Housing in the Household Portfolio and Implications for Retirement Saving: Some Initial Findings from SOFIE

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Abstract

This paper uses unit record data from a new panel survey (SOFIE) to study housing wealth in household portfolios. It then estimates the rates of saving that would be needed to smooth consumption between pre- and post-retirement. Finally it explores the effect of some home equity withdrawal on the required saving rates.

The main findings of this study are:

- 60% of households are recorded as owning a home;
- Almost half of home-owning households have no mortgage debt;
- One in six households own residential investment property;
- One in twelve households own a rental property;
- Patterns of property ownership in New Zealand are similar to those in selected comparator countries;
- Housing represents a major share of household wealth, and this share has risen in line with the increase in house prices;
- The composition of household portfolios is comparable to other selected countries except for the USA;
- Empirical results indicate that even if households planned to draw down 30% of housing equity to support retirement income, the impact on the saving rate needed to smooth consumption would be modest.

JEL CLASSIFICATION	D31 – Personal Income and Wealth Distribution D91 – Intertemporal Consumer Choice: Life Cycle Models and Saving J26 – Retirement R21 – Housing Demand
KEYWORDS	Consumption smoothing, home equity, household portfolio, household wealth, housing, life cycle, retirement, savings

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1 Introduction

Housing is an important sector of the economy. As such there are implications for aggregate investment, interest rates, inflation and economic cycles. At the household level, there are issues of ownership, access, affordability and wealth accumulation. This paper addresses two questions. First, what is the pattern of property ownership and investment among New Zealand households? Second, what role might housing equity play in retirement income and what would that imply for retirement saving?

The first issue is addressed in Section 3, which presents recent results from the Survey of Family, Income and Employment (SOFIE). It covers ownership patterns, gearing, net equity and composition of household portfolios. Comparisons are also made with results from the Household Savings Survey (HSS) and with international evidence. The second question is examined in Sections 4 and 5. This analysis is based on a model of retirement saving and provides a framework to explore implications of housing equity for retirement saving.

2 Data

The primary data source in this study is SOFIE, a panel survey which started in October 2002 and is intended to run annually for eight years. SOFIE collects data on levels, sources and changes in income for New Zealand individuals and families. It also reports on major influences on income, such as employment and education experiences, household and family status and changes, demographic factors and health status. The survey covers 26,339 individuals of 10,244 households, representing 3,771,864 people.[1]

The data on assets and liabilities used in this study come from wave 2, which ran from 1 October 2003 to 30 September 2004. Most of the analysis in this paper pertains to the household level.[2] The household's age is that of the 'head' member, defined as the person who earns the highest income within the household. The analysis in Section 3 excludes ages 17 and below, while Section 5 focuses on ages 45-64.[3]

3 Housing in the household portfolio

This section uses data from SOFIE to analyse evidence on home ownership and investment property. Some comparisons are made with HSS results (from Van Zijll de Jong and Scobie (2006)) and international data drawn from the Luxembourg Wealth Study.[4]

[1] SOFIE's target population is ordinary residents who live in private dwellings. Excluded from the survey sample are short-term overseas visitors (intending to stay for less than 12 months), non-NZ diplomats and diplomatic staff and their dependants, members of non-NZ armed forces stationed in NZ and their dependants, and residents of offshore islands other than Waiheke Island (Statistics New Zealand, 2006).

[2] A household may have more than one family.

[3] A description of the HSS is provided in Appendix A.1. Differences between SOFIE and HSS are also outlined in Appendix A.2.

[4] Available from `www.lisproject.org/lws.htm`.

3.1 Home ownership

Table 1 summarises the pattern of home ownership by age of the household head. The ownership rate rises steadily with age and shows no tendency to decline amongst those over 65 years old. Home ownership rates also rise with income, yet the variation across income levels is far less pronounced than across age groups (Appendix Table 1).

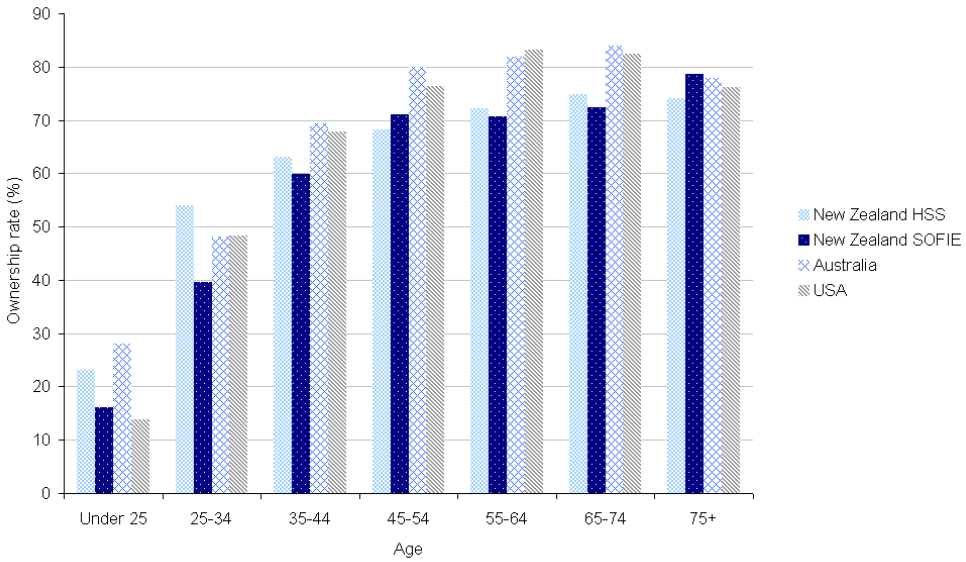
Table 1 – Home ownership: by age

Age	Ownership rate	Share in total owners
18-24	16.1	1.8
25-34	39.6	12.2
35-44	59.8	22.9
45-54	71.0	22.6
55-64	70.6	17.0
65-74	72.3	11.5
75+	78.7	12.0
Total	59.7	100.0

Note: Entries are percentages.

For most age groups the rates derived from HSS and SOFIE are very comparable (Figure 1). An exception occurs in the two younger groups. These gaps are mainly due to the difference in the survey design. Specifically, the reported HSS data refer to couples, while the SOFIE data are based on households. As households include single occupants, who are less likely to own a home, the SOFIE rates are predictably lower than those derived from HSS.

Figure 1 – Home ownership by age: a comparison of New Zealand, Australia and USA

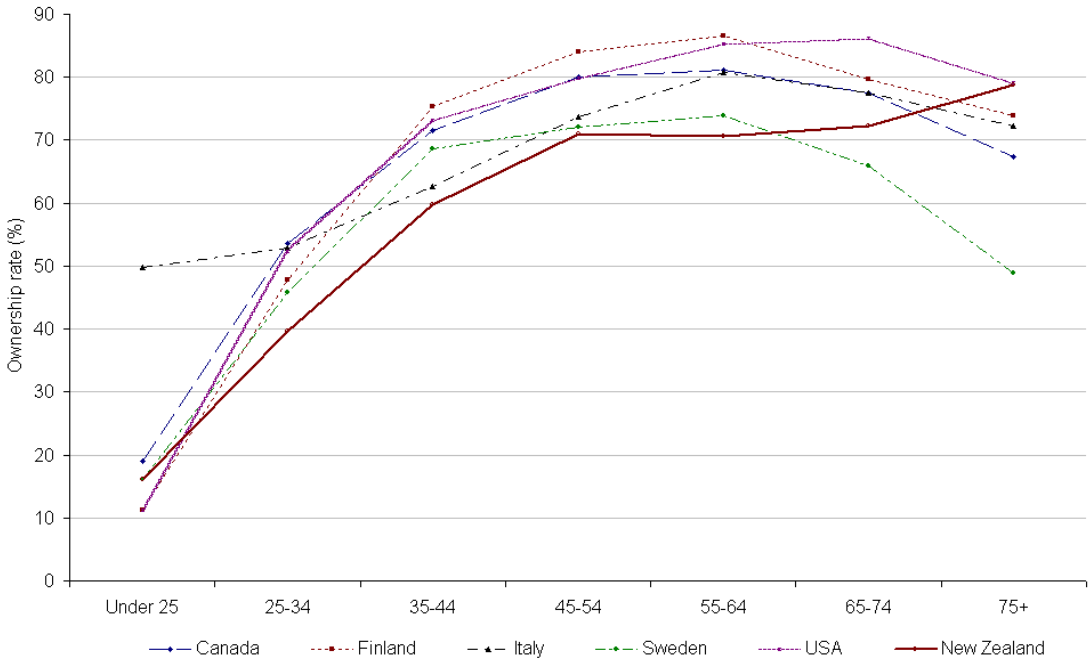


Note: New Zealand HSS data refer to couples, while other data pertain to households.

Compared with Australia and the United States (USA), the ownership rates in New Zealand are lower in almost all age groups, but only marginally. Figure 2 further underscores the fact that the New Zealand rates are not markedly out of line with international evidence, though tend to be at the lower end.

Institutional and economic differences across countries can influence patterns of home ownership. Banks et al (2002) observe that home ownership rates are higher in the UK than in the USA, especially at younger ages. The authors offer two reasons for this phenomenon. First, the

Figure 2 – Home ownership by age: an international comparison



Sources: New Zealand data are from SOFIE, while data for the other countries come from the Luxembourg Wealth Study (2001).

rental market tends to operate more efficiently in the USA. Second, housing prices have historically been much more volatile in the UK. Therefore, young home buyers who plan to upgrade as their income and family expand face greater price risk in the UK. One approach to self-insuring against house price volatility is to maintain a larger proportion of household wealth in housing equity. We believe that the issue of price volatility and its potential impact on home ownership represents a potentially fruitful area for further work on the New Zealand housing market.

3.2 Ownership of investment property

Table 2 shows that one in six New Zealand households have some form of investment property, while around 8% report ownership of rental property. The ownership of rental property increases with age, exceeding 11% in the pre-retirement age groups (Appendix Table 2). Amongst the highest income quintile, almost one in five own a rental property (Appendix Table 3).

Table 2 – Ownership of investment property: by type

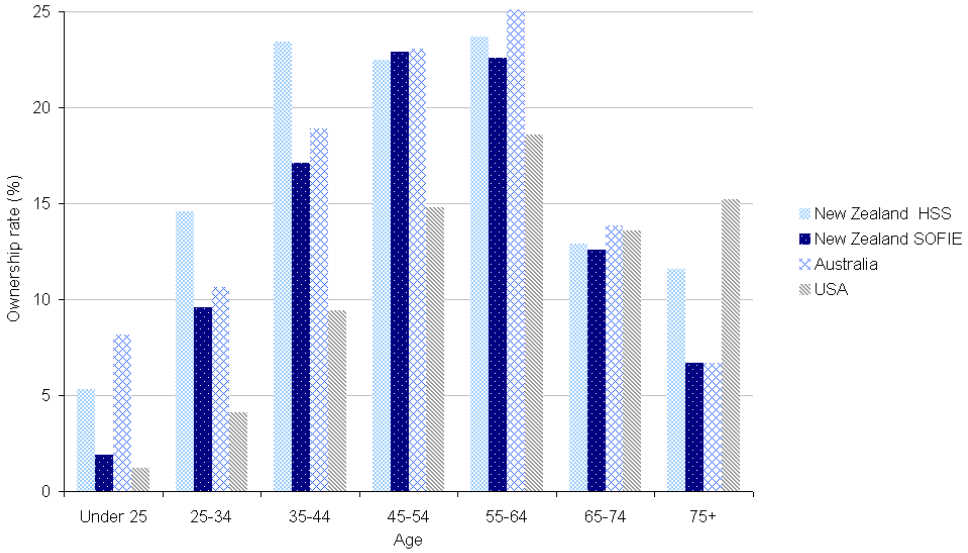
Investment type	Ownership rate (%)	Mean value	Median value
Holiday homes in NZ	2.8	219,405	169,300
Rental property in NZ	7.7	302,972	223,400
Other property in NZ	4.9	215,907	140,100
Timeshares in NZ	1.0	13,008	5,000
Overseas property	1.0	392,448	150,000
Any investment property	15.2	253,868	172,000

Note: Values of property have been adjusted for the household's share when a property is owned by multiple households.

An international comparison of the ownership pattern of investment property is provided in Figure 3. The high rates observed in the HSS data are again mostly attributable to the difference

in the sampling design. With the exception of the under-25 group, the rates of ownership of investment property amongst New Zealand households are largely similar to those recorded for Australia. The rates in the USA are typically lower, reflecting the higher proportion of financial assets in investment portfolios of US households.

Figure 3 – Ownership of investment property by age: a comparison of New Zealand, Australia and USA



Note: New Zealand HSS data refer to couples, while other data pertain to households.

3.3 Gearing

Gearing is defined as the ratio of mortgage debt to gross value of property holdings. As explained in Appendix A.2, SOFIE data do not break down the total value of mortgages into various types of property. As a consequence, we are only able to present the gearing ratio for the aggregate holding of property.

As evident from Table 3, close to one half of property-owning households have no mortgage debt. Among mortgage debtors, approximately one half have a gearing ratio of under 50%. Predictably, gearing ratios fall with age and the typical household above 55 has no mortgage debt, as indicated by the medians in Appendix Table 4.

Table 3 – Property gearing ratios for property-owning households

Level of gearing	Population share (%)
0	43.2
0.00 – 0.25	16.9
0.25 – 0.50	19.4
0.50 – 0.75	14.7
0.75 – 1.00	4.1
1.00 – 1.25	0.8
1.25+	0.9
Total	100.0

3.4 Net equity

In this section, we examine the relationship between net equity in property and total net worth.[5] Across the population, the median share of property equity in total net worth is 56%, whereas among property owners, typically over 80% of total net worth is held in residential property (Table 4).

Table 4 – Net equity in property as a share of total net worth

Age	All households	Property owners only
18-24	0.00	0.85
25-34	0.00	0.81
35-44	0.59	0.84
45-54	0.65	0.77
55-64	0.63	0.77
65-74	0.76	0.85
75+	0.82	0.88
Total	0.56	0.82

Note: Entries in are medians of ratio of net equity in property to total net worth.

A finer breakdown of net equity is given in Appendix Tables 5-6 for couples in the pre-retirement age groups. These tables contain the average level of net wealth for each of the major categories: housing, pension, New Zealand Superannuation (NZS) and other. This last category includes all other forms of net equity, including household assets, financial assets and investment in property other than the owner-occupied house. The value of NZS is computed as the present value of the future expected streams of payments assuming that the current policy parameters are retained.

We calculate the share of housing in the average household portfolio as the ratio of mean housing wealth to mean total wealth. On average, housing accounts for 38% in total net worth (Table 5). This ratio falls to one quarter when NZS is added to the wealth portfolio. These estimates serve to emphasise the important role that NZS plays in the total wealth of New Zealand households, particularly among the lowest quintile of the wealth distribution.

Table 5 – Share of housing wealth in total wealth

Wealth	Couples aged 45-54		Couples aged 55-64	
quintile	Incl. NZS	Excl. NZS	Incl. NZS	Excl. NZS
1	0.07	0.97	0.08	0.57
2	0.22	0.64	0.21	0.57
3	0.28	0.57	0.30	0.57
4	0.31	0.50	0.32	0.50
5	0.23	0.28	0.21	0.26
Total	0.24	0.38	0.24	0.37

Note: Entries are ratios of mean housing wealth to mean total wealth reported in Appendix Tables 5-6.

[5] Again, because SOFIE does not provide a breakdown of mortgage liability, the results presented here refer to all property.

3.5 Household portfolio composition

We can again draw on the Luxembourg Wealth Study to make cross-country comparisons of the composition of household wealth. As reported in Table 6, between 2001 and 2004 there was a rise in the share of property assets in total investment assets of New Zealand households, reflecting increases in house prices over this period.[6] But even with this rise the composition of household portfolios in New Zealand is not dramatically different from those in the selected comparator countries. The USA emerges as an outlier, with households investing relatively more in financial instruments than in real estate.

Table 6 – Household portfolio composition

	Canada[a] 1999	Finland[a] 1998	Italy[a] 2002	Sweden[a] 2002	USA[a] 2001	NZ[b] 2001	NZ[c] 2001	NZ[d] 2004
Financial assets[e]	**22**	**16**	**16**	**28**	**41**	**21**	**22**	**15**
Deposit accounts[f]	42	59	56	40	24	46	59	50
Mutual funds[f]	21	4	18	31	34	25	18	22
Stocks[f]	30	34	8	21	34	29	23	}28
Bonds[f]	6	3	17	7	8	-	-	
Real estate assets[e]	**78**	**84**	**84**	**72**	**59**	**79**	**78**	**85**
Principal residence[f]	83	77	80	85	73	81	81	80
Investment property[f]	17	23	20	15	27	19	19	20
Total debt[e]	**26**	**16**	**3**	**35**	**20**	**30**	**26**	**26**
Home mortgage[f]	83	68	80	-	82	60	57	61

Sources: [a] Luxembourg Wealth Study, these estimates are taken from the preliminary 'beta' version, see `www.lisproject.org/lws.htm`. [b,c] HSS [d] SOFIE
Note: Entries are percentages [e] Share of total investment assets [f] Share of corresponding investment asset class [b] Couples [c] Non-partnered individuals. All other data refer to households.

4 Saving for retirement – the model

To model adequacy of retirement saving, we adopt a framework of joint determination of saving and replacement rates. This framework seeks to smooth consumption throughout the life cycle.

4.1 General assumptions

To simplify the modelling process, we ignore uncertainty. Specifically, this assumption means that an individual will retire at a certain age as planned; does not engage in the work force after retirement; knows exactly what their income until retirement will be; can accurately project the rate of return on investments; has a known life expectancy at the age of retirement; knows the amount of NZS that they will receive; plans and executes whatever bequests they wish to make; has no unexpected changes in health status that would affect income or expenditures; and assumes tax rates and other policies remain unchanged.[7]

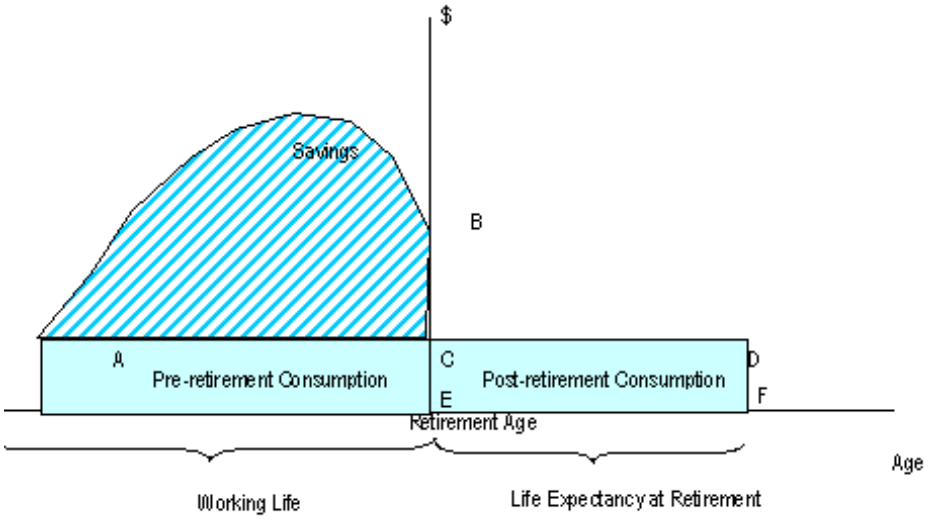
[6] Table 6 covers investment assets, both real estate and financial, but ignores other household assets such as vehicles, collectibles, farms and business and pension schemes.

[7] Uncertainty, including such sources as sickness, disability, employment, earnings, inheritances and life expectancy, can best be introduced using micro-simulation models. See, for example, Statistics Canada (2004).

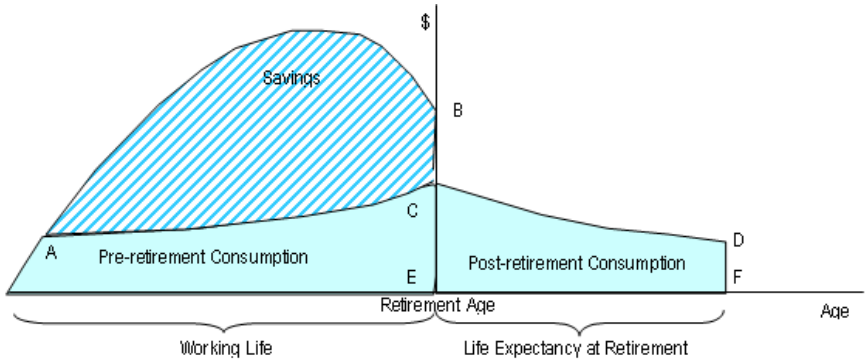
In the absence of uncertainty, the life-cycle saving and consumption patterns can be illustrated as in Figure 4. The household chooses a level of consumption that can be financed from income over the working life, and then from savings during retirement. This implies (ignoring interest for the moment) that savings (area ABC) are equal to consumption needs in retirement (area CDEF).

Figure 4 – A life-cycle model of income, savings and consumption

(a) No uncertainty



(b) Uncertainty



Source: Adapted from Moore and Mitchell (1997)

This simple life-cycle pattern can be modified to allow for uncertainty. As shown by Moore and Mitchell (1997), when life expectancy is uncertain, consumption will tend to rise until retirement and fall subsequently, rather than remaining uniform throughout (see Figure 4b). However, the basic pattern of earnings and savings before retirement and wealth decumulation throughout retirement to finance consumption is left unaltered.

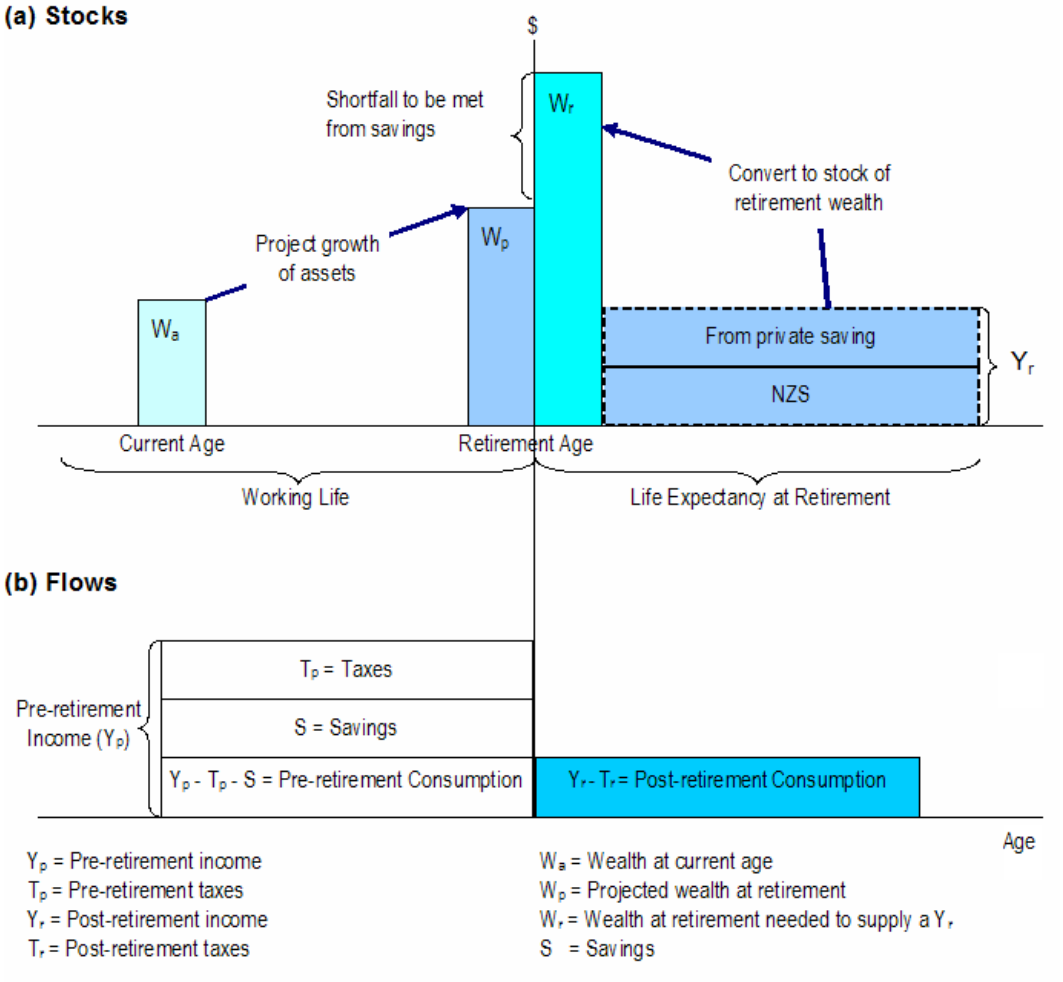
In the face of uncertainty, some precautionary savings may be accumulated, which, if not needed, may lead to bequests. Conversely, if accumulated savings prove inadequate due to unforeseen events, some source of assistance income in retirement would be required.

Abstracting from uncertainty has the advantage of significantly simplifying the analysis. Clearly, the results can not be interpreted as applying to a particular individual whose incomes, expenditures, returns on assets and life expectancy are all subject to shocks. However, when these shocks are both unanticipated and distributed equally among both positive and negative changes, the outcomes illustrated here can be interpreted as expected values for any given population group.

4.2 A model of joint determination of replacement and saving rates

This approach[8] calculates jointly the saving and income replacement rates for each person or couple. A complete derivation of the model is given in Appendix B, while a graphical illustration is presented in Figure 5. At the current time a person/couple has a net worth W_a as measured by SOFIE. This wealth is projected to grow to W_p by the time they reach a pre-determined retirement age. In order to have a given level of consumption in retirement they would need to have accumulated a stock of wealth equivalent to W_r. Part of their retirement income is provided by NZS and the stock of wealth equivalent to the NZS income is incorporated in W_r and W_p.

Figure 5 – A model of joint determination of saving and replacement rates



The difference between the required wealth W_r and the projected wealth W_p is the shortfall that would need to be accumulated between now and retirement. This additional amount, in the absence of inheritances or unanticipated revaluation in asset values, would need to be built up through savings. These flows are depicted in Figure 5b.

The approach assumes that some fixed share of pre-retirement income will be saved ($s = S/Y_p$) and the replacement rate is given by the ratio of gross income in retirement to gross income pre-retirement ($R = Y_r/Y_p$). Under the New Zealand taxation system of TTE,[9] post-retirement taxes T_r are zero, so consumption is equal to income in retirement. To assess the level of

[8] The approach adopted follows that of Moore and Mitchell (1997).

[9] TTE refers to a system where the savings are made from after-tax income, the returns are taxed and the withdrawals are exempt. It differs from those systems which exempt savings or earnings from taxation and tax withdrawals (TET, ETT or EET).

consumption smoothing, we also compute consumption replacement rates as the ratio of pre-retirement consumption to post-retirement consumption.[10]

Clearly, some values of retirement income could imply a substantial shortfall in retirement wealth, which might in turn require unrealistic or infeasible levels of savings before retirement. It is for this reason that the saving and replacement rates are jointly determined.

4.3 Specific assumptions

The retirement age is set at 65. We project pre-retirement income from its current level using an annual growth rate of 1%, chosen to approximate the average rate of labour productivity and real wage growth in the economy. Pre-retirement tax rates are based on this pre-retirement income Y_p. NZS payments are assumed to grow at 1% annually in real terms, matching the growth in average real wages.[11] Bequests involve only the current equity in the principal residence.

The model for couples is complicated by the fact that the two partners of each couple may neither retire nor die at the same time. The retirement phase for couples is assumed to start when the older partner reaches 65 (the younger partner will continue earning an income, which may affect the value of NZS received by the retired partner). We further postulate that after one partner dies, the surviving partner will have a consumption level equivalent to 60% of the couple's level.

We compute life expectancies from mortality rates projected by Statistics New Zealand. These projections take into account predicted changes in health status. We assume that Pacific Islanders have the same mortality rates as Maori and that mortality rates are the same for all other ethnic groups. As such, we are able to calculate life expectancies at retirement for each gender, ethnic broad group and year of retirement.

5 Saving for retirement – results

This section reports estimates of the prescribed saving rate for age groups 45-54 and 55-64. This rate has been found to be negative for some households. We would caution against interpreting these negative values too literally; ie they should not be taken as a recommendation that those households should 'dissave.' Rather, these rates suggest that no further saving is needed to sustain their consumption levels in retirement, given the household's current wealth.[12] Even without extra savings, these households would already be able to afford higher consumption in retirement than their present level.

5.1 Baseline results

Table 7 contains the rate at which households need to save until age 65 in order to have sufficient wealth so that they could enjoy a level of consumption in retirement similar to what they had before retirement. The median prescribed saving rate is higher for households aged 45-54, but the distribution is far more uneven among older households. While 49% of non-partnered individuals aged 55-64 are prescribed a negative saving rate, 10% would need to set aside over 30% of their

[10] $R_c = \frac{Y_r}{Y_p(1-t_p)} = \frac{R}{1-t_p}$.

[11] In 2003, NZS after-tax payment was $12,756 for non-partnered individuals (who live alone) and $19,624 for couples.

[12] We have set negative prescribed saving rates to zero to preclude literal interpretation.

current income for retirement. The 'typical' non-partnered individual aged 45-54 has a prescribed saving rate of as high as 11.3%, but at the 90th percentile this rate is less than 25%.

Table 7 – Prescribed saving rates for households aged 45-64

	Percentile				
	10th	25th	50th	75th	90th
Non-partnered individuals					
Ages 45-54	0	0	11.3	20.6	24.6
Ages 55-64	0	0	1.1	22.3	31.7
Couples					
Ages 45-54	0	4.4	17.1	23.2	26.7
Ages 55-64	0	0	16.8	28.7	35.1

Note: Entries are percentages.

The prescribed saving rates, consumption replacement rates and projected retirement incomes are given for each wealth quintile in Tables 8-9. Apparently, the prescribed saving rates for couples are considerably higher than for non-partnered individuals. There are at least three reasons for this. First, the retirement period for couples is longer; it extends from when the older partner retires until when the last partner dies. Second, couples earn more than twice as much as non-partnered individuals, reflecting the phenomenon of assortative mating. Third, NZS pays couples only 53% more than the rate for individuals (implying economies of household size).

Table 8 – Median prescribed saving rates, consumption replacement rates and retirement income for non-partnered individuals

Wealth	Ages 45-54			Ages 55-64		
quintile	S	R_c	Y_r	S	R_c	Y_r
1	8.8	88.9	18,300	0.0	100.0	11,200
2	17.0	78.6	20,100	1.6	98.0	13,700
3	16.7	79.0	24,200	7.3	90.7	15,100
4	14.0	82.3	26,600	16.0	79.6	20,500
5	0.9	98.8	35,300	0.0	100.0	29,500
Total	11.3	85.6	23,100	1.1	98.6	15,800

Note: S = prescribed saving rate, R_c = consumption replacement rate, Y_r = retirement income. Entries for S and R_c are percentages.

Table 9 – Median prescribed saving rates, consumption replacement rates and retirement income for couples

Wealth	Ages 45-54			Ages 55-64		
quintile	S	R_c	Y_r	S	R_c	Y_r
1	17.4	77.7	38,800	14.6	81.6	27,600
2	19.0	74.9	44,500	20.3	74.2	33,300
3	19.7	74.4	50,400	22.2	71.1	36,800
4	17.5	75.5	57,800	19.9	74.1	46,200
5	0.4	99.4	80,900	0.0	100.0	70,100
Total	17.1	77.5	50,700	16.8	78.5	37,900

Note: See Table 8.

Across the wealth distribution, there is little variation in median prescribed saving rates for the lowest four quintiles of wealth. For non-partnered individuals aged 45-54, for example, the median prescribed saving rate ranges from 8.8% for quintile 1 to 17% for quintile 2, while it is almost

zero for the 20% wealthiest individuals. These saving rates will enable them to attain a retirement consumption level of around 80% as much as their pre-retirement level. Non-partnered individuals aged 45-54 will expect to have a median retirement income of $23,100, compared with $15,800 for those nearing retirement. For couples, the corresponding difference between the two cohorts is 34%.

The prescribed saving rate rises with income level (Figures 6-7). While the 20% lowest earners should save no more for retirement, the typical household in the top income quintile will need to save over a fifth of their income to smooth consumption over the life cycle.

Figure 6 – Median prescribed saving rates by wealth and income quintiles for non-partnered individuals aged 45-54

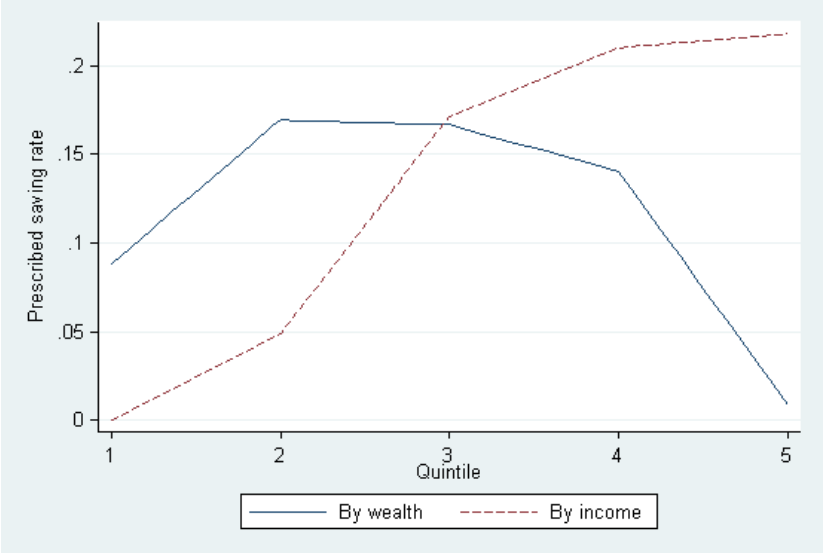
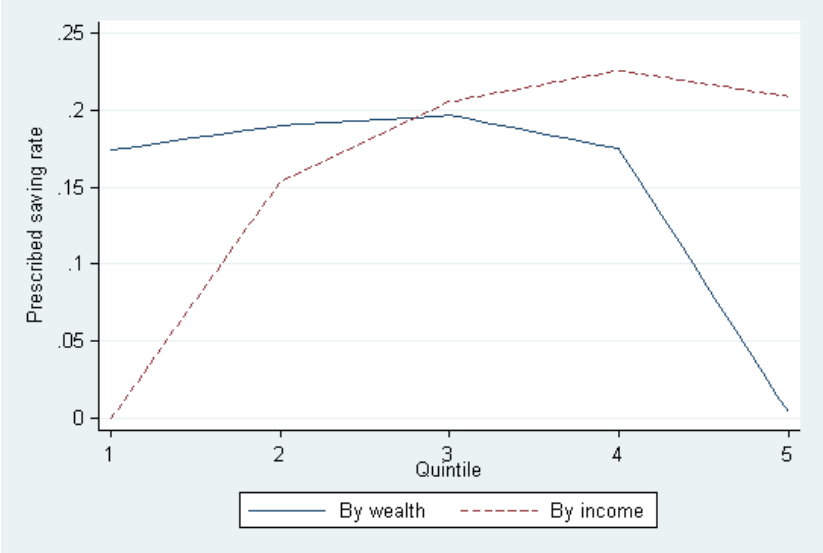


Figure 7 – Median prescribed saving rates by wealth and income quintiles for couples aged 45-54



Our model prescribes negative saving rates for 25% of couples and 40% of non-partnered individuals. These households either are earning too little or hold much wealth. Indeed, 27% of non-partnered individuals and 9% of couples in our sample reported income that was below the current NZS payment; additional saving is not justified for these people as NZS income would already provide them more consumption than they can currently afford. Likewise, no more saving is necessary if the household has accumulated sufficient wealth to sustain their pre-retirement consumption levels.

There are several reasons why our prescribed saving rates are conservative. First, we assume pre-retirement consumption will be sustained throughout retirement. However, empirical evidence often suggests that private consumption spending declines with age (Gibson and Scobie, 2001). Second, the level of wealth in private pension schemes reported in SOFIE has apparently been underestimated due to some technical problems with the questionnaire.

5.2 Potential contribution of home equity

Ageing population and longer life expectancies have led to an extensive debate on mechanisms, both public and private, for funding retirement incomes. From the private perspective, discussion centres on the need for more aggressive saving rates before retirement, accepting a lower level of post-retirement consumption or extending the period of labour-force participation. As a significant part of wealth for many households is the principal residence, releasing equity from the home has featured increasingly in debates about retirement income options.[13]

Home equity can be released pre-retirement through equity withdrawal for other more liquid forms of investment. Post-retirement home equity can be freed up by 'downsizing' or by reverse equity mortgages. In this paper, we do not enter into the specifics of the actual mechanisms. Rather, we explore the extent to which using some portion of home equity could augment retirement incomes and so decrease the level of required saving.[14]

Section 5.1 assumes that only the current equity in the owner-occupied house is retained for bequests. For this analysis we assume that mortgages on the principal residence will have been paid off by the time the household retires. Accordingly, at the time of retirement the household's housing equity will be equal to their share in the gross value of the house.[15] Their wealth in the 'other' category will be commensurately reduced by the outstanding value of the home mortgage. In fact, the vast majority of retirees own their home free and clear. As reported in Appendix Table 7, 58.5% of all property owners have mortgage debt, compared with only 8.3% among those older than 64. The latter rate is even lower (7.4%) when property investors are excluded. The average mortgage debt is also considerably lower among the older people.

As Table 10 shows, the extent of home equity withdrawal affects the prescribed saving rate. The relative impact is similar across the distribution of saving rates. If the house is to be retained and bequeathed, the median prescribed saving rate for couples aged 55-64 is 18.1%, dropping to 16.9% when 10% of home equity is withdrawn, and 14.4% when the amount of housing wealth to be released is 30%. At the 90th percentile, the prescribed saving rate falls from 36.6% to 35.3% and 33.3% respectively. By construction, lower prescribed saving rates mean higher replacement rates and higher retirement income. That is, by converting housing wealth into income in retirement, households are able to achieve better consumption smoothing over the life cycle and thus to enjoy higher consumption in retirement.

The effect of home equity withdrawal is, however, not substantial. This is because we have only allowed a small rate of conversion of housing wealth. Yet there are significant transaction costs in releasing home equity which we have ignored. These costs would further reduce the potential role of home equity to alleviate the pressure on saving. While housing wealth may well represent a buffer for some households facing uncertain income and expenditures in retirement, this analysis suggests that reverse equity mortgages or 'downsizing' has a limited role in easing the need for retirement saving.

[13] See Davey (2005) for a recent New Zealand perspective.

[14] For an example of the use of home equity as a buffer against unexpected income shocks, see Hurst and Stafford (2004).

[15] Some houses may not be wholly owned by an individual or a couple.

Table 10 – Effect of home equity withdrawal on prescribed saving rates

	Ages 45-54				Ages 55-64			
Percentile	25th	50th	75th	90th	25th	50th	75th	90th
Non-partnered individuals								
Retain the house	0.0	12.0	22.4	27.4	0.0	3.9	24.3	32.9
Withdraw 10% of home equity	0.0	11.3	21.7	26.7	0.0	1.7	22.6	31.8
Withdraw 20% of home equity	0.0	11.1	21.3	25.9	0.0	0.0	21.7	31.1
Withdraw 30% of home equity	0.0	10.5	20.7	24.9	0.0	0.0	19.9	30.3
Couples								
Retain the house	5.7	18.9	24.8	29.0	0.0	18.1	30.0	36.6
Withdraw 10% of home equity	5.2	18.3	24.1	28.2	0.0	16.9	28.7	35.3
Withdraw 20% of home equity	4.4	17.6	23.5	27.5	0.0	15.4	27.3	34.2
Withdraw 30% of home equity	4.2	16.8	22.9	26.8	0.0	14.4	26.3	33.3

Note: Entries are percentages.

6 Summary and conclusions

Data from SOFIE provide a comprehensive picture of property ownership and investment. Sixty percent of all households are home owners. The rate of ownership rises sharply with age until 45 years, and then shows moderate increases among older households. Nearly 80% of households headed by a person older than 75 own the house in which they live. This ownership pattern resembles what prevails in other countries.

Overall, one in six households own some form of investment property; nearly half of whom own a rental property. As the ownership rate drops drastically after age 65, income from rental property represents a very minor component of retirement income. Apparently, investment in rental property is often liquidated once the household head reaches 65. The pattern of ownership of investment property in New Zealand seems to match in large measure that observed in Australia and the USA.

What role does housing play in the total wealth portfolio of households? There are a number of possible measures. According to the aggregate data for the household sector, the share of housing wealth in total wealth was 73% in December 2005.[16] An alternative measure can be derived from SOFIE data using the median ratio of net equity in property to total net worth. This measure indicates that for a 'typical' household, property represents over half of total net worth. This share increases to over 80% when the population is restricted to households who report ownership of property. Close to one half of property-owning households report no mortgage debt, while among mortgage debtors, about one half have debt under 50% of the property value.

In addressing the role of home equity for retirement income we adopt a life-cycle model of consumption smoothing. We find that even if 30% of housing equity is converted to retirement income, the reduction in the prescribed saving rate is still modest. The prospect of reverse equity mortgages may well play a precautionary role in that housing equity represents a store of value that could be drawn on to meet unanticipated expenditures (such as health and extended life expectancy). However, it should not be viewed as a substitute for 'adequate' levels of retirement saving.

[16] See `http://www.rbnz.govt.nz/statistics/monfin/HHAandL2005webcopy.xls`.

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Appendices

A Data

A.1 Household Savings Survey

The 2001 Household Savings Survey covered those over 18 years of age living in private dwellings and usually resident in New Zealand. People living in non-private dwellings such as institutions, motels, rest homes or hostels were excluded, as were those on offshore islands (except Waiheke Island).

For the core sample 6,600 households were approached. One person from those qualifying in the household was chosen at random, and information was collected from and about that individual. If they had a partner, information was collected for the couple, ie where the respondent and their partner were living in the same household the couple was interviewed as a single unit. In order to improve the accuracy of estimates for Māori, a booster sample was used. The response rate was 74% and the final sample includes 5,374 households (2,392 non-partnered individuals and 2,982 couples). In total, a population of 930,900 non-partnered individuals and 1,711,800 individuals in couples, or a total of 2,642,700 people, are covered.[17] The survey results, when appropriately weighted, represent about 98% of the resident adult population.

A.2 Differences between HSS and SOFIE data

	HSS	SOFIE
Statistical unit	The non-partnered individual or the couple	The individual and the household. SOFIE provides no information on whom a person is partnered with, but we can infer this from people's role in their family nucleus and form partnered individuals into couples accordingly. The couple's income or wealth is made up of the income/wealth of both partners while the age of the couple refers to the age of the older partner.
Property	Non-partnered individuals/couples were asked for the dollar value of their share in a property.	Individuals were asked for the total value of each property and the number of other owners of that property. We assume equal ownership shares among owners.
Mortgages	Mortgages were collected for each property.	There is only one figure which refers to the total value of all mortgages, but no information on the number of mortgages or which property the mortgages are for. We assume that the total mortgage value is split between owner-occupied and other residential property such that the gearing ratio is equal between the two classes of property.

[17] Although the survey is entitled a 'household' survey, it does not pertain strictly to households *per se*. Rather, it covers non-partnered individuals and couples.

	HSS	SOFIE
Household items	No data	We ignore household items in the calculation of wealth, since these assets depreciate over time and that they can not easily be liquidated. These assets are also valued inconsistently across individuals.[18]
Pension schemes	Values were provided by the Government Actuary and are consistent with the Reserve Bank's aggregate data.	Due to errors in the questionnaire, there is evidence that the participation rates in pension schemes and reported values of schemes are markedly lower than indicated by other sources.[19] The errors are complex and we have been unable to remedy them. We take the data as is, acknowledging that these errors understate net worth by 2% on average and thus render our results 'conservative.'

B Derivation of the model of joint determination of saving and replacement rates

The framework outlined in this appendix is drawn from Moore and Mitchell (1997). They argue that it is necessary to develop a model which allows the replacement rate and the pre-retirement saving rate to be jointly determined. The reasons for this are twofold. Firstly, in view of a household's actual and projected income and assets, the saving rate needed to achieve some pre-specified replacement rate may be infeasible. Secondly, the replacement rate depends in part on the rate of taxation in retirement, which in turn depends on the level of retirement income, itself a determinant of the replacement rate. Only when the tax rates in retirement were pre-determined would this second issue be avoided.

The starting point is the condition that real consumption (ie income net of taxes and saving) be equal before and after retirement, as given by:

$$Y_p - T_p - S = Y_r - T_r \tag{1}$$

where:
$Y_p =$ pre-retirement gross income;
$T_p =$ pre-retirement taxes;
$S =$ savings;
$Y_r =$ post-retirement gross income;
$T_r =$ post-retirement taxes.

Next define

$s =$ pre-retirement saving rate = (S/Y_p)
and $R =$ replacement rate = (Y_r/Y_p)

so that substituting these definitions in (1) and dividing by Y_p gives:

$$1 - (T_p/Y_p) - s = R - (T_r/Y_p) \tag{2}$$

[18] The methods that were used to evaluate household items include: 1) Insured value for replacement (59.4%); 2) Insured value not for replacement (6.3%); 3) Amount that would be received if sold (13%); 4) Amount that was paid (8.1%); 5) Other method of estimation (11.7%); 6) Don't know; 7) Refused; and 8) Missing.

[19] Informal communications and unpublished notes from staff of Statistics New Zealand.

Now let $T_p = t_p Y_p$ and $T_r = t_r Y_r$ where t_p and t_r are the pre- and post-retirement proportional tax rates, so that:

$$s = (1 - t_p) - (1 - t_r)R \tag{3}$$

Equation (3) defines a set of combinations of s and R which satisfy the condition specified in (1). By first finding a value for R, we can then solve for the corresponding value of s that satisfies (3).

The post-retirement income flow (Y_r) can be converted to a lump sum at retirement by applying an annuity factor (α). This expresses the stream of post-retirement income in terms of a stock in wealth at the time of retirement. In other words, were a person to have accumulated this amount they would be able to receive a lifetime annuity of Y_r. Denoting the 'required' wealth needed to generate Y_r as W_r, then:

$$W_r = \alpha Y_r = \alpha[(1 - s)Y_p - T_p + T_r] \tag{4}$$

The amount of saving needed to reach this required level of retirement income W_r will depend on:

- the existing stock of net wealth W_p
- the expected returns on investment
- future income
- tax rates.

We define W_p as the projected level of wealth, so that the shortfall is:

$$W_r - W_p = \alpha[(1 - s)Y_p - T_p + T_r] - W_p \tag{5}$$

We are now in a position to derive the rate of saving needed to reach the required level of wealth. This rate is the share of pre-tax income the household would need to save in order to have the level of income Y_r in retirement.

The amount accumulated by retirement would then be:

$$W_r - W_p = \sum_{t=1}^{T} sY_a(1 + g)^t(1 + r)^{T-t} = sY_a \left[\sum_{t=1}^{T} (1 + g)^t(1 + r)^{T-t} \right] = sY_a Z \tag{6}$$

where:

$Y_a =$ actual income in year $t = 1, \cdots, T$;
$g =$ annual growth rate of income;
$r =$ after-tax real rate of return on saving.

Using (5) and (6) we can solve for the saving rate, s:[20]

[20] Note the saving rate is defined as a constant share of pre-retirement income.

$$s = \frac{\alpha(Y_p - T_p + T_r) - W_p}{Y_p[\alpha + \frac{Z}{(1+g)^T}]} \tag{7}$$

where $Y_p = Y_a(1+g)^T$. Now dividing by Y_p gives:

$$s = \frac{\alpha t_r R + \alpha(1-t_p) - \frac{W_p}{Y_p}}{\alpha + \frac{Z}{(1+g)^T}} \tag{8}$$

where T is the number of years from the person's current age until the pre-determined age of retirement. Note again that s is a linear function of R. Equating (3) and (8) we have:

$$\frac{\alpha t_r R + \alpha(1-t_p) - \frac{W_p}{Y_p}}{\alpha + \frac{Z}{(1+g)^T}} = (1-t_p) - (1-t_r)R \tag{9}$$

which after collecting terms in R gives:

$$R\left[\frac{\alpha t_r}{\alpha + \frac{Z}{(1+g)^T}} + (1-t_r)\right] = (1-tp) - \left[\frac{\alpha(1-t_p) - \frac{W_p}{Y_p}}{\alpha + \frac{Z}{(1+g)^T}}\right] \tag{10}$$

Now consider the coefficient of R on the LHS of (10):

$$= \frac{\alpha t_r}{\alpha + \frac{Z}{(1+g)^T}} + (1-t_r) = 1 - \left[\frac{t_r Z}{\alpha(1+g)^T + Z}\right] \tag{11}$$

while the RHS of (10) can be written as:

$$= (1-t_p) - \left[\frac{\alpha(1-t_p) - \frac{W_p}{Y_p}}{\frac{\alpha(1+g)^T + Z}{(1+g)^T}}\right] = \frac{Z(1-t_p) + \frac{W_p}{Y_p}(1+g)^T}{\alpha(1+g)^T + Z} \tag{12}$$

Substitute (11) and (12) in (10) and solve for R:

$$R = \frac{\frac{Z(1-t_p) + \frac{W_p}{Y_p}(1+g)^T}{\alpha(1+g)^T + Z}}{\frac{\alpha(1+g)^T + Z - t_r Z}{\alpha(1+g)^T + Z}} \tag{13}$$

so that:

$$R = \frac{(1-t_p)Z + \frac{W_p}{Y_p}(1+g)^T}{(1-t_r)Z + \alpha(1+g)^T} \tag{14}$$

We return now to the question of t_r. It is argued that in the context of the New Zealand system of taxation, private retirement saving is made from after-tax pre-retirement income $Y_p - T_p$, and

the earnings on the investments are taxed. However, once those accumulated funds are withdrawn (in this case to purchase an annuity), there is no further taxation on the income received in retirement. Furthermore, NZS payments are received net of tax. Hence under this system (denoted TTE), $t_r = 0$. With this simplification we can solve for R for each individual having T years remaining until retirement, such that:

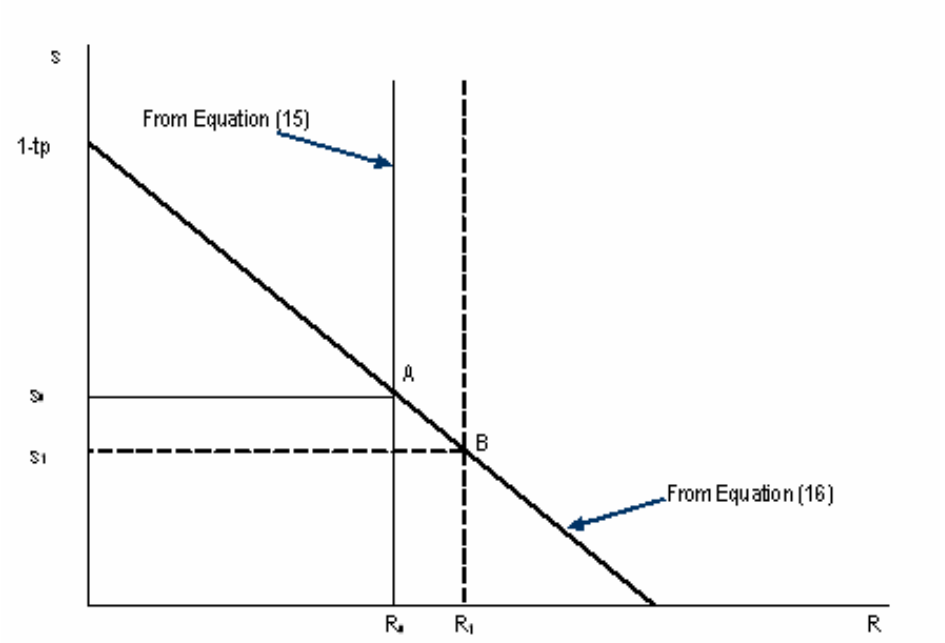
$$R = \frac{(1 - t_p)Z + \frac{W_p}{Y_p}(1 + g)^T}{Z + \alpha(1 + g)^T} \tag{15}$$

and then substitute this value to find s from:

$$s = (1 - t_p) - R \tag{16}$$

The linear relation between s and R specified in (13) is described in Appendix Figure 1 as a negatively sloped line with slope equal to -1. It is derived from the condition that pre- and post-retirement consumption levels are equal (refer to (1)).

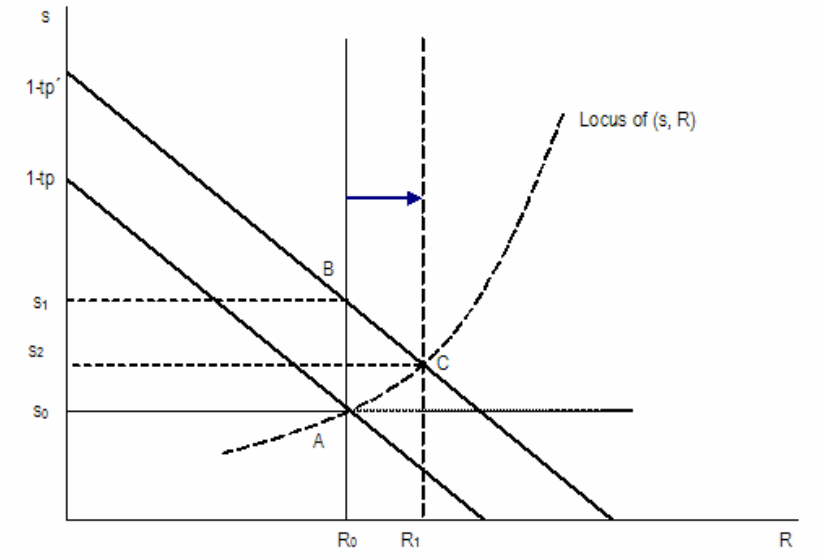
Appendix Figure 1 – Joint determination of the saving rate and replacement rate



The maximum value s can take is $(1 - t_p)$, which would imply (unrealistically) that all after-tax income was saved. For a given individual, equation (12) specifies a replacement rate (R_0) and the intersection at point A determines the corresponding saving rate (s_0). A higher value of initial wealth (W_a) and hence projected wealth (W_p) would lead to a greater replacement rate ($R_1 > R_0$) and, all else being equal, this would allow a lower rate of saving ($s_0 < s_1$). For example, to the extent that NZS is viewed as part of retirement wealth (W_p), then given an increase in the level of payment, the model would predict a decrease in the saving rate.

Consider the effect of a reduction in the pre-retirement tax rate from t_p to t'_p. This will raise the intercept on the s axis from $(1 - t_p)$ to $(1 - t'_p)$, as $t'_p < t_p$. This is demonstrated by an outward shift of the $s - R$ line in Appendix Figure 2. Initially this would raise the saving rate to s_1 corresponding to the intersection at B. However, as is evident from (12), R is negatively related to t_p, so a fall in t_p will result in an increase in R. This will now lead to a new saving rate of s_2, corresponding to the point C; ie the new (s, R) combination lies in the north-east quadrant from

Appendix Figure 2 – Effect of a reduction in the pre-retirement tax rate on the saving rate and replacement rate



A and the lower tax rate would induce a higher saving rate ($s_2 > s_0$) and a higher replacement rate ($R_1 > R_0$). Only when the marginal propensity to consume exceeded unity could the saving rate fall below its initial level of s_0. By making successive changes to the tax rate the locus of equilibrium combinations of s and R is traced out as illustrated in Appendix Figure 2. The key theoretical proposition to emerge from this comparative statics exercise is that lower pre-retirement tax rates can lead to higher saving rates and, simultaneously, higher replacement rates.

C Additional tables

Appendix Table 1 – Home ownership: by income quintile

Income quintile	Ownership rate	Share in total owners
1	49.8	16.7
2	54.3	18.2
3	58.5	19.6
4	67.1	22.5
5	68.9	23.1
Total	59.7	100.0

Note: See Table 1 (page 2).

Appendix Table 2 – Ownership of rental property: by age

Age	Ownership rate (%)	Mean value	Median value
18-24	0.8	316,467	304,100
25-34	5.4	222,172	157,200
35-44	9.4	279,112	212,700
45-54	11.9	331,006	248,300
55-64	11.3	338,496	241,050
65-74	4.7	347,605	212,200
75+	1.8	237,527	183,600
Total	7.7	302,972	223,400

Note: See Table 2 (page 3).

Appendix Table 3 – Ownership of rental property: by income quintile

Income quintile	Ownership rate (%)	Mean value	Median value
1	1.1	163,926	121,200
2	2.8	243,369	170,300
3	6.7	261,955	195,600
4	9.4	272,049	201,000
5	18.5	350,875	250,350
Total	7.7	302,972	223,400

Note: See Table 2.

Appendix Table 4 – Property gearing ratios for property-owning households: by age

Age	Mean	Median
18-24	0.47	0.44
25-34	0.52	0.53
35-44	0.37	0.35
45-54	0.26	0.21
55-64	0.12	0.00
65-74	0.03	0.00
75+	0.01	0.00
Total	0.24	0.11

Appendix Table 5 – Mean value and composition of net wealth for couples aged 45-54

Wealth quintile	Housing	Pension	NZS	Other	Total
1	24,521	1,803	314,121	-1,036	339,409
2	107,765	8,722	327,452	51,229	495,168
3	178,764	17,988	329,168	116,544	642,464
4	270,070	28,072	328,385	237,831	864,357
5	477,848	35,970	328,364	1,200,760	2,042,942
Total	211,709	18,506	325,496	320,779	876,489

Note: Housing wealth is net equity in the principal residence, while other property is included in 'other' wealth.

Appendix Table 6 – Mean value and composition of net wealth for couples aged 55-64

Wealth quintile	Housing	Pension	NZS	Other	Total
1	30,418	3,059	334,983	19,965	388,426
2	117,909	10,072	344,866	78,776	551,624
3	218,688	21,423	345,209	142,877	728,197
4	321,288	28,932	342,483	297,622	990,325
5	448,229	40,860	346,339	1,255,175	2,090,603
Total	227,051	20,845	342,772	358,311	948,979

Note: See Appendix Table 5.

Appendix Table 7 – Mortgage holdings

	Share of population with mortgage debt (%)	Average value of mortgage ($)
Property owners aged 18+	58.5	79,900
Property owners aged 65+	8.3	29,200
Home owners aged 65+ who do not hold investment property	7.4	22,600