

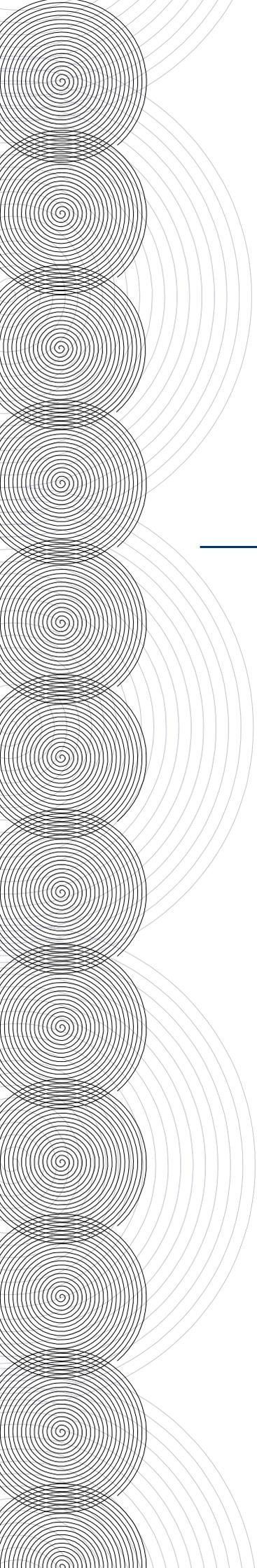
Periodic Report Group 2003

Background Paper

Savings in New Zealand: A Synthesis

The Treasury

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Saving in New Zealand: A Synthesis

NEW ZEALAND TREASURY

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THE TREASURY
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Part A: Key findings

Introduction and motivation

The adequacy of saving in New Zealand and the appropriateness of policy settings with respect to saving have been subjects of lengthy policy debate. A substantial body of work has been undertaken within the Treasury on these subjects. This paper seeks to draw together the main findings from, and in some respects extend, that earlier work, with the aim of providing a framework within which current and future policy questions can be addressed.

The paper covers a wide range of subjects related to saving, but with the underlying interests being:

- How does saving matter for raising economic growth and income levels? Our focus is on the links between saving, investment, a country's net foreign assets, and income.
- The determinants of, and policy influences, on the level of saving. We look at this aspect mainly through the lens of the saving behaviours of individuals (rather than businesses or the government), on the basis that long-run saving outcomes are importantly shaped by the preferences and incentives facing individuals.

The subject matter is organised under the following headings:

- Saving, investment and economic growth
- The open economy case: cross-border saving and investment
- Determinants of and influences on the supply of domestic saving
- New Zealand saving outcomes
- Policy issues, specifically: (i) financial education, (ii) taxation of saving, (iii) the institutional environment for saving, and (iv) financial regulation.
- Concluding remarks

Saving, investment and output growth

Saving, by definition, is equal to investment. Hence, increasing saving raises the amount of capital available to each unit of labour and/or, in the case of an open economy, results in increased net foreign assets (more on the open economy case below). In standard, so-called "neo-classical" models of economic growth increased capital intensity in production

results in a higher level of output, and a faster rate of growth in output during the transition to that higher level.

In these models, however, a higher level of saving and investment alone cannot sustain a permanently faster rate of output growth. This is because capital is subject to diminishing returns; that is, combining ever-increasing amounts of capital with a given amount of labour results in diminishing marginal contributions to output. It follows that ultimately the rate of growth in output is constrained to the rate of growth in the labour force, and in the rate of advancement in technology and business practices that enable labour and capital to be combined more effectively, referred to as multi-factor productivity (MFP).

In “endogenous” growth models, this constraint on the contribution that higher saving and investment can make to output growth is thought to be less binding, owing to the way in which investment itself can be a source of MFP growth. New technologies generally are embodied in new investment, and via this channel, investment additionally can serve as a catalyst for the development of new labour skills, as the result of “learning by doing”.

Taking these two classes of model together, we can conclude that an increase in the saving rate that results in an increased rate of productive investment will raise the level of output, and result in faster economic growth, at a minimum during the transition to that higher level, but also possibly beyond that owing to the role of investment in raising technology and skill levels.

The open economy case: foreign savings as a source of finance for investment

For an open economy, a change in the saving rate can be reflected in a change in investment abroad as well as a change in domestic investment. This means that an increase in saving need not result in a future increase in domestically produced output, but instead, if invested abroad, will result in increased claims on the output of other economies. Alternatively, increased domestic saving could result in a substitution of domestic saving for use of foreign savings, and smaller payments to foreign savers as remuneration for use of their savings. Either way, there would be an associated increase in future net income, whether sourced from increased claims on foreign production, from increased local production, or as the result of less of the income from that production accruing to foreign providers of saving.

An open economy, as well as being able to invest savings abroad, can also access foreign savings to finance domestic investment. This means that the level of domestic investment is not constrained to the level of domestic saving. However, it does not follow that financing investment from foreign savings is equivalent to financing investment from domestic saving. For foreign financed investment to contribute to raising domestic per capita income, the output it generates must exceed the payments that accrue to the foreign savers as the return on their saving. Generally that will be the case where there are “spill-overs” from the inward foreign investment, for example, where new technologies are embedded in inward foreign direct investment.

Finally, it should be noted that there is no necessary trade-off between the level of domestic saving and inward flows of foreign saving. Increased domestic saving can be accompanied with increased inflows of foreign savings as well, given the ability to invest both at home and abroad. And generally, it will be advantageous for an economy to both invest and borrow from abroad. This enables investment risks to be diversified and the indirect gains from inward foreign investment, for example, from technology spill-overs, to

be captured. It also means that a higher level of domestic saving does not reduce the scope to benefit from inward flows of foreign saving.

Determinants of and influences on the supply of savings

Understanding how people make saving/consumption choices is important for understanding the determinants of the supply of domestic saving, and for the design of the institutions and policies required to facilitate saving and investment. An assumption in most analyses of saving is that people make rational choices, based on a consistent set of time and risk preferences. Rationality assumes that people use available information, learn from mistakes, and do not act in a manner that is persistently contrary to their preferences.

It is further hypothesized that people seek to smooth consumption over their lifetime. In particular, they save during their income earning years and dis-save when retired. The fact that we observe generally positive levels of net private saving (by households and firms) suggests that other factors also influence saving behaviour. Two such influences are uncertainty, which motivates saving for precautionary reasons, and the bequest motive. These motivations for saving can readily be incorporated into a rational-agent based model of saving behaviour.

Other, quite different, insights are offered by a literature in behavioural economics. This literature suggests a need to qualify the underlying assumption that individual saving behaviour will always reflect “rational” choices. Insights from psychology suggest that people do not maintain consistent preferences over time and as a result face difficulties in initiating actions that have high up-front costs and distant benefits. They also have difficulties in adhering to long-term plans. This literature suggests that differences in the institutional environment for saving, particularly with respect to the availability and strength of mechanisms that assist people to commence, and bind themselves to, long-term saving plans will have a bearing on aggregate saving outcomes. Economies in which those mechanisms are relatively weak may be expected to have a lower saving rate than those in which they are strong.

Another possible impediment to saving is the information gap between lenders (savers) and borrowers (investors). Generally borrowers know more about their investment projects than do potential lenders. To overcome these information asymmetries, lenders need to assess potential borrowers before making a loan and monitor borrowers who have received a loan. This is costly. Financial intermediaries provide a mechanism by which these costs can be reduced. By developing specialised skills, and scale, in evaluating borrowers, financial intermediaries can evaluate borrowers more efficiently than can individual savers. But savers are still at something of an informational disadvantage, as they do not have as much information about the intermediaries they deal with as the intermediaries have on those they lend to. Financial regulation is concerned with reducing the costs of information asymmetry facing savers (and maintaining financial stability), thereby supporting the saving-investment process.

New Zealand saving outcomes

Over the last two decades aggregate saving in New Zealand, that is the sum of household, business and government saving, has fallen somewhat as a ratio of gross domestic product (GDP). This trend is evident across many OECD economies, though New Zealand’s saving rate has been lower, or among the lowest, for much of that period.

New Zealand's low "ranking" currently is mostly attributable to low private saving; the government's contribution to saving has been higher in the most recent decade compared with the preceding decade.

However, the margins relative to some other, notably "Anglo-Saxon", countries are not all that large, particularly when account is taken of significant uncertainties that surround the measurement of saving, and the caveats that need to be attached to cross-country comparisons. Nonetheless, small differences, if sustained over long periods, cumulate. In the case of New Zealand this has resulted in a net external liability position equivalent to 80 percent of GDP (as at the March quarter 2003), one of the highest ratios in the developed world.

Whether or not a comparatively lower level of saving should be of concern depends in part on our understanding of the causative factors. One possibility is that the rate of saving has been affected by transitional factors, for example, the deregulation of financial markets in the mid 1980s, which increased access to consumer credit. If transitional factors have been the dominant influence on private saving trends during the past decade or so, then, other things remaining equal, we would expect to see some increase in aggregate private saving in the period ahead. If we do not observe signs of that increase in saving occurring in the period ahead, that would point to other factors as having been more material in New Zealand's comparatively low level of saving.

Another issue concerns whether a high level of use of foreign savings makes the economy vulnerable to sharp changes in the sentiment of foreign investors. Most analyses of this issue have concluded that external vulnerability is not a current concern for New Zealand, but that if the currently strong financial (budgetary, financial system, monetary and exchange rate) policy frameworks that underpin that assessment were to weaken, then the current level of New Zealand's external obligations could become unsustainable, and possibly quite rapidly.

A further reason why a low level of saving might be viewed as a problem is because it is symptomatic of inadequate saving for retirement. However, that does not necessarily follow. A low level of saving in the aggregate could be the result of retired people dis-saving at a similar rate as the working population saves, and there is some evidence that supports that hypothesis. But, be that as it may, with the large "baby boom" cohort now in its highest income earning, highest saving, years, one might expect saving for retirement currently to be making a positive contribution to aggregate private saving.

A fourth possible reason for concern is that the income derived directly from foreign capital accrues to the foreign savers that provided the finance. The share of the output generated in New Zealand (net of income earned from investments abroad) that accrues as income to foreign providers of saving currently is equivalent to about 6 percent of GDP. This means that the current level of income of New Zealand residents is about 6 percent lower than it could have been if investment during, say, the past three decades had been fully financed from domestic savings. However, that amount can also be viewed as being reasonably modest relative to the constraints that the New Zealand economy would have faced if investment had been limited to domestic saving. Higher levels of saving during the 1970s, 1980s and 1990s would have involved some welfare cost insofar as consumption levels then would have had to be lower than they were.

Policy issues

There are at least four areas where policy can influence national saving outcomes: (i) financial education, to improve knowledge and change preferences; (ii) the structure of taxation, and possibly government spending instruments, that influence the incentive to save; (iii) the institutional environment for saving; and (iv) financial regulation to mitigate asymmetric information costs.

(i) Financial education

Financial education addresses an assumed market failure arising from people being insufficiently informed to make “optimal” saving/consumption choices. One of the reasons why people may be insufficiently informed is because financial intermediaries have only weak incentives to invest in this activity. The incentive is weak because the benefits will not be confined to an intermediary’s own customers but rather will accrue to the public more generally (giving financial education the attributes of a public good).

Financial education does not so much as seek to bias the saving/consumption choices people make, as to provide the information they need to make their own informed choices, although it can also be viewed as an attempt to counteract the behavioural traits mentioned above. However, financial education does not alter the incentives people face, and its ability to change preferences may be limited where those preferences are deeply embedded. Nor does financial education provide actual mechanisms that assist agents to initiate and bind themselves to saving plans.

(ii) Taxation of saving

In New Zealand most analysis of the structure of incentives people face in making saving/consumption decisions has been focused on tax. Analysis of tax policy with respect to saving has been cast in terms of the role of tax “incentives”. Two issues have been central: the fiscal cost of tax incentives and the potential for inefficiency of incentives.

Concerns about the fiscal cost of a reduction in the taxation of saving are predicated on such measures not being accompanied by an increase in the tax rate or other revenue raising measures, that is, on not being revenue-neutral. If compensating revenue-raising measures are not feasible, then providing tax relief for saving could jeopardize achievement of fiscal objectives and result in lower national saving, due to a larger fall in government saving than an increase in private saving. This is one reason why analysis of policy issues relating to the taxation of saving is best conducted within a revenue-neutral framework. A second reason is that in assessing the implications of a change in tax structure for allocative efficiency, it is important to take into account the increases in the taxes required to compensate for any reduction in the taxation of saving.

Embedded in any analysis of the allocative efficiency of alternative tax structures is some notion of what constitutes “tax neutrality”. One definition of tax neutrality is to tax all sources of income equally (source neutrality). This corresponds with the basic design of New Zealand income tax, which taxes the return for work, for entrepreneurial effort, and for saving, essentially equally. Such a tax regime, by not favouring one source of income over others, avoids creating allocative distortions across those different sources of income.

Another dimension to tax neutrality concerns avoiding distortions in allocations over time, for example, in making choices between whether to consume or to save (inter-temporal

neutrality). Tax regimes that defer the taxation of income saved until it is consumed or, equivalently, exempt the reward for deferring consumption are neutral in this respect. There is a number of different mechanisms by which a tax system can be so configured, although, in practice, not all options are equal as some mechanisms are less amenable to efficient tax administration and more open to avoidance opportunities than others. Also, different approaches have quite different implications for the progressivity of the tax system.

The two conceptions of neutrality outlined – source neutrality and inter-temporal neutrality – are conflicting; a tax regime that delivers source neutrality will lack inter-temporal neutrality and vice versa. But it is possible to structure the tax system to incorporate facets of both. In the case of New Zealand, the income tax sits on one axis (source neutrality) and the goods and services (GST) regime, which is one way to defer the taxation of income saved until it is consumed, sits on the other (inter-temporal neutrality). Where, and how, to strike the balance between these two dimensions of neutrality is a policy choice that will be influenced by judgments around the extent to which saving is a policy objective, the extent to which saving is sensitive to taxes, the implications for tax administration and avoidance opportunities, and the implications for the distribution of the tax burden.

In making that choice, regard also needs to be had for the implications for work/leisure incentives. The overall effect on work incentives of a (revenue-neutral) change in tax structure that reduces taxes on saving is theoretically ambiguous. Those with ample scope to take advantage of the tax change, by increasing their saving, would also face an increased incentive to work to fund the increased saving and hence increased future consumption. However, those who consume most of their income would face what, in effect, would be increased taxes on work, and hence a disincentive to work. If there are more of the latter than the former, the overall effect on work incentives would likely be negative. Also, the worsened incentives would be concentrated amongst lower income earners, which might be regarded as undesirable from an equity as well as from an efficiency standpoint.

(iii) The institutional environment for saving

Policy debate on saving has had a limited focus on the institutional environment for saving. The insights offered by the literature in behavioural economics suggests the institutional environment may matter for saving outcomes, perhaps at least as much as the structure of taxation. In this context, employment-based saving arrangements have been identified as a possible platform for developing the sorts of mechanisms that might help to address any behavioural traits against saving. If, and how, tax policy, or other policy instruments, could be used to encourage these kinds of development remains an open issue.

More comprehensive and direct means of compelling saving have also been considered. Compulsory saving may be a simple and direct means to counter the behavioural traits against saving, but that simplicity and directness can result in a loss of flexibility, and impose welfare costs where insufficient scope exists to accommodate diverse individual circumstances.

An alternative means by which the government may be able to influence national saving is through fiscal policy. By accumulating fiscal surpluses, the government can save on behalf of the community. To some extent the New Zealand government currently is already doing that. It has committed to maintaining fiscal surpluses for about the next 25

years, to build a fund (the New Zealand Superannuation Fund) to partially cover the rising future costs of publicly provided pensions, as New Zealand's population ages. This policy is directed not so much at achieving a structural and permanent lift in the New Zealand saving rate as at managing its own balance sheet and at smoothing the increase in taxes that will be required to finance rising pension costs. To be sure, as the fund is built, aggregate saving will increase, subject to any offset in private saving, but thereafter the fund will be drawn down, ultimately to a zero balance.

Whether there is a role for the government to save on behalf of the community to make up for any perceived shortfall in the underlying level of private saving is a wider question. A larger role for the government in saving than is presently envisaged would result in the government playing a greater role as an owner of investment assets, or, at least as a financial intermediary. That in turn involves questions around the appropriate scope of private and public ownership, and the role of the government as a financial intermediary, that go beyond the scope of this paper.

(iv) Financial regulation

The financial regulatory regime is another important element of the institutional environment for saving. In New Zealand, regulation of financial markets and institutions mainly involves the regulation of information that must be provided to savers and, through that mechanism, the fostering of financial market disciplines. This approach has been thought to be more effective in maintaining financial stability than alternative approaches that give greater emphasis to merit regulation, where a regulator monitors and enforces financial standards on behalf, and for the benefit, of savers. To the extent this is the case, a disclosure-based approach to financial regulation can be viewed as supporting the saving-investment process. At the same time, it may do less than merit regulation to mitigate the asymmetric information problem, in that it remains for savers to process and act on the information they are provided with. This can be costly, whether in terms of time taken to monitor and evaluate the information provided, fees paid for financial advice, or worry. Hence, structuring financial regulation in a way to best support the mobilisation of saving involves complementarities and trade-offs. Where to strike the balance between fostering market disciplines, and minimising the costs of asymmetric information, is another policy choice.

Conclusions

This paper does not come to definitive conclusions on whether New Zealand's currently lower level of saving relative to that in most other OECD countries calls for policy change. The margin by which saving in New Zealand is lower than that in some (mainly Anglo-Saxon) comparator economies, though persistent, is not large. There are also uncertainties around the relative weight to be attached to the transitional and more permanent factors that explain New Zealand's comparatively low saving outcomes as well as uncertainties in the data we have. Also some argue that the choices that have been made to sustain consumption and forego an otherwise higher level of future income and consumption may well reflect welfare maximizing choices – assuming that those choices have not been influenced by policy distortions.

However, we also caution against adopting an entirely sanguine view. The analysis summarized above indicates that saving/consumption choices are never fully independent from government policy settings, such as in areas of taxation and financial regulation. This leaves room for questions around whether current policy settings are “optimal” in all respects. In that connection it may be instructive for future work to benchmark New

Zealand's policy settings in the areas discussed against those of comparable countries. Judgments on the appropriateness of current policy settings might also be informed by ongoing monitoring of saving outcomes, with a view to coming to firmer conclusions on the transitional versus structural explanations for New Zealand's comparatively lower saving rate.

Part B: A synthesis

1 Introduction

The adequacy of saving in New Zealand has been a subject of lengthy debate, and the sense of disquiet about the rate of saving seems to have a number of origins. First is a possible concern that an inadequate level of domestic saving will constrain investment and, by implication, reduce capital accumulation and the subsequent growth of income. Second, low levels of domestic saving may lead to increased use of foreign saving and, at some point, the concomitant cumulative increase in the country's external obligations may be a cause for concern. Third, the rate of households' saving may affect their ability to meet the costs of health, education and, above all, retirement, without greater reliance on the state.

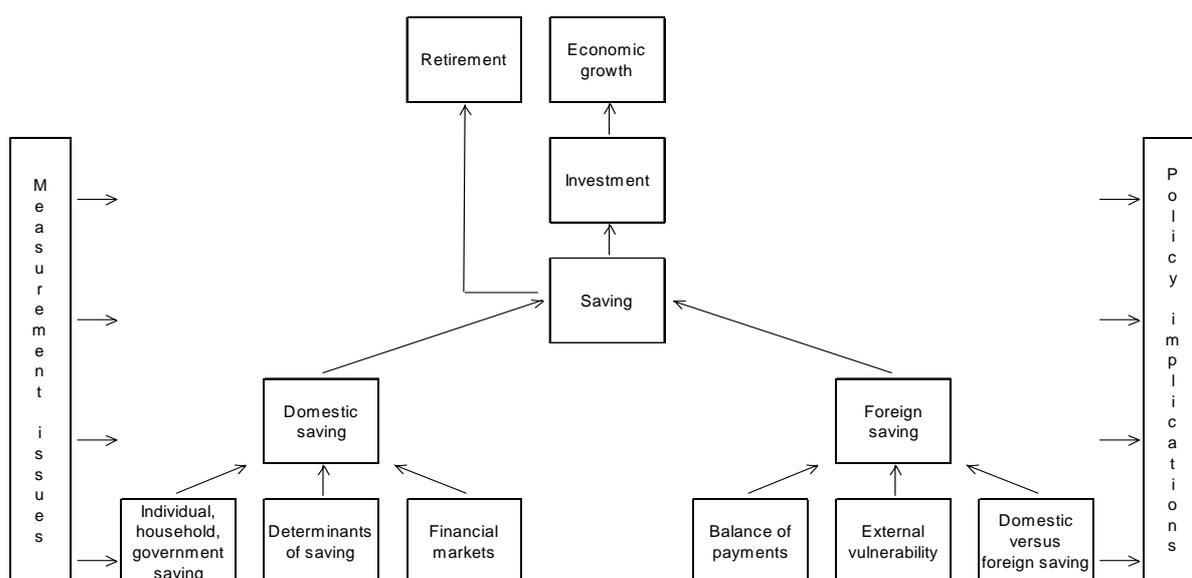
The aims of this paper are to draw together the findings from earlier Treasury work on saving and to consider how they can be forged into a framework that can be used in future analysis of what constitute appropriate policy settings with respect to saving. Our core interests in this paper are in the role of domestic saving as a factor that affects economic growth and future per capita income levels and how policy influences domestic saving outcomes.

Our focus also is mostly on the saving behaviour of individuals/households. This reflects a view that in a market economy, long-run outcomes are importantly shaped by the preferences and incentives facing individual agents. Policies directed at changing the level of saving by the government, or by firms, but that do not flow through to the preferences and incentives facing individuals, can be expected to be offset, at least in part, and over time, by adjustments in the saving behaviour of individuals. If that is the case, then the policy environment in respect of individual saving takes on a particular, though not exclusive, significance.

The remainder of this paper proceeds as follows. The next section discusses the link between saving, investment and economic growth, essentially in a closed economy context. Section 3 broadens the analysis to consider some of the issues that arise for an open economy, when saving can be raised from and invested abroad. Section 4 discusses the determinants of and influences on the level of saving domestically, including with respect to the role of the financial system. In section 5 we review the data on saving outcomes for New Zealand and discuss some issues with respect to how saving is measured. Section 6 sets up a framework for policy analysis, and section 7 concludes.

Figure 1 outlines schematically the scope of the paper, and how the different subjects identified link to saving.

Figure 1 – Organising framework of the paper



2 Saving, investment and economic growth

In this section, we consider the relationship between saving and the level and rate of growth of output. The main points can be summarised as follows. Total saving in an economy is by definition equal to total investment. Theory predicts that an increase in investment leads to a higher level of output, and a faster rate of growth in output during the transition to that higher level. However, a higher level of saving and investment, by itself, may not lift the *growth rate* of output permanently. For that to occur, a higher level of saving and investment needs also to contribute to faster (multi-factor) productivity growth, which it may do if the investment results in the introduction of, for example, new technology.

A popular model of the relationship between investment (and hence of the saving that finances investment) and output is the neo-classical growth model of (Solow 1956) and (Swan 1956). Despite its rudimentary structure and that it assumes a closed economy, it yields useful insights. In particular, the Solow-Swan model shows that an increase in the stock of capital leads to a higher level of output, and faster growth while the economy moves to that higher level of output, but not permanently faster growth.¹ The absence of permanently faster growth results from an assumption that there are diminishing marginal returns to capital, that is, as more capital is added to a given amount of labour, the incremental additional output from each additional unit of capital gets progressively smaller. This means that, even if the capital stock grows faster than the labour force or productivity, the rate of output growth in the long run is constrained to the rate of growth of

¹ All assuming that the capital is allocated to productive uses. This assumption bears emphasis, given that policies designed to increase saving and investment can be associated with a mis-allocation of capital. If this occurs, then the increase in growth from increased capital will be more limited, quite apart from being only temporary. For this reason, some authors regard the processes for allocating saving to productive use as being more important than the level of saving, although obviously both are important. Our knowledge of the quality of investment in New Zealand is limited, although some work suggests that the rate of return on capital, measured by the ratio of operating surplus to total value added, in recent years has been higher than in other OECD countries (Claus and Li 2003).

those factors.² In other words, in this model, an increase in saving and investment has level, but not growth effects. (A more formal presentation of the Solow-Swan model is presented in Appendix 1.)

In practice, the dynamics around the saving-investment-output process just described can be long and complicated, and the distinction drawn between the level and growth effects of increased saving/investment may not be nearly as sharp. For example, a period of slower growth in consumption, and correspondingly increased saving, need not be matched simultaneously with increased productive investment, but instead may accumulate as inventories. Also there may be lags before new productive investment generates output. Indeed, the horizon over which the adjustment to the levels occurs may be sufficiently long as to be reflected in higher annual rates of growth in output over a run of years, perhaps as long as a decade or more. But none of this detracts from the key insights. Those are that increasing saving and investment generally will contribute to lifting the level of output albeit at a diminishing rate.

Endogenous growth models, in contrast to neo-classical growth models, do not limit the contribution of saving and investment, in the long run, to just level effects. In these models growth is not so constrained by diminishing returns to capital, because of assumed spill-overs from investment to other factors of production and/or productivity. For example, (Lucas 1988) suggested that an individual's human capital accumulation might have external effects, by raising the productivity of other workers (even though the other workers do not contribute to the cost of educating/training of the individual who accumulates human capital). Likewise (Romer 1990) developed a model where research and development (R&D) investment increases the available pool of knowledge that firms can draw on (without cost). Similarly new investment may be a channel for the diffusion of new technologies that contribute to lifting productivity.

Another extension to the Solow-Swan growth model is to allow the saving rate to be determined endogenously, that is, to be influenced by the level and rate of growth in income (as in Ramsey, 1928, Cass, 1965 and Koopmans, 1965). In these models the paths of consumption and hence saving are determined endogenously, by optimising households and firms who interact in competitive markets subject to inter-temporal budget constraints. The saving rate is not constant like in the neo-classical Solow-Swan growth model, but instead is itself a function of the capital stock, labour and technology. These models are consistent with the empirical evidence that saving rates tend to rise with income.³

² The reference here is to multi-factor productivity (MFP), that is growth in output that stems from combining capital and labour more efficiently. Growth in multi-factor productivity is to be distinguished from growth in labour productivity, which includes the contribution to increased output per unit of labour input that comes from increased capital intensity as well as growth in MFP.

³ See, for example, (Carroll and Weill 1994) and (Attanasio, Picci and Scorcio 2000). For New Zealand, there is also evidence to suggest that higher real output growth produces greater saving (Claus, Haugh, Scobie and Tornquist 2001).

3 The open economy case: cross-border saving and investment

Our next question concerns the sourcing of saving to finance domestic investment. Much of the discussion in New Zealand on saving has revolved around whether the level of domestic saving has constrained investment, and hence output. The general conclusion has been that investment and output have not been constrained, owing to the demonstrable access that New Zealand has had to international capital markets, and hence to the global pool of savings.

However, while access to foreign saving has enabled investment and hence output to be maintained above the levels that would have been possible in the absence of that access, there are several reasons why domestic and foreign saving may not be equivalent. This section explores those issues.

3.1 The national income accounting relationships

The national income accounting framework provides a useful way to think about saving and investment. Output (Q) produced within an economy must equal the sum of domestic and foreign spending on that output. Domestic spending comprises private consumption (C), investment by households, firms and government (I) and government current expenditure on goods and services (G).⁴ Net exports, that is, exports less imports (X – M), represent foreign demand for domestically produced goods and services. Hence:

$$Q = C + I + G + (X - M) \quad (1)$$

To derive national income (Y), we need to add the claims of New Zealand residents on foreign-produced output (mainly income earned on investments abroad) and deduct the share of income earned within New Zealand that is attributable to foreign residents (principally the returns that foreign investors earn in New Zealand). If we label the net amount of such income as net foreign income (NFI), then we can define national income as:

$$Y = C + I + G + (X - M) + \text{NFI} \quad (2)$$

National saving (S) can be defined as the difference between national income and consumption, both private (C) and public (G):

$$S = Y - (C + G) \quad (3)$$

which we can see from (2) means that:

$$S = I + (X - M) + \text{NFI} \quad (4)$$

The current account balance of the balance of payments (CAB) corresponds with

$(X - M) + \text{NFI}$, which means that:

⁴ Government outlays on transfers, such as welfare benefits, are not included, as they do not involve spending on goods and services. Rather they finance spending by households, hence the term "transfers".

$$S - I = CAB \quad (5)$$

Rearranging and changing the sign on the CAB (so that deficits are presented as a positive balance) gives:

$$I = S + CAB \quad (6)$$

That is, investment can be financed by domestic saving (S) and by the current account balance (CAB). When the current account balance is in deficit, the excess of investment over domestic saving is financed by foreign saving, that is, by the net capital inflows that correspond with, and finance, the current account deficit. This means that an economy with access to foreign capital can augment its investment by using foreign saving.

The above relationships are expressed in terms of gross saving and investment. Net national saving (NS) and net investment (NI) are represented by the corresponding gross measures less allowance for depreciation (D) of the existing stock of capital:

$$NI = NS + CAB \quad (7)$$

where $NI = I - D$ and $NS = S - D$.

Equation (7) can then be written as:

$$I = NS + D + CAB \quad (8)$$

From equation (8) it is evident that total investment outlays (on both replacement capital and new capital) are financed from three sources: net saving, depreciation (which, as income retained by firms, can also be thought of as saving by firms) and from abroad. Hereafter, references to saving and investment are to the net measures, unless otherwise stated.

Figure 2 – Saving-investment identity for 2002 (dollar millions)

Net total saving 8,487	Foreign saving 2,595	Current account (CAB) 2,595	Net investment (NI) 8,726
	Government saving 1,472	Net national saving (NS) 5,892	
	Business saving 6,949		
	Household saving -2,529		Statistical discrepancy: 239

Source: Statistics New Zealand, The Treasury, authors' calculations

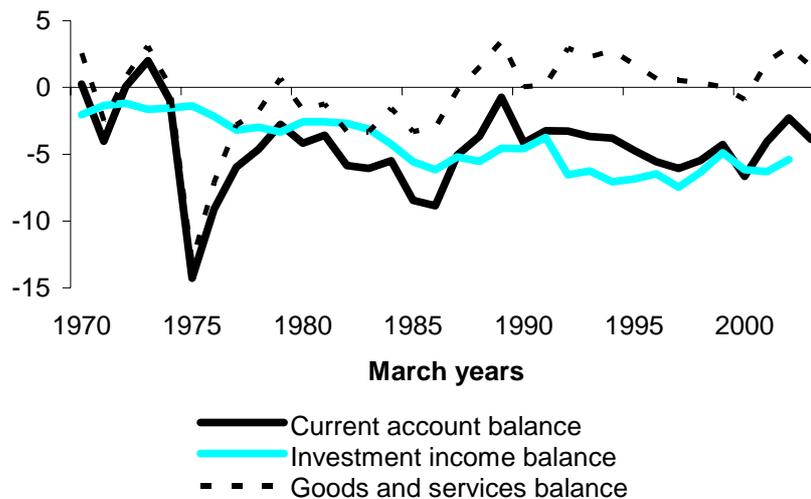
The relationships between investment, saving and the current account are illustrated schematically, with reference to data for New Zealand for 2002 (March year), in Figure 2.⁵ It shows the contributions of foreign, government, business and household saving to total net investment in the economy.

3.2 New Zealand’s use of foreign saving: the current account balance

In New Zealand domestic investment has exceeded domestic saving, and has been associated with an inflow of foreign capital.⁶ The inflows of foreign saving on the capital account of the balance of payments are mirrored in the current account deficit (Figure 3).

The core element of New Zealand’s persistent current account deficit, at least since the mid 1980s, has been a large net investment income deficit. The investment income account captures the return to the growing net amount of foreign capital, or saving, that New Zealand has accessed from abroad. That stock of net obligations to the rest of the world in the March quarter 2002 amounted to \$99 billion or 81 percent of GDP (one of the highest ratios amongst developed economies) and the net investment income deficit since 1992 has averaged about \$6 billion or 6.4 percent of GDP.

Figure 3 – Current account balance (as a percent of GDP)



Source: Statistics New Zealand, authors’ estimates

3.3 Might low domestic saving constrain investment?

This issue largely revolves around the “Feldstein-Horioka puzzle”, which is based on the empirical observation that “most of the incremental saving in countries remain(s) there – countries’ savings do not tend to seek out the most productive investment opportunities worldwide” (Feldstein and Horioka 1980). While the Feldstein-Horioka claim that domestic investment is mostly determined by domestic saving is probably an over-simplification, observed “home bias” in investment portfolios (ie investors holding less of their wealth in foreign assets than is optimal for diversification) does suggest that there may be some

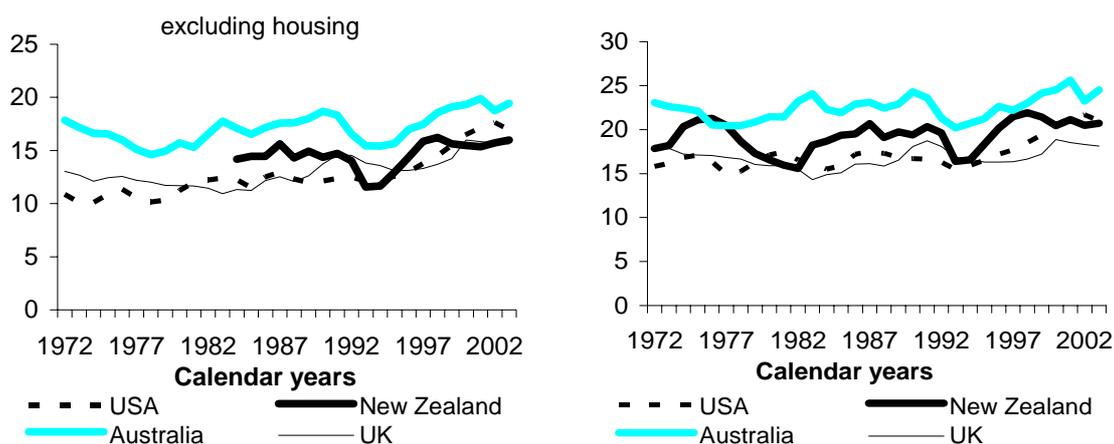
⁵ The data used in Figure 2 are described in more detail in section 5.

⁶ The direction of causation, from domestic saving to capital inflow, or vice versa, is debateable.

barriers to capital mobility. One factor thought to explain this home bias is cross-border information asymmetries. Investors have easier access to information about investment opportunities closer to home, and this may result in a preference for investing closer to home. Also, in some countries there are regulatory restrictions on the extent to which certain investment intermediaries can invest abroad.

However, there is evidence that suggests smaller countries may be less affected by home bias, which also seems to be the case in New Zealand. Also, there are virtually no regulatory restrictions on capital movements out of, or into New Zealand (excepting a relatively light-handed approval regime for inward foreign direct investment). Overall, capital appears to be flowing more freely into and out of New Zealand than in other countries (Claus *et al* 2001). This suggests that in the case of New Zealand a comparatively low saving rate should not constrain investment. Evidence to support this proposition includes that New Zealand's use of foreign capital, relative to the size of the economy, is amongst the highest in the world; that the level of gross fixed capital formation (investment) in New Zealand has been within the range for other OECD countries (Figure 4); and that shocks to the New Zealand economy, at least during the last decade or so, have been absorbed more by saving than by investment.

Figure 4 – Gross fixed capital formation: New Zealand versus selected countries (as a percent of GDP)



Source: OECD

A related issue, raised in the New Zealand context by Skilling (2002a), is that the effect of cross-border information asymmetries may be reflected more in the allocation than in the quantity of investment. The proposition is that, because of information asymmetries, foreign investors have a bias toward investing in well-established, low risk, investments. To the extent this is the case, a low level of domestic saving may result in less capital being available for investment in local “sun-rise” industries, and thus a higher cost of capital for those industries (compared with if domestic saving was more plentiful). These issues would benefit from further examination, with a view to improving our knowledge of the cost of capital facing New Zealand firms.

Reliance on foreign saving may also increase the cost of capital to domestic firms because increased external indebtedness raises the probability of default or, where foreign obligations are denominated in local currency, exchange rate risk. Lenders can be expected to demand a premium to compensate for taking on the additional risk. And

where the market for foreign capital is fully integrated with domestic financial markets, as is the case for New Zealand, that premium will be reflected in the cost of domestic as well as foreign capital.

Studies on the cost of capital in New Zealand have been undertaken using aggregate data, but virtually no information is available at the firm or industry level. Lally (2000) compares the real cost of capital in New Zealand, Australia and the United States and finds that the New Zealand real government bond borrowing rate over the second half of the 1990s was comparable with, or only modestly higher, than in Australia, but significantly higher than in the United States. This is in line with the results in Hawkesby, Smith and Tether (2000), who find that, over the 1990s, the risk premium in New Zealand's interest rates versus interest rates in the United States was quite significant, but was much smaller versus Australian rates. Lally (2000) found the risk premium for equity capital in New Zealand to be similar to that for government bonds.⁷ Using a panel of OECD countries, Plantier (2003) also finds a persistent margin between real interest rates in New Zealand and the rest of the world, albeit a declining margin.

A range of explanations has been offered for these premia in New Zealand interest rate and equity yields. One is the high level of New Zealand's external obligations. The results in Plantier (2003) provide some support for this hypothesis. Another is that New Zealand dollar yields incorporate a "liquidity risk" premium, stemming from the fact that the market for New Zealand assets is small, and hence that it may be difficult to exit a New Zealand dollar currency exposure at the prevailing exchange rate. A recent study by Orr and Conway (2003) of interest differentials across a number of currencies has suggested that countries' current account balances and the liquidity of their currencies are both explanatory factors.

3.4 External vulnerability

The focus on whether a high level of external indebtedness and persistent current account deficits make a country vulnerable to shocks intensified following the external financing crises experienced in the 1990s by a succession of countries; Mexico, a number of East Asian economies, and Russia being most notable. At first glance, New Zealand appeared to share some characteristics with those countries, at least in respect of its external position. However, deeper analysis generally has suggested that while New Zealand's external position does represent an exposure, the policy frameworks in New Zealand (covering monetary, fiscal, financial sector and exchange rate policy) provide a solid underpinning, and effective shock absorbers.⁸

The sustainability of the external liability (current account and associated net external liability position) depends on the willingness of foreign investors to continue to provide the necessary financing. That, in turn, is founded on assessments of the willingness, and ability, of New Zealand borrowers to continue to service their external obligations. In terms of the aggregate inter-temporal budget constraint, the present value of current and expected future primary (trade) surpluses must equal the current outstanding stock of net external obligations.

This condition generally is thought more likely to be respected where the obligations are private. Private sector borrowing that reflects the informed investment decisions of

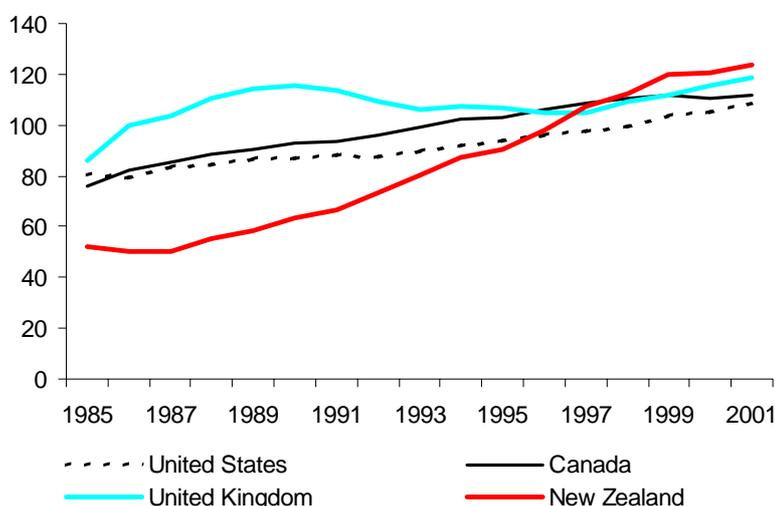
⁷ For a discussion of market equity risk premiums see (McCulloch 2001).

⁸ See, for example, Woolford, Reddell and Comber (2001), Collins, Nadal De Simone and Hargreaves (1998) and International Monetary Fund (2003).

households and businesses, and which have been subject to rigorous and independent scrutiny by those who lend, provides the underpinning for the serviceability of the aggregate level of external obligations incurred. Where this is the case, a current account deficit should not result in generalised default on external obligations (Corden, 1991 and Pitchford, 1995).

Correspondingly, where it may be a problem is where the excess of spending reflects spending that has not been subject to rigorous evaluation of the costs, benefits and risks – say, where weak budgetary processes result in growth in unproductive government spending, or where the financial intermediation process is weak. For New Zealand, the great bulk of the obligations to foreign providers of capital comprise private capital raisings (debt and equity) from private offshore lenders and investors. Also, much of that has been intermediated through the New Zealand banking system, which is generally thought to have sound balance sheets, implying strong debt servicing capacities by the underlying borrowers.

Figure 5 – Household liabilities (as a percent of disposable income)



Source: OECD, Reserve Bank of New Zealand

New Zealand's current account position (over the period June 1982 to September 1999) has been subjected to formal evaluation by Kim, Buckle and Hall (2001). Using statistical tests and an inter-temporal optimisation model, they found that despite the substantial deterioration in the current account deficit during the late 1990s, the current account position for the period as a whole was consistent with the solvency condition.⁹ Moreover, as Collins *et al* (1998) note, with a floating exchange rate, any emerging foreign investor concerns about the current account are likely to result in a depreciation of the exchange rate. Provided the foreign obligations are denominated in local currency, the exchange rate depreciation largely absorbs the shock and, in effect, transfers it to those holding the devalued New Zealand dollar claims.¹⁰

A large part of the increase in New Zealand's external indebtedness can be traced to increased household borrowing, funded by banks, who in turn have raised large amounts

⁹ The optimisation model reflects the "permanent income hypothesis" of consumption and saving, where the private sector consumes the *annuity value* of its total discounted wealth net of government spending and investment.

¹⁰ Statistics New Zealand surveys indicate that over 90 percent of the offshore obligations of New Zealand borrowers are either denominated in foreign currency, or have been hedged into New Zealand dollars.

of funding from offshore (partly on the strength of overseas parent bank balance sheets). This increase in household borrowing has brought a spotlight on to the increased gearing of the household sector, but international comparisons indicate that New Zealand household debt ratios are now in line with those observed in other developed countries, having previously been below (Figure 5).

3.3 The external investment income account deficit

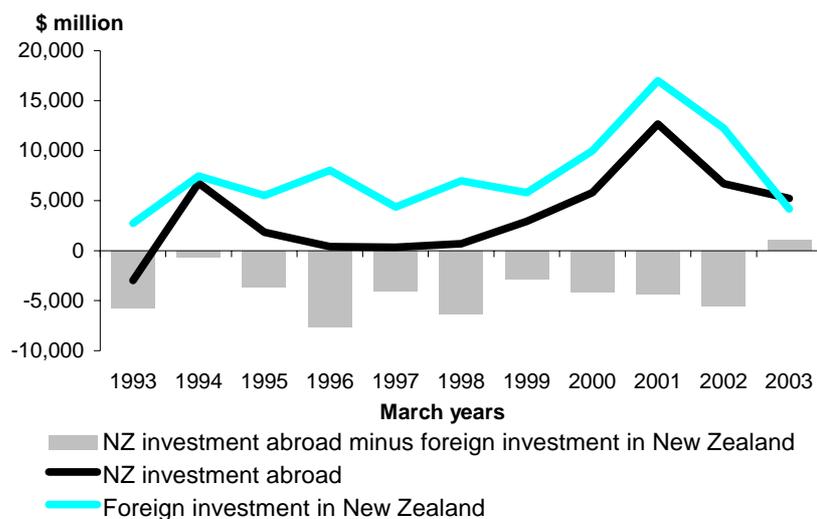
Even if financing investment from foreign savings has enabled investment, and thus output levels to be maintained as if domestic saving was higher, and has not generated a risk of external insolvency, there is a cost in financing investment from foreign rather than domestic savings. This cost arises from future generations having to consume less of the economy's future output, so as to release more to meet interest and dividend payments on the capital invested by foreigners. These interest and dividend payments (net of interest and dividends received from abroad) constitute the investment income account deficit on the balance of payments, and account for a gap between New Zealand's level of GDP, the measure of output produced within the New Zealand economy, and gross national income (GNI), the measure of income that accrues to New Zealand residents.¹¹ In the context of an objective to lift the living standards of New Zealand residents, the more relevant measure of progress is GNI (per capita). The level of GNI per capita has been consistently lower than GDP (output) per capita, in recent years to the extent of about 6 percent of GDP.

However, it does not necessarily, or even likely, follow that national income would be higher if New Zealand was less open to foreign capital markets. Accessing foreign capital enables investment to be maintained at a higher level than could be financed from domestic saving alone. While the direct return to capital generated by that investment does not add to New Zealand's national income, the investment can still make an indirect contribution – for example, by enabling greater employment of New Zealand labour and natural resources, or at higher rewards than they would otherwise have received. Also, foreign sourced investment can act as a vehicle for the inward transmission of foreign-sourced technology and skills, and for linking to global markets.

But neither does it follow that accessing these benefits from using foreign saving has to mean forgoing the benefits from raising saving domestically. An economy with open capital markets can simultaneously access savings from abroad (and capture the indirect benefits from that) and use domestic savings to invest abroad. A motivation for this two-way flow of saving is risk diversification. This two-way cross-border flow of saving is reflected in the New Zealand data (Figure 6).

¹¹ The other factor behind New Zealand's net investment income account deficit has been a difference between the investment returns earned on foreign investment in New Zealand and the returns earned on the overseas investments of New Zealand residents, which has been substantially in favour of the former. The reasons for this need further investigation.

Figure 6 – New Zealand's financial account (New Zealand dollar million)



Source: Statistics New Zealand

It follows that there is no necessary trade-off between an economy's level of domestic saving and its ability to benefit from "gains from trade" in capital. There is a direct parallel here with international trade in goods and services, in that there is no connection between the breadth and depth of an economy's participation in international trade in goods and services and the size, or sign, of its net trade balance. An economy actively engaged in international trade (as reflected in high ratios of imports and exports to GDP) can have a trade surplus, a trade deficit, or trade balance. Similarly, for an economy to be well-integrated into international capital markets, and to capture the benefits from cross-border capital flows, it need not necessarily be a net capital importer: an economy can have more of both domestic saving and inward foreign investment.

Judgements on a country's overall level of domestic saving, therefore, can be largely divorced from issues around the potential gains to be derived from cross-border capital flows. Where there *is* a trade-off is between consuming now, and saving/investing for a higher income and greater consumption opportunities later. In other words, an economy can grow its future income by saving (and investing) more now, but at the cost of a loss of current welfare as the result of having to consume later rather than now. In this sense, the issues around the "optimal" balance between financing investment from domestic saving, and from foreign saving, are no different from those concerning the optimisation of saving/consumption choices in a closed economy. At the heart of the matter are the ways in which consumption/saving preferences are formed, the incentives that people face, and the intersection of the two.

4 Determinants of and influences on the supply of domestic savings

The reasons why people save are many and complex, although most economic theory on the subject has centered on a standard model in which people optimize inter-temporal utility by choosing between consumption and saving in a way that smoothes consumption

over time. Embedded in this model of saving behaviour is an assumption that people make rational choices between consuming and saving, based on a consistent set of time and risk preferences. Most theoretical advances of the last decade, which have introduced how the saving behaviour of agents will be influenced by uncertainty (precautionary saving) and liquidity constraints (which constrain the scope to smooth consumption by borrowing), have taken place within the confines of this framework (Coleman 1998).

However, there has also emerged a literature that suggests a need to qualify the standard assumption that agents act rationally. This literature draws on insights from psychology and takes as its point of departure the possibility that individuals' preferences are not maintained consistently over time, particularly where long horizons are involved. We also discuss how the saving behaviour of individuals/households may be influenced by saving done by the business and government sectors.¹² Finally, we examine the role the financial system plays in reducing the monitoring costs that savers would otherwise face because of information asymmetries between borrowers and lenders, and its role in mobilising and allocating saving.

4.1 The underlying micro-behaviour assumptions

There are at least three broad reasons for saving. First, people save to meet certain long-term objectives, such as a comfortable retirement, the purchase of a house or car, to travel, or to pay for the education of their children. Since many of these needs occur at fairly predictable stages in one's life, this type of saving is called life-cycle saving. The second type of saving is precautionary saving; that is, people save to protect themselves and their families against unexpected events, such as job loss or health problems. They may do this individually (self-insure), or by buying insurance, which enables risks to be pooled. Generally, the stock of savings required to cover risks that are pooled will be less than where individuals save to cover risks on an individual basis. A third reason to save is to accumulate an estate to leave to one's children, or to a charity. Saving for the purpose of leaving an inheritance is called bequest saving.¹³

4.1.1 The life cycle model of saving

Most theoretical models of individual saving behaviour are founded on the life-cycle model of Modigliani and Brumberg (1954), Ando and Modigliani (1963), and Barro (1974). In these models, individuals choose how much to save/consume and how much to work over their lifetimes. Moreover, in the Barro model, individuals also care about their descendants' welfare. These models all assume that consumption exhibits diminishing marginal utility, such that, in order to maximise utility, households smooth consumption over time (and in the case of the Barro model, across generations). These models predict, for example, that individuals will save when income is high (during their high-earning, middle-aged years) and dis-save when income is low (during youth and retirement).

There is a debate in the literature on the extent to which the life-cycle model of saving is consistent with the saving behaviour reflected in the data. Generally the empirical evidence is found to provide some, but far from full, support for the life-cycle hypothesis, at least in its simple form. The major empirical shortcomings of the model appear to be

¹² Henceforth we use the terms individuals, households and people inter-changeably.

¹³ See (Coleman 1998) for a more comprehensive discussion of the reasons why people save.

that consumption, and hence saving, is excessively sensitive to temporary changes in income. Moreover, there are constraints on the ability to borrow against expected future income, and the elderly do not dis-save nearly as much as the model predicts. However, more recent and sophisticated versions of life-cycle saving models, that take account of uncertainty and precautionary saving, and of a bequest motive, perform better (Coleman 1998).

New Zealand research provides some support for the life-cycle model. In New Zealand, saving patterns for households show a hump shape over the life cycle; that is, saving rates increase throughout households' working life, peak when household heads are between ages 55 and 60 and show a tendency to decline thereafter. These results are based on unit record data from the Household Economic Survey (HES) for 1984 to 1998 (Gibson and Scobie 2001). Coleman (1999) finds a broadly similar pattern using the Household Economic Survey for 1998.

Further evidence supportive of a life-cycle pattern to saving in New Zealand is provided in a study focussed on the question: "Are New Zealanders saving adequately to finance their retirements?" (Scobie and Gibson 2003). Based on current wealth, income, and saving rates of the 45-55 aged cohort (in 2001), this study concluded that, at least for that cohort, current saving behaviour, and past saving as reflected in accumulated wealth to date, was aligned with what a life-cycle model would have predicted. The study estimates that the median saver (within each wealth decile) would have sufficient wealth at retirement to sustain consumption during retirement at pre-retirement levels, as well as to bequeath a residence. As noted, this result may be taken as providing evidence that is supportive of life-cycle saving behaviour, albeit on the basis of only a snapshot of one cohort at one point of time, and assuming that that cohort will fully consume in retirement all its at-retirement non-residential wealth.

It should also be noted, however, that individuals whose saving behaviour accords with that predicted by the life-cycle model will accumulate little saving over their life-time as a whole. They dis-save in their old age at a rate that consumes the savings built up during their working life. This suggests that saving for retirement may not be a source of aggregate saving to finance growth in the stock of capital, since the saving of the working age population is offset by those dis-saving in retirement.¹⁴ This points to bequests as being an important element of the saving that underpins growth of the local capital stock (and/or of claims on the capital and hence output of foreign economies). On some international estimates, about 50 percent of the saving that finances growth in the capital stock can be attributed to bequests, with estimates in the literature ranging from 20 percent to 80 percent (Coleman 1998). If individual saving behaviour in New Zealand accords with the life-cycle model more than in other countries, that would imply smaller bequests, and would be consistent with less aggregate saving than in other countries.

4.1.2 Behavioural economics

As noted above, a core assumption in most theoretical models of individual saving behaviour is that people make "rational" decisions. In relation to saving this means that they make decisions in accordance with a consistent set of time and risk preferences, and that their decision-making is well-informed. This does not mean that all people need to act in accord with their underlying preferences all of the time, nor that they need to have

¹⁴ Where the population is growing, such that the working age population is consistently larger than the retired population, saving (that is confined to) saving for retirement will generate net savings. However, unless the rate of accumulation of savings exceeds the rate of growth in the labour force, capital "per worker" will still not increase.

perfect information. But it does require that they maintain consistent preferences over time and that they learn from their mistakes, such that they do not act in ways that are *persistently* at variance from maximising welfare in accordance with their underlying preferences.

Behavioural economics takes a different tack and suggests a need for models based on the standard rationality assumptions to be augmented with other facets of our understanding of the psychology of human behaviour.¹⁵ This literature suggests that individual behaviour may persistently depart from that suggested by the rational agent model. It is observed that some, maybe most, people have a tendency to put off taking certain actions, even though they know that those actions are in their long-term interests, that is, they are prone to procrastinate. Also, once under-way, they can find it difficult to maintain commitment to the pursuit of long-term goals.¹⁶

These behaviours can be explained more formally in terms of people's preferences not being consistently specified.¹⁷ In the case of procrastination, costs are discounted inconsistently (over time and relative to benefits). Where this is the case, it can appear that an action that on a net present value analysis would show a net cost if undertaken "today" would show a net benefit if undertaken "tomorrow". Where this is the case, deferring action today, but with the intention of acting tomorrow, can be viewed as rational behaviour.¹⁸

The difficulties people have in maintaining commitment to the pursuit of long-term objectives can also be explained by inconsistencies in the way people specify their preferences. The suggestion here is that there is a tendency for one's relative preference for well-being at an earlier date over a later date to get stronger as the earlier date gets closer (Skilling 2002b). Specifically, if people embark on a course of action on the basis of one rate of time preference (consistent with being patient), but after some time has elapsed, switch to a higher rate of time preference (they become impatient), they will fail to achieve their long-run objective. (An example of this behaviour is also shown in Appendix 2.)

Individuals whose rate of time preference is susceptible to change from one period to the next need to be able to bind their behaviours to those consistent with their long-run objective, if that objective is to be achieved. The fact that some people do this indicates that inconsistent preferences do not necessarily result in sub-optimal outcomes. In the case of saving, a range of products designed to help people commit to a long-term saving plan are available, for example, saving products which impose penalties on early withdrawal, or offer bonuses when saving targets are achieved. Also, it is common for individuals to set up automatic contributions to a saving programme, which require the saver to take a positive action if the programme is to be suspended or terminated.

Nonetheless, for individuals to put such pre-commitment mechanisms in place requires that they recognise their proneness to act inconsistently from their long-run preferences and the consequences of those actions. In other words, it requires that people have a relatively high level of self-awareness (Skilling 2002b). Also, it can be argued that in the case of saving, at least saving for the long term, there is limited opportunity to learn from

¹⁵ See Akerlof (2002) for a review of the literature.

¹⁶ Putting off going to the dentist, and having difficulty in adhering to a diet, are examples.

¹⁷ Inconsistent time preferences can also be explained by theories of rivalry and habituation (Layard 2003) and oblivious ignorance – not knowing what one doesn't know (Bhidé 2003).

¹⁸ See Skilling (2002b) and Coleman and Claridge (1999) and Appendix 2 for examples of these behaviours.

“mistakes”. By the time people recognise the inconsistencies in their preference functions, say, when approaching retirement, it may be too late to take remedial action.¹⁹

How much weight should be attached to the insights offered by the literature in behavioural economics, relative to those that underpin standard neo-classical models, remains a reasonably open question. Our own assessment is that the latter retain a central place in our understanding of saving behaviours, but that there are aspects of the design of public policy as it relates to saving that could be improved by taking account of the traits in human behaviour suggested by the behavioural economics literature.

4.2 Individual, business and government saving

Much of the literature on saving behaviour is focussed on saving by individuals, or households. However, account also needs to be taken of the fact that aggregate saving comprises saving by businesses and the government as well as by households, and that households’ saving decisions are not made entirely independently from the saving decisions of those other agents. Nor are the boundaries between sectors clear-cut, particularly as between the household sector and business sector, where the distinction between (small) businesses and their owners can be quite blurred.

Business saving is about firms’ investment decisions and their choices on the financing of investment. Firms can finance investment either from retained earnings, or, if they choose to distribute earnings as dividends, by raising external debt or equity, typically via financial intermediaries or markets, but ultimately from households. In other words, firms can either save (and invest) directly, effectively on behalf of their (ultimate) shareholder owners in the household sector, or they can distribute income to households, who make the decision whether to consume or save. There is a large and detailed literature on the factors that influence business investment and financing decisions. For the purposes of this paper, however, the point is that there are interactions between the saving behaviours of the two sectors. Indeed, given these interactions, and given the blurred boundary between the household and business sectors, a case can be made for combining them into a single “private” sector for the purpose of analysing saving behaviour and outcomes.

To some degree there is a similar relationship between government and household saving. While the boundary between the household and the government sectors may be clearer, theory and evidence suggest that individuals’ saving behaviours are influenced by government saving decisions.²⁰ Where the government’s fiscal position is in surplus, it too, in effect, saves/invests on behalf of households.

It follows that to develop an understanding of household saving outcomes, we need also to take account of the saving being done by businesses and by the government. If, for example, businesses and the government increase their saving, it can be expected, all other things being equal, that household saving will be lower. This could be because, in the short run, changes in household saving buffer the consequential fall in household income (stemming from lower dividend receipts or higher taxes), pending adjustment to consumption over a longer period. Alternatively, it could be because households factor their increased future claims on the business sector and on the government into their

¹⁹ There may be some scope though for children to learn from their parents’ mistakes and for people generally to learn from others’ mistakes.

²⁰ See McCulloch (2002) for a synthesis of government financial management in the New Zealand context.

wealth, and hence judge that they need to save less to meet a given wealth accumulation objective. The latter behaviour is often referred to as being “Ricardian” (Ricardo 1817).²¹

Another interaction between household, business and government saving, that can affect economy-wide saving outcomes, arises from changes in the mix of arrangements by which households insure against the contingencies of life – for example, illness, unemployment, or longevity. Households may accumulate wealth that is available to be drawn down when a contingency crystallises, or they may choose to buy insurance against the risk. In the latter case, the insurer needs to accumulate a stock of wealth sufficient to cover the actuarial value of its insurance obligations. This will be less than the sum of all the individual risks, owing to the benefits of pooling risk. Where the government acts as the insurer, as a provider of “social insurance”, there is an even greater pooling of risks. Moreover, because governments have a power to tax, they do not need to back their social insurance “obligations” with a stock of wealth, but instead can operate on a “pay-as-you-go” basis (or even on a “pay later” basis). It follows that structural shifts in the mix of self-insurance (precautionary saving), insurance provided by private insurance intermediaries, and social insurance, will result in changes in the stock of savings, and (transitional) changes in saving rates across sectors. Those changes in saving rates generally will entail increased saving in one sector and reduced saving in the other, although to the extent that there is a move toward increased pooling of risks, total savings can be expected to fall.²²

New Zealand has mixed arrangements. Retirement income and the social welfare arrangements are publicly provided up to certain levels, and are funded mostly on a pay-as-you-go-basis. Private insurance in respect of health care and income protection (that supplements social insurance) are funded on an actuarial basis, and government-provided (compulsory) accident insurance is being moved on to an actuarial footing. And individuals wishing to maintain an income in retirement above the level of the public pension need to save individually.²³

The structure of these arrangements has also changed over time, and those changes will have had an influence on both the sectoral composition, and aggregate level, of saving. Scobie and Gibson (2001), for example, find evidence of the expansion of social insurance arrangements in the 1930s as having resulted in lower saving by the cohort of households that benefited from that development. It is unlikely that that fall in household saving will have been offset by a corresponding increase in government saving, given the lesser need for the government to save owing its ability to pool risk, and its power to tax.²⁴

²¹ For a discussion of Ricardian equivalence in the New Zealand context, see Scobie (2000).

²² Total savings might also fall if the shift from individual saving to, say, social insurance is associated with the opening up of an expectation gap between the social insurance cover that individuals expect, and the cover consistent with the level of “premium” the community is willing to pay. The IMF has raised this possibility in connection with whether households may be assuming a continued level of public pension (and health care) provision that proves to be fiscally unsustainable, and in consequence are saving less than they otherwise would (International Monetary Fund 2003).

²³ There is only a very small market for annuities, which if available would enable greater pooling of the risk of longevity. Reasons given for the absence of an annuities market generally centre on “adverse selection” problems, and the risk of substantial advances in medical technology that would result in significant increases in the life expectancy of the elderly, eg a “cure for cancer”. Both result in annuities not being available at actuarially “fair” prices.

²⁴ See Carran (1999) for a discussion of the implications of shifts between financing social insurance (pensions) on a pay-as-you-go and pre-funded (actuarial) basis.

4.3 The mobilisation and allocation of saving: overcoming asymmetric information

Ex post, saving and investment, by definition are always equivalent. This is because all investment has to be financed by foregoing consumption, that is, by saving. However, there are important considerations around the mechanisms by which saving is mobilised and allocated to investment, that may affect the level of each. Those mechanisms concern the role of financial intermediaries and markets, in helping to reduce information asymmetries between savers (lenders) and investors (borrowers).

Akerlof (1970) in a seminal paper on the “lemons” problem illustrates how asymmetric information between buyers and sellers can cause a market to malfunction. With imperfect information, the market price of a product reflects buyers’ perceptions of the average quality of the product being sold, and sellers of low quality goods (lemons) will receive a premium relative to the true worth of their product, at the expense of those selling higher quality products. As a result, some high quality sellers stay out of the market, which lowers average quality and price even further, leading still more high-quality sellers to stay out of the market, and so forth. This process may preclude the market from actually opening. Efficient markets require some mechanisms to overcome this imperfect information problem.

In financial markets, an information asymmetry arises between borrowers and lenders because borrowers generally know more about their investment projects than do lenders. The information asymmetry can occur ex ante or ex post. An ex ante information asymmetry arises when lenders cannot differentiate between borrowers posing different credit risks before providing loans. The information asymmetry occurs ex post when only borrowers, but not lenders, can observe actual returns after project completion. Ex ante information asymmetry increases the likelihood that loans will be made to bad credit risks (the adverse selection problem), while ex post information asymmetry increases the likelihood that credit risks that initially were good will turn bad (the moral hazard problem). For both reasons, lenders may decide that they would rather not make a loan, ie not save, at least not other than by acquiring physical assets directly.

To overcome these information asymmetries, lenders need to assess potential borrowers before making a loan and monitor borrowers who have received a loan. However acquiring this information is costly. The effect of these costs is to create a wedge between the costs of internal and external financing (Bernanke and Gertler 1989), that bias financing toward internal, out of retained earnings, financing. To the extent this occurs, investment will be constrained to a lower level than would be possible in the absence of information asymmetries.

Financial intermediation provides a mechanism by which the costs of information asymmetry can be reduced.²⁵ By developing specialised skills in evaluating prospective borrowers and investment projects, and by exploiting economies of scale in processing information, including by exploiting cross-sectional (across customer) information, financial intermediaries can monitor more efficiently than can individual savers.

We observe in practice a combination of mechanisms by which intermediaries seek to signal their information advantage, by employing officers with demonstrable expertise and/or established reputations, publishing summary information (financial statements),

²⁵ In the broadest sense, including intermediaries (and markets) that borrow and lend, that manage financial wealth, that offer saving and investment advice and that broker dealing in financial instruments.

having that information audited, and by engaging rating agencies to publicly rate the risk of default on their liabilities. In these ways, financial intermediaries seek to differentiate themselves from “lemons”.

Some or all of these mechanisms may be imposed as regulatory requirements, with compliance being monitored by the regulator. This regulatory monitoring role recognises that financial intermediaries themselves are subject to adverse selection and moral hazard problems and for the full economic value of financial intermediation to be captured, it is necessary to find mechanisms that enable public confidence in the intermediaries themselves to be maintained. This needs to be achieved while at the same time preserving the value of the proprietary information held by those intermediaries. In recent years the role of financial regulation in supporting the functioning of financial intermediation, that is, the process by which savings are mobilised and allocated, have received increased theoretical and policy attention.

Asymmetric information in financial systems may also be of more significance in small economies like New Zealand, given that small economies tend to have a large number of small firms, which are more affected by asymmetric information than large businesses (given economies of scale in acquiring and monitoring information). Large borrowers have a greater capacity to raise funds from financial markets directly, because the amounts being raised are large enough to make it worthwhile for savers themselves to invest in obtaining the information required to make an informed investment decision. By contrast, small firms generally are reliant on specialised institutions for funding, or arranging funding, whereas large borrowers have more scope to go to the market directly.²⁶ Potentially greater information asymmetries in New Zealand have at least two possible implications. First, agency costs may be larger and the cost of capital higher. Second, if banks are “special” and provide credit to borrowers who otherwise would not be able to borrow, a sound and efficient banking system is crucial to economic activity. These issues may have implications for financial regulation in New Zealand (which is discussed further in section 6).

5 New Zealand saving outcomes

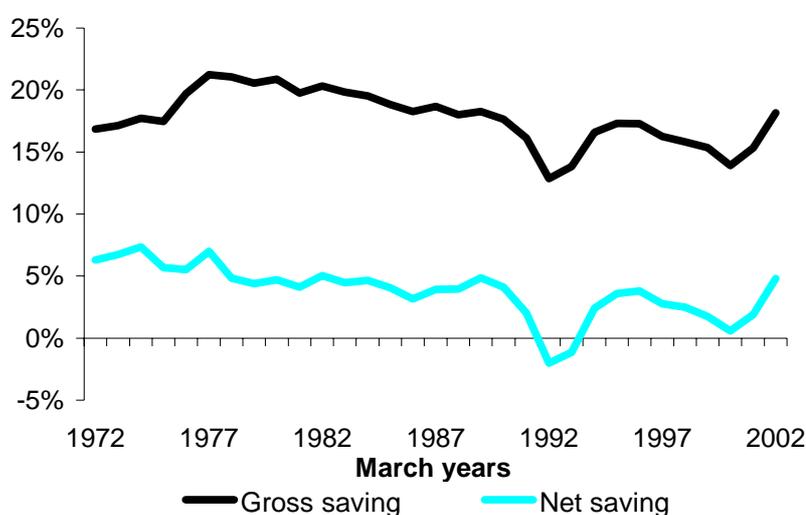
A significant component of Treasury work to date on New Zealand’s saving performance has been about measuring what that performance has actually been. Aggregate saving is measured as the difference between income and expenditure, which, in turn, is equal to the sum of investment expenditures and the current account on the balance of payments (as discussed in section 3). National or aggregate saving can be divided into saving by sectors, ie household, business and government saving. This section highlights a number of issues with how saving data is defined and constructed which make it difficult to draw firm conclusions about the absolute level, and sectoral composition, of saving in New Zealand.

²⁶ Knuckey and Johnston (2002) found that 51 percent of firms in a study of New Zealand business practices and performance “used banks to fund some proportion of their innovation or expansion activities in the three years prior to the survey, with 22 percent of respondents using banks to fund more than 50 percent of their activities”.

5.1 Aggregate, household, business and government saving

The only official saving data currently available is for national (aggregate) saving, contained in the System of National Accounts 1993 (SNA93). It is measured as the difference between current income and expenditure. A measure of saving is also available for households although this series is not currently official data as Statistics New Zealand is reviewing the construction of the series.²⁷ An often used measure of government saving is the central government's net cash flows from operations (from the government's financial statements prepared by The Treasury).²⁸ Business saving can then be calculated as the residual (net national saving minus household saving minus government saving).

Figure 7 – Gross and net national saving (as a percent of GDP)



Source: Claus and Scobie (2002), updated.

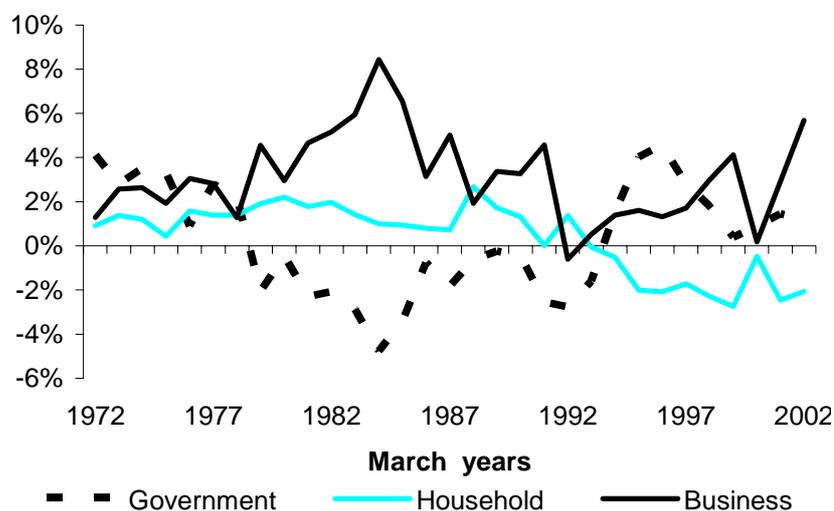
Figure 7 shows gross and net national saving as a percent of GDP. All data are in nominal terms. Gross national saving is the sum of net saving plus consumption of fixed capital (ie depreciation). Both gross and net national saving as a percent of GDP were fairly stable over much of the 1970s and 1980s, but possibly shifted to a somewhat lower mean following financial deregulation during the second half of the 1980s. Saving has been more cyclical in recent years, with a large trough in 1992. This was largely driven by a fall in both government and business saving (Figure 8). National saving rebounded strongly with the economic recovery in 1995/96 as both government and business saving picked up, but fell again in 2000 due to the lagged effects of the 1997/98 recession on business saving. In 2001/02 business saving increased on the back of a strong economy and an income-boosting improvement in New Zealand's external terms of trade.

²⁷ SNA93 national and household saving rates are only available from 1987 onwards. Data prior to 1987 were constructed by splicing the growth rates of the SNA68 series to the levels of the SNA93 series.

²⁸ Central government's net cash flows from operations are not strictly comparable to national and household saving as they are compiled on a cash flow basis rather than accrual accounting. Moreover, they are in June years whereas the national accounts' measures are in March years. A comparison of general government saving in the Institutional Sector Accounts, which is comparable to the national accounts measures, and central government's net cash flows from operations shows that the two measures are largely consistent (Claus and Scobie 2002).

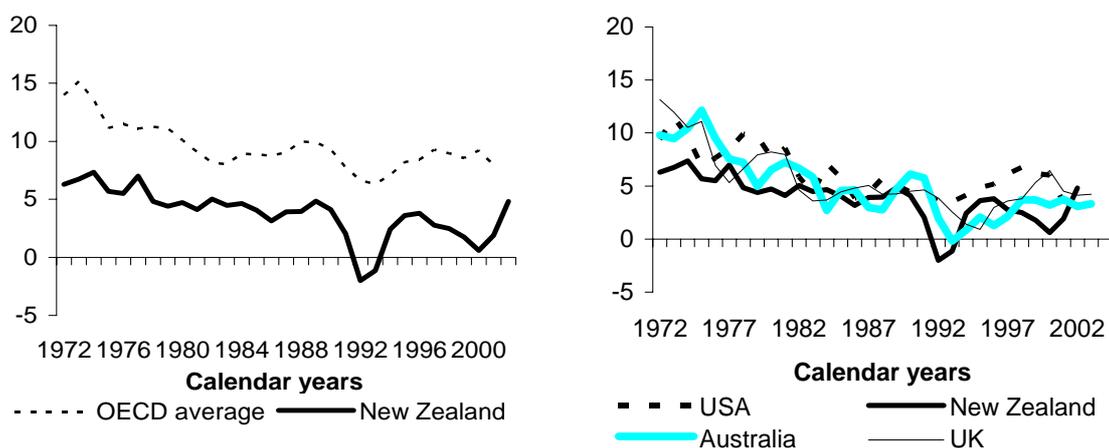
Figure 8 shows that the household saving rate was relatively stable during the 1970s and 1980s, but has been declining over the 1990s and negative since 1994.²⁹ Government saving shows a decline from the early 1970s and was negative for a long period of time. It increased from 1992 and has been positive since 1994. Business saving has generally been positive and has provided a relatively large proportion of national saving.

Figure 8 – Household, business and government saving (as a percent of GDP)



Source: Claus and Scobie (2002), updated

Figure 9 – New Zealand’s net national saving rate compared to selected OECD countries (as a percent of GDP)



Source: OECD, Claus and Scobie (2002), updated.

²⁹ A measure of household saving constructed from the Household Economic Survey (HES) provides a rather different picture, both in terms of levels and trends (see Claus and Scobie 2002). The HES saving rate has generally been trending upwards, increasing from around -4.3 percent in 1984 to about 4.9 percent in 2001. Over the same period, the household saving rate from the national accounts fell from around 1.7 percent in 1984 to about -3.7 percent of disposable income in 2002. The differences between the two measures arise in part because of definitions. The system of national accounts seeks to track all incomes and expenditures regardless of source whereas the financial model of household behaviour that underlies the Household Economic Survey is implicitly a cash flow measure and identifies cash flows into and out of consumer units. The two measures may also be an example of where the microeconomic data conveys a different picture to that suggested by the macroeconomic data.

New Zealand's net national saving rate compared to the OECD average and to selected countries is plotted in Figure 9.³⁰ The cross-country data show that New Zealand's (net) saving rate as a percent of GDP has been consistently lower than the OECD average, but only marginally lower than in Australia, the United States and the United Kingdom (particularly when account is taken of the uncertainties around the data and the caveats that need to be attached to cross-country comparisons of saving).

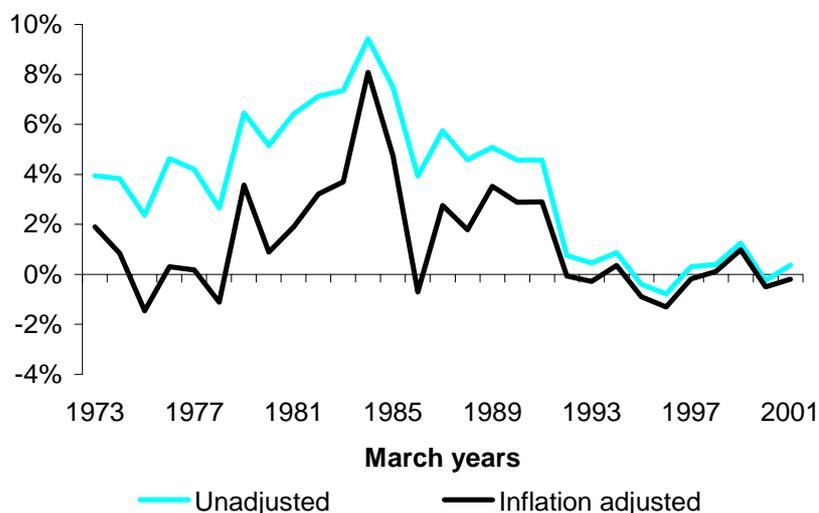
5.2 Data uncertainties

The uncertainties around measuring saving can be grouped into two main categories: (i) statistical accounting issues and (ii) conceptual issues.

The statistical accounting issues arise from a number of sources. A general source of uncertainty around the data is that saving is calculated as the residual between income, and expenditure (two large numbers). Hence any errors or omissions in the accounting for these two aggregates are carried over into, and magnified in, the measure of saving.

Second, national product and income accounts only partially capture illegal and hidden economy activities and, as a result, measured saving rates are probably biased downward. This is because, while both income and expenditure associated with the hidden economy will be under-recorded, income will likely be under-recorded relative to expenditure as at least some illegal income is likely to be consumed in the market.

Figure 10 – Unadjusted and inflation adjusted private saving (as a percent of GDP)³¹



Source: Claus and Scobie (2002)

Third, interest receipts and payments in the national accounts are included fully as a component of current income, without accounting for the erosion of the real value of financial assets and gains on debt due to inflation.³² During the 1970s and 1980s, the

³⁰ The countries have been selected on the basis of being Anglo-Saxon, with financial systems broadly similar to New Zealand's. Generally European and Asian economies have higher saving rates. See Claus and Scobie (2002) for a more comprehensive comparison of the national saving ratio for New Zealand with those for other countries.

³¹ The adjustment does not take into account the effects of inflation on depreciation and inventory charges.

³² Inflation also will have caused business income, and thus saving, to have been overstated when inflation was high in the 1970s and 1980s, owing to depreciation and inventory charges having been calculated on the basis of historic rather than current replacement

period of high inflation in New Zealand, the government was a net borrower from the private sector. The implication for measured saving will have been that government saving was understated, and private (household plus business) saving was overstated (Figure 10).³³

5.3 The investment-consumption boundary

Perhaps more fundamental to our interpretation of the data on saving are the conceptual issues that arise from the way saving is defined in the national accounts. These issues relate to:

- the classification of expenditures as between consumption and investment; and
- the measurement of saving as the difference between current period flows of income and expenditure, rather than as the difference between net wealth (or net assets) from one period to the next.

Investment represents expenditures that generate flows of services over time, extending beyond the current accounting period. It is to be distinguished from final consumption expenditures, where the good or service is fully consumed by final consumers in the current period, and from intermediate consumption, which comprises goods and services that are fully consumed in a current period *production* process. However, categorising expenditures between consumption and investment is not always straightforward. To illustrate:

- outlays on consumer durables such as appliances, furniture and non-commercial motor vehicles are categorised as consumption, although the service-generating lives of these items generally span a number of years;
- some defence capital expenditures are allocated to consumption, presumably because they do not generate future goods and services (indeed, if used, defence capital equipment is more likely to be destructive!). However, if a broader view is taken of defence activities, such that they are viewed as providing a national security service, outlays on defence equipment could be categorised as capital expenditure;
- some expenditures on developing land and natural resources, especially by unincorporated businesses, is counted within the household sector, and are treated as consumption spending.

Beyond these specifics, the character of investment in a modern economy may be changing from that of two or three decades ago. As economies become more service oriented, relative to the production of physical goods, there tends to be a shift, at least at the margin, from investment outlays on “hard” capital (manufacturing plant and equipment, buildings, etc) to outlays on “soft” capital, for example, investment in education and training, computer software, design, intellectual property, brands and the like. This gives

costs. However, since 1987 the national income accounting methodology has been adjusted to correct for this measurement distortion.

³³ It is more difficult to say to what extent the overall level of national saving, as distinct from the sectoral composition of saving, was distorted by inflation. Wealth transfers between the government and the household sector net out and, to the extent that New Zealand as a whole was a net debtor vis-à-vis the rest of the world, it will have benefited from erosion of the real value of that debt caused by high (global) inflation.

rise to questions about whether some expenditures that conventionally have been accounted for as consumption spending should be categorised as investment. If, for example, aggregate investment comprises a growing proportion of outlays of investment in “soft capital “ and this is not being recorded as investment, then both the level and the trend in investment, and hence in saving, will be mis-stated.

Re-defining national accounts measures of saving to include expenditure on the items discussed above likely raises measured gross and net saving. Claus and Scobie (2002) calculate that gross national saving for New Zealand in 2001 increases from 15.7 percent to about 37 percent of GDP with such adjustments. The net national saving rate rises from 2.1 percent of GDP to about 13 percent (see Table 1). The extent of the adjustment to the net saving rate depends largely on assumptions on the rate at which the additional categories of investment (which under national accounting conventions are classified as consumption) depreciate.

Table 1 – An extended national saving rate for New Zealand in 2001 (as a percent of GDP)³⁴

Gross national saving rate in 2001	15.7
Adjusted for:	
Government education expenditure	6.0
Government health expenditure (30 percent)	2.0
Household education expenditure	0.9
Household health expenditure (30 percent)	0.3
Research and development (80 percent)	0.8
Durable consumer goods (80 percent)	11.2
Augmented gross national saving rate	36.8
Unadjusted depreciation	13.6
Adjusted depreciation	23.9
Unadjusted net national saving rate	2.1
Augmented net national saving rate	12.9

Source: Claus and Scobie (2002)

The magnitude of the adjustments by Claus and Scobie are similar to estimates for other OECD countries (see, for example, Shafer, Elmeskov and Tease, 1992). The analysis implies net additions to the stock of human capital and consumer durables equivalent to around 10 percent of GDP per annum, compared with growth in plant and equipment, and in physical structures, of about 2 percent per annum. This large difference is perhaps surprising and suggests that some allowance probably needs to be made for the depreciation of human capital.

On the other hand, the difference between conventional and extended measures of saving will increase if the components causing the difference assume greater importance over

³⁴ The following adjustments are made to the gross national saving rate. 30 percent of all health expenditures are allocated to saving, as are all education expenses. Research and development expenditure and consumer durables are counted as an investment and 80 percent are added back into saving. To calculate the net national saving rate, depreciation adjusted for the fact that consumer durables are now counted as investment are subtracted from gross national saving, assuming a straight line depreciation and an average five year write-off period.

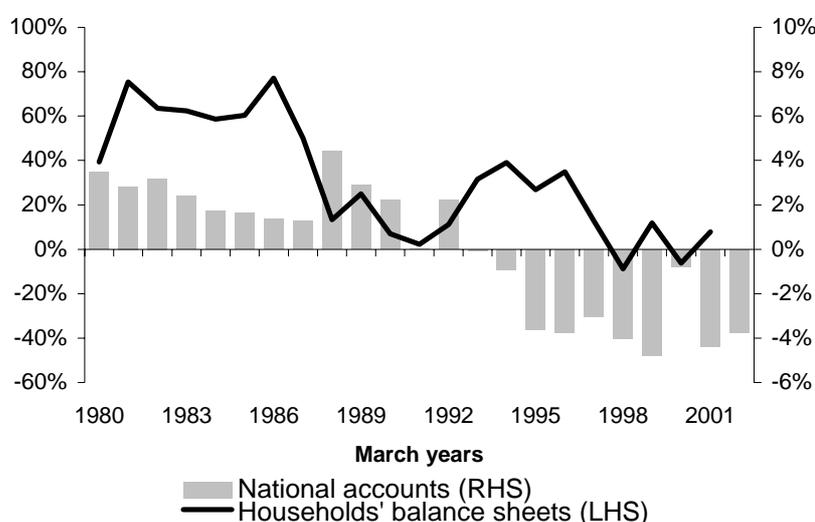
time. And the divergence between the two measures will be larger in countries where there has been a greater shift toward investment in human capital and consumer durables, perhaps as in the case of New Zealand during the 1990s, when participation in tertiary education increased quite sharply, and following the lowering of tariff barriers to imports of consumer durables.

The World Bank has calculated augmented measures of national saving that take account of educational investment; energy, mineral and net forest depletion; and carbon dioxide damage. These augmented measures of saving show New Zealand's national saving rate in 1998 to have been almost six percentage points higher than the official measure.³⁵ Also, the adjustment for New Zealand is higher than for Australia, Canada, the United Kingdom, the United States, and the average for high-income countries. While the level of the adjustments to official saving rates of the sort made by Claus and Scobie and by the World Bank may be open to debate, there are also reasons to think that the appropriate magnitude of adjustment for New Zealand during the 1990s was larger than for comparator countries.

5.4 Stock and flow measures of saving

Our discussion of the saving data so far has been cast entirely in terms of national accounts-based data. In this framework, saving is measured in terms of flows, that is, as the difference between current period income and current period consumption.

Figure 11 – Stock and flow measures of household saving (as a percent of GDP)³⁶



Source: Claus and Scobie (2002), Reserve Bank of New Zealand, Statistics New Zealand

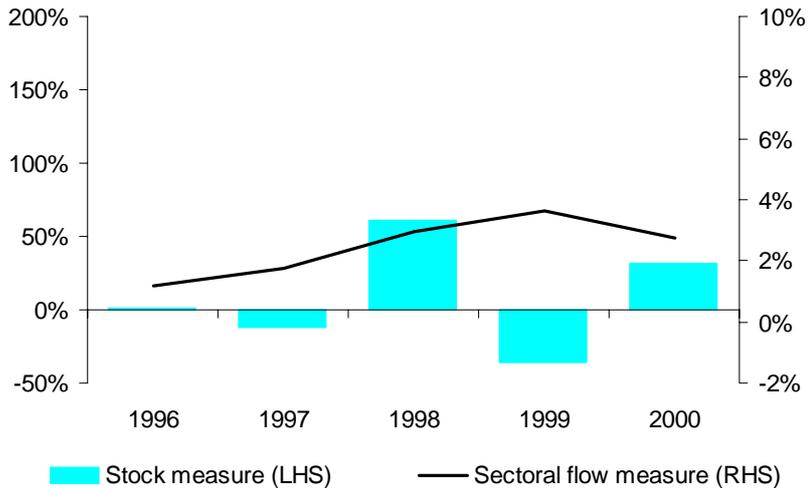
An alternative method of measuring saving is as the difference between beginning and end of period net wealth, where net wealth is the difference between assets and

³⁵ See http://www.worldbank.org/data/wdi2000/pdfs/tab3_15.pdf.

³⁶ Note that the stock measure of household saving will incorporate increases in the value of claims on other sectors held by households. For example, increases in the value of the shares held by households in firms that arise from increases in the value of the underlying business assets, or the retention of earnings by firms, will also be incorporated into the stock-based measure of business saving. Similarly, increases in the value of government claims on the business sector that arise from increases in the underlying value of assets held by businesses owned by the government will be included in the stock-based measure of government saving.

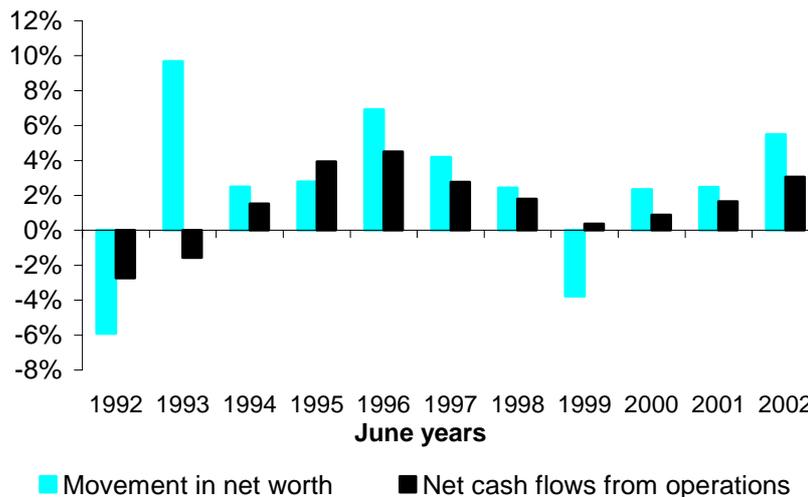
liabilities.³⁷ Measures of saving defined this way produce a very different picture from the flow measures in Figure 8. Figures 11 to 13 show comparative income-expenditure and wealth-based measures of saving for the household, business and government sectors. In these charts, household and business wealth-based measures of saving exceed the income-expenditure flow measures by about 10 times.³⁸ The wealth-based measure of government saving is more in line with the income-expenditure flow measure, which can be attributed largely to the fact that the Crown's balance sheet is less subject to asset revaluations than are firms' and households' balance sheets.

Figure 12 – Stock and flow measures of business saving (as a percent of GDP)



Source: Claus and Scobie (2002)

Figure 13 – Stock and flow measures of government saving (as a percent of GDP)



Source: Claus and Scobie (2002), The Treasury, Statistics New Zealand

³⁷ Net wealth measures typically do not include human wealth. Human capital statistics for New Zealand were published earlier this year. See

<http://www.stats.govt.nz/domino/external/pasfull/pasfull.nsf/web/Reference+Reports+Human+Capital+Statistics+2003?open>.

³⁸ The wealth-based measure of household saving will include the change in business wealth insofar as the value of firms owned by households (shares, interests in unit trusts that own shares, etc) is included in household wealth.

A large component of the difference between saving measured from income-expenditure data and from wealth data will be asset revaluation changes. These are incorporated into the current period measures of assets and liabilities, and hence saving measured as the period-to-period change in net wealth. However, they are not incorporated into the corresponding conventional measure of saving out of current period income.

An asset price changes because of either (i) changed expectations of the future income-generating potential of the asset; or (ii) a change in the rate at which future income is discounted to a present value. Where the future income-generating potential of an asset is assessed to have increased, markets will value the asset more highly. And the resulting increase in wealth can provide a basis for bringing forward consumption out of the expected higher level of future income, either by borrowing against, or by realising, the increased wealth.

In the case of businesses, expected future earnings can change, for example, because of changes in the productivity of existing activities, stemming from, say, new technology or improved management practices. It follows that increased future business earnings, and hence increases in business asset values, generally will be associated with (expected) increases in future output of goods and services (or, equivalently, a reduction in the resource inputs required to produce the existing level of goods and services). Those expectations may or may not be realised, but if they are not, then asset prices will eventually revert to previous levels. For example, when it became apparent that the increase in the supply of goods and services from the late 1990s' information technology (IT) boom was going to fall short of expectations, the share prices of IT companies collapsed. But if expectations of increased future output are realised, or for so long as they are expected to be realised, the associated increase in asset values can be regarded as a form of saving, in the sense that saving is a source of future income.

In the case of rising house prices, it is not so clear that the increased house value represents a source of future real income. An increase in the real price of a house (assuming no change in the characteristics of the house) is not associated with an increase in future output of goods and services. Though a house may rise in market value, if the house remains the same house, then it delivers the same housing services. House price changes may need to be understood more in terms of factors that shift the demand for housing services, and less in terms of a change in the supply of future services.

It follows that the durability of household saving that derives from increased house prices may depend importantly on the permanence of the demand-shifting factors, for example, in the current New Zealand context, those associated with household formation rates (smaller households), demographics (the "baby boom" cohort in its high income middle aged years), and immigration (which has been at historically high levels). If those influences on the demand for houses were to reverse, the relative price of houses could come under some downward pressure. Stephenson and Scobie (2002) note this as a possibility around the time the large cohort of currently middle-aged New Zealanders retire. More generally, it underscores how asset prices are sensitive to the expectations and assumptions that underpin them, both in the case of business assets and residential housing assets.³⁹

³⁹ For a wider discussion of population ageing, capital markets and asset values see Asscher and Gaminiratne (2002).

6 Policy issues and extensions

The appropriate policy setting for saving has been a subject of policy debate for most of the last three decades. In this section we briefly review those policy changes, and the issues that have been the subject of on-going debate. We seek to do so within a framework, drawn from the analysis so far, that helps to make explicit the key judgements that need to be made in arriving at policy conclusions. Our focus is on four areas of government policy, as they bear on saving behaviours and outcomes: (i) financial education (ii) the taxation of saving (iii) the institutional environment for saving and (iv) the regulation of financial markets and institutions.

6.1 Shifts in the policy environment

There have been significant policy shifts in the 1970s and 1980s that will have influenced saving outcomes. These included the major changes to financial regulation and the tax system in the mid 1980s, and have raised questions about whether the policy settings post those changes became more or less conducive to saving.

First, there was a major reform of financial regulation. This removed most regulatory controls on financial institutions' activities, and resulted in greater access to credit (previously constrained by regulatory impediments), but also a change in the risk environment facing savers. At the same time, however, prudential and market conduct regulatory regimes for the financial sector were strengthened, although these generally have been more "light-handed" than are the corresponding regulatory regimes in other developed economies. Public education on saving-related issues, and in particular on saving for retirement, has also been strengthened.

In New Zealand the authorities have used disclosure requirements as the main means to address asymmetric information problems, and have gone beyond that, by way of "merit" regulation to a lesser extent than is the case in many countries. Merit regulation involves the authorities applying, monitoring and enforcing prudential standards including in a gate-keeper role, rather than leaving those standards to be determined in (well-informed) markets. This has reflected a view that well-informed markets can and do develop their own solutions to many of the problems caused by information asymmetry, and that more direct regulatory interventions can undermine those market solutions. Also the risks of regulatory failure need to be taken into account alongside the costs of market failure. Overall, the policy framework in New Zealand has placed less emphasis than in most countries on the role of financial regulators acting as an "agent" to protect the interests of savers.

Second, there was a major reform of the tax system, including with respect to the taxation of income saved. The introduction of a GST – which, in effect, defers the taxation of income saved until it is consumed – and reductions in income tax, resulted in a more "saving-friendly" tax environment.⁴⁰ However, previous, more specific, provisions which deferred the taxation of certain categories of income saved (contributions to qualifying retirement saving plans, and life insurance premiums) were removed. Also, the income tax scale was flattened. It is unclear whether the tax system overall is now more or less saving-friendly than 20 years ago, although there appears to be a public perception that it

⁴⁰ This overstates the shift from the taxation of income to the taxation of consumption to the extent that new GST also "funded" the abolition of then existing wholesale sales taxes.

is less so.⁴¹ This perception seems to stem from the previous exemptions having been widely understood as “saving incentives”, while the more general shift in the balance from the taxation of income to the taxation of consumption does not appear to have been regarded the same way.

Third, there has been a significant decline in the role of employer-based retirement saving plans, and a shift towards individual saving plans. This development stems at least in part from tax changes (that removed already mentioned “incentives” to invest in long-term retirement saving plans), in part from changes in the labour market (very few people nowadays work for a single employer for their whole working life), and possibly in part because of increased regulatory compliance costs (new obligations in connection with issuing a prospectus, and reporting to members). Increased labour market mobility has also resulted in employer-based saving schemes having migrated from defined-benefit schemes, to defined contribution schemes, and an associated transfer of investment risk from employers to individuals. These developments will have meant some potential narrowing of the mechanisms by which individuals can bind themselves to long-term saving plans and some shift of investment risk in respect of retirement savings, from employers to savers.

Fourth, real (inflation-adjusted) after-tax interest rates have moved from being generally negative for most of the 1970s and the first half of the 1980s, to positive since. This change resulted from the deregulation of interest rates in the mid-1980s, as part of the overall programme of financial sector reform, and from the lowering of inflation from double digit to low single digit levels. Moreover, after-tax real rates of return rose with the flattening of the income tax scale.

Fifth, there has been an increase in saving by the government. During most of the 1970s and 1980s, the government was a dis-saver (fiscal deficits), whereas for most of the 1990s, it was a saver (fiscal surpluses). An important institutional development that underpinned this change was the Fiscal Responsibility Act (1994).

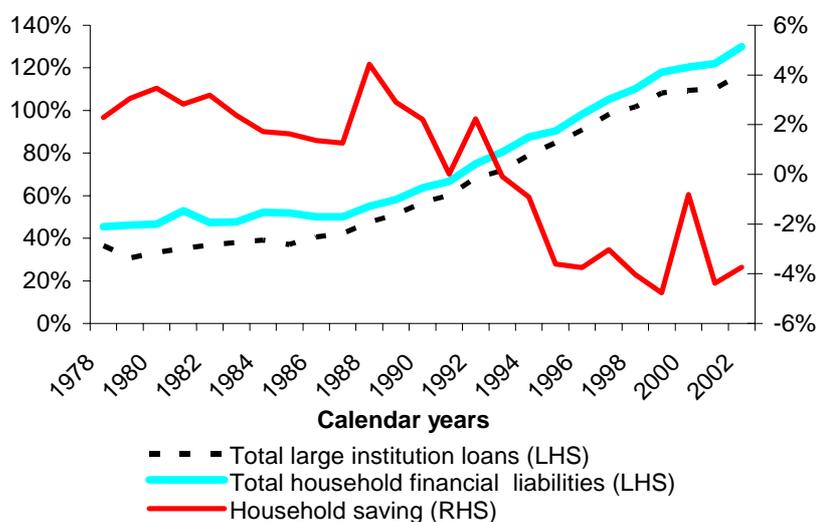
It is difficult to judge – and there is no consensus view – on the overall effect of these changes in the policy environment in terms of their effect on saving, and the extent to which their effects are permanent or transitional. However, there does appear to be a view that the decline in *household* saving during the late 1980s and early 1990s stemmed to a significant extent from the improved access households have had to credit, and that may be a transitional factor. The Reserve Bank, for example, observed in August 2000 that the ratio of household debt to disposable income in New Zealand had reached about 100 percent, in line with the level for this ratio in a number of comparable countries, and inferred that the New Zealand ratio might level off at around the same level (Reserve Bank of New Zealand 2000). Although the most recent evidence on that indicator is less supportive of that conclusion, the household saving rate, which fell during the first half of the 1990s, does appear to have levelled off, at least relative to the pronounced decline in the first half of the 1990s (Figure 14).⁴² Developments in these measures during the next few years will be instructive as to the factors that have been behind the change in the saving rate during the last 15 years or so. If the dominant influences on trends in the saving during the 1990s were transitional factors, then some increase in the saving rate

⁴¹ Complicating the picture is probably that the balance will have shifted differently for people at different levels of income; for high income earners the environment may be more saving-friendly (more scope to take advantage of the tax deferral benefit inherent in the GST regime, lower marginal tax rates, and for whom the “tax incentives” were of relatively less significance given that they were “capped” at modest amounts).

⁴² (Claus and Scobie 2001) observe that countries with liberalised (Anglo-Saxon) financial systems tend to have lower household saving rates than those with still more regulated systems (eg some of the continental European countries and Japan).

might be expected in the period ahead. If that is not observed, it would suggest that other factors were more material.⁴³

Figure 14 – Household saving and liabilities (as a percent of disposable income)



Source: Reserve Bank of New Zealand, Statistics New Zealand, authors' estimates

6.2 The policy issues

Central to any consideration of what constitutes appropriate policy settings for private saving are judgements about the way in which individuals make saving/consumption choices. One question in this connection concerns whether, and if so to what extent, a model of saving behaviour based on individuals making “rational” choices needs to be qualified by the insights from psychology discussed in section 4 of this paper. Those insights suggest that people’s consumption/saving choices may be biased in favour of consuming. If that is thought to be the case, then there may be a case for a policy regime that is tilted in favour of saving or, at a minimum, that pays particular attention to avoiding impediments or disincentives to saving. A concern might be that impediments or disincentives to saving which might not be of much consequence in a “behaviourally-neutral” environment have greater impact if they reinforce an existing bias. Examples of such distortions might include the taxation of unit trusts and superannuation funds at the corporate rate rather than at members’ personal tax rates, and the taxation of capital gains by managed funds, but not individual investors.

6.2.1 Financial education

The main policy instrument directed toward saving objectives in New Zealand has been raising financial awareness. This has been directed to encouraging people to save in general, and in particular for retirement. The programme has been delivered mainly by the Office of the Retirement Commissioner.

⁴³ This, of course, will be the case only if “all other things remain equal”, which they rarely do. However, against that, the demographic profile (a growing cohort that is approaching late middle age, and which, according to the life-cycle model, will be in its high saving years) is such that, if anything one might expect to see a rise in the saving rate in the years ahead, independently of any credit liberalisation effects running their course.

The policy of successive governments to deliver financial awareness and saving promotion campaigns can be viewed as a response to the possibility that people under-save, particularly for long-term needs like retirement, because of a lack of awareness. One of the reasons why people may be insufficiently informed is because financial intermediaries have only weak incentives to invest in this activity. The incentive is weak because the benefits will not be confined to an intermediary's own customers but rather will accrue to the public more generally (giving financial education the attributes of a public good).

Financial education may help make saving "easier" by providing individuals with improved tools for assessing their long-term saving needs, and for choosing saving products that are appropriate for those needs. In these ways, financial education may help to mitigate tendencies to procrastinate, insofar as one of the upfront, and more salient costs, of commencing a long-term saving plan concerns making difficult choices amongst the alternative options. However, as noted by Skilling (2002b), financial education programmes represent only a partial response to the issues raised in the behavioural economics literature: they do not provide the commitment mechanisms considered necessary to support long-term saving. Nonetheless, there is international empirical evidence that indicates that financial education programmes have a positive effect on saving behaviour, particularly where that education has been delivered in connection with employer-based saving programmes (Coleman and Claridge, 1999 and Skilling, 2002b).

6.2.2 Tax incentives

Much of the policy debate on saving has focussed on whether it is appropriate to incentivise saving by using the tax system.⁴⁴ And much of that debate has focussed on the question whether such incentives would be effective in raising national saving, and whether they would be efficient, in the economic sense of resulting in less distortion to the allocation of resources.

A broad conclusion in previous Treasury analysis has been that the responsiveness of personal saving to tax concessions would be low (Skilling 2002b), particularly if the concessions were to be confined to only certain categories of saving, or capped to a specified amount of saving. In the latter cases the main effect would be a change in the composition of saving rather than a change in the level, since those taxpayers already saving in amounts above the capped level would need change only the form of existing saving to capture the full tax benefit. On the basis of this assessment, it has been thought likely that introducing tax incentives for saving would result in a lower level of national saving, that is, that any increase in household saving would be more than offset by reduced government saving.

Economic efficiency objectives also have been thought to be better advanced by maintaining a broad base, low rate (BBLR) tax regime that taxes income from all sources, and equally so. This stems from a judgement that allocative distortions of taxes are a quadratic function of the tax rate and, because reducing the tax on saving would result in a narrower tax base, revenue maintenance would require the tax rate on that narrower base to be increased. It should also be noted, however, that if the tax rate was adjusted to maintain revenue, government saving would not fall. In this case, there would be an unambiguous increase in saving, albeit perhaps only a small increase if the elasticity of private saving with respect to after-tax returns is low. Hence, the two arguments that have been advanced against tax "incentivising" saving are not additive: there can be a loss of

⁴⁴ See, for example, The Treasury (2001b).

government revenue and hence lower government saving, or the tax rate has to be increased to compensate for the loss of revenue, but not both.

In this section we draw out some of the analysis around these issues. We follow standard microeconomic analysis in assuming that the change in tax structure is revenue-neutral, that is, there is no reduction in government saving. This enables us to focus on the allocative efficiency of alternative tax structures with respect to saving. A critical element in any analysis of this issue concerns one's definition of tax "neutrality".

One dimension of tax neutrality involves taxing all sources of income equally, which we will refer to as "source neutrality". This corresponds with the basic design of the New Zealand income tax, which taxes the reward from work, from entrepreneurial effort, and from saving, essentially equally. At one level, such a tax regime, by not favouring one source of income over others, avoids creating allocative distortions across those different sources of income.

Another dimension to tax neutrality concerns inter-temporal choices, that is, in avoiding distortions in allocations over time, such as in making choices between whether to consume now or later. The tax regime that delivers neutrality according to this definition is one that avoids introducing a wedge between pre- and post-tax returns for deferring consumption (saving). The most obvious way to achieve that outcome, under an income tax regime, would be to exempt returns to saving from taxation. It can also be shown that *deferring* the taxation of income, including any income return on saving, until it is consumed, produces the same result.⁴⁵ This tax treatment of saving is generally referred to as an exempt, exempt, tax (EET) regime. Alternatively, income saved can be taxed at the time it is earned, but with the benefit of tax deferral attached to the investment it finances, for example, if investment outlays are 100 percent deductible against assessable income. Another tax structure that amounts to deferring the taxation of income saved until it is consumed is to define the tax base as consumption expenditure (as under a GST).⁴⁶ All four of these tax structures are equivalent in terms of the inter-temporal neutrality property, although there are major differences amongst them in relation to other aspects of tax structure design, such as, for example, tax avoidance possibilities and the progressivity of the tax structure.

The two conceptions of neutrality outlined – source neutrality and inter-temporal neutrality – are orthogonal; a tax regime based on source neutrality principles will lack inter-temporal neutrality and vice versa. But it is possible to structure a tax system to deliver intermediate outcomes. The New Zealand tax regime reflects such an intermediate position, in so far as the income tax regime sits on one axis (source neutrality) and the GST regime on the other (inter-temporal neutrality). Where, and how, to strike the balance between these two dimensions is a policy choice that will be influenced by judgments around, inter alia, the extent to which saving is a policy objective, the extent to which saving is sensitive to the size of the tax wedge, the implications for tax administration and avoidance opportunities, the implications for the distribution of the tax burden, and the implications for work incentives.

⁴⁵ To see the equivalence of exempting returns to saving with the deferral of the taxation of income saved, consider the following example. An income tax payer has an income of \$100, faces an income tax rate of 30 percent and an interest rate of 10 percent per annum. If income is taxed, but returns to saving are not, they will have \$70 available to save and if saved, an after-tax rate of return of \$7 per annum ($(\$100 \cdot 0.7) \cdot (0.1)$). If, however, the taxation of income saved is deferred, but returns to saving are taxed, they will have \$100 available to save, but still receive an after-tax return of \$7 per annum ($(\$100) \cdot (0.1 \cdot 0.7)$).

⁴⁶ Partial application of any of these approaches would have the effect of reducing, rather than eliminating, the tax wedge on saving.

The effect of a change in the tax wedge on saving for work incentives is not clear-cut. As already discussed, if the tax wedge on saving was to be reduced, and revenue is to be maintained, the rate of tax on other sources of income, essentially on returns to work, would have to be increased. At first sight, it might appear that reducing one tax wedge (on saving versus consumption) necessarily would increase another (on labour versus leisure). However, the trade-off is not quite that simple. A more complete formulation is to think in terms of agents being faced with a three-way choice, amongst, current consumption, future consumption (saving) and leisure. Within this framework, reducing the taxation of saving and increasing the taxation of current consumption, while leaving leisure untaxed, would result in:

- substitution out of (more highly taxed) current consumption for (less taxed) saving, ie an increase in saving;
- substitution out of (more highly taxed) current consumption into (untaxed) leisure, ie a reduction in work;
- substitution out of (untaxed) leisure into (less taxed) saving, ie an increase in both work and in saving.

From this, we can conclude unambiguously that reducing the tax wedge on saving would increase saving, albeit only by a small amount if the elasticity of saving with respect to tax is low. The effect on the labour-leisure choice, however, is ambiguous, as there are both positive and negative incentive effects. However, we can say that the worsened work incentives would likely be concentrated amongst lower income earners, since they generally will have less scope to substitute future consumption for current consumption.⁴⁷

Overall, judgments on whether it would be desirable to reduce the tax wedge on saving, therefore, depend on judgments around the elasticity of saving with respect to changes in after-tax rates of return to saving, the size – and sign – of the labour supply (work/leisure) elasticities, the relative importance attached to employment and saving outcomes, and the equity of a redistribution of tax burden towards lower income earners.

In making these judgements, it may also be appropriate to take account of whether the best way to deliver any remission of tax on saving account is within the tax system, or whether more direct approaches, such as the payment of grants from the expenditure side of the budget, might have a role. A possible advantage of this approach includes that non-tax measures would be less open to unintended tax avoidance and tax planning responses. The tax on savings, like many taxes, serves as a backstop to other taxes so that a scheme that is able to circumvent a particular tax is unlikely to be able to circumvent tax generally. Such a structure lowers the return to any particular tax reduction scheme. This result is obviously important fiscally, but also in an allocative sense because the easier tax planning/avoidance becomes, the greater the misallocation of resources that is directed toward that effort. For these sorts of reason, there may be fewer constraints on designing non-tax measures than tax measures to offset the tax wedge on saving.

6.2.3 The institutional environment for saving

The preceding analysis of the effect of tax on saving/consumption/work incentives is cast within a framework which assumes essentially “optimising agents” who make choices

⁴⁷ See Lewis (1996) for a more formal presentation of this analysis.

according to relative (after-tax) rates of return to competing activities. Whether rates of return are a major factor in saving/consumption choices, however, is open to debate, with empirical evidence generally suggesting that the elasticity of saving with respect to after-tax rates of return is quite low. This could suggest that a more significant explainer of relatively low household saving outcomes is an absence of institutional structures that address the behavioural traits discussed in section 3. If that is so, then targeting policy responses more directly at that issue could be more effective than tax policy measures. A range of regulatory and incentive-based approaches could be considered, including incentivising the use of such structures through the tax or budgetary system, or more prescriptive approaches, such as regulatory requirements under which employers are required to provide and/or employees are required to participate in employment-based saving programmes. The latter approach has been adopted in Australia.

An argument in support of compulsory private saving is that it addresses directly the “behavioural” traits that result in under-saving. It can be argued that policies that seek to address those behavioural tendencies by changing incentives are unlikely to be effective given that those most subject to those traits are least likely to recognise the “problem” (Skilling 2002b). A counter argument is that interventions that attempt to cause people to act differently, but without altering the incentives they face, are unlikely to be effective. Those already saving more than the compulsory level would have no need, nor incentive, to change their behaviour, other than to divert existing saving into qualifying forms. This could result in distortions in the allocation of saving to best uses, and efficiency costs in the allocation of investment. There has also been a concern that compulsory saving would result in welfare costs. For those currently saving less than the prescribed minimum amount, there may be an increase in saving, but at the expense of lower current welfare for those, likely mostly lower income, households.

Most analyses of compulsory saving have focussed on compelling saving on an individual basis. An approach, which has been receiving more attention of late and has been adopted in Australia, involves employment-based compulsory saving. Participation in such plans (by employers or employees) can be encouraged either by adjusting (tax or other) incentives, or by regulatory mechanisms, that can be as light-handed or heavy-handed as might be thought necessary to be effective.

A variation on compulsory private saving is public sector saving, financed by (compulsory) taxes. There is an existing administrative structure for collecting taxes, and the tax (and benefit) system has built-in mechanisms that cater for individual circumstances, at least to some degree. These considerations might suggest that compulsory saving via the government’s budget may be preferred to compulsory private saving schemes.

The government already plays a significant role in the provision of publicly funded pensions, health care, education and other services. Owing to its power to tax, it can do so on a pay-as-you-go basis. However, owing to population aging, which could raise substantially the pay-as-you-go cost of pensions over the next two to three decades, the government has chosen to pre-fund a proportion of future expected pension outlays. The New Zealand Superannuation Act (2001) requires the government to make contributions to a fund (the New Zealand Superannuation Fund) over about the next 25 years, which thereafter will then be drawn on to finance some of the building cost of pensions.

There will be a number of effects on saving. First, the expectation is that the government will run operating surpluses, that is, maintain positive saving, over the next 25 or so years, from which it makes the required contributions to the fund. Thereafter government saving can be expected to turn negative. There may be offsets in private saving, depending on

the extent of Ricardian equivalence, and possibly also if there emerges a gap between the level of future public pension that private agents expect and the amount of financing available from future taxpayers and the fund. In the latter regard, the planned pre-funding on future pensions is not expected to be sufficient to avoid a need for some increase in future taxes as well. These future tax increases should also be factored into any Ricardian equivalence “calculations”, although it is conceivable that they might not be.

In effect, therefore, the New Zealand Superannuation Fund structure amounts to only a partial tax-smoothing device. It will result in higher than otherwise taxes and higher than otherwise government saving for around 25 years, followed by a period during which taxes and government saving will be lower than they otherwise would have been. That leaves a question about whether there is a role for a level of compulsory (government) saving that is more permanent and over and above that required to achieve tax smoothing, say, in lieu of measures to sustainably raise the level of private saving. The answer to that question probably turns on (a) judgements around the extent to which New Zealand has a comparatively low level of saving and hence a comparatively low level of capital accumulation⁴⁸ and, if that is thought to be so, (b) judgements around whether it is preferable for savings to be intermediated via public or private institutions.

6.2.4 Financial regulation

Another important element of the institutional environment for saving is the financial regulatory regime. In section 4, we identified mechanisms for addressing information asymmetries between lenders (savers) and borrowers (investors) as being important for mobilising saving. We also discussed how those information asymmetries have provided market opportunities for intermediaries to cost-effectively provide services that reduce the cost of acquiring information by savers. Those intermediaries include financial institutions, investment advisors, rating agencies, and auditors. The common element in the roles played by these institutions is that they monitor information on behalf of those at an informational disadvantage.

The public policy issue in relation to financial markets and financial institutions concerns the regulatory structures needed to support the functioning of those processes. These can be thought of as including:

- (a) A core body of law and regulation that governs all economic activity – enforcement of contracts, and laws that define the rules of the game (covering fraud, fair-trading, etc);
- (b) A body of law and regulation that defines obligations and mechanisms to help redress information asymmetries, eg mandatory disclosure, audit and rating requirements;
- (c) A gatekeeper (licensing body), which enforces standards that are required to be met in order to obtain, and keep, a licence to operate in the financial sector (merit regulation).

In New Zealand, the financial regulatory structure has been built mainly around elements (a) and (b), with relatively less emphasis on (c). The core regulatory regime is provided by the Securities Regulations (1983), promulgated under the Securities Act (1978), and administered by the Securities Commission. This is primarily a disclosure-based regime,

⁴⁸ Including accumulation of net foreign assets

and applies to all classes of entity raising funds from the public (except for registered banks) and, irrespective of the form of the instrument, ie whether by way of deposits, securities (debt or equity), or syndicate participations.⁴⁹ A specialised regime applies to financial institutions that represent themselves as “banks”⁵⁰, is administered by the Reserve Bank of New Zealand, and includes both disclosure requirements and a “gate-keeper”/merit regulation role. The conduct of participants in the markets for financial securities is also subject to regulation, in respect of such matters as insider trading and takeovers. A distinctive feature of the overall regime of financial regulation has been the emphasis on disclosure over merit regulation, and a greater emphasis on “caveat emptor” than in most developed economies.

The evidence suggests that this financial regulatory regime has been generally effective in supporting the soundness and stability of New Zealand’s financial system over the past decade, at a time of significant financial instability in many other countries. This financial stability can probably be attributed, at least in part, to the relative strength of the market disciplines that financial institutions and markets have been subject to. In so far as maintenance of financial stability is important for creating an environment that is conducive to mobilising and allocating saving, the regulatory regime can be considered as having been a positive influence on saving.

There is a question, however, whether the regulatory regime may, at the same time, have been an inhibitor of saving. Relative to what is the case in other countries, the costs of monitoring fall more directly on savers. These are one of the “up-front” costs of saving (where cost is measured in terms of time and worry as well as financial cost), and if, as the behavioural economics literature suggests, these upfront costs figure disproportionately, they will tend to bias saving decisions in favour of consumption. Alternatively, they will bias savings toward those institutions where monitoring costs are lowest. In New Zealand the monitoring costs are probably lowest in the case of registered banks, given that the Reserve Bank’s regulatory regime for registered banks includes an official gate-keeper and merit regulation role, virtually all the registered banks have large, and perceived to be financially strong, parents, and possibly also are perceived to be “too big to fail”. The dominance of the banking system in the New Zealand financial system overall is consistent with this hypothesis. If saving is being channelled more through the banking system in New Zealand than in other countries, that might also result in a lower saving rate owing to bank deposits being probably the most liquid form of saving instrument.

7 Concluding remarks

In this paper we have attempted to develop a framework for assessing the saving performance of the New Zealand economy, and for considering the appropriate public policy structures with respect to saving. The framework is based on two prongs: an examination of the micro foundations of saving/consumption choices, and a consideration of how recent and current government policies might have influenced aggregate saving outcomes. We identify possible reasons why private saving decisions may result in under-saving – without concluding that has in fact been the case – and focus on four broad areas of government policy which will have had, or could in future have, an

⁴⁹ Life insurance companies are additionally subject to regulatory requirements prescribed under laws governing these entities. These include some merit regulation by a gatekeeper, but this is minimalist; the core regulation is that in the Securities Act regime.

⁵⁰ Technically, it is institutions that wish to include the word bank in their name, or otherwise, voluntarily choose to be covered by this regime instead of the Securities Act regime.

influence on saving. These relate to financial education, the structure of taxes, the institutional environment for saving, including the role of the government itself as a saver, and the role of financial regulation in supporting the saving process.

Saving in New Zealand has been at a margin, albeit not a substantial margin, below that of similar countries, but for an extended period. However, we have refrained from reaching strong conclusions on whether the level of saving has, or has not, been “too” low, and on policy implications. This is because of some remaining uncertainties about the factors that have been responsible for past and recent saving outcomes and because more detailed policy analysis would be required if specific policy adjustments were thought necessary. Our analysis has pointed to the following areas of work that could enable more definitive assessments and policy conclusions to be reached.

First, it is possible that household saving will increase in the period ahead (under existing policy settings), given that the generally negative transition effects on saving from economic restructuring and financial deregulation will by now have largely run their course, and given that the “baby boom” cohort is now in its middle, high income earning, years. If some increase, or at least levelling off, in household saving does not become apparent in the period ahead, that could provide clearer evidence of New Zealand experiencing a low level of saving that has its origins in, and may call for adjustment to, government policy. This suggests that monitoring and evaluation of saving outcomes and indicators (eg the current account balance, household borrowing, the institutional sector accounts) should be a priority. We also suggest on-going work to improve data on saving. We currently do not have official data on the breakdown of saving by sectors (the household, business and the government sectors), which makes it difficult to assess saving developments. Also, the Household Savings Survey undertaken by Statistics New Zealand for the Office of the Retirement Commissioner provides useful information on household net wealth that would be valuable for future years.

Second, we have outlined a framework for evaluating how government policy influences saving behaviours and outcomes. In parallel with the monitoring of up-coming developments in saving, there would be value in benchmarking the current New Zealand policy settings against those of other (like) countries, with a view to assessing where the more substantive policy differences – in terms of affects on saving outcomes – might lie, and hence where policy adjustments, if thought necessary, might be considered.

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Appendix 1: The neo-classical growth model

The Solow-Swan model of long-run economic growth consists of a *production function*, which relates the inputs in the economy to the outputs produced, and a *capital accumulation equation*, which describes how capital accumulates in the economy. The production function is assumed Cobb-Douglas with constant returns to scale in capital (K_t) and labour (L_t); that is, doubling the inputs, K_t and L_t , leads to double the output, Y_t :

$$Y_t = A_t (K_t)^\alpha (L_t)^{1-\alpha} \quad (9)$$

where A_t is an exogenous multi-factor productivity parameter and $0 < \alpha < 1$ is the income share of capital.⁵¹

Because (in a closed economy) domestic saving must equal domestic investment, capital accumulation ($K_{t+1} - K_t$) is given by:

$$K_{t+1} - K_t = sY_t - dK_t \quad (10)$$

where sY_t denotes saving (ie saving is a fixed fraction s of current income Y_t) and d is the rate of depreciation.⁵² Equation (10) states that capital accumulation (or net investment) is the difference between gross saving and depreciation. It assumes a closed economy or, alternatively, that the current account balance is equal to zero.

The engines of output growth in this model are multi-factor productivity and labour force expansion. Multi-factor productivity is assumed to grow at rate g and labour force expansion at rate n . Because productivity and the labour force are growing, other variables in the model, like output, will also grow. To remove these drivers of growth, so as to be able to assess the effects of an increase in saving (and hence investment), we divide the capital accumulation equation (10) and the production function (9) by $A_t L_t$, which yields:

$$\frac{K_{t+1}}{A_t L_t} - \frac{K_t}{A_t L_t} = \frac{sY_t}{A_t L_t} - \frac{dK_t}{A_t L_t} \quad (11)$$

and

$$\frac{Y_t}{A_t L_t} = \frac{A_t K_t^\alpha L_t^{1-\alpha}}{A_t L_t} \quad (12)$$

Equations (11) and (12) can then be re-written as⁵³

⁵¹ Note that the production function has diminishing returns in capital (labour); that is, doubling capital (or labour) alone increases output by less than double.

⁵² Note that sY_t denotes gross saving and $sY_t - dK_t$ net saving.

⁵³ Equations (13) and (14) are derived as follows:

$$k_{t+1} - k_t = \frac{1}{1 + (1+g)(1+n)} \{sy_t - [d + (1+g)(1+n)]k_t\} \quad (13)$$

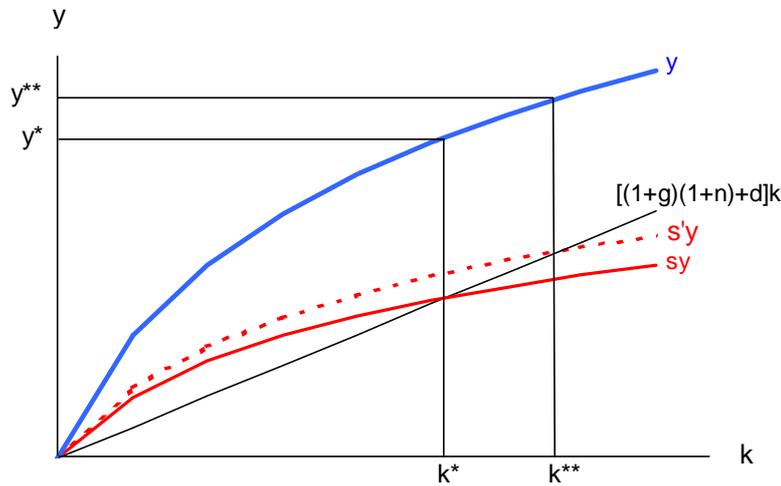
and

$$y_t = (k_t)^\alpha (l_t)^{-\alpha} \quad (14)$$

where $y_t = \frac{Y_t}{A_t L_t}$, $k_t = \frac{K_t}{A_t L_t}$ and $l_t = \frac{L_t}{A_t L_t}$.

The implications of a permanent change (say, increase) in the saving rate for the level of output can be illustrated with the Solow diagram (Figure 15). Time subscripts are dropped in Figure 15 as it describes the long run.⁵⁴ The Solow diagram plots each of output (y), and saving (sy) as a function of the capital stock (k), and also shows the investment required to maintain the capital stock at its steady state.

Figure 15 – The Solow-Swan model



In Figure 15, k^* and y^* describe the economy's steady state for the saving rate sy . At this point, saving equals investment, and the economy is on its balanced growth path, i.e. k and y are growing at the rate $n + g$. Now consider an increase in the saving rate to $s'y$. The new long run steady state is described by k^{**} and y^{**} , which corresponds with where the

$$\frac{K_{t+1}}{A_{t+1}L_{t+1}} - \frac{K_t}{A_t L_t} = \frac{sY_t}{A_t L_t} - \frac{dK_t}{A_t L_t}$$

$$\frac{K_{t+1}}{A_{t+1}L_{t+1}} (1 + (1+g)(1+n)) = \frac{sY_t}{A_t L_t} + \frac{(1-d)K_t}{A_t L_t}$$

$$\frac{K_{t+1}}{A_{t+1}L_{t+1}} = \frac{1}{(1 + (1+g)(1+n))} \left(\frac{sY_t}{A_t L_t} + \frac{(1-d)K_t}{A_t L_t} \right)$$

$$\frac{K_{t+1}}{A_{t+1}L_{t+1}} - \frac{K_t}{A_t L_t} = \frac{1}{(1 + (1+g)(1+n))} \left(\frac{sY_t}{A_t L_t} + \frac{(1-d)K_t}{A_t L_t} - \frac{(1 + (1+g)(1+n))K_t}{A_t L_t} \right)$$

$$\frac{K_{t+1}}{A_{t+1}L_{t+1}} - \frac{K_t}{A_t L_t} = \frac{1}{(1 + (1+g)(1+n))} \left(\frac{sY_t}{A_t L_t} - \frac{(d + (1+g)(1+n))K_t}{A_t L_t} \right)$$

$$\frac{Y_t}{A_t L_t} = \frac{A_t (K_t)^\alpha (L_t)^{1-\alpha}}{A_t L_t}$$

and

$$\frac{Y_t}{A_t L_t} = \frac{A_t (K_t)^\alpha (L_t)^{1-\alpha} (A_t L_t)^\alpha}{(A_t L_t)^\alpha (A_t L_t)^{-\alpha}}$$

$$\frac{Y_t}{A_t L_t} = \frac{(K_t)^\alpha (L_t)^{-\alpha}}{(A_t L_t)^\alpha (A_t L_t)^{-\alpha}}$$

⁵⁴ In the long run, $t = t + 1$.

(higher) saving rate equals the steady state rate of investment. While the new level of output is higher than when the capital stock was at level k^* , the increase is proportionately smaller than the increase in the capital stock to k^{**} . In other words, for a given rate of growth in the labour force and in productivity, there are diminishing returns to increasing the saving rate.

Appendix 2: Behavioural economics models

Procrastination

Consider the following example. Suppose I assess the cost (financial and physical) of going to the dentist as \$200, the benefit as \$63 in each of the four succeeding periods, and my discount rate for costs is 50 percent, but 10 percent for benefits. As shown in the Table 2, a net present value calculation of going to the dentist today would result in a marginal line call (the present value of the cost and benefits are equal). But it will seem that going tomorrow would be beneficial: today's net present value calculation of going tomorrow is clearly positive (\$181.50 - \$133.30). Hence I would decide not to go to the dentist today, but with the intention of going tomorrow. Of course, when tomorrow comes, the net present value calculation is no different from today's calculation. Again, it will appear that the cost of going today exceeds the benefit, but that it will be different tomorrow. Inconsistent specification of my rates of time preference makes procrastinating a rational response.

Table 2 – Example of procrastination

Period	Today's cost-benefit assessment of going to the dentist today		Today's cost benefit assessment of going to the dentist tomorrow	
	Present value of cost (50 percent discount rate) \$	Present value of benefit (10 percent discount rate) \$	Present value of cost (50 percent discount rate) \$	Present value of benefit (10 percent discount rate) \$
0	200			
1		$63/1.10 = 57.3$	$200/1.5$	
2		$63/1.21 = 52.1$		$63/1.21$
3		$63/1.33 = 47.4$		$63/1.33$
4		$63/1.46 = 43.2$		$63/1.46$
5				$63/1.61$
Total	200	200	133	182

Impatience⁵⁵

In this case, consider an individual who has a choice between a vacation now or in one or two years' time, valued respectively at \$1,000, \$1,200, \$1,400, and whose discount rate is 10 percent. In present-value terms, the preferred choice is the vacation in two years time (Table 3).

However, if after a year has elapsed, the individual becomes less patient, as reflected in a discount rate that is now 20 percent, the preferred option is to take the vacation without further delay. Moreover, it can be shown that if at the outset they knew that after one year their rate of time preference would adjust in this way, the optimal decision would have been to take the vacation at the outset. \$1,400 discounted for two years at 20 percent per

⁵⁵ This example closely follows (Coleman and Claridge 1999).

annum equals \$972, less than the value of the initial option of taking a \$1,000 vacation immediately.

Table 3 – Example of impatience

	Initial present value (10 percent discount rate)	Present value one year on (20 percent discount rate)
Vacation in year zero (\$1,000)	\$1,000	--
Vacation in year one (\$1,200)	$\$1,200/1.10 = \$1,091$	\$1,200
Vacation in year two (\$1,400)	$\$1,400/1.21 = \$1,157$	$\$1,400/1.2 = \$1,167$