the publication of the institutional sector accounts.

The first method involves deriving business saving as a residual, the difference between national saving and government saving, where government saving is represented by the government's net cash flows from operations. Sectoral saving derived by this method will be termed '*aggregate*' sectoral saving henceforth.

Saving can also be obtained entirely from the sum of sector savings, from the Institutional Sector Accounts (henceforth, *'Institutional Sector Saving'*).

The flow measure of national saving used in this paper calculated from the ISA is defined as:

$$S_F = S_P + S_G \tag{3}$$

where:

$$S_P = S_h + S_B$$

$$S_B = S_{nfi} + S_f + S_{np}$$

and:

S_P = saving by the private sector

S_G = saving by government

S_h = saving by the household sector

S_{nfi} = saving by non-financial corporations (producer enterprises)

S_f = saving by financial intermediaries

S_{np} = saving by non-profits entities

S_B = saving by the 'business sector'

Finally, the Household Economic Survey (HES) is often used to approximate a flow measure of the household saving rate. The HES is an income and expenditure survey of New Zealand resident households. The complete HES, collecting both income and expenditure data, was conducted annually from 1974 to 1998, and subsequently triennially. It has been used to estimate household saving rates in New Zealand, and for a range of other economic analyses, due to its rich set of data on household characteristics; see for example Gibson and Scobie (2001).

However the HES was not designed specifically to measure savings rates, and Statistics New Zealand emphasises that its results must be interpreted with caution, for a number of reasons as outlined in Bascand *et al*., (2006). The HES underestimates a substantial amount of expenditure, particularly on durables, and goods such as tobacco. However, the Household Outlay and Income Account (HOIA) is also not free of measurement issues, and is thought to underestimate various forms of income, notably trust income and foreign investment income and transfers (see Bascand *et al.,* 2006 for an analysis of the differences in coverage and measurement).

Table 2 summarises the various available data sources for constructing measures of sectoral saving in New Zealand.

Table 2 – Data sources for sectoral components of national saving

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

3 Trends in saving rates

This section provides flow estimates for saving by sectors and stock estimates for the household sector.

3.1 The saving and investment identity

The saving, investment and current account in an economy are linked by construction.[8] Table 3 sets out the relation between the components of saving and total investment and provides a numerical estimate of each element. By construction total saving in the economy must be equal to net investment – in practice there is an adjusting element (referred to as a statistical discrepancy) which reflects the fact that there difficulties with measurement.

Saving by the private sector (households and business) plus saving by the government (the budget surplus or deficit) together comprise national savings. When allowance is made for consumption of fixed capital, saving within the domestic economy can be expressed as net national saving. The extent to which net national saving is greater or less than total investment is reflected in the current account balance.

In the upper part of Table 3 net national saving in 1981 was less than total investment; the difference was made up by an inflow on the external capital account in the form of borrowing or direct equity investment by foreign savers. Foreign savings were some 45% of total saving; in other words domestic savings covered about one half of New Zealand's net investment needs.

By 2012, the dependence on foreign savings had increased substantially; approximately 85% of net investment in New Zealand was covered by foreign savings. A fall in domestic savings in the absence of a commensurate change in investment implies greater reliance on foreign savings and a rise in external liabilities.

New Zealand's total net external liabilities (termed the Net International Investment Position, NIIP) was 70% of GDP in 1992, and 71% in 2012, having reached a peak of 86% in 1998 (see Appendix Table G.1).

[8] See Claus and Scobie (2002) for the derivation of the fundamental identity that the current account balance is the difference between net national savings and total investment.

Table 3 – Net national saving and investment ($m nominal))

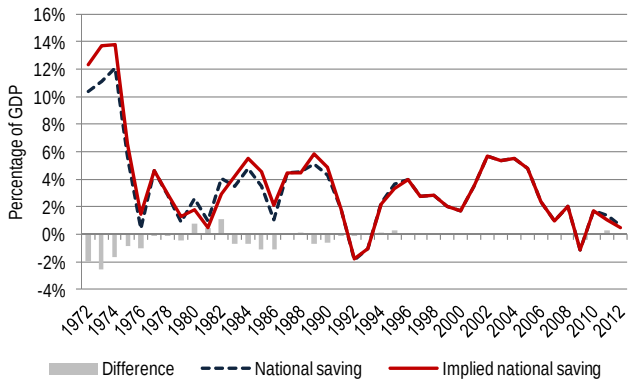
<table>
<tr><th colspan="4">A. 1981</th></tr>
<tr><td rowspan="4">Total saving
1,748</td><td>Current account deficit
792</td><td>Foreign saving
792</td><td rowspan="3">Investment
1,739</td></tr>
<tr><td rowspan="3">Net national saving
956</td><td>Government saving
535</td></tr>
<tr><td>Business saving
1,079</td></tr>
<tr><td>Household Saving
412</td><td>Statistical discrepancy
9</td></tr>
<tr><th colspan="4">B. 2012</th></tr>
<tr><td rowspan="4">Total saving
10,460</td><td>Current account deficit
9,032</td><td>Foreign saving
9,032</td><td rowspan="3">Investment
9,973</td></tr>
<tr><td rowspan="3">Net national saving
1,428</td><td>Government saving
-3,619</td></tr>
<tr><td>Business saving
5,191</td></tr>
<tr><td>Household Saving
-144</td><td>Statistical discrepancy
-487</td></tr>
</table>

Sources: Statistics New Zealand and authors' estimates.

3.2 Flow measures of saving[9]

The following discussion of the flow measure of saving is based on the difference between disposable income and current consumption. An alternative approach is to define saving as the sum of net investment and the current account balance. As shown in Figure 1, the two are practically identical, this internal consistency giving some degree of confidence in the estimate of national saving. "Implied national saving" here is equal to net investment plus the current account balance.

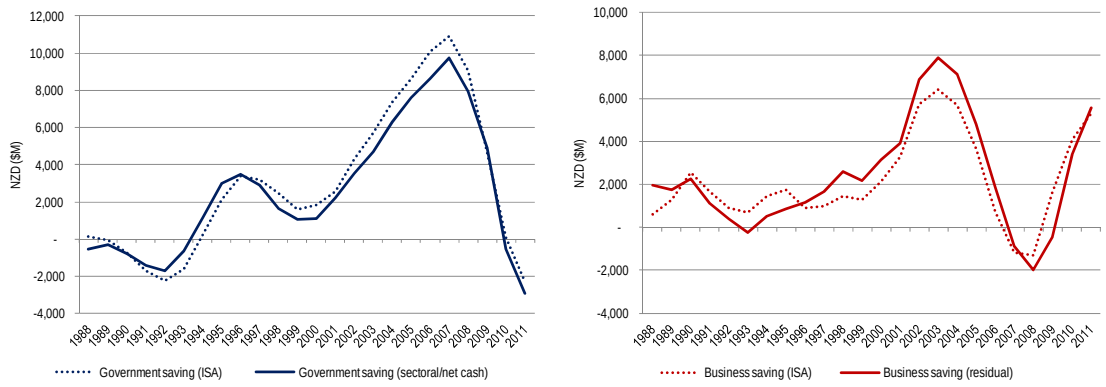
Figure 1 – Two alternative constructions of national saving



[9] A complete set of the data for flow measures is given in Appendix B and saving rates are given in Appendix C.

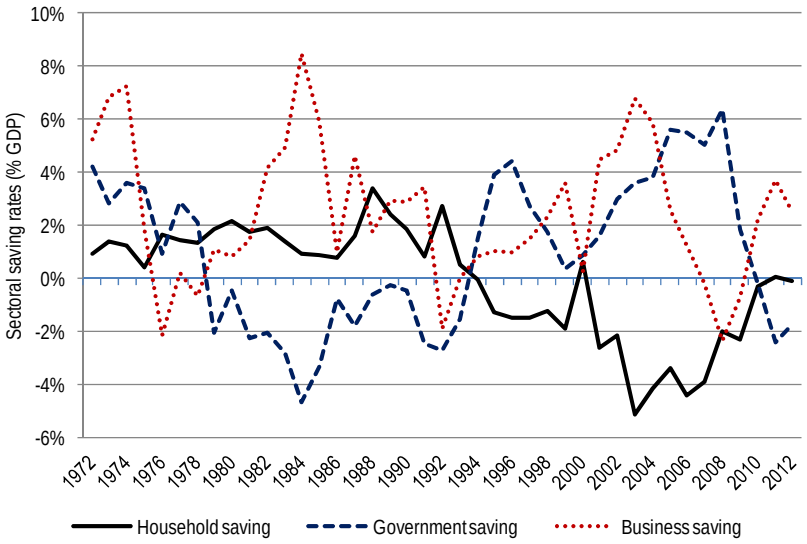
We use saving defined as the difference between income and consumption in this paper. As noted in Sections 2.3 and 2.4, there are two methods we consider in constructing sectoral saving estimates from the national accounts: The first is entirely based upon the Institutional Sector Accounts (ISA); these are available from 1987 to 2009, with the years from 1987 to 1998 denoted as "experimental." In contrast, the "aggregate" measure using Crown accounts data for government saving rather than the ISA measure can be derived for a longer period, namely 1972 to 2012. Using this approach requires that an estimate of business savings be derived as a residual. Figure 2 presents three year moving averages of nominal government and business savings using the two approaches.

Figure 2 – A comparison of ISA and 'aggregate' sectoral saving (3YMA)



It is apparent that the two approaches give very similar results. Given closeness of the series, it was decided to use the aggregate sectoral estimates which are available for a much longer period. The three key sectoral saving components, namely household, business and government are shown in Figure 3 as a fraction of GDP.

Figure 3 – Sectoral saving rates: 1972-2012



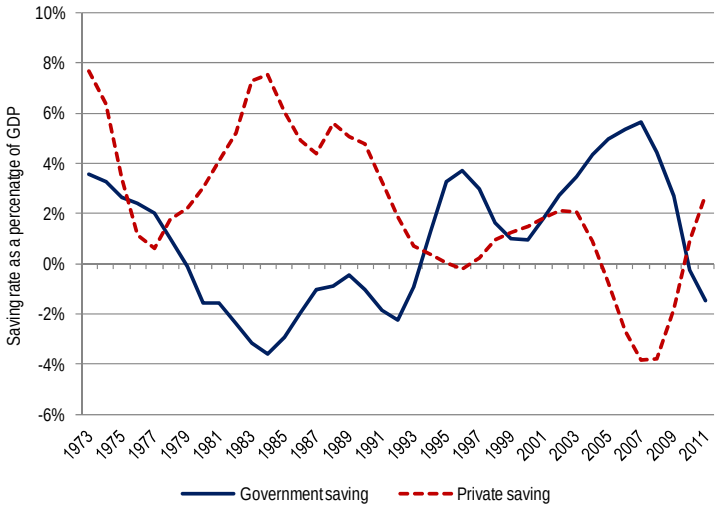
Household saving rates remained relatively stable from 1972 to 1992. This was followed by over a decade of decline. In 2011 household savings were positive for the first time since 2000, and then became negative again in 2012.

The boundary between the savings of households and businesses is blurred, as the household sector includes unincorporated businesses. Furthermore, households are "owners" of a significant share of the businesses (along with foreign investors). So when a firm invests retained earnings, these are arguably savings of households. For these reasons, it is appropriate for some purposes to combine the household and business sectors to form an estimate of private saving.

A further blurring occurs related to household income and net assets. With the rapid rise in income from trusts, it is possible that household income is under-reported. Bollard and Barrow (2012) note "*...the use of trusts impacted quite significantly on the data sources used to estimate New Zealand's household saving rate"* (p.7). Briggs (2006) notes that both the assets and income of households may be under-reported as a result of the extent of family trusts.

Three year moving averages of private and government savings rates are shown in Figure 4. It is evident that these rates tend to be quite strongly inversely correlated. In part this arises over the course of the business cycle. A strongly growing economy tends to generate additional revenues for the government while instilling a sense of confidence amongst households who tend to reduce their saving rate in the face of growing incomes. A fall in government surpluses in a recessionary period is associated with the tendency of households to reduce their liabilities in the face of uncertainty leading to a rise in household saving rates.[10]

Figure 4 – Government and private saving rates: 1972-2012 (3YMA)



In commenting on the swing in the US government's net position from a user to a supplier of savings between 1980 and 1998, Hall (1999, p.216) notes:

> *Government-federal, state, and local-went from being a user of saving in the aggregate to being a contributor of saving. Private saving fell to offset this change in the government's role in credit flows. Almost any reasonable general-equilibrium macroeconomic model would have predicted this offset, even if it did not imply full Ricardian neutrality.*

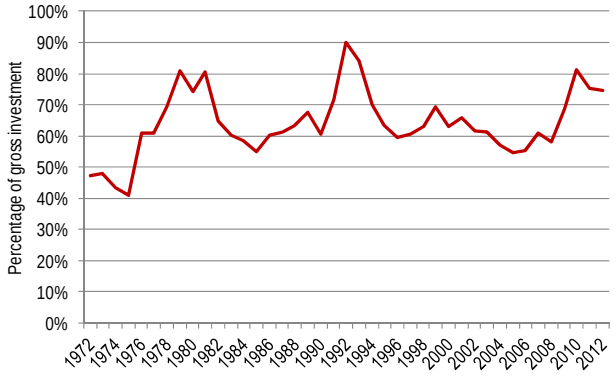
---

10 For further discussion and estimates of the so-called Ricardian equivalence see Seater (1993).

Additionally, sluggish adjustment of household consumption to increased income taxation may be reflected in higher saving rates. Consumption patterns may adjust slowly due to habit persistence, either as a psychological phenomenon, or due to real constraints such has long term contracting arrangements.

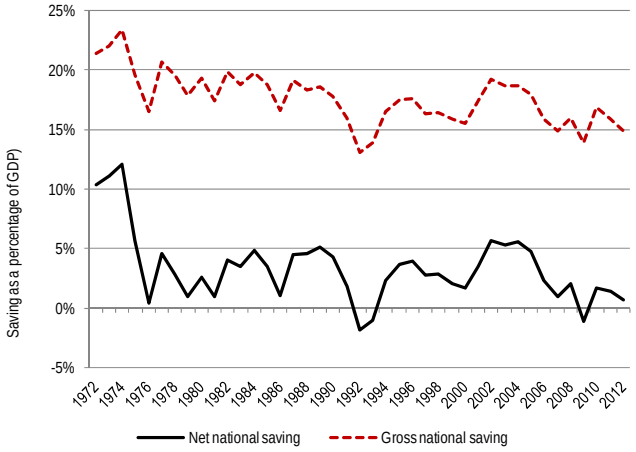
Gross saving rates are substantially higher than the net saving rate. Net saving is equal to gross saving after subtracting consumption of fixed capital. Consumption of fixed capital is the decline over the accounting period in the present value of the remaining capital services, or in other words, it is the decline in value of the net stock of assets used in production. Consumption of fixed capital represents a substantial proportion of gross investment, as shown in Figure 5 below.

Figure 5 – Consumption of fixed capital as a proportion of gross investment: 1972-2012



Gross saving rates are often used for international comparison owing to differences in methods of calculating consumption of fixed capital. Figure 6 shows both gross and net saving rates for New Zealand.

Figure 6 – Net and gross national saving trends: 1972-2012



3.3 Revisions to the household savings measure

The household saving data used in Section 3.2 was based on the latest estimates from the national accounts. The full time series is given in Column (2) of Appendix Table B.1. It is important to note that these data have been significantly revised in recent years. The importance of this arises from the fact that the policy debate for a time was dominated by concerns of extremely low rates of household saving. For example the saving rate in 2005 based on estimates at that time was -14.8%, making New Zealand an outlier in international comparisons. By 2012, the revised estimate of the 2005 rate was -6.2%.

To illustrate the significance of these revisions, Table 4 has been constructed. It shows the estimate of the saving rate initially made and compares that with the latest published estimates for 2012 (the latter having been used in this paper). Over the period 1987 to 2012 the current (2012) estimate exceeds the initial estimate on average by 2.5 percentage points of household disposable income. Over the period 2004 to 2009, the difference was on average +7.1 percentage points.

Table 4 – Revisions to the estimates of the household saving rate: 1987-2012

(as a percentage of Household Disposable Income)

	Initial Estimate		Revised Estimate		Change[1]
	%	Year made	%	Year made	%
1987	1.3%	2004	2.7%	2012	1.4%
1988	4.4%	2004	5.6%	2012	1.2%
1989	2.9%	2004	4.0%	2012	1.1%
1990	2.2%	2004	3.1%	2012	0.9%
1991	0.0%	2004	1.4%	2012	1.4%
1992	2.2%	2004	4.4%	2012	2.1%
1993	-0.1%	2004	0.9%	2012	1.0%
1994	-0.9%	2004	0.0%	2012	0.9%
1995	-3.6%	2004	-2.2%	2012	1.4%
1996	-3.7%	2004	-2.6%	2012	1.1%
1997	-3.2%	2004	-2.6%	2012	0.6%
1998	-4.1%	2004	-2.1%	2012	2.0%
1999	-4.6%	2004	-3.2%	2012	1.4%
2000	-1.5%	2004	1.0%	2012	2.5%
2001	-4.9%	2004	-4.7%	2012	0.2%
2002	-4.9%	2004	-3.9%	2012	1.0%
2003	-11.1%	2004	-9.7%	2012	1.5%
2004	-12.3%	2004	-7.6%	2012	4.6%
2005	-14.8%	2005	-6.2%	2012	8.6%
2006	-14.0%	2006	-8.2%	2012	5.8%
2007	-14.2%	2007	-7.1%	2012	7.1%
2008	-10.7%	2008	-3.6%	2012	7.1%
2009	-13.7%	2009	-4.1%	2012	9.6%
2010	-2.2%	2010	-0.5%	2012	1.7%
2011	0.2%	2011	0.2%	2012	-0.1%
2012	-0.1%	2012	-0.1%	2012	0.0%
Average	-4.3%		-1.7%		2.5%

Notes:

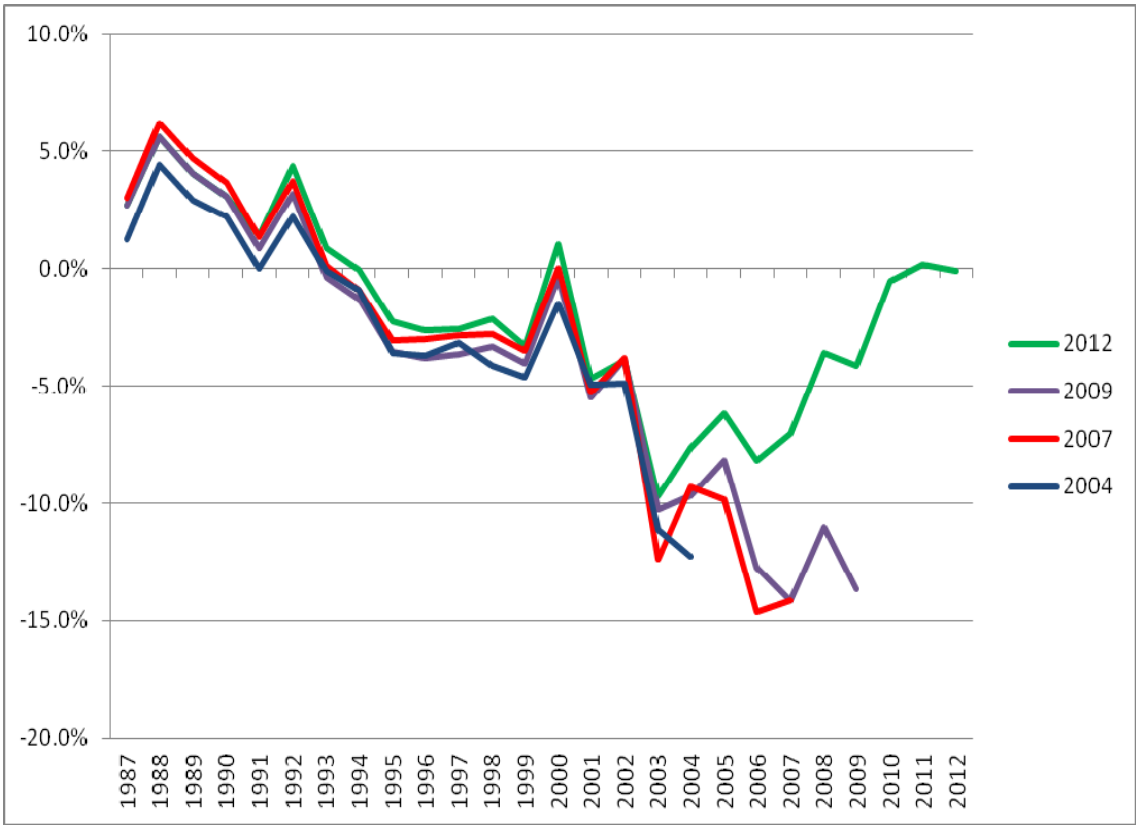
[1] Percentage point change

A complete history of the estimates of the household saving rate made each year from 1987 to 2012 is given in Appendix D, together with a synthesis of major recent revisions. A selection of these is illustrated in **Figure 7**. For example, in 2009, the

estimate of the household saving rate for that year was -13.7%. By 2012 however, following significant revisions, the estimate for 2009 revised to -4.1%. These findings underscore the need for the policy debate to be grounded in solid evidence, and to be cognizant of any limitations of the data that underpins that evidence.

Figure 7 – Revisions to the estimates of the household saving rate: selected years

(Household saving rate as a % of Household disposable income)



Adapted from Bollard and Barrow (2012) based on data supplied by Statistics New Zealand.

3.4 Stock measure of savings

The 'stock' measure of saving as calculated here comprises changes in real household net wealth as a proportion of real household disposable income.

The total change in net wealth can be viewed as comprising two components: these are sometimes referred to as 'active' and 'passive'. Active saving refers to increases made following a conscious decision by an individual or household, and could take a range of forms including for example term deposits, retirement accounts or investments in shares. The critical issue is that they imply foregone consumption spending.

In contrast, passive saving occurs when there are changes in net wealth arising from the revaluation of assets held by the household. Predominant among these is housing. A rise or fall in house prices will lead to a change in measured net wealth of saving due to real changes in net wealth.

The estimates of stock saving used in this paper are derived from the Reserve Bank's Household financial assets, liabilities and housing values data.[11] In order to estimate the active component of savings it is necessary to remove the effect of asset revaluations from total savings. Ideally this would be done for all assets and liabilities. In reality, data limitations are such that the estimate is restricted to housing, which, in 2011, represented almost 75% of total household assets. The likely consequence of restricting adjustments to asset prices to housing alone is that the 'active' component of saving may be overstated, and the 'passive' component understated by an equivalent amount, however the total would be unaffected.

The following describes the approach adopted. It reflects the fact that housing mortgages may or may not be applied solely to housing but can be used to provide funds for other investments, unincorporated businesses or consumption. Whether the relevant index to indicate purchasing power of mortgage liabilities is the CPI or the HPI depends on the purpose of the mortgage. Two approaches are possible; these are referred to as gross and net.

Measure 1 (gross): $V_h / HPI + (A_f - L_h - L_o) / CPI$ (4)

Measure 2 (net): $(V_h - L_h) / HPI + (A_f - L_o) / CPI$ (5)

where:

V_h = gross value of housing

L_h = mortgage liabilities

A_f = non-housing (financial) assets

L_o = non-housing liabilities

HPI, *CPI* = house price index and consumer price index

In the first case, gross housing wealth is deflated by the index of house prices; while in the second net housing wealth is deflated by the index of house prices.[12] The critical difference is that in the first case, mortgage liabilities are deflated by the Consumer Price Index; this case is denoted as "gross". It is applicable where the house serves as collateral for a mortgage some or all of which can be used for consumption. In the second case the mortgage is viewed as solely tied to the investment in the house, and is denoted as "net".[13]

Note that the "gross" and "net" adjusted series will tend to diverge if house prices and consumer prices grow at different rates. When the HPI is higher than the CPI, the gross-adjusted series will tend to be below the net-adjusted series. This is because the

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11 *http://rbnz.govt.nz/statistics/monfin/c18/hc18.xls.* Note the estimate of financial assets does not include equity in farms and unincorporated businesses (among other items).

12 Further details are given in Scobie and Henderson (2009).

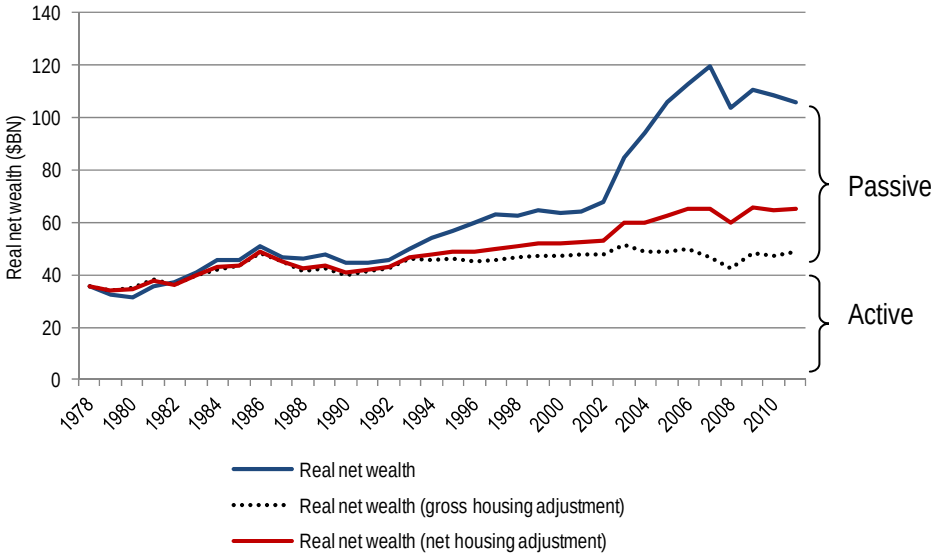
13 In reality, 'true' net wealth is going to be somewhere in between the two. Research from the Reserve Bank of Australia found that around 18% of equity withdrawn in Australia was used for consumption (Schwartz, *et al*., 2006).

"real" mortgage will be larger when it is deflated by the CPI (gross adjustment) than when it is deflated by the HPI (net adjustment).

The two measures follow each other closely until the mid 1990's, when they begin to separate as the HPI and the CPI start to diverge with the HPI rising more sharply than the CPI. The purchasing power of saving in terms of the real housing stock has decreased, relative to the real basket of general goods one could purchase.

Each of these measures of housing wealth can be combined with other net assets to form two real net wealth series for the household sector which show the 'active' component of saving. This together with the total real net wealth is depicted in Figure 8

Figure 8 – Measures of household net wealth: 1978-2011 (constant 1978 dollars)



Source: RBNZ, QV and authors' estimates

Unsurprisingly, a large proportion of the variation in household net wealth is explained by changes in house prices; this is shown by the passive component of saving. Figure 9 translates these net wealth data into implied household saving rates (using equation (2)). The long run trends in household saving rates using the two measures of housing wealth are shown in Figure 10.

In the most recent two decades, the gross measure of saving has decreased relatively more so than the net measure. This is because house price inflation has tended to exceed CPI inflation, resulting in the real size of mortgage liabilities being larger in the gross calculation.

Figure 9 – Household saving rates based on changes in net wealth (3YMA)

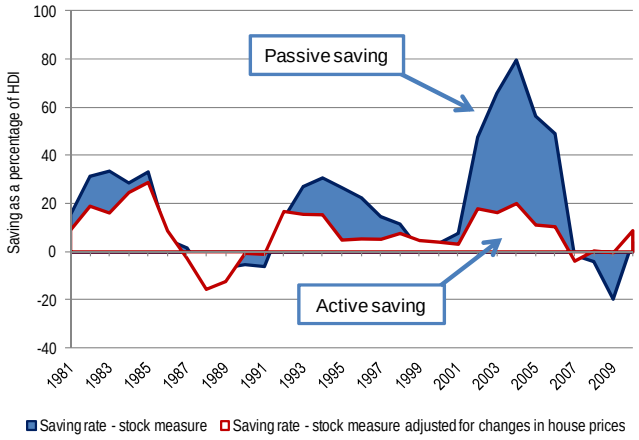
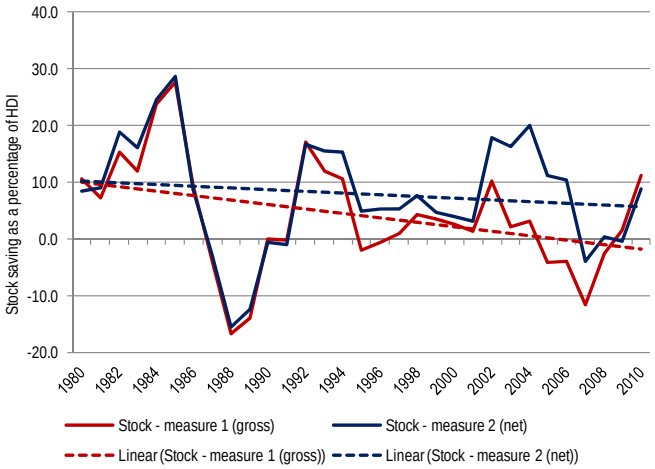


Figure 10 – Household saving after adjusting for changes in house prices (3YMA)



Source: RBNZ, QV and author's estimates

Asset revaluations (in this case those associated with housing) are a major factor contributing to the difference between flow and stock measures. After excluding the effects of housing revaluations, the stock saving trend appears more similar to the flow measure, albeit with still a less marked downward trend (see Figure 11).

The comparisons between the stock measures based on aggregate data and the flow measures are summarised in Table 5. The results reinforce the finding that stock measures of saving (adjusted for housing revaluations) are substantially higher than the standard flow measure, although they display a similar declining trend.

In their work based on the equity injection method, Hodgetts, Briggs and Smith (2006). estimated implied household saving using an asset and liability acquisitions approach. They concluded that over the period 1987 to 2004, their alternative measure of savings exceeded the HIOA flow measure by an annual average of almost 8 percentage points of household disposable income. In the present study, we find that over the same period the stock measure (adjusted for house prices on a net basis) exceed the average flow measure by 5 percentage points. Both estimates indicate that there is a

substantial increase in the estimates of the long run saving rate when a measure based on assets and liabilities is used in contrast to the flow measure..

Figure 11 – Household saving: flow, real stock excluding housing revaluation effects (gross adjustment (A) and net adjustment (B), 3YMA)

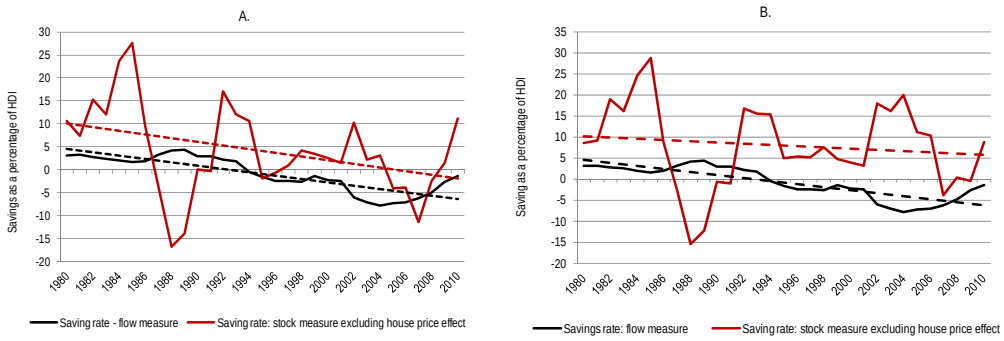


Table 5 – Stock and flow measures of saving rates: 1979-2011 (%HDI)

	Stock measures from sector data (RBNZ)		Flow measure (HIOA)
	Net[a]	Gross[a]	
Average saving rate	7.1	3.8	-0.3
No. of years in which the saving rate was negative	10	12	16

Sources: See Appendix F.

a The terms net and gross refer to the system of adjustment for housing price revaluations. See equations (4) and (5).

Delbrück (2012) has updated these estimates and finds that in 2009 the alternative measure of the household saving rates was 8% compared to the household income and outlay measure of -4.1%, or more than 12 percentage points of household disposable income higher.

The results pertaining to the stock measures have, to this point, been based on the aggregate household sector data on assets and liabilities from the Reserve Bank. However as indicated in Table 1, stock measures of saving rates can also be obtained from "micro" data – ie details of assets and liabilities collected from household surveys. The Survey of Family Income and Employment (SoFIE), a longitudinal household survey conducted by Statistics New Zealand, provides extensive coverage of assets and liabilities in every other wave. Estimates of net wealth from this source provide the basis for computing saving rates. Table 6 summaries the results based on SoFIE, the RBNZ aggregate sector data and the flow measures from the Institutional Sector Accounts.

The estimates from SoFIE and the RBNZ, two totally independent sources, are strikingly similar, both for the overall saving rate and the 'active' component which removes the house price revaluations from the overall rate. Further corroboration of these results comes from Le, Gibson and Stillman (2010) who report an estimate 23% for the active component of the saving rate for these years based on SoFIE.[14]

14 The higher value found by Le, Gibson and Stillman (2010) reflects in part the inclusion of business assets in their estimate.

Table 6 – Stock and flow measures of saving rates: 2004-2006

	Stock measures		Flow
Source	SoFIE[a, d] (micro)	RBNZ[a] (macro)	HIOA[b]
Overall saving rate[c]	41	43	na
Excluding house price changes (net adjustment)	19	18	-7.3
Excluding house price changes (gross adjustment)	12	10	

Notes:

a From Scobie and Henderson (2009), Table 5, p.24. As noted in Scobie and Henderson (2009), the RBNZ data was adjusted to be comparable with the SoFIE estimates. For example the data is converted from December to March years, and the denominator in the saving rate is gross income receivable subtracting imputed rents form the HIOA, as it is gross income which is available in SoFIE. The flow measure here is as a proportion of disposabe income.

b From Appendix Table C.

c The overall saving rate is is defined as the change in real net wealth between 2004 and 2006 (in March 2006 prices) divided by the average of 2004 and 2006 real income, divided by 2 to convert to an annual rate.

d In this comparison of stock measures, business assets (farms, orchards, commercial property) and durables have been excluded from the SoFIE estimates to make then comparable with the RBNZ data which do not include these items.

na: not applicable

A second important conclusion from Table 5 is that again, the stock measure of the household saving rate based in this case on independent survey evidence (SoFIE) is significantly greater than the flow measure from the Household Income and Outlay Account.

A further indication that stock measures provide a different perspective on household saving is summarised in Figure 12. Net household wealth as implied by the flow measure of household saving was estimated, by starting in 1978 with a given stock of net wealth and adding each year the flow of savings. For example if net wealth at the start of the year was say $50bn and savings were $5bn, then the implied net wealth at year end would be $55bn. The results are plotted in Figure 12 together with the actual net wealth series from the Reserve Bank (excluding the effect of house price changes). The flow measure of household saving was apparently negative from 1994 to 2010 (with one exception in 2000).[15]

As a consequence, starting in 1994, the implied stock of net wealth declined every year (bar 2000), to the point that it would now be negative. In other words, the negative saving rates based on the Household Income and Outlay Account imply that households would have completely drawn down their stock of net wealth. However, this is inconsistent with the evidence from both the aggregate sector data on household wealth published by the Reserve Bank, and the micro stock data from SoFIE.[16]

Measures of saving based on net wealth for other similar countries typically yield a "paradoxically" higher and increasing implied stock saving rate than the flow measure, which tends to be declining (see Goh, 2005, and Penner, 2008).

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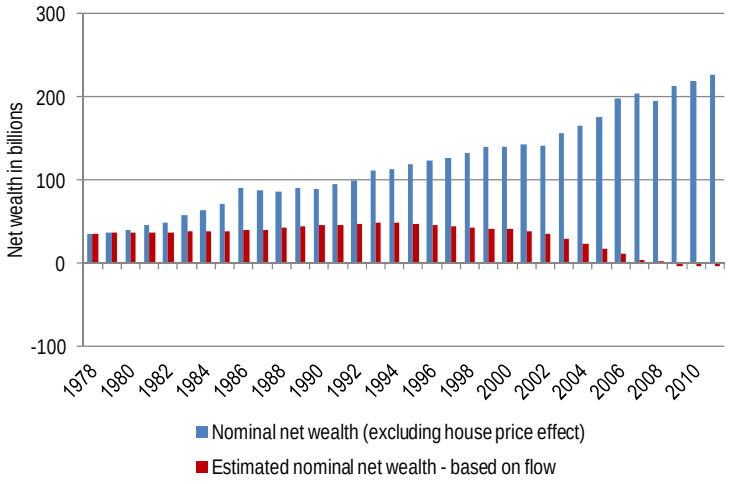
15 See Appendix B.

16 For a comprehensive view of the differences between flow and stock measures for the case of the USA, see Guidolin and La Jeunesse (2007).

Figure 12 – A stock measure of net wealth compared with net wealth implied by the flow measure of saving



3.5 Augmenting the household balance sheet

The Reserve Bank of New Zealand publishes annual estimates of the assets and liabilities of households.[17] These formed the basis of estimates presented in Section 3.4. However, as noted in Table 6, not all assets are included. The Bank has an on-going project to augment the household balance sheets with a series of elements not currently included. A progress report provides a preliminary augmented balance sheet for the household sector (Briggs, 2012).

To date, the following items have been added to the existing data on household assets: equity held in unincorporated businesses and in unlisted incorporated businesses. This adds about $170 billion to previously published estimates of household assets. It is important to note that these are labelled 'experimental" at this stage, although it is expected that ultimately they will be formally incorporated in the Bank's published tables of assets and liabilities.

In addition, the augmented estimates of assets include currency (notes and coins) held by households and unfunded superannuation claims. The latter refer to "entitlements not covered in full by the amounts that are held in superannuation funds. These unfunded claims largely relate to defined benefit schemes" (Briggs, 2012, p.33). At this stage they relate only to public sector schemes.

In the current context the question which arises is: would these revisions to the household balance sheet have implications for the implied stock measure of the household saving rate? Briggs (2012) notes that incorporation of equity held in unincorporated businesses and in unlisted incorporated businesses into the assets of households will not necessarily result in an implied saving rate that are higher than those based on the existing data. Briggs presents the augmented estimates for the years 2007 to 2011. Using the existing data, the implied annual average household

[17] See: http://www.rbnz.govt.nz/statistics/az/2989639.html

saving rate over this period was 2.7%. When this is recomputed using the augmented balance sheet data, the implied saving rate is 5.5% (noting that there are large swings in both cases associated with the impact of the global financial crisis). This is a *very preliminary* snapshot based on a short period; however it does suggest that the revisions to the household balance sheets may well have implications for the implied stock measure of the household saving rate.

3.6 A comparison with other OECD countries

In this section we compare the saving outcomes at a national level for selected OECD countries. Appendix K plots the current account, net and gross national saving rates and investment all as a percentage of GDP for 12 OECD countries: Australia, Canada, Finland, Germany, Ireland, Japan, Korea, New Zealand, Norway, Sweden, the United Kingdom and the United States. The data are plotted for 1972 to 2010 where available.

Table 7 – Long term averages saving rates for selected OECD countries

Country	Gross national saving rate		Net National Saving rate		Household Saving rate	
	%GDP	Years	%GDP	Years	%GDP	Years
Australia	23.4	1972-2010	7.6	1972-2010	8.5	1972-2008
Canada	20.5	1972-2010	8.0	1972-2010	10.2	1972-2010
Finland	24.5	1875-2009	8.4	1875-2009	1.5	1996-2010
Germany	22.7	1972-2010	8.8	1972-2010	10.6	1994-2010
Ireland	17.9	1972-2010	7.1	1972-2010	2.6	2002-2010
Japan	30.7	1972-2008	13.6	1972-2008	6.4	1996-2009
Korea	31.2	1972-2006	20.3	1972-2006	10.2	1990-2010
New Zealand	*17.7*	1972-2012	*3.4*	1972-2012	*-0.1*	1972-2012
Norway	29.4	1972-2006	14.2	1972-2006	3.9	1978-2010
Sweden	24.5	1972-2006	12.6	1972-2006	7.1	1995-2010
United Kingdom	16.7	1972-2010	4.5	1972-2010	1.0	1995-2009
United States	16.5	1972-2010	5.1	1972-2010	6.8	1972-2010

Source: OECD; Statistics New Zealand.

Net national saving rates have been both volatile and display a long term declining trend in most countries. Norway and Ireland were exceptions to this. An overall picture can be obtained by taking the long term average savings rates. These are shown in Table 7. There is a great deal of variation across countries. However, New Zealand has the lowest long term average savings rates, both for net national and household saving. Our gross national saving figure is more similar to other countries, and is possibly a better comparator, as methods of calculating depreciation can differ across countries, and rely on relatively arbitrary assumptions. The United Kingdom, Ireland and Finland are the only countries with similarly low household saving rates; however their long term average rates are all positive in contrast to the negative value for New Zealand.

4 Adjusted measures of saving

This section initially outlines a range of conceptual and measurement issues involved in the derivation of savings rates.[18] This is followed by a discussion and estimates of four sets of adjustments.[19] The first is an allowance for the impact on inflation on measured saving rates (Section 4.2). The second discussion discusses the role of the hidden economy in savings measurement (Section 4.3). The third series of adjustments are incorporated to reflect the fact that some elements of both private and public consumption expenditures may more appropriately be treated as investment (Section 4.4). Finally the implications of the New Zealand Superannuation Fund (NZSF) for national and household saving are explored (Section 4.5).

4.1 Conceptual and measurement issues

An underlying issue which arises with many macroeconomic balances is that of being calculated as a residual of two large flows. In the case of savings, the flow measure is found as the difference between income and consumption. The consequence is that the estimate of savings can become very sensitive to any errors in the measurement of income and consumption. To illustrate: suppose income was 100 units and consumption 95, then measured savings would be 100 – 95 = 5. Suppose however that both income and consumption are measured with error of say 1%, such that income was actually 101 and consumption 94 implying savings, the difference, would be 7. In other words a 1% measurement error in the underlying aggregates could potentially lead to overstating savings by 40%.

Secondly, the boundary between different sectors is not always clear. In the context of savings this arises in the case of the business and household sectors. An example is the treatment of income from small scale proprietorships. In the system of national accounts applied by Statistics New Zealand, entrepreneurial income from owner-operated businesses is credited as an income in the household income and outlay account. This effectively means that any income that is retained in the unincorporated business is not recorded in the business sector saving. While this difference nets out when estimating total national savings it does mean household saving would be overstated relative to business saving. This is in no sense “wrong”: it simply reflects a different underlying concept of the household – one that may incorporate that which would normally be thought of as business activities.

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18 See Savage (1999) and Australian Treasury (1999) for a more detailed survey of these issues.

19 For a series of adjustments to personal saving rates for the USA see Reinsdorf (2007).

The system of national accounts excludes capital gains/losses associated with holding or trading capital and financial assets. For example, any increase in the value of a house owned by a household will not be included in the income and outlay account. This results in the gains/losses from such assets to be excluded in the flow measure of saving, and is a major source of the difference between flow and stock measures. Gains and losses due to exchange rate movements on assets denominated in foreign currencies are also not included. The underlying rationale for the exclusion of capital gains and losses is that unrealised capital gains provide no investable funds, and neither do realised gains. In the latter case the funds that seller of the asset gains are offset by the funds that a buyer must apply to the purchase (Reinsdorf, 2005).

4.2 Adjusting for inflation

In this section we address three separate adjustments to measured savings that arise as a result of inflation. Net lenders become relatively worse off in inflationary conditions, as inflation acts as a tax on their holdings. In contrast, net debtors tend to become better off, as inflation reduces their real debt. Each of the three adjustments we make reflects this impact of inflation. The distortionary effects of inflation on saving and other national statistics have also been recognised by previous authors in New Zealand (eg. White, 1980; Clements, 1984; Coleman; 2006).

4.2.1 New Zealand as a net foreign borrower

In the presence of inflation, real holding losses are incurred by lenders on financial assets. Lenders commonly demand higher nominal interest rates to compensate for inflation. As such, nominal interest rates can be decomposed into two components, real interest, and a component to offset the impact of inflation. This second component represents repayment of the real principal, rather than a real return. The consequence is that this amount should be recorded separately as a capital transfer, rather than as income for the lender or expense for the debtor.[20]

The national accounts and derived measures, however, are presented in nominal terms: Nominal interest receipts are entered as current income and nominal interest payments as current expenditure. Consequently, the income of lender is overstated, and the saving of borrowers is understated, as the nominal rate of interest includes an implicit capital repayment to the lender. The essence of the following adjustments lies in recognising the fact that inflation erodes the real value of financial assets.

[20] See Hill, Peter and Organisation for Economic Co-operation and Development. (1996). *Inflation Accounting: a Manual on National Accounting under Conditions of High Inflation* for a detailed explanation of the treatment of inflation in national accounts.

The following clearly state the problem for measurement of savings in the presence of inflation:

> *As conceptually, the inflation component of the interest payments represents a repayment of capital in real terms, it should not be regarded as income when received or an expense when paid* (The Australian Treasury, p.32).
>
> *It is well known that, in times of inflation, the nominal interest rate consists of two components – the real interest rate and an inflation component. From the viewpoint of borrowers, the inflation component of interest payments is, in effect, equivalent to the repayment of real principal because the real value of the principal outstanding falls by the same amount. In other words, the inflation component represents a flow of savings or an accumulation of wealth on the part of the borrower. Similarly, from the view point of the lenders, the inflation component of interest receipts is equivalent to receiving back part of the principal lent because the real value of the principal has declined by the same amount. In other words, the inflation component of interest receipts does not represent true economic income.* (O'Mara and Walshaw, 1992, p. 51).
>
> *In an inflationary environment for a country with net external liabilities, the real value of the burden of these foreign obligations denominated in home currency falls at a rate equal to the domestic inflation rate and, consistent with the Fisher real interest rate effect, part of the annual interest payments effectively compensates lenders for the erosion in the value of their principal. Hence the inflation segment of interest received is not really additional income earned by creditors. Yet under existing external accounting procedures, all interest actually paid to foreigners appears in the current account when that part attributable to inflation should in fact be recorded in the capital account. (*Makin, 1995, p.59*).*

The consequence for the measurement of savings is as follows: in the case of borrowers, interest expenses are overstated as the inflation component is in fact saving; reducing expenses for any given income level will lead to a *higher* estimate of saving. Likewise for lenders, their income will be overstated by the inflation component of their interest receipts, so that for any given level of expenses reducing income will lead to a *lower* estimate of saving.

In nations with a limited net foreign debt position, these effects offset each other in aggregate, and only the *sectoral composition* of income and savings is affected. However, New Zealand is a net borrower with the rest of the world, so the effects of inflation impact our position in aggregate. Our net external investment position represents claims on our economy by foreigners.[21]

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[21] See Obstfeld and Rogoff (1996, Box 1.1, p.18) and Makin (1995) for further discussion of the inflation distortion in external accounts.

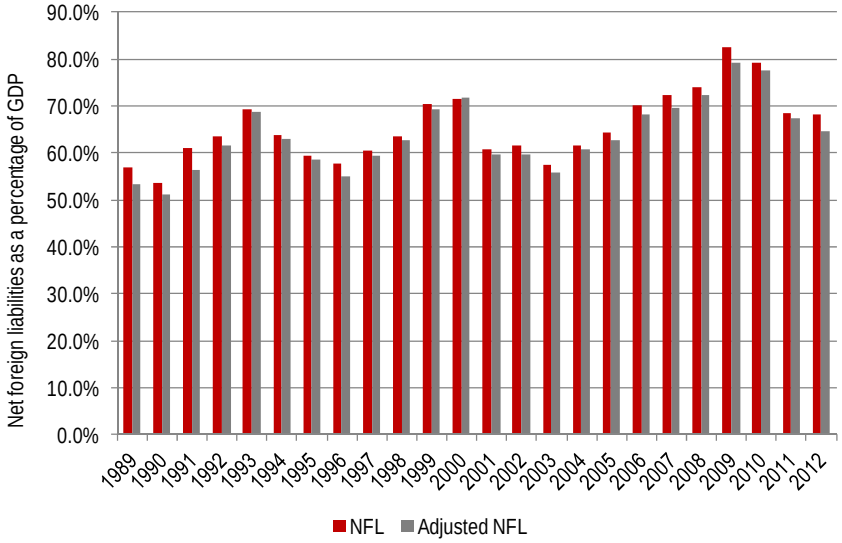
Adjusting our net international investment position (excluding equity) (henceforth, *net foreign liabilities*) for inflation[22] results in a reduction in the level of net foreign liabilities and a commensurate increase in our net national savings rate. In making this adjustment we rely on the fact that the majority of overseas debt is either denominated in New Zealand dollars or hedged, and that the inflation rates in creditor countries have been broadly similar in the last two decades.

The following two figures summarise the results. Figure 13 shows the level of net foreign liabilities with and without the inflation adjustment. In 2012, the inflation adjusted level of liabilities is some 3.6 percentage points of GDP lower than the observed level.

This is an approximation, as the net international investment position is also affected by the currency in which debt is denominated as well as price levels, and hence exchange rate fluctuations, which are not taken into account here. A substantial part of New Zealand's foreign liabilities is denoted in New Zealand dollars, and of the remaining amount, much is hedged. This tends to minimise the problem of multiple currencies.

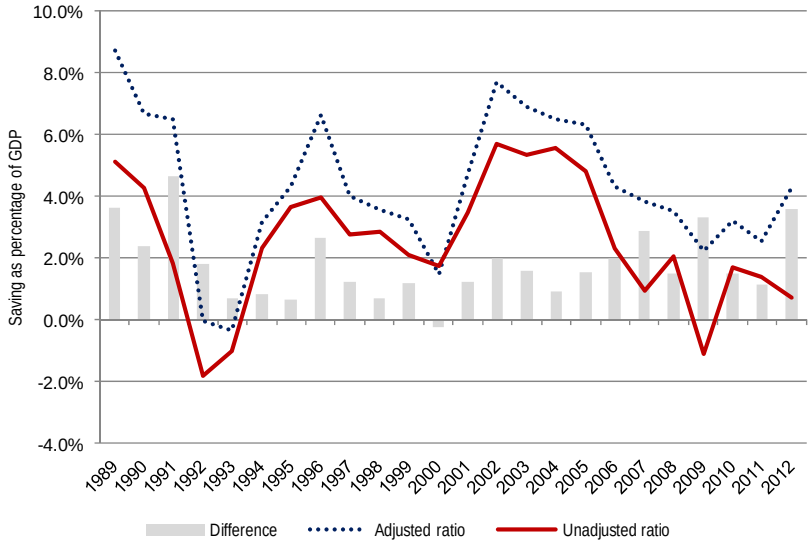
Based on the estimates of the inflation effect we can now adjust net national saving; the results are shown in Figure 14. The long run average (1989 to 2012) net national saving rate increases from 2.5% to 4.3% after incorporating the adjustment for inflation.

Figure 13 – Net foreign liabilities adjusted for effects of inflation: 1989-2012



22 See Appendix G for details of the data and methodology.

Figure 14 – Net national saving adjusted for the effects of inflation on net foreign liabilities: 1989-2012



Source: Statistics New Zealand and author's estimates

The finding that on average the national saving rate is understated due to the impact of inflation by some 1.7 percentage points of GDP corresponds closely to a similar finding by the Reserve Bank (2010) which estimated the under estimation was up to 2 percentage points. The Bank noted that as a result of this correction for inflation, there are implications for international comparisons. Specifically debtor countries will have a higher adjusted saving rate, and by the same reasoning, the national saving rate of creditor countries would be reduced. This would have the effect of reducing the apparent gap between the national saving rate of New Zealand and the average of the OECD countries.

> *Inflation can distort the measurement and interpretation of national savings across time and across countries. A portion of any interest payment is simply compensation for the reduction in the purchasing power of the underlying financial instrument because of inflation. The full extent of nominal interest payments is recorded as an expense, but the inflation compensation component is better thought of as a repayment of principal. Although inflation rates among the countries we typically compare ourselves with are now quite similar over time, New Zealand's high net dependence on external debt means that this issue still affects the cross-country interpretation of our savings data. For a country with no net dependence on foreign debt, all the interest payments and receipts are (net) between residents, and net out for the purposes of national savings statistics. But New Zealand has net foreign debt of just over 80 per cent of GDP and survey measures of expected medium-term inflation are around 2.5 per cent. That combination means that the real national savings rate for New Zealand is understated by up to 2 percentage points. The inflation distortion works in the other direction for countries with large net foreign assets (such as Switzerland or Norway or Singapore). Correcting for this factor tends to narrow international differences in reported national savings rates a little.* Reserve Bank (2010, p.4)

4.2.2 Adjusting household savings for inflation

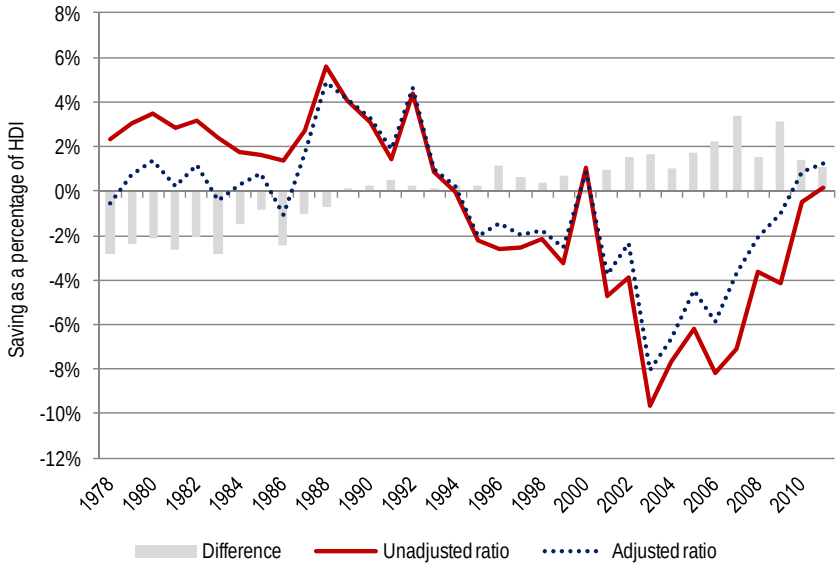
Recognising that households engage in borrowing and lending activity, a similar adjustment can be made for the effects of inflation. Part of the nominal interest charged on outstanding mortgage (and other financial) liabilities is an implicit capital repayment to the lender. A reduction in debt is simply the equivalent of a rise in net wealth (in real terms), and is equivalent to additional saving of an equivalent amount; and vice versa, part of the interest earned on assets is recompense for inflation rather than real economic income (Hill and OECD, 1996).

Adjusting households' net debt position for the effects of inflation results in an adjusted household saving rate below the measured rate in times where households were net lenders, and there was high inflation (Figure 15). For example, in the ten years following 1977, annual inflation rates were in double digits; the adjusted saving rates for the household sector were some 2 percentage points of HDI lower than the measured rate.

With lower inflation subsequently, the gap narrowed through the 1990s. More recently, as the household sector has become a net debtor, this effect has reversed and the adjusted saving rate is in excess of the measured rate. With higher inflation rates and increased mortgage borrowing from 2004, the gap averaged almost two percentage points of HDI in excess of the measured rate. Considering the adjusted saving rate, it is not so apparent that there has been a long-term decline in household saving.

Berry, Williams and Waldron (2009) estimate the effect of inflation on the measurement of household savings in the UK. They find that the inflation adjusted level of savings was below the actual level, but rose strongly in the 1980s. They suggest that it is possible that the decline observed from the mid 1990s may in effect have been a return to a more "normal" long run inflation adjusted household saving rate.

Figure 15 – Household saving adjusted for the effects of inflation: 1978-2011



Source: Statistics New Zealand and author's estimates

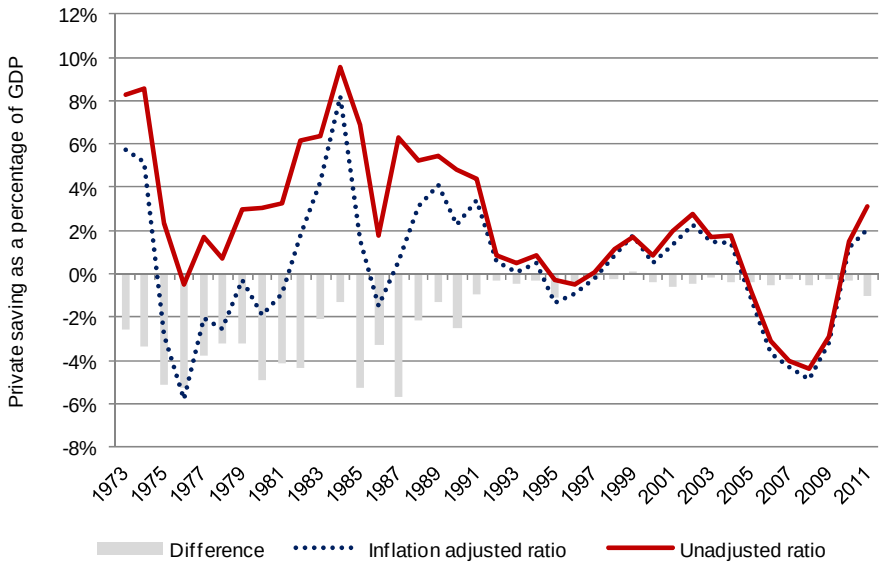
The redistributive effects of inflation are also relevant when considering saving and investment behaviour over the lifecycle. Younger people tend to have less savings, earn more wage income, are more likely be paying off a mortgage than older people; overall they are more likely to be net debtors. Older people are more likely to have more savings and earn less wage income; they are more likely to be in the position of net lender. This implies an age related redistributive impact of inflation, in addition to the aggregate redistribution between net debtors and lenders over time. [23]

4.2.3 Adjusting for the inflation tax on liabilities of the government held by the public

In the previous two subsections, the impact of inflation of the net lending position of the national and the household sectors were examined. We can also consider the impact of inflation on private sector assets (and implicitly the positive effect on government liabilities), and the contribution this would make the private sector saving rate. When the private sector is a net lender, inflation will reduce the value of its assets, resulting in a downward adjustment to measured savings.

Figure 16 illustrates the extent of the overstatement in private saving as a result of the domestic public holding of government debt in the form of notes and coins and bonds.[24]

Figure 16 – Contribution of inflation adjustment to private saving: 1973-2011



[23] Coleman (2006) estimates the age-saving profile for New Zealand incorporating the effect of inflation on interest payments and receipts. He concludes that between 2000 and 2005 around 15% of the observed decline in household savings was attributable to the impact of inflation and that "since New Zealanders are net borrowers the current account deficit has been overstated by at least as much over the same period" (pp.7-8).

[24] See Appendix G for details of the data and methodology.

4.3 The hidden economy

The hidden, or underground, economy is difficult to measure; however complete coverage of economic production is important for exhaustive estimates of GDP. Economic activity which isn't directly observed or measured is often also referred to as the non-observed economy, comprising: underground production (for purposes of tax evasion); informal activity (*eg,* unincorporated household enterprises); household production for own final use; and the production and distribution of illegal goods.

The size of hidden economy in New Zealand has been estimated using currency demand models to average approximately 9% of GDP over the period of 1972 to 1994 (Giles, 1999)[25] and more recently averaging approximately 12% over the period from 1999 to 2006 (Schneider, 2010).

The impact on national saving of the non-observed economy is however, unclear. Illegal activity is not excluded from the production boundary; however these are not currently measured in the New Zealand national accounts. With regard to the trade of illegal goods, given these are not measured on both the income and consumption side, ultimately leading to offsetting effects on national saving. The decline in measured consumption by the consumer is offset by the increase in measured consumption by the producer, and measured production remains the same.

The unrecorded production or maintenance of household durable goods, or small improvements to a home or farm is likely to have a positive impact on national saving. Substantial repairs by tenants or landlords are recorded as gross fixed capital formation, however smaller do-it-yourself type repairs are not recorded. This may increase the value of residential dwellings or farms, or produce durable goods, leading to an associated increase in saving which is not captured in the national accounts. This may be a particularly salient omission in New Zealand, where do-it-yourself activity and informal trade in home improvement are likely to be relatively prevalent. In conclusion, we have not attempted to estimate the impact on the saving rate of the hidden economy; any such attempt would likely be speculative. However we can conclude that measured saving rates are probably understated as a result of the hidden economy.

4.4 Adjusting measures of saving for investment goods

A critical issue is that of the distinction between consumption and investment. For example, consumer durables such as automobiles or kitchen appliances are typically treated as current expenditure rather than investment. The consequence is the flow measures of savings for any given level of income are reduced due to the higher expenditure levels. What we would ideally like to measure is consumption, rather than expenditure. Thus when consumption of a good is spread over multiple years, it suggests that allocating the full amount of the expenditure to one year is not appropriate. And indeed it can be argued that from the household's perspective, it is this expected consumption of service flows over time which is factored into their saving and borrowing decisions. The implication is that durable goods should be treated as an

[25] For a critique of the methodology used by Giles see Breusch (2005) and a response by Tedds and Giles (2005).

investment, where the purchase expenditure is classified as a capital expenditure, rather than a current expense in the income and outlay account.

This issue of classification arises also in the case of public expenditures. For example, spending by the state on education is counted as current consumption spending by government in the system of national accounts. To the extent that education confers benefits that flow to an individual over an extended period (arguably a lifetime), a legitimate case can be made to classify most of educational expenses as investments.[26]

Similarly, large lumpy items of defence expenditure (eg, a new frigate) represent an investment in the nation's defence capacity whose services can be expected to flow over many years. To count these items as current "consumption" may significantly reduce the estimate of national saving.

Intangible investments, and particularly intellectual property, are a further example. For example research and development expenditure, is currently treated as current consumption; yet successful research and development can generate long term returns. Indeed, the 2008 System of National Accounts (SNA2008, p.122) suggests:

> *"Research and development is treated as capital formation except in any cases where it is clear that the activity does not entail any economic benefit for its owner in which case it is treated as intermediate consumption".*

Other components of intellectual property which potentially should be capitalised include mineral exploration, computer software and databases (already included as intangible assets), and entertainment, literary or artistic originals which are more difficult to quantify. Statistics New Zealand is currently working on implementing the SNA2008 framework in the national accounts, including the capitalisation of research and development expenditure. Indeed the Australian Bureau of Statistics has now implemented the SNA 2008 in their national accounts (ABS, 2009).

While human capital is not a part of the SNA2008 framework, it is of interest from an economic perspective, and has implications for the measurement of savings. Education is a key component of human capital, and as discussed above, represents an investment in the future productive capacity of the economy (in addition to other positive externalities). A valid case exists for education expenditure to be treated as capital formation rather than a current expense.[27]

Similarly, good health can conceptually be considered as a component of human capital. This was posited by Grossman (1972), who derived a theoretical model for the demand for good health, in which individuals are endowed with a predetermined stock of health capital at birth. While this stock depreciates with age similar to any other form of capital, it can be augmented by inputs such as expenditure on medical care or sporting activities. The stock of health capital then contributes to the number of healthy days available to produce work or leisure outputs. In this framework, health is a key

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[26] In the absence of data to estimate the (small) component of education that might be considered as current consumption, we have treated all education expenditure as investment.

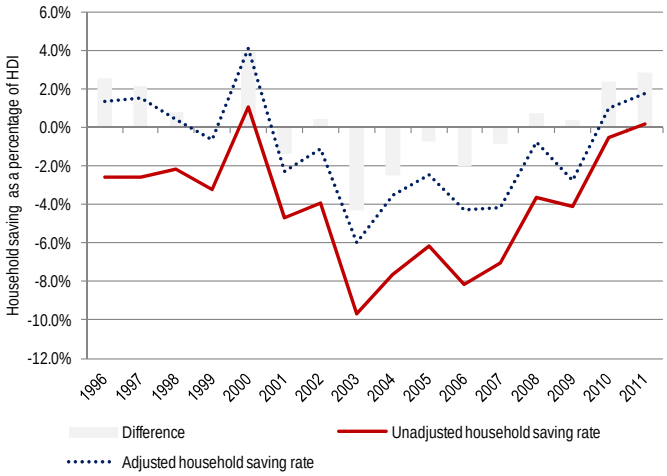
[27] See Le *et al.,* (2003) for a critical review of the cost- and income-based approaches to measuring human capital.

component of human capital which provides an extended flow of services to both the individual and society. Again treating some of health expenditures as investments in the stock of health capital has implications for the measurement of savings[28].

As expenditure on education and health have been increasing over time, reflecting increased enrolments in tertiary education and changing population demographics, this is likely to have been a contributing factor in declining measured saving rates. This has been noted by Gokhale *et al.,* (1996) for the US, who argued that increasing medical consumption through in-kind health care transfers, particularly by the elderly, explained a large proportion of the decline in post-war aggregate saving. These structural trends, some of which are surely contributing to the productive capacity of the economy, are likely to explain some proportion of New Zealand's (and potentially other countries') declining aggregate saving rates. Figure 17 shows the unadjusted household saving rate augmented by various adjustments discussed above: reclassifying education, health and consumer durables as investment, and subtracting the associated depreciation expenses.[29] These adjustments result in an upward adjustment to the household saving rate, of 3 percentage points on average over the sample period, and of 2 percentage points in 2011.

Figure 18 augments the net national saving rate in a similar fashion. Expenditure in health, education, consumer durables and research and development are now classified as investments. The average adjustment is 7 percentage points, with a 7 percentage point difference in 2011.[30]

Figure 17 – Net household saving rate adjusted for investment items: 1996-2011

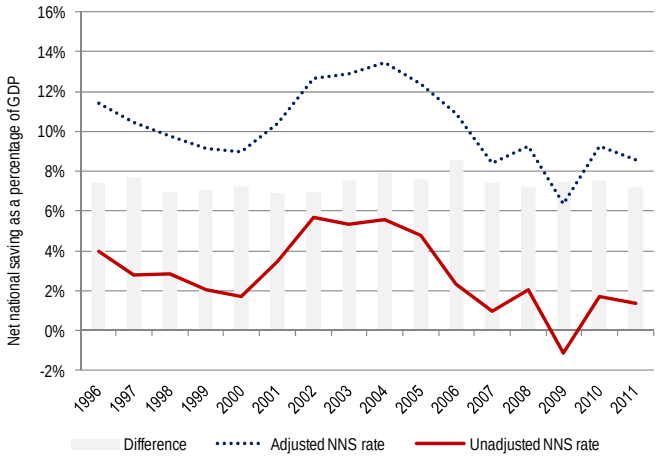


28 We treat 70% of health expenditures as saving, to reflect the fact that some proportion of health expenditure goes toward older individuals. For an alternative approach to the measurement of health capital based on increased life expectancy, see Arrow *et al*. (2011).

29 A double-declining balance method is used to approximate depreciation expenses.

30 See Appendix I for details.

Figure 18 – Net national saving rate adjusted for investment items: 1996-2011



4.5 Adjusting for NZ Superannuation Fund

Since 2002, public contributions have been made to a fund denoted the New Zealand Superannuation Fund.[31] These have been invested by the Fund with a view to meeting the rising costs of universal superannuation as the population ages. As these funds have been raised from households (or businesses as owners of households), and as households are the intended beneficiaries when the funds are distributed through the system of superannuation, then it is legitimate to view these funds as being in effect part of household saving. They are fundamentally equivalent to those funds set aside by households in private retirement schemes (although arguably one might want to apply a discount factor to reflect the possibility that as long as the funds remain under Crown control, future governments may want to divert the funds to another purpose).

Data were obtained for the opening annual balances of the fund, and these were used to derive the annual net increases after taxes and expenses. This amount was taken as an addition to household wealth, equivalent to an increase in the annual saving rate of households.[32] Over the period 2002 to 2011, this has the effect of raising the estimate of household saving by an annual average of 2.1 percentage points of household disposable income.

4.6 An overview of the adjustments to saving rates

We conclude this section with a brief discussion of adjustments made for other countries. Various international estimates of the impact of capitalisation of durables on the household saving ratio are available. A moderate impact on household saving ratios has been found in the Euro Area, being between 1.0 and 1.8 percentage points (Jalava and Kavionus, 2007), which the authors note is slightly smaller than effects found in the US in other studies (up to 3 percentage points). Estimates for Australia have been found to be approximately 1 percentage point (Doss, 2000).

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31 See http://www.nzsuperfund.co.nz/.

32 See Appendix I for details.

Table 8 summarises the impact in 2011 of the illustrative adjustments for inflation and investment made in the above sections of the paper (4.2 and 4.4). In addition, includes the adjustment for the saving effect of the NZ Superannuation Fund (discussed in Section 4.5). Full details for all years for which data are available are set out in Appendices F to I.

It is evident that the adjustments raise both the national and household flow measures of savings from the national accounts by an appreciable margin. In 2011, the unadjusted net national saving rate was 1.4% of GDP. Once the flow adjustments are included the net national saving rate is estimated to have been 9.7%. And if allowance is made for the NZ Superannuation Fund, this increases to 11.2% of GDP in marked contrast to the unadjusted value of 1.4%. The time series of both the adjusted and unadjusted rates for 1996 to 2011 are plotted in **Figure 19** which shows the composition of the adjustments.[33]

We conclude this section with a brief discussion of adjustments made for other countries. Various international estimates of the impact of capitalisation of durables on the household saving ratio are available. A moderate impact on household saving ratios has been found in the Euro Area, being between 1.0 and 1.8 percentage points (Jalava and Kavionus, 2007), which the authors note is slightly smaller than effects found in the US in other studies (up to 3 percentage points). Estimates for Australia have been found to be approximately 1 percentage point (Doss, 2000).

Table 8 – Summary of adjustments to national and household saving rates: 2011

	National (% GDP)	Household (% GDP)	Household (% HDI)
Unadjusted net saving rate	1.4%	0.1%	0.2%
Adjusted for:			
Government education expenditure	3.0%	-	-
Government health expenditure (70 percent)	2.7%	-	-
Household education expenditure	0.2%	0.2%	0.4%
Household health expenditure (70 percent)	0.3%	0.3%	0.5%
Research and development	0.5%	-	-
Durable consumer goods	0.4%	0.4%	0.7%
Inflation adjustment	1.1%	0.6%	1.1%
Adjusted net saving rate (a)	9.7%	1.7%	2.9%
Adjustment for NZSF(b)	1.5%	1.5%	2.6%
Total Adjusted net saving rate	11.2%	3.2%	5.5%
Increase due to total adjustment	9.8%	3.1%	5.3%

Notes:

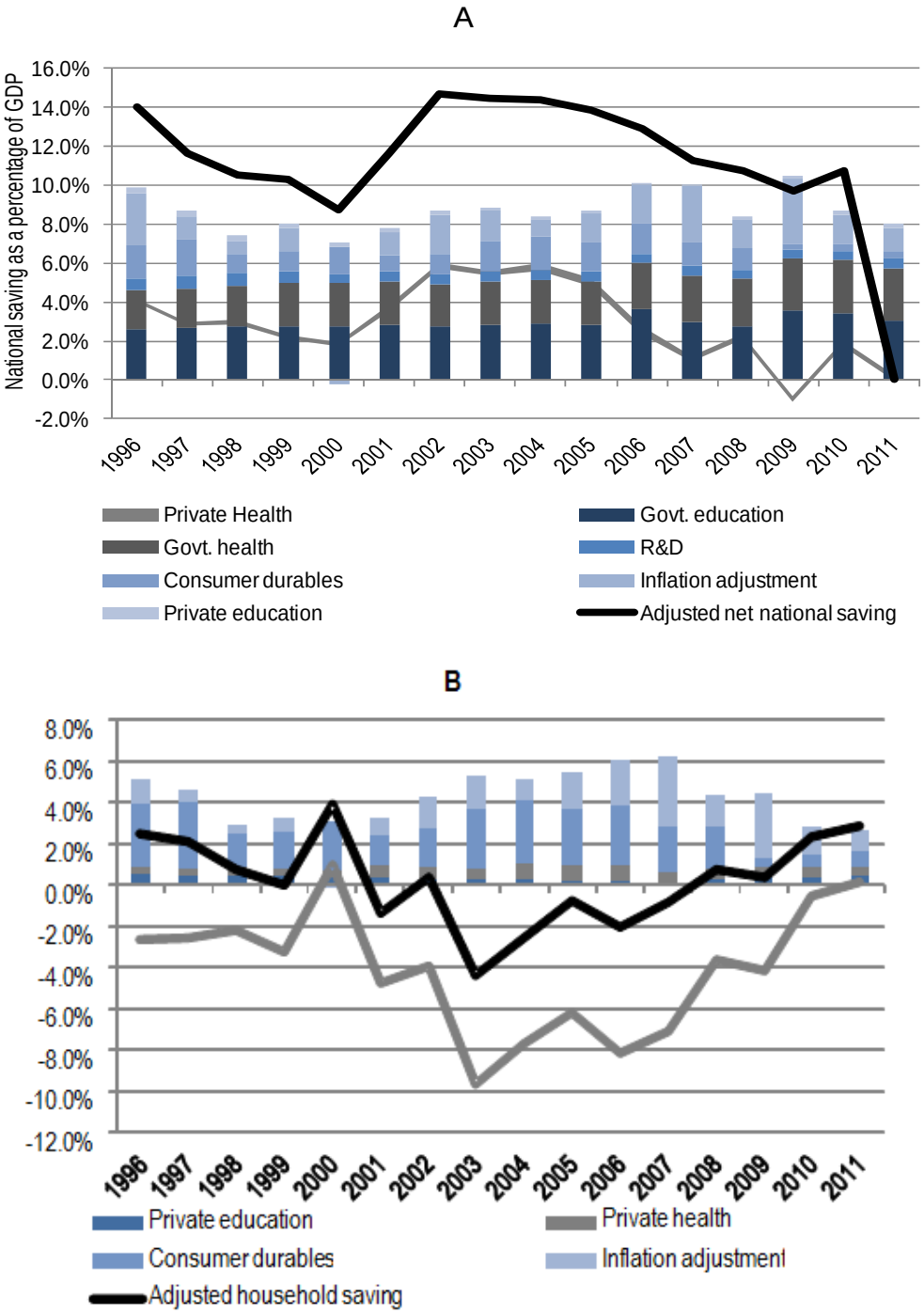
a The national data to this point includes that derived from central government spending. The total adds in the household spending effect.

b Derived from Appendix J.

[33] The adjusted series plotted in Figure 18 does not include the adjustment based on the NZ Superannuation Fund.

The impact of research and development on national saving have been found to be around 2 percentage points in the US (Fraumeni and Okubi, 2002), and between 1 to 2 percentage points for the UK (Galindo-Rueda, 2007). New Zealand has relatively low expenditure on research and development, suggesting a contribution of half a percentage point to be a reasonable estimate.[34]

Figure 19 – Summary of adjustments to national (A) and household (B) saving rates



[34] The estimates we present are approximations. Further refinements could be made in a national accounting sense with the use of more detailed data to incorporate differential useful lives by asset class, and more specific estimates of services flows.

5 Summary and Conclusions

> *"No one saving rate measure is the answer to all the questions one might pose about saving and wealth accumulation"*
>
> *Boskin* (1988), p.31

It has long been recognised that saving rates in New Zealand are low, and below those of most other OECD countries. From a macroeconomic perspective, a dearth of saving raises concerns of over reliance on the possibly fickle supply of foreign saving. If national savings are not sufficient to meet the desired level of investment, foreign savings in the form of capital inflows will be required to make up the shortfall. In 2012 some 85% of New Zealand's net investment was met by foreign rather than national savings.

Low levels of domestic saving may have implications for the level of investment. Too little capital investment can be associated with lower labour productivity and a slower growth of real incomes than might otherwise be the case. From a micro perspective, retirement income adequacy and unsustainable household debt are often aired as concerns.

Successive governments have introduced a range of pro-saving policies. Similar approaches have been adopted by other countries. A necessary condition for ensuring such interventions are truly welfare enhancing is that evidence base on which they rest is solid. This paper contributes to that goal by examining the measurement of saving. It builds on a number of existing pieces published by the Treasury.

The paper makes three significant contributions. First it documents the existing measures of savings from the national accounts from 1972 to 2012. Second it summarises the evidence on the level and trends of both flow and stock measures of saving. Third, it makes a series of adjustments which illuminate important conceptual issues in the measurement of saving. Throughout the focus is on the measurement of savings; no attempt is made to address the question of adequacy.

The long run average national saving rates are 17.7% of GDP (gross) and 3.4% (net). For the household sector the average long run rate is -0.1%. As the boundary between households and business in not one that is clearly defined in practice, it is sometimes preferable to look at the combined household and business sectors, denoted the private sector. Here the long run average rate is 2.4% of GDP.

Changes in net wealth are a useful alternative for estimating savings rates. Such changes however embody both and active and passive component of saving, the latter arising from asset revaluations. In applying the stock measure to aggregate household sector data on assets and liabilities we find the long run average annual saving rate was 16.1% of household disposable income (from 1979 to 2011). After stripping out the effect of house price revaluations (the passive component) which amounted to an annual average of 8.9% we are left with an estimate of the active annual average

household saving rate of 7.1%. In contrast, over the same period the flow measure of the average annual household saving rate as measured by the national accounts was -0.7% of household disposable income.

A completely independent approach to measuring household saving rates from net wealth data can be applied to household survey data. Over the years 2004 to 2006, the annual average saving rate derived from the Survey of Family Income and Employment was 19%, which was virtually identical to the saving ratio from the aggregate Reserve Bank of 18% (adjusted to be comparable with the SoFIE calculations), suggesting these estimates are reasonably robust. In contrast, over the same period the flow measure of the average annual household saving rate as measured by the national accounts was -7.3% of household disposable income.

Regarding changes in wealth, it is useful to note that changes in wealth may occur for a variety of reasons, including permanent changes in the future earning potential of the asset, as well as changes in the way these earnings are valued. A fruitful avenue for future work may be an examination of the extent to which asset revaluations reflect increases in earning potential, and therefore may reduce the need for future saving, as opposed to transitory changes in the way in which these earnings are discounted (eg, Lettau and Ludvigson, 2004).

This study finds that when the flow measures of both household and national saving rates are adjusted for spending which may more appropriately be defined as investment and the impact of inflation, estimated saving rates are significantly increased. The unadjusted rate for household saving was -4.1% of household disposable income between 1996 and 2011; for the same period the net national saving rate was 2.8% of GDP. After incorporating the adjustments the estimated saving rates were 0.3% and 11.8% respectively.

Similar findings have emerged from other countries. For example, in the case of the USA, Boskin (1998, pp.30-31) observes:

> *While the United States has a saving rate which is low by historical and international standards, that saving rate is substantially higher when more comprehensive measures of saving are developed. While there are substantial difficulties in developing such augmented measures of national saving, various data sources and estimation methodologies all conclude that adjustments for net saving in durables, government capital, capital gains and losses, revaluations, etc. are all substantial*.

A potentially significant adjustment arises from the stock of wealth that has accumulated in the New Zealand Superannuation Fund. To the extent that this is viewed as funds contributed by households through taxation for the provision of retirement income in future, it represents savings by households. On average the stock measure of savings is some 2.1 percentage points of household disposable income higher between 2002 and 2011, when allowance is made for the net wealth accumulated in the NZSF.

Statistics New Zealand is constantly seeking improvement in the collection and coverage of the data it publishes. Important revisions have been made to the

household saving rates. The consequence of these is that some of the very extreme levels of household dissaving seen between 2004 and 2009 have been revised such that the current estimates of negative saving by households from the household income and outlay account are very much more modest. Over this period the annual average change was an improvement in the saving rate of households of over 7 percentage points of disposable income. These revisions underscore the importance for the policy debate to be grounded in solid evidence, and for full cognizance of the limitations of the underlying data.

The finding that existing flow measures may not be capturing the full extent of savings in all likelihood does little to alter the relative position of New Zealand in international comparisons. Arguably, were similar adjustments made to other countries a largely comparable ranking would remain. The exception is when New Zealand (a significant debtor country) is compared with significant creditor countries (eg Norway, China, Hong Kong). In this case adjusting for the impact of inflation is likely to lead to a closing of the apparent gap in national saving rates by as much as 4 percentage points of GDP.

In short, this paper concludes that the actual level of the saving rate may not be quite as low as the standard estimates imply. It is not that they are in any sense "wrong:" It is simply that they may not necessarily capture the full richness of saving behaviour.

Bollard and Barrow (2012) review a number on measurement issues relating to national income. They conclude that potential revisions could add as much as 10 percent to New Zealand's official GDP (p.15). Other things equal this would imply a significant change in the estimated rate of national saving.[35]

This is not to imply that the augmented measures presented here are a complete picture of saving rates. Conceptual and practical issues remain, whether they be in aggregation across heterogeneous households, the impact of changes in the age distribution and the composition of households, the role of bequests, the measurement of all forms of physical, natural, human and social capital, the choice of appropriate deflators or the comprehensive revaluation of all forms of assets and liabilities. Judgement calls are still needed to deal with many of these issues.

Overall, however the results presented here suggest that broader measures of saving might well be considered as complements to the official series when analysing the saving behaviour of firms and households, and the net saving of the nation as a whole.

[35] To illustrate suppose income was 100 units and consumption 90. Savings is then 100-90=10 and the saving rate of 10/100 or 10%. If income is actually 10% higher as suggested by Bollard and Barrow, then savings would be 110-90 = 20, and the saving rate of 20/110 or 18%. In other words the estimated saving rate could be almost doubled by a 10% adjustment in estimated income.

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Appendix A: The system of national accounts

The following table sets out the elements of the system of national accounts. These make up what would constitute a "complete" set of accounts. These accounts are what make up a complete system of accounts. In reality, not all of the accounts are available for New Zealand at this stage. The first three accounts are prepared in New Zealand and the income and outlay account is also prepared at an institutional level for the household and government sector.

Appendix Table A.1 – The system of national accounts

Production Account	
Compensation of employees (wages and salaries)	Value added
Indirect taxes, net	
Depreciation	
Operating surplus	
Total inputs	Total outputs

Income and Outlay Account	
Final consumption expenditure	*Operating surplus*
Interest and other payments	Interest received and other income
Savings	
Total current expenditure	Total current income

Capital Account	
Gross capital formation	*Savings*
Purchases of assets	Depreciation
Net lending	Net capital transfers
Total capital expenditure	Total financing of capital expenditure

Financial Account	
Change in cash and deposits	*Net lending*
Change in investments	Change in loans/mortgages
Change in other financial assets	Change in other liabilities
Net acquisition of financial assets	Net incurrence of liabilities

Reconciliation Account	
Revaluations of financial assets	Revaluations of liabilities
Revaluations of fixed and other assets	Changes in net worth
Revaluations of assets	Revaluations of liabilities

Balance Sheet	
Financial assets	Liabilities
Fixed and other assets	*Net worth*
Total assets	Total liabilities

Source: Savage (1999).

Appendix B: Basic data: flow measures

Appendix Table B.1 – Basic data (in $m unless otherwise indicated)

	Net national saving	Household saving	Government saving (net cash flows)	Business saving	Household saving	Government saving	Business saving	Nominal GDP	Net Household disposable income (HIOA)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1972	724	65	293	367				6,962	4,148
1973	894	113	230	551				8,044	4,830
1974	1,124	114	334	677				9,313	5,494
1975	578	45	346	187				10,141	5,952
1976	49	190	107	-248				11,428	7,293
1977	638	201	404	33				13,876	8,311
1978	438	212	331	-105				15,534	9,238
1979	164	329	-356	192				17,662	10,732
1980	523	441	-90	172				20,359	12,726
1981	224	412	-535	347				23,766	14,587
1982	1,162	552	-586	1,195				28,732	17,335
1983	1,153	458	-929	1,624				33,027	19,239
1984	1,775	354	-1,706	3,127				36,823	20,482
1985	1,456	378	-1,386	2,464				41,784	23,235
1986	495	371	-361	485				48,242	27,200
1987	2,557	907	-1,010	2,660	907	36	715	57,385	33,484
1988	2,930	2,207	-396	1,119	2,207	222	-574	64,565	39,398
1989	3,578	1,697	-164	2,045	1,697	229	1,713	69,996	42,050
1990	3,160	1,368	-332	2,124	1,368	-541	2,696	73,960	44,547
1991	1,387	643	-1,861	2,605	643	-1,929	3,224	75,410	45,998
1992	-1,382	2,064	-2,021	-1,425	2,064	-2,599	-953	75,201	47,199
1993	-802	407	-1,201	-8	407	-2,183	450	77,480	46,386
1994	1,932	-14	1,259	687	-14	-40	2,582	83,569	47,984
1995	3,264	-1,134	3,490	908	-1,134	2,997	1,281	89,431	50,685
1996	3,780	-1,408	4,233	955	-1,408	3,358	1,392	95,367	53,945
1997	2,775	-1,473	2,720	1,528	-1,473	3,757	-10	100,098	57,454
1998	2,945	-1,289	1,803	2,431	-1,289	2,402	1,515	103,813	59,995
1999	2,191	-2,010	392	3,809	-2,010	1,286	2,812	105,647	61,936
2000	1,928	691	963	274	691	1,111	-510	112,033	67,214
2001	4,129	-3,102	1,922	5,309	-3,102	3,130	4,102	118,377	66,043
2002	7,230	-2,731	3,774	6,187	-2,731	3,498	6,217	127,282	69,880
2003	7,125	-6,835	4,856	9,104	-6,835	6,295	6,901	133,906	70,718
2004	7,955	-5,899	5,443	8,411	-5,899	7,367	6,132	143,138	77,168
2005	7,333	-5,145	8,560	3,918	-5,145	8,427	4,059	153,188	83,186
2006	3,776	-7,112	8,859	2,029	-7,112	10,083	763	161,645	87,253
2007	1,609	-6,580	8,534	-345	-6,580	11,797	-2,596	169,869	93,112
2008	3,786	-3,660	11,767	-4,321	-3,660	10,826	-1,722	183,997	101,180
2009	-2,049	-4,232	3,479	-1,296	-4,232	4,566	418	185,555	102,753
2010	3,251	-564	-387	4,202	-564	-1,294	6,134	189,718	109,421
2011	2,759	177	-4,749	7,331	177	-3,066	5,648	198,525	114,710
2012	1,428	-144	-3,619	5,191	-144	-2,498	4,070	206,058	120,159

(1) 1972-2012: Statistics New Zealand: SNDA.SG00NAC00B08
(2) 1972-1977: Authors' estimates by splicing SNBA.S1AM and SNCA.S2NB000E
1978-2012: Statistics New Zealand: ISAA.S2NB8000S5000
(3) 1972-2012: The Treasury: net cash flows from operations
(4) 1972-2012: Authors' estimates: (1)-(2)-(3)
(5) 1972-1986: Authors' estimates by splicing SNBA.S1AM and SNCA.S2NB000E
1987-2012: Statistics New Zealand: ISAA.S2NB8000S5000
(6) 1988-2009: Statistics New Zealand: ISAA.S2NB8000S3000
(7) 1988-2009: Statistics New Zealand: ISAA.S2NB8000S2000+ISAA.S2NB8000S1000+ISAA.S2NB8000S4000
(8) 1972-2012: Statistics New Zealand: SNDA.SG00NAC00B15
(9) 1972-2012: Statistics New Zealand: ISAA.S2NB6100S5000

Appendix Table B.1 continued

	Net national disposable income	Current account	Gross fixed capital formation	Consumption of fixed capital	Change in inventories	Investment	Gross saving	Private saving
	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1972	6,008	2	1,526	767	98	857	1,491	431
1973	6,876	153	1,906	876	-82	948	1,770	664
1974	8,007	-84	2,204	1,054	215	1,365	2,178	790
1975	8,529	-1,365	2,712	1,405	725	2,032	1,983	232
1976	9,249	-1,018	3,307	1,839	-287	1,181	1,888	-58
1977	11,218	-786	3,601	2,233	59	1,427	2,871	234
1978	12,468	-693	3,626	2,609	133	1,150	3,047	107
1979	14,005	-469	3,941	2,989	-246	706	3,153	520
1980	16,608	-824	4,132	3,411	470	1,191	3,934	613
1981	19,403	-823	4,891	3,918	-33	940	4,142	759
1982	23,775	-1,628	6,855	4,542	165	2,478	5,704	1,748
1983	26,860	-1,918	8,093	5,037	248	3,304	6,190	2,082
1984	29,663	-1,914	9,081	5,518	375	3,938	7,293	3,481
1985	32,902	-3,327	10,503	6,387	1,111	5,227	7,843	2,842
1986	37,578	-3,980	12,636	7,501	-154	4,981	7,996	856
1987	46,291	-2,747	13,121	8,406	588	5,303	10,963	3,567
1988	52,466	-2,255	14,411	8,876	-413	5,122	11,806	3,326
1989	57,249	-469	14,058	9,405	-114	4,539	12,983	3,742
1990	60,503	-2,938	15,249	10,016	1,289	6,522	13,176	3,492
1991	61,793	-2,719	14,923	10,624	-154	4,145	12,011	3,248
1992	59,099	-2,606	12,524	11,194	-88	1,242	9,812	639
1993	61,074	-3,000	13,092	11,548	624	2,168	10,746	399
1994	66,062	-3,280	15,564	11,898	1,432	5,098	13,830	673
1995	71,471	-4,128	18,355	12,397	1,166	7,124	15,661	-226
1996	76,563	-5,010	20,600	12,992	1,182	8,790	16,772	-453
1997	79,886	-6,046	21,544	13,532	809	8,821	16,307	55
1998	84,032	-5,248	21,427	14,052	817	8,192	16,997	1,142
1999	86,443	-4,236	20,767	14,610	270	6,427	16,801	1,799
2000	90,228	-7,075	22,921	15,456	1,537	9,002	17,384	965
2001	95,379	-4,460	23,635	16,466	1,419	8,588	20,595	2,207
2002	103,514	-3,464	26,035	17,228	1,886	10,693	24,458	3,456
2003	109,226	-4,137	28,037	17,870	1,094	11,261	24,995	2,269
2004	117,461	-6,186	31,691	18,810	1,259	14,140	26,765	2,512
2005	124,370	-9,453	35,360	20,218	1,644	16,786	27,551	-1,227
2006	129,208	-14,014	38,561	21,873	1,100	17,788	25,649	-5,083
2007	134,875	-13,542	39,128	23,712	-265	15,151	25,321	-6,925
2008	145,291	-14,595	42,415	25,645	1,611	18,381	29,431	-7,981
2009	145,133	-14,840	40,513	27,773	51	12,791	25,724	-5,528
2010	154,565	-3,401	36,246	28,698	-897	6,651	31,949	3,638
2011	160,191	-7,176	37,019	28,733	1,061	9,347	31,492	7,508
2012	166,471	-9,032	37,281	29,155	1,847	9,973	30,583	5,047

(10) 1972-2012: Statistics New Zealand: SNDA.SG04NAC00B22
(11) 1972-2012: Statistics New Zealand: SNDA.SG06NAC00B12
(12) 1972-2012: Statistics New Zealand: SNDA.SG02NAC01P51T4
(13) 1972-2012: Statistics New Zealand: SNDA.SG02NAC01K10T4
(14) 1972-2012: Statistics New Zealand: SNDA.SG05NAC00P52
(15) 1972-2012: Authors' estimates: (12)-(13)+(14)
(16) 1972-2012: Authors' estimates: (1)+(12)
(17) 1972-2012: Authors' estimates: (2)+(4)

Appendix C: Summary of saving rates: flow measures

Appendix Table C.1 – Summary of saving rates: flow measures

	Household		Business	Private	National	
	% GDP	% HDI	% GDP	% GDP	Net	Gross
	(1)	(2)	(3)	(4)	(5)	(6)
1972	0.9	1.6	5.3	6.2	10.4	21.4
1973	1.4	2.3	6.9	8.3	11.1	22.0
1974	1.2	2.1	7.3	8.5	12.1	23.4
1975	0.4	0.8	1.8	2.3	5.7	19.6
1976	1.7	2.6	-2.2	-0.5	0.4	16.5
1977	1.4	2.4	0.2	1.7	4.6	20.7
1978	1.4	2.3	-0.7	0.7	2.8	19.6
1979	1.9	3.1	1.1	2.9	0.9	17.9
1980	2.2	3.5	0.8	3.0	2.6	19.3
1981	1.7	2.8	1.5	3.2	0.9	17.4
1982	1.9	3.2	4.2	6.1	4.0	19.9
1983	1.4	2.4	4.9	6.3	3.5	18.7
1984	1.0	1.7	8.5	9.5	4.8	19.8
1985	0.9	1.6	5.9	6.8	3.5	18.8
1986	0.8	1.4	1.0	1.8	1.0	16.6
1987	1.6	2.7	4.6	6.2	4.5	19.1
1988	3.4	5.6	1.7	5.2	4.5	18.3
1989	2.4	4.0	2.9	5.3	5.1	18.5
1990	1.8	3.1	2.9	4.7	4.3	17.8
1991	0.9	1.4	3.5	4.3	1.8	15.9
1992	2.7	4.4	-1.9	0.8	-1.8	13.0
1993	0.5	0.9	0.0	0.5	-1.0	13.9
1994	0.0	0.0	0.8	0.8	2.3	16.5
1995	-1.3	-2.2	1.0	-0.3	3.6	17.5
1996	-1.5	-2.6	1.0	-0.5	4.0	17.6
1997	-1.5	-2.6	1.5	0.1	2.8	16.3
1998	-1.2	-2.1	2.3	1.1	2.8	16.4
1999	-1.9	-3.2	3.6	1.7	2.1	15.9
2000	0.6	1.0	0.2	0.9	1.7	15.5
2001	-2.6	-4.7	4.5	1.9	3.5	17.4
2002	-2.1	-3.9	4.9	2.7	5.7	19.2
2003	-5.1	-9.7	6.8	1.7	5.3	18.7
2004	-4.1	-7.6	5.9	1.8	5.6	18.7
2005	-3.4	-6.2	2.6	-0.8	4.8	18.0
2006	-4.4	-8.2	1.3	-3.1	2.3	15.9
2007	-3.9	-7.1	-0.2	-4.1	0.9	14.9
2008	-2.0	-3.6	-2.3	-4.3	2.1	16.0
2009	-2.3	-4.1	-0.7	-3.0	-1.1	13.9
2010	-0.3	-0.5	2.2	1.9	1.7	16.8
2011	0.1	0.2	3.7	3.8	1.4	15.9
2012	-0.1	-0.1	2.5	2.4	0.7	14.8
Average rates:						
1972-1984:	1.4	2.4	3.0	4.5	4.9	19.7
1985-1994:	1.5	2.5	2.1	3.6	2.4	16.8
1995-2012:	-2.1	-3.7	2.3	0.2	2.8	16.6
Overall:	-0.1	-0.3	2.5	2.4	3.4	17.7

(1) 1972-2012: (2)/(8) from Appendix B.
(2) 1972-2012: (2)/(9) from Appendix B.
(3) 1972-2012: (3)/(8) from Appendix B.
(4) 1972-2012: (17)/(8) from Appendix B.
(5) 1972-2012: (1)/(8) from Appendix B.
(6) 1972-2012: (16)/(8) from Appendix B.

Appendix D: Revisions to household saving rates

Appendix Table D.1 – Revisions to the estimates of the flow measure of household saving rates

	Estimates made in the year:								
Estimates made for the year:	2012	2011	2010	2009	2008	2007	2006	2005	2004
1987	2.7%	2.8%	2.7%	2.7%	3.2%	3.0%	3.0%	1.3%	1.3%
1988	5.6%	5.7%	5.6%	5.6%	6.2%	6.2%	6.2%	4.4%	4.4%
1989	4.0%	4.2%	4.1%	4.0%	4.7%	4.7%	4.7%	2.9%	2.9%
1990	3.1%	3.2%	3.1%	3.1%	3.7%	3.7%	3.7%	2.2%	2.2%
1991	1.4%	1.5%	0.9%	0.9%	1.4%	1.4%	1.4%	0.0%	0.0%
1992	4.4%	4.5%	3.8%	3.2%	3.8%	3.7%	3.7%	2.2%	2.2%
1993	0.9%	0.9%	0.1%	-0.4%	0.2%	0.1%	0.9%	-0.1%	-0.1%
1994	0.0%	0.0%	-0.8%	-1.3%	-0.8%	-0.9%	-0.1%	-1.0%	-0.9%
1995	-2.2%	-2.2%	-3.2%	-3.6%	-3.0%	-3.1%	-2.3%	-3.7%	-3.6%
1996	-2.6%	-2.6%	-3.5%	-3.8%	-3.0%	-3.0%	-2.2%	-3.8%	-3.7%
1997	-2.6%	-2.6%	-3.7%	-3.6%	-2.8%	-2.9%	-2.1%	-3.3%	-3.2%
1998	-2.1%	-2.2%	-3.5%	-3.3%	-2.6%	-2.8%	-2.1%	-4.2%	-4.1%
1999	-3.2%	-3.2%	-3.2%	-4.1%	-3.4%	-3.5%	-2.9%	-4.5%	-4.6%
2000	1.0%	1.1%	1.1%	-0.4%	0.2%	0.0%	0.6%	-1.6%	-1.5%
2001	-4.7%	-4.6%	-4.7%	-5.5%	-5.1%	-5.2%	-4.5%	-5.1%	-4.9%
2002	-3.9%	-3.6%	-3.6%	-3.9%	-3.7%	-3.8%	-3.9%	-5.2%	-4.9%
2003	-9.7%	-9.5%	-9.5%	-10.3%	-10.4%	-12.4%	-10.9%	-11.7%	-11.1%
2004	-7.6%	-7.5%	-7.4%	-9.7%	-9.8%	-9.3%	-10.0%	-12.4%	-12.3%
2005	-6.2%	-6.0%	-6.0%	-8.2%	-9.3%	-9.9%	-11.0%	-14.8%	
2006	-8.2%	-7.9%	-8.3%	-12.8%	-11.7%	-14.6%	-14.0%		
2007	-7.1%	-6.7%	-8.9%	-14.2%	-12.8%	-14.2%			
2008	-3.6%	-3.0%	-4.0%	-11.0%	-10.7%				
2009	-4.1%	-4.5%	-4.5%	-13.7%					
2010	-0.5%	-1.5%	-2.2%						
2011	0.2%	0.2%							
2012	-0.1%								

Appendix D: (continued)

Notes on the major recent revisions to the estimates of the household saving rate[36]

- **2006**

  The main revision in 2006 was a change in methodology regarding trusts, due to additional data.

  Updated estimates of household saving have been introduced following a review of income accruing to trusts. In recent years, trusts have become an increasingly popular means of holding capital and financial assets. Family trusts, as the owners of 'household' assets, are classified to the household sector, and income earned by the trusts is classified as household income.

  However, the sector of ownership and the different forms of financial and capital ownership are complex, as are the ways in which the relevant trust's income flows might be captured in the existing survey platforms used to compile New Zealand's National Accounts. An analysis was conducted where Inland Revenue tax data was confronted with the Statistics New Zealand Business Frame. This analysis identified a number of improvements that could be made to the measurement of income accruing to trusts. As a result, these improvements have been incorporated within the experimental household income and outlay account.

  For further discussion see:
  http://www.stats.govt.nz/~/media/Statistics/Browse%20for%20stats/NationalAccounts/previous-releases/national-accounts-yemar06-hotp-revised.pdf

- **2009**

  The main revision in 2009 reflected the incorporation of Census data on new dwellings into the National Accounts. This flowed through into the household accounts in two ways. Firstly additional imputed rents increased the Gross operating surplus for owner occupied dwellings. Second, Household consumption expenditure was increased by higher actual and imputed rents, with the net effect being a decrease in household saving rate from -11.0 to -13.7 as a percentage of revised estimates of household disposable income. The revisions section in the link below refers to these changes:

  http://www.stats.govt.nz/browse_for_stats/economic_indicators/NationalAccounts/NationalAccounts_HOTPyemar09/Commentary.aspx

[36] The authors are grateful to Chase O'Brien and Malcolm Gray at Statistics New Zealand for providing material for these notes.

- **2010**

  The main revisions in 2010 were related to *Interest paid and Entrepreneurial income.*

  A higher proportion of the household mortgage interest is now allocated to entrepreneurial income. The result is a decrease in interest paid by households, and an offsetting lower entrepreneurial income for residential landlords. , As the household sector is now paying lower mortgage interest than previously, and this is only partially offset by lower entrepreneurial income, the estimated household saving increases from -4.5% in 2009 to -2.2% in 2012. There is a discussion on this change in methodology in O'Brien (2012).

  http://www.stats.govt.nz/surveys_and_methods/methods/research-papers/nzae/nzae-2012/~/media/Statistics/surveys-and-methods/methods/research-papers/NZAE/2012/obrien-2012-residential-boom.pdf

  Details of the implications of a range of revisions to the household income and outlay account are given in:
  http://www.stats.govt.nz/browse_for_stats/economic_indicators/NationalAccounts/InstitutionalSectorAccounts_HOTP99-08/Commentary.aspx

  Investment income from the rest of the world

  New IRD data on 'overseas income' resulted in a revision to the Balance of Payments release that has flowed through into the household accounts. Further details of this revision can be found at:
  http://www.stats.govt.nz/browse_for_stats/economic_indicators/balance_of_payments/improvements-to-income-in-bop-stats.aspx

Appendix E: Household saving rates: stock measures

Appendix Table E.1 – Household saving rates: stock measures

(in $b unless otherwise indicated)

	Financial assets	Financial liabilities	Student loans	Housing value	Household net wealth	Real net wealth
	(1)	(2)	(3)	(4)	(5)	(6)
1978	16	5	0	25	35	35
1979	18	6	0	25	37	33
1980	21	7	0	28	42	31
1981	25	9	0	38	54	35
1982	28	9	0	48	66	37
1983	36	10	0	53	79	41
1984	42	12	0	62	92	45
1985	49	14	0	73	108	46
1986	68	16	0	81	133	51
1987	65	19	0	100	146	47
1988	65	22	0	109	152	46
1989	69	25	0	120	164	48
1990	68	28	0	126	165	45
1991	75	31	0	125	169	44
1992	79	33	0	129	175	45
1993	90	36	0	140	194	50
1994	92	41	1	164	214	54
1995	98	47	1	183	233	57
1996	104	53	2	201	251	60
1997	108	59	2	221	268	63
1998	115	63	3	221	270	62
1999	124	70	3	227	278	65
2000	125	75	4	232	279	64
2001	129	80	4	246	290	64
2002	128	88	6	282	317	68
2003	139	102	6	370	401	85
2004	151	117	7	429	456	94
2005	162	135	7	506	525	106
2006	185	152	8	559	584	113
2007	196	170	9	614	630	119
2008	189	177	10	568	571	104
2009	203	182	10	606	618	110
2010	210	184	11	602	617	108
2011	219	186	12	615	635	106

(1) 1978-2011: RBNZ: Household financial assets and liabilities
(2) 1978-2011: RBNZ: Household financial assets and liabilities
(3) 1978-2011: RBNZ: Household financial assets and liabilities
(4) 1978-2011: RBNZ: Household financial assets and liabilities
(5) 1978-2011: RBNZ: Household financial assets and liabilities (1)-(2)-(3)+(4)
(6) 1978-2011: (6)=(5) adjusted to 1978Q2 dollars.

Appendix Table E.1 continued

	Real net wealth (gross adjustment)	Real net wealth (net adjustment)	Change in real net wealth (1978 constant dollars)	Change in real net wealth (gross mortgage adjustment)	Change in real net wealth (net mortgage adjustment)	Household saving (real, % HDI)	Household saving (gross adjustment, % HDI)	Household saving (net adjustment, % HDI)
	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1978	35	35	na	na	na	na	na	na
1979	34	34	-2.8	-1.3	-1.6	-28.8	-13.8	-17.2
1980	35	34	-1.3	1.1	0.5	-13.1	11.1	5.4
1981	39	38	4.0	3.3	3.6	41.4	34.6	37.1
1982	36	36	1.8	-2.3	-1.5	18.9	-23.9	-15.4
1983	40	40	3.4	3.5	3.5	34.4	35.0	34.9
1984	42	43	4.8	2.5	2.9	47.8	24.8	28.7
1985	43	44	0.4	1.1	1.0	4.1	11.2	9.9
1986	48	49	5.0	4.9	5.0	48.2	47.0	47.5
1987	45	45	-3.9	-3.2	-3.4	-36.5	-30.0	-31.3
1988	42	42	-0.7	-3.4	-2.9	-6.1	-28.3	-24.2
1989	43	43	1.3	1.0	1.1	10.8	7.9	8.9
1990	40	41	-2.9	-2.6	-2.6	-24.0	-21.7	-21.6
1991	42	42	-0.3	1.6	1.3	-2.2	13.6	10.8
1992	42	43	1.0	0.9	1.0	8.5	7.2	7.8
1993	46	47	4.3	3.6	3.8	35.8	30.1	31.5
1994	46	48	4.6	-0.2	0.9	37.6	-1.4	7.2
1995	46	49	2.4	0.4	0.9	19.3	3.4	7.2
1996	45	49	3.0	-1.0	0.0	23.7	-8.0	0.2
1997	46	50	3.4	0.4	1.2	25.0	2.7	8.6
1998	47	51	-0.6	1.1	0.9	-4.3	8.1	6.8
1999	47	52	2.1	0.3	1.1	14.3	1.8	7.4
2000	47	52	-1.0	0.1	0.0	-6.3	0.4	-0.3
2001	48	53	0.5	0.8	0.7	3.1	5.5	4.8
2002	48	53	4.0	-0.3	0.7	26.6	-1.7	4.9
2003	52	60	16.9	4.0	6.6	113.1	26.8	43.8
2004	49	60	9.3	-3.0	0.0	58.4	-18.7	0.0
2005	49	63	11.4	0.2	2.7	67.9	1.0	16.2
2006	50	65	7.3	0.9	2.9	43.1	5.2	17.1
2007	47	65	6.5	-3.2	-0.4	36.6	-18.2	-2.2
2008	43	60	-15.4	-4.0	-4.9	-83.5	-21.6	-26.5
2009	48	66	6.5	5.9	5.5	35.3	32.2	29.8
2010	47	65	-2.0	-1.2	-0.9	-10.2	-6.1	-4.5
2011	49	65	-2.3	1.4	0.2	-12.3	7.4	1.0

(7) 1978-2011: (7)=(5) gross housing wealth adjusted by HPI.
(8) 1978-2011: (8)=(5) net housing value adjusted by HPI.
(9) 1978-2011: Change in (6)
(10) 1978-2011: Change in (7)
(11) 1978-2011: Change in (8)
(12) 1978-2011: (9)/(9) from Appendix B converted to constant real 1978 $
(13) 1978-2011: (10)/(9) from Appendix B converted to constant real 1978 $
(14) 1978-2011: (11)/(9) from Appendix B converted to constant real 1978 $

Appendix F: Summary of flow and stock saving measures

Appendix Table F.1 – Summary of flow and stock measures

	Stock measure (gross adjustment, % HDI)			Stock measure (net adjustment, %HDI)			Flow measure (unadjusted, % HDI)	Flow measure (adjusted, % HDI)
	Total	Active	Passive	Total	Active	Passive		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1979	-28.8	-13.8	-15.0	-28.8	-17.2	-11.6	3.1	na
1980	-13.1	11.1	-24.3	-13.1	5.4	-18.5	3.5	na
1981	41.4	34.6	6.8	41.4	37.1	4.3	2.8	na
1982	18.9	-23.9	42.7	18.9	-15.4	34.3	3.2	na
1983	34.4	35.0	-0.6	34.4	34.9	-0.5	2.4	na
1984	47.8	24.8	23.0	47.8	28.7	19.0	1.7	na
1985	4.1	11.2	-7.1	4.1	9.9	-5.8	1.6	na
1986	48.2	47.0	1.2	48.2	47.5	0.6	1.4	na
1987	-36.5	-30.0	-6.5	-36.5	-31.3	-5.2	2.7	na
1988	-6.1	-28.3	22.2	-6.1	-24.2	18.0	5.6	na
1989	10.8	7.9	2.9	10.8	8.9	1.9	4.0	na
1990	-24.0	-21.7	-2.4	-24.0	-21.6	-2.4	3.1	na
1991	-2.2	13.6	-15.8	-2.2	10.8	-13.0	1.4	na
1992	8.5	7.2	1.3	8.5	7.8	0.7	4.4	na
1993	35.8	30.1	5.7	35.8	31.5	4.2	0.9	na
1994	37.6	-1.4	39.0	37.6	7.2	30.4	0.0	na
1995	19.3	3.4	15.9	19.3	7.2	12.1	-2.2	na
1996	23.7	-8.0	31.7	23.7	0.2	23.5	-2.6	2.5%
1997	25.0	2.7	22.3	25.0	8.6	16.5	-2.6	2.1%
1998	-4.3	8.1	-12.4	-4.3	6.8	-11.1	-2.1	0.8%
1999	14.3	1.8	12.5	14.3	7.4	6.9	-3.2	0.1%
2000	-6.3	0.4	-6.7	-6.3	-0.3	-6.1	1.0	4.0%
2001	3.1	5.5	-2.4	3.1	4.8	-1.7	-4.7	-1.4%
2002	26.6	-1.7	28.3	26.6	4.9	21.8	-3.9	0.4%
2003	113.1	26.8	86.3	113.1	43.8	69.2	-9.7	-4.3%
2004	58.4	-18.7	77.0	58.4	0.0	58.4	-7.6	-2.5%
2005	67.9	1.0	66.9	67.9	16.2	51.7	-6.2	-0.7%
2006	43.1	5.2	37.9	43.1	17.1	26.0	-8.2	-2.0%
2007	36.6	-18.2	54.8	36.6	-2.2	38.9	-7.1	-0.8%
2008	-83.5	-21.6	-61.9	-83.5	-26.5	-57.0	-3.6	0.7%
2009	35.3	32.2	3.1	35.3	29.8	5.4	-4.1	0.4%
2010	-10.2	-6.1	-4.0	-10.2	-4.5	-5.6	-0.5	2.4%
2011	-12.3	7.4	-19.7	-12.3	1.0	-13.2	0.2	0.0
Average rates:								
1979-1995:	11.5	6.3	5.2	11.5	7.5	4.0	2.3	na
1996-2006:	33.1	2.1	31.0	33.1	10.0	23.2	-4.5	-0.1%
2007-2011:	-6.8	-1.3	-5.5	-6.8	-0.5	-6.3	-3.0	1.1%
Overall:	16	4	12	16	7	9	-1	0.3%

(1) Column 12, Appendix E
(2) Column 13, Appendix E
(3) (1)-(2)
(4) Column 12, Appendix E
(5) Column 14, Appendix E
(6) (4)-(5)
(7) Column 2, Appendix E
(8) Column 6 , Appendix I.2

Appendix G: Adjusting the current account and the external debt for inflation[37]

Consider the national accounting identity:

$$Y = C + I + (X - M) \quad \text{(F1)}$$

where Y is national income, C includes both private and public consumption, I is total investment and X and M are exports and imports respectively.

Let S be measured savings and be offshore interest payments on the external debt so that:

$$C = Y - S - R^n \quad \text{(F2)}$$

Substituting (D2) into (D1) and rearranging yields:

$$S - I = X - M - R^n \quad \text{(F3)}$$

Now the nominal interest payment comprises a real and an inflation component so that:

$$R^n = R^r + R^i \quad \text{(F4)}$$

Substituting (D4) into (D3) yields:

$$S = X - M - R^r - R^i + I \quad \text{(F5)}$$

Consider the case in which inflation is zero, so that there is no capital repayment term R^i; then:

$$S^* = X - M - R^r + I \quad \text{(F6)}$$

It follows that the difference in savings with and without inflation is

$$S^* - S = R^i \quad \text{(F7)}$$

We now turn to the impact of inflation on the measured net external liabilities (NIIP).

The standard identity for the current account balance is:

$$CAB = S - I \quad \text{(F8)}$$

Substituting (D5) for S yields:

$$CAB = X - M - R^r - R^i \quad \text{(F9)}$$

which in the absence of inflation becomes

$$CAB^* = X - M - R^r \quad \text{(F10)}$$

[37] The initial part of this appendix relating to savings draws on O'Mara and Walshaw (1992), Appendix 1, p.64.

so that the difference becomes

$$CAB^{*} - CAB = R^{i} \quad \text{(F11)}$$

Finally starting from the following identity for the stock of foreign liabilities:

$$NIIP_{t} = NIIP_{t-1} + CAB_{t-1} \quad \text{(F12)}$$

Substituting (D9) into (D12) yields

$$NIIP_{t} = NIIP_{t-1} + (X - M - R^{r})_{t-1} - R^{i}_{t-1} \quad \text{(F13)}$$

So that

$$NIIP_{t} = NIIP_{t-1} - R^{i}_{t-1} + CAB^{*}_{t-1} \quad \text{(F14)}$$

In other words the observed level of net foreign liabilities will overstated by an amount equal to the implicit capital repayment (the inflationary component) of R^{i}_{t-1}.

Appendix Table G.1 – Derivation of adjusted NIIP

	Total NZ investment abroad	Direct investment abroad (equity capital)	Portfolio investment abroad: equity securities	Total foreign investment in New Zealand	Direct investment in NZ (equity capital)	Portfolio investment in NZ: equity securities	NIIP	NIIP (% GDP)	NIIP excluding equity
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1989	7,201	5,263	197	51,346	8,412	1,378	-44,145	-63.1	-39,815
1990	14,756	7,585	248	60,484	12,293	1,561	-45,728	-61.8	-39,707
1991	20,897	13,108	461	68,357	13,294	1,766	-47,460	-62.9	-45,969
1992	22,501	13,090	917	74,803	17,698	855	-52,302	-69.5	-47,756
1993	18,962	12,425	1,128	82,854	21,244	2,473	-63,892	-82.5	-53,728
1994	23,474	13,242	1,482	90,845	27,220	1,451	-67,371	-80.6	-53,424
1995	24,935	14,353	1,888	95,994	31,966	2,283	-71,060	-79.5	-53,051
1996	34,742	18,812	6,497	105,603	40,695	425	-70,860	-74.3	-55,050
1997	33,096	18,838	7,040	112,966	43,641	1,503	-79,870	-79.8	-60,604
1998	34,733	19,340	8,337	124,056	50,618	376	-89,323	-86.0	-66,006
1999	40,121	30,024	8,367	127,261	50,632	453	-87,140	-82.5	-74,446
2000	48,366	31,449	13,416	135,451	50,969	817	-87,084	-77.7	-80,164
2001	85,026	17,031	15,264	172,549	38,153	9,620	-87,523	-73.9	-72,045
2002	94,807	14,556	28,843	179,153	39,459	9,675	-84,345	-66.3	-78,611
2003	90,684	15,970	22,590	180,565	40,348	11,251	-89,880	-67.1	-76,842
2004	96,666	16,362	29,874	197,192	43,759	14,700	-100,526	-70.2	-88,303
2005	102,296	16,555	32,382	212,859	44,385	16,631	-110,562	-72.2	-98,484
2006	115,969	15,635	42,802	233,657	45,179	17,435	-117,688	-72.8	-113,511
2007	123,820	16,694	44,747	252,080	49,759	16,774	-128,261	-75.5	-123,168
2008	136,308	17,363	44,395	272,914	48,766	13,569	-136,606	-74.2	-136,029
2009	136,923	21,164	32,535	293,932	47,569	10,038	-157,009	-84.6	-153,101
2010	137,430	18,569	43,111	288,121	49,486	12,654	-150,691	-79.4	-150,231
2011	166,972	19,794	46,221	299,325	48,594	13,533	-132,353	-66.7	-136,241
2012	158,500	17,941	43,043	304,139	53,649	12,549	-145,639	-70.7	-140,425

(1) 1992-2012: Statistics New Zealand: IIPA.S5AAA
1989-1991: Statistics New Zealand: IIPA.S4AD1
(2) 1992-2012: Statistics New Zealand: IIPA.S4AD1A1
1989-1991: Statistics New Zealand: IIPA.S4AD1
(3) 1992-2012: Statistics New Zealand: IIPA.S5AAA21
1989-1991: Statistics New Zealand: IIPA.S4AD1B1
(4) 1992-2012: Statistics New Zealand: IIPA.S5ALA
1989-1991: Statistics New Zealand: IIPA.S4AC1
(5) 1992-2012: Statistics New Zealand: IIPA.S5ALA11
1989-1991: Statistics New Zealand: IIPA.S4AC1A1
(6) 1992-2012: Statistics New Zealand: IIPA.S5ALA21
1989-1991: Statistics New Zealand: IIPA.S4AC1B1
(7) 1992-2012: (1)-(4)
(8) 1989-2012: (7)/(8) from Appendix B
(9) 1989-2012: [(1)-((2)+(3))]-[(4)-((5)+(6))]

Appendix Table G.2 – The level of net foreign liabilities with and without inflation

	NIIP excluding equity (sign inverted)	Inflation	Inflation adjustment	NIIP with inflation adjustment	Net national saving	Net national saving to GDP ratio	Adjusted net national saving	Adjusted net national saving to GDP ratio
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1989	39,815	4%	2,526	37,289	3,578	5.1	6,104	8.7
1990	39,707	8%	1,762	37,945	3,160	4.3	4,922	6.7
1991	45,969	3%	3,505	42,464	1,387	1.8	4,892	6.5
1992	47,756	1%	1,345	46,411	-1,382	-1.8	-37	0.0
1993	53,728	1%	522	53,206	-802	-1.0	-280	-0.4
1994	53,424	1%	701	52,723	1,932	2.3	2,633	3.2
1995	53,051	5%	580	52,471	3,264	3.6	3,844	4.3
1996	55,050	2%	2,522	52,528	3,780	4.0	6,302	6.6
1997	60,604	1%	1,212	59,392	2,775	2.8	3,987	4.0
1998	66,006	2%	740	65,266	2,945	2.8	3,685	3.5
1999	74,446	0%	1,237	73,209	2,191	2.1	3,428	3.2
2000	80,164	2%	-291	80,455	1,928	1.7	1,637	1.5
2001	72,045	3%	1,441	70,604	4,129	3.5	5,570	4.7
2002	78,611	3%	2,543	76,068	7,230	5.7	9,773	7.7
2003	76,842	1%	2,116	74,726	7,125	5.3	9,241	6.9
2004	88,303	2%	1,306	86,997	7,955	5.6	9,261	6.5
2005	98,484	3%	2,332	96,152	7,333	4.8	9,665	6.3
2006	113,511	4%	3,232	110,279	3,776	2.3	7,008	4.3
2007	123,168	2%	4,901	118,267	1,609	0.9	6,510	3.8
2008	136,029	4%	2,721	133,308	3,786	2.1	6,507	3.5
2009	153,101	2%	6,154	146,947	-2,049	-1.1	4,105	2.2
2010	150,231	2%	2,832	147,399	3,251	1.7	6,083	3.2
2011	136,241	5%	2,269	133,972	2,759	1.4	5,028	2.5
2012	140,425	1%	7,411	133,014	1,428	0.7	8,839	4.3

(1) 1989-2012: Statistics New Zealand, authors' estimate.
(2) 1989-2012: Statistics New Zealand: CPI All groups CPI009AA
(3) 1989-2012: (3)=(2)[t-1]*(1)
(4) 1989-2012: (4)=(1)-(3)
(5) 1989-2012: Statistics New Zealand: SNDA.SG00NAC00B08
(6) 1989-2012: Statistics New Zealand
(7) 1989-2012: (6)+(3)
(8) 1989-2012: (7)/(8) from Appendix B

Appendix Table G.3 – The level of household saving with and without inflation ($m)

	Net debt	Inflation adjustment	Household saving	Adjusted household saving	Adjusted household saving rate
	(1)	(2)	(3)	(4)	(5)
1978	-1863	-261	212	-49	-1%
1979	-2058	-252	329	76	1%
1980	-2187	-272	441	170	1%
1981	-2138	-383	412	29	0%
1982	-2350	-354	552	198	1%
1983	-3184	-541	458	-82	0%
1984	-3648	-303	354	51	0%
1985	-4242	-200	378	178	1%
1986	-3955	-657	371	-286	-1%
1987	-3235	-337	907	570	2%
1988	-1464	-277	2207	1930	5%
1989	614	39	1697	1736	4%
1990	2273	101	1368	1469	3%
1991	2977	227	643	870	2%
1992	4484	126	2064	2190	5%
1993	6207	60	407	467	1%
1994	8503	112	-14	98	0%
1995	10773	118	-1134	-1016	-2%
1996	13670	626	-1408	-782	-1%
1997	17758	355	-1473	-1118	-2%
1998	19583	219	-1289	-1070	-2%
1999	25754	428	-2010	-1582	-3%
2000	28893	-105	691	586	1%
2001	30358	607	-3102	-2495	-4%
2002	33270	1076	-2731	-1655	-2%
2003	42194	1162	-6835	-5673	-8%
2004	51409	760	-5899	-5139	-7%
2005	61350	1453	-5145	-3692	-4%
2006	69074	1967	-7112	-5145	-6%
2007	78704	3132	-6580	-3448	-4%
2008	77126	1543	-3660	-2117	-2%
2009	80295	3228	-4232	-1004	-1%
2010	79591	1500	-564	936	1%
2011	74277	1237	177	1414	1%

(1) 1978-2011: RBNZ Household assets and liabilities; authors' calculations
Deposits less housing and consumer loans
(2) 1978-2011: Inflation[t-1]*(3)
(3) 1978-2011: Statistics New Zealand: SNDA.SG00NAC00B08
(4) 1978-2011: (5)+(4)
(5) 1978-2011: (6)/(8) from Appendix B.

Appendix H: Adjusting for the inflationary tax on liabilities of the government held by the public

Appendix Table H.1 – Adjusting private sector assets for inflation

	Notes and coins held by public	Gross government debt	Overseas debt	Private claims	Inflation	Loss due to inflation	8. Private saving	Inflation adjusted private saving	GDP	Unadjusted ratio	Inflation adjusted ratio
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1972	171	3,187	654	2,704	7%	-	431	431	6,962	-	-
1973	192	3,503	564	3,131	8%	205	664	460	8,044	8.3	5.7
1974	211	3,735	465	3,480	10%	312	790	478	9,313	8.5	5.1
1975	254	4,200	1,081	3,373	15%	519	232	-287	10,141	2.3	-2.8
1976	296	5,558	2,164	3,690	18%	598	-58	-656	11,428	-0.5	-5.7
1977	326	6,289	2,563	4,051	14%	518	234	-284	13,876	1.7	-2.0
1978	366	7,484	3,256	4,594	12%	497	107	-390	15,534	0.7	-2.5
1979	404	8,820	3,676	5,547	12%	570	520	-50	17,662	2.9	-0.3
1980	453	10,346	4,297	6,503	18%	994	613	-381	20,359	3.0	-1.9
1981	500	11,617	4,809	7,308	15%	980	759	-221	23,766	3.2	-0.9
1982	524	14,381	6,688	8,218	17%	1,241	1,748	507	28,732	6.1	1.8
1983	594	18,733	9,178	10,148	8%	682	2,082	1,400	33,027	6.3	4.2
1984	642	21,879	9,367	13,153	5%	479	3,481	3,002	36,823	9.5	8.2
1985	653	28,246	13,916	14,983	17%	2,186	2,842	656	41,784	6.8	1.6
1986	723	32,002	15,595	17,130	10%	1,561	856	-705	48,242	1.8	-1.5
1987	797	42,472	21,822	21,447	19%	3,245	3,567	322	57,385	6.2	0.6
1988	877	39,068	19,269	20,676	6%	1,361	3,326	1,965	64,565	5.2	3.0
1989	978	39,721	16,777	23,922	4%	917	3,742	2,825	69,996	5.3	4.0
1990	1,047	44,347	20,041	25,353	8%	1,824	3,492	1,668	73,960	4.7	2.3
1991	1,071	43,935	20,198	24,808	3%	714	3,248	2,534	75,410	4.3	3.4
1992	1,087	47,105	20,036	28,156	1%	241	639	398	75,201	0.8	0.5
1993	1,110	47,478	23,523	25,065	1%	370	399	29	77,480	0.5	0.0
1994	1,225	46,429	26,829	20,825	1%	274	673	399	83,569	0.8	0.5
1995	1,340	44,530	23,418	22,452	5%	954	-226	-1,180	89,431	-0.3	-1.3
1996	1,405	41,901	21,896	21,410	2%	449	-453	-902	95,367	-0.5	-0.9
1997	1,503	36,236	20,649	17,090	1%	240	55	-185	100,098	0.1	-0.2
1998	1,598	38,475	19,969	20,104	2%	284	1,142	858	103,813	1.1	0.8
1999	1,735	37,307	17,384	21,658	0%	(73)	1,799	1,872	105,647	1.7	1.8
2000	1,889	36,580	16,368	22,101	2%	433	965	532	112,033	0.9	0.5
2001	2,068	37,194	16,946	22,316	3%	715	2,207	1,492	118,377	1.9	1.3
2002	2,250	36,650	20,069	18,831	3%	615	3,456	2,841	127,282	2.7	2.2
2003	2,402	36,617	17,343	21,677	1%	278	2,269	1,991	133,906	1.7	1.5
2004	2,540	36,017	18,100	20,457	2%	513	2,512	1,999	143,138	1.8	1.4
2005	2,681	35,478	16,444	21,715	3%	582	-1,227	-1,809	153,188	-0.8	-1.2
2006	2,851	35,867	18,191	20,527	4%	864	-5,083	-5,947	161,645	-3.1	-3.7
2007	2,953	36,805	15,398	24,360	2%	411	-6,925	-7,336	169,869	-4.1	-4.3
2008	3,168	37,745	18,156	22,757	4%	979	-7,981	-8,960	183,997	-4.3	-4.9
2009	3,410	50,973	20,393	33,990	2%	429	-5,528	-5,957	185,555	-3.0	-3.2
2010	3,481	58,891	24,397	37,975	2%	566	3,638	3,072	189,718	1.9	1.6
2011	3,692	77,290	36,159	44,823	5%	2,004	7,508	5,504	198,525	3.8	2.8

(1) 1972-2011: RBNZ
(2) 1972-2011: Treasury fiscal time series
(3) 1972-2011: RBNZ
(4) 1972-2011: (2)-(3)
(5) 1972-2011: Statistics New Zealand: CPI All groups CPI009AA.
(6) 1972-2011: (4)*(5)[t-1]
(7) 1972-2011: Statistics New Zealand: authors' estimates.
(8) 1972-2011: (7)+(6)
(9) 1972-2011: Statistics New Zealand: SNDA.SG00NAC00B15
(10) 1972-2011: (7)/(9)
(11) 1972-2011: (8)/(9)

Appendix I: Adjusting saving for investment items

Certain items of expenditure may provide a stream of benefits over time, therefore maybe be more appropriately classified as an asset rather than an expense. This involves removing the expenditure item from current consumption, and reclassifying it as an asset. Thus gross saving is increased. Net saving is different from gross saving, in that depreciation is subtracted. Subtracting cumulative depreciation, or equivalently entering this as an expense, distributed over the useful life of the asset, results in a net measure of saving. Now the expense is incurred in the period in which the economic benefit may be thought to be received. This flow of services is often assumed to be either constant or declining in an exponential fashion until the asset is depleted. We have used a double-declining balance method. Net measures of saving tend to be substantially lower than the associated gross saving rate, owing to this subtraction of depreciation. For example, the *net* investment in durables is relative small; however the *gross* impact on saving in 2011 as calculated here would be approximately 8 percentage points.

Appendix Table I.1 – Adjustments to net national saving

	Net national saving rate	Net govt. Health	Net govt. Education	Net private health	Net private education	Net consumer durables	Net R&D	Inflation adjustment	Adjusted net national saving
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1996	4.0%	2.0%	2.6%	0.2%	0.3%	1.7%	0.6%	2.6%	14.0%
1997	2.8%	2.0%	2.7%	0.2%	0.3%	1.9%	0.6%	1.2%	11.6%
1998	2.8%	2.1%	2.8%	0.2%	0.3%	1.0%	0.6%	0.7%	10.5%
1999	2.1%	2.3%	2.7%	0.2%	0.2%	1.1%	0.5%	1.2%	10.3%
2000	1.7%	2.2%	2.8%	0.2%	0.2%	1.4%	0.5%	-0.3%	8.7%
2001	3.5%	2.2%	2.8%	0.3%	0.2%	0.8%	0.5%	1.2%	11.6%
2002	5.7%	2.2%	2.7%	0.3%	0.2%	1.0%	0.5%	2.0%	14.7%
2003	5.3%	2.2%	2.9%	0.3%	0.2%	1.5%	0.5%	1.6%	14.4%
2004	5.6%	2.2%	2.9%	0.4%	0.1%	1.7%	0.5%	0.9%	14.4%
2005	4.8%	2.3%	2.8%	0.4%	0.1%	1.5%	0.5%	1.5%	13.9%
2006	2.3%	2.3%	3.7%	0.4%	0.1%	1.6%	0.5%	2.0%	12.9%
2007	0.9%	2.4%	2.9%	0.3%	0.1%	1.2%	0.5%	2.9%	11.3%
2008	2.1%	2.5%	2.7%	0.3%	0.1%	1.1%	0.5%	1.5%	10.8%
2009	-1.1%	2.7%	3.5%	0.3%	0.2%	0.3%	0.5%	3.3%	9.7%
2010	1.7%	2.8%	3.4%	0.3%	0.2%	0.4%	0.5%	1.5%	10.7%
2011	1.4%	2.7%	3.0%	0.3%	0.2%	0.4%	0.5%	1.1%	9.7%

(1) 1996-2011: Statistics New Zealand: SNDA.SG00NAC00B08
(2) 1996-2011: NZ Treasury: Fiscal time series
(3) 1996-2011: NZ Treasury: Fiscal time series
(4) 1996-2008: Ministry of Health: Expenditure and Trends, Appendix 3 (HES)
2010: HES.
(5) 2001, 2007, 2010: HES, authors' estimates.
(6) 1996-2011: Statistics New Zealand:
(7) 1996-2011: (bi-annually), GERD: Research and Development survey
Note: Values in time periods where no data was available have been estimated.

Appendix Table I.2 – Adjustments to net household saving

	Net household saving rate	Net private health	Net private education	Net consumer durables	Inflation adjustment	Adjusted household saving rate
	(1)	(2)	(3)	(4)	(5)	(6)
1996	-2.6%	0.4%	0.5%	3.1%	1%	2.5%
1997	-2.6%	0.3%	0.5%	3.3%	1%	2.1%
1998	-2.1%	0.4%	0.4%	1.7%	0%	0.8%
1999	-3.2%	0.4%	0.4%	1.8%	1%	0.1%
2000	1.0%	0.4%	0.4%	2.4%	0%	4.0%
2001	-4.7%	0.6%	0.4%	1.5%	1%	-1.4%
2002	-3.9%	0.6%	0.3%	1.9%	2%	0.4%
2003	-9.7%	0.5%	0.3%	2.9%	2%	-4.3%
2004	-7.6%	0.8%	0.3%	3.1%	1%	-2.5%
2005	-6.2%	0.8%	0.2%	2.7%	2%	-0.7%
2006	-8.2%	0.8%	0.2%	2.9%	2%	-2.0%
2007	-7.1%	0.5%	0.2%	2.2%	3%	-0.8%
2008	-3.6%	0.5%	0.3%	2.1%	2%	0.7%
2009	-4.1%	0.5%	0.4%	0.5%	3%	0.4%
2010	-0.5%	0.5%	0.4%	0.6%	1%	2.4%
2011	0.2%	0.5%	0.4%	0.7%	1%	2.9%

Sources: see previous page, and Appendix B.

Appendix J: Adjusting for NZ Superannuation Fund

Appendix Table J.1 – Adjustments to the stock measure of household saving arising from the accumulation of net wealth in the New Zealand Superannuation Fund (NZSF): 2002-2011

	NZSF Opening Balance	Active saving	Passive saving	Total change in net wealth	Household saving rate (%HDI)	Household saving rate including NZSF (%HDI)	Change in the household saving rate (%HDI)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
2002	600	600	15	615	26.6	27.5	0.9
2003	1,815	1200	69	1,269	113.1	114.8	1.8
2004	3,763	1879	193	2,072	58.4	61.1	2.7
2005	6,063	2107	492	2,599	67.9	71.0	3.1
2006	8,892	2337	963	3,300	43.1	46.9	3.8
2007	11,904	2049	1,070	3,119	36.6	40.0	3.3
2008	15,078	2104	-865	1,239	-83.5	-82.3	1.2
2009	16,456	2243	-2,767	-524	35.3	34.8	-0.5
2010	13,939	250	1,718	1,968	-10.2	-8.4	1.8
2011	15,657	0	2,996	2,996	-12.3	-9.6	2.6
2012	18,653	0	51	51	na	na	na
				Average (% of Household Disposable Income – HDI)	27.5	29.6	2.1

(1) From Fiscal Time Series: Historical Fiscal Indicators http://www.treasury.govt.nz/government/data
(2) This corresponds to the Crown contributions: Source as for (1)
(3) Fund revenue + Gains/losses – (Taxes + other expenses): Source as for (1)
(4) (2) + (3)
(5) Column (12) from Appendix E.1 and expressed as a % of Household Disposable Income
(6) (5) adjusted for the total change in net wealth from (4) and expressed as a % of Household Disposable Income
(7) (6) – (5)

Appendix K: International Comparisons

Current account, net and gross national saving, investment (% GDP)