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**Working Paper**

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

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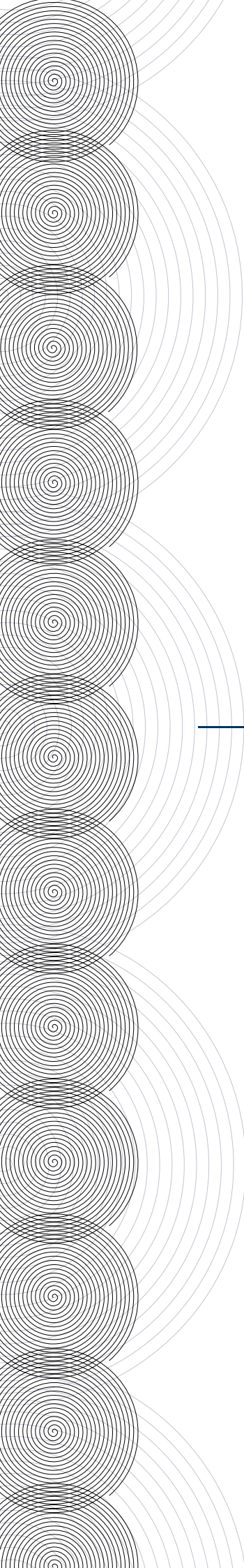
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# Housing in the Household Portfolio and Implications for Retirement Saving: Some Initial Finding from SOFIE

Grant Scobie, Trinh Le and John Gibson

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Access to the data used in this study was provided by Statistics New Zealand in a secure environment designed to give effect to the confidentiality provisions of the Statistics Act 1975. The results in this study and any errors contained therein are those of the authors, not Statistics New Zealand.

# Abstract

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Housing is an important sector of the economy. It has widespread implications for investment, banking, saving and employment. Home ownership has been linked to building social capital and a sense of community. Furthermore housing equity is a significant element of retirement accumulation for many New Zealanders. The Treasury maintains a programme of work related to housing, saving, wealth accumulation and retirement. The results of this contribute to Treasury's role in providing advice to the Minister and at the same time informing a wider group of external stakeholders.

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 half of housing equity to support retirement income, the impact on the saving rate needed to smooth consumption would be modest.

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

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

## 1 Introduction

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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

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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.<sup>1</sup>

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<sup>1</sup> 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). A description of the HSS is provided in Appendix A.1. Differences between SOFIE and HSS data are outlined in Appendix A.2.



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.<sup>2</sup> The household's age is that of the 'head' member, defined as the person who earns the highest income in the household. The analysis in 3 excludes ages 17 and below. In Section 5 we focus only on ages 45-64 because people in this age range are old enough to start thinking seriously about preparing for retirement.<sup>3</sup>

## 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.<sup>4</sup>

### 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	72.2	11.5
75+	78.0	12.0
<b>Total</b>	<b>59.7</b>	<b>100.0</b>

Note: Entries are percentages.

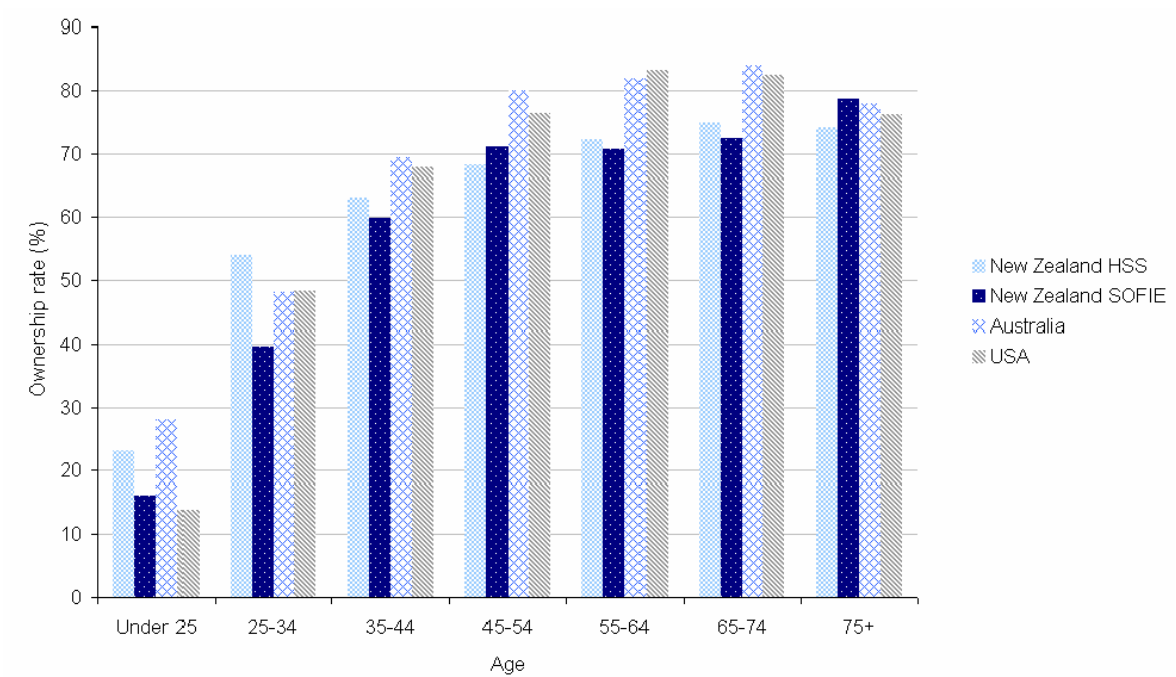
For most age groups the rates derived from the HSS and SOFIE are very comparable (Figure 1). An exception occurs in the two younger groups. These gaps are mainly due to the difference in the survey design. Specifically, the reported HSS data refer to couples, while the SOFIE data are based on households.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

<sup>2</sup> A household may have more than one family.

<sup>3</sup> It is more challenging to apply the model to younger ages as the further one is from retirement, the more imprecise projections of retirement wealth, income and consumption become.

<sup>4</sup> Available from [www.lisproject.org/lws.htm](http://www.lisproject.org/lws.htm).

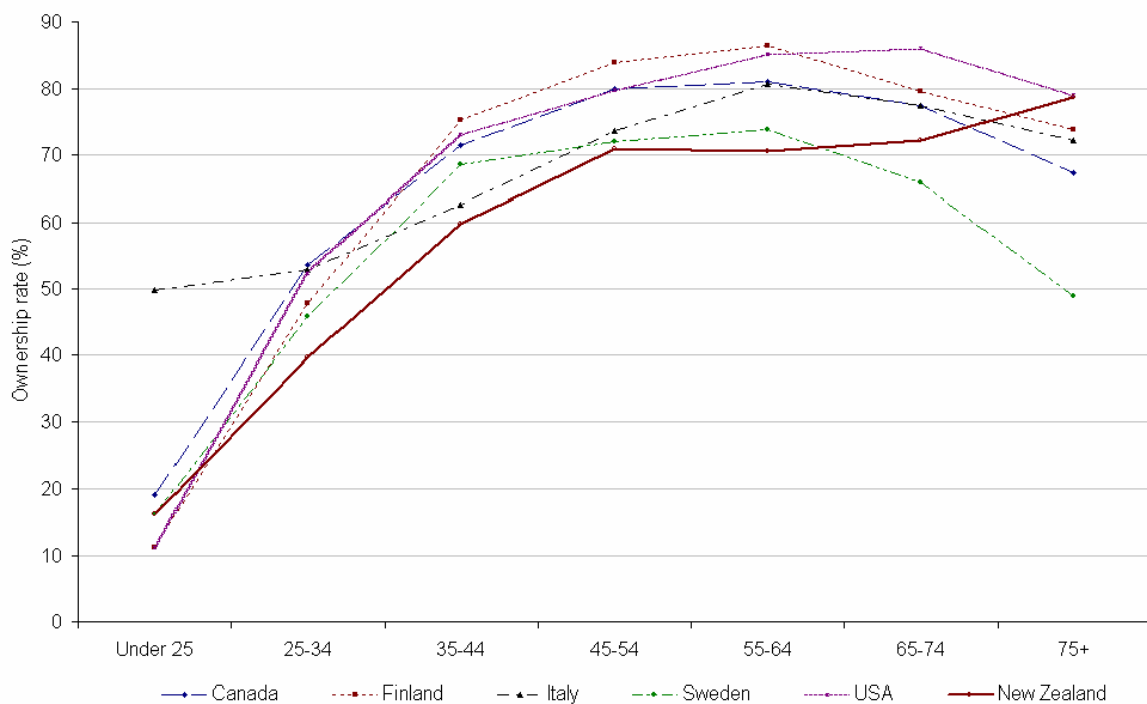
**Figure 1 – Home ownership by age: New Zealand in comparison with Australia and USA**



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 for most 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, except in the case of the oldest age group.

**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).

Institutional and economic differences 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 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 rate of rental property increases with age, at around 12% in the pre-retirement age groups (Appendix Table2). Amongst the highest income quintile, almost one in five own a rental property (Appendix Table 3).

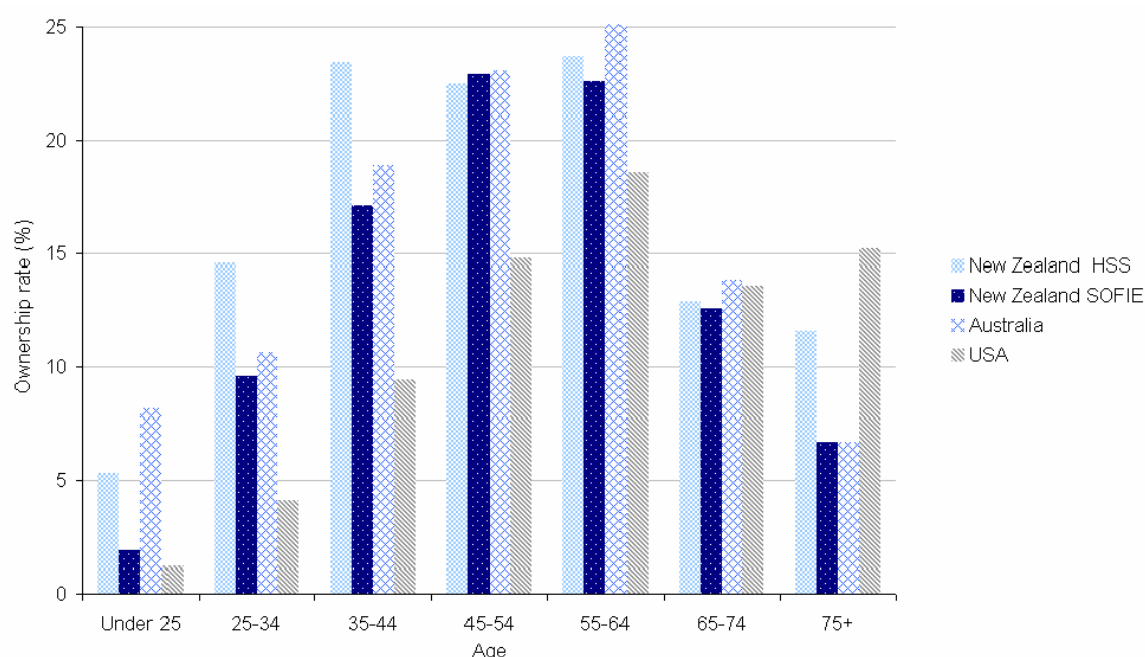
**Table 2 – Ownership of investment property: by type**

Investment type	Ownership rate (%)	Mean value	Median value
Holiday homes in NZ	2.8	220,200	169,300
Rental property in NZ	7.9	305,800	224,000
Other property in NZ	5.0	216,000	140,100
Timeshares in NZ	1.0	13,100	5,000
Overseas property	1.0	392,700	150,000
Any investment property	15.4	255,400	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 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: New Zealand in comparison with 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 and about half of those with mortgage debt have a gearing ratio of under 50%. Gearing ratios decline with age and the 'typical' households above 55 own their property outright, as indicated by the medians in Appendix Table 4.

**Table 3 – Gearing ratios for property-owning households**

Level of gearing	Population share (%)
0	43.1
0.00 - 0.25	16.9
0.25 - 0.50	19.4
0.50 - 0.75	14.7
0.75 - 1.00	4.2
1.00 - 1.25	0.8
1.25+	0.9
<b>Total</b>	<b>100.0</b>

### 3.4 Net equity

In this section, we examine the relationship between net equity in property and total net worth.<sup>5</sup> 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	0.85
25-34	0	0.81
35-44	0.59	0.84
45-54	0.65	0.77
55-64	0.64	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 Table 5 for couples in the pre-retirement age groups. This table contains the average value 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 quintile	Couples aged 45-54		Couples aged 55-64	
	Incl. NZS	Excl. NZS	Incl. NZS	Excl. NZS
1	0.07	0.98	0.08	0.57
2	0.22	0.64	0.21	0.57
3	0.28	0.57	0.30	0.58
4	0.31	0.50	0.32	0.49
5	0.23	0.28	0.21	0.25
Total	0.24	0.38	0.24	0.37

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

<sup>5</sup> Again, because SOFIE does not provide a breakdown of mortgage liability, the results presented here refer to all properties.

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

<sup>6</sup> 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.

## 4 Saving for retirement - the model

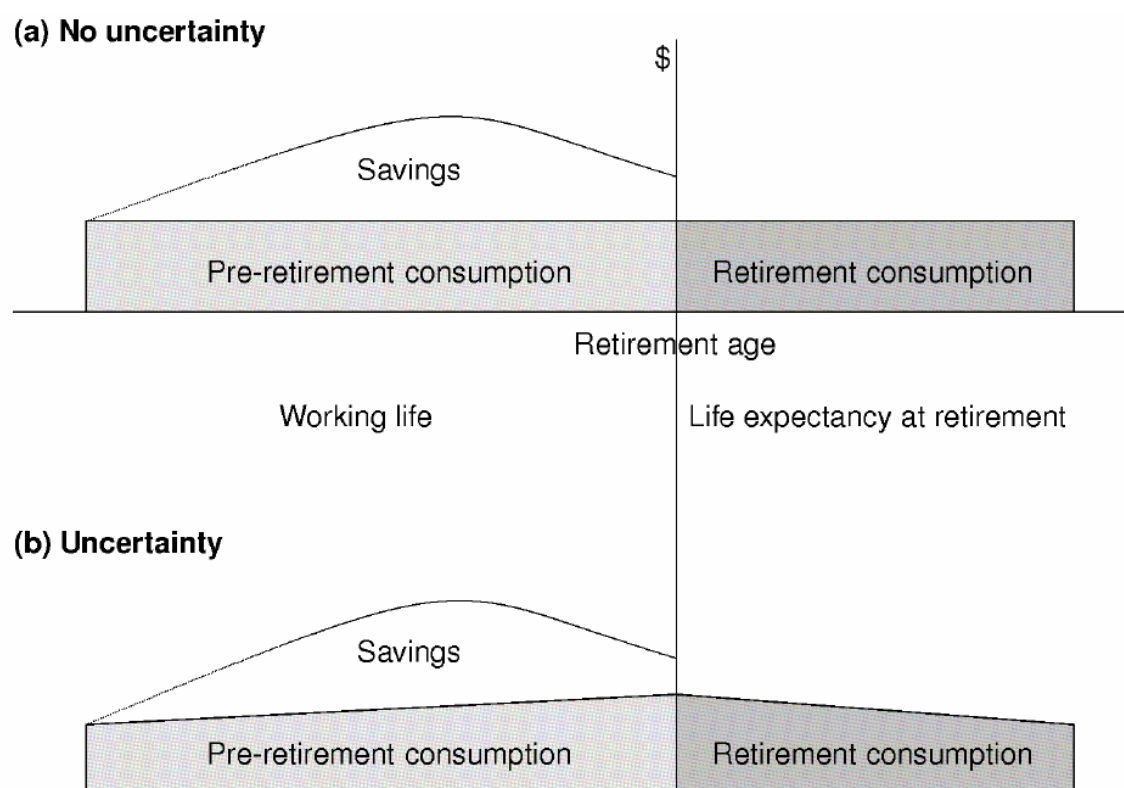
To model adequacy of retirement saving, we adopt a framework of joint determination of saving and replacement rates. This framework seeks to smooth consumption throughout the life cycle.

### 4.1 General assumptions

For simplicity, 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.<sup>7</sup>

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 are equal to consumption needs in retirement.

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



Source: Adapted from Moore and Mitchell (1997).

<sup>7</sup> 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).

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 saving and replacement rates

This approach<sup>8</sup> calculates jointly the saving and income replacement rates for each person or couple. A complete derivation of the model is given in Scobie et al (2005, Appendix C) and reprinted 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  $W_p$ .

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 income tax system of TTE,<sup>9</sup> retirement taxes  $T_r$  are zero, so consumption is equal to income in retirement. 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.

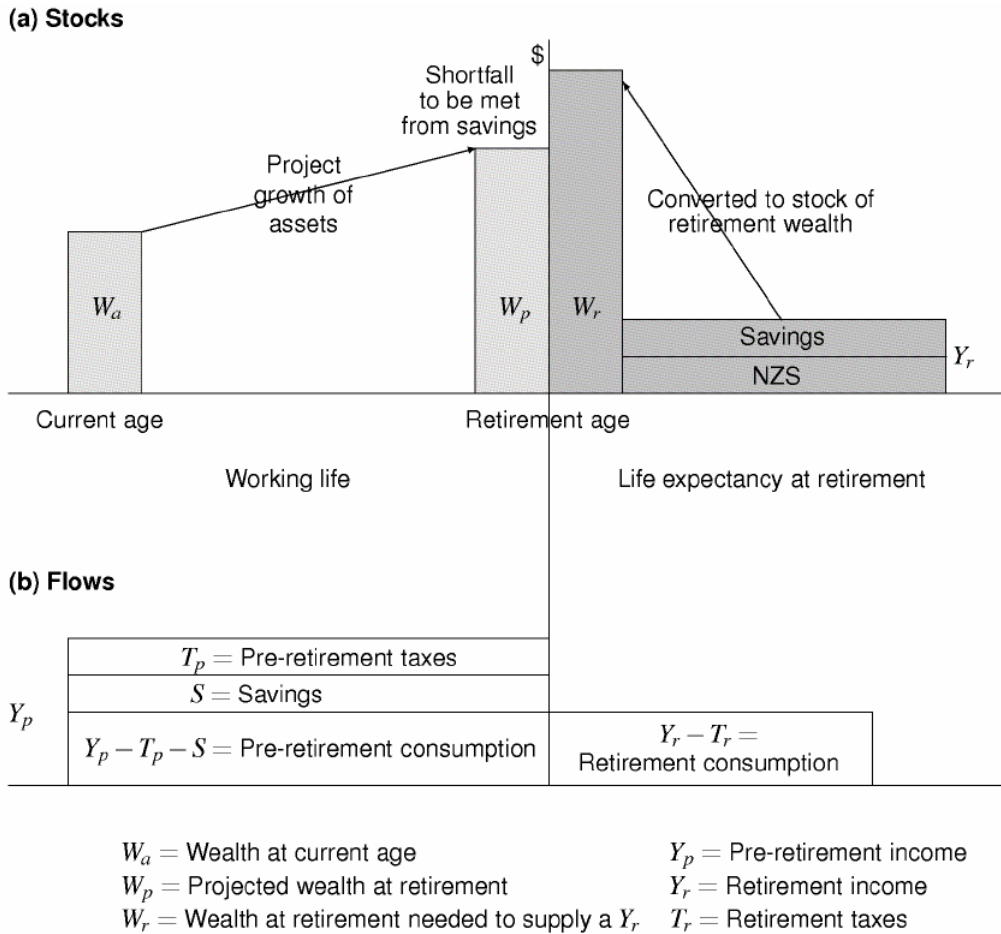
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<sup>8</sup> The approach adopted follows that of Moore and Mitchell (1997).

<sup>9</sup> 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).



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



### 4.3 Specific assumptions

The retirement age is set at 65. We apply an after-tax, real rate of return of 2% per year for all compounding and discounting. 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.<sup>10</sup> 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 based on 'medium' assumptions around fertility, mortality and migration. 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, broad ethnic group and year of retirement.

<sup>10</sup> This growth rate is rather conservative. Treasury's (2006) Long-term Fiscal Model uses a growth rate of 1.5% for average labour productivity and real wages. Benefits are also assumed to grow at that rate.

## 5 Saving for retirement - results

The model in Section 4.2 prescribes saving rates as a share of gross income. These figures may not be immediately intuitive, hence for the empirical results we will report after-tax saving rates. To assess the level of consumption smoothing, we also compute a consumption replacement rate as the ratio of pre-retirement consumption to post-retirement consumption.

Some households are prescribed a negative saving rate. Literally, this means that these households should either draw down their current wealth before retirement or borrow against their NZS income to supplement their current consumption, which is hardly feasible in practice. We suggest that negative prescribed saving rates be interpreted as no further saving being needed to sustain their consumption levels in retirement, given the household's current wealth.<sup>11</sup> 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 so that they could enjoy a level of consumption in retirement similar to what they had before retirement. The median required saving rate is higher for households aged 45-54, but the distribution is far more uneven among older households. While 49% of non-partnered people aged 55-64 are prescribed a negative saving rate, 10% would need to set aside over 40% of their after-tax income for retirement. The 'typical' non-partnered individual aged 45-54 has a prescribed saving rate of 14%, but at the 90th percentile this rate only rises to 34%.

**Table 7 – Prescribed saving rates at various percentiles**

	Percentile				
	10th	25th	50th	75th	90th
<b>Non-partnered individuals</b>					
Ages 45-54	0	0	14	27	34
Ages 55-64	0	0	1	29	42
<b>Couples</b>					
Ages 45-54	0	6	23	31	36
Ages 55-64	0	0	22	38	48

Note: Entries are percentages. Saving rates here are expressed as a proportion of after-tax income.

<sup>11</sup> We have set negative prescribed saving rates to zero to preclude literal interpretation.

The prescribed saving rates are considerably higher for couples than for non-partnered individuals (Table 8). 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 people (reflecting the phenomenon of assortative mating), so they have a higher *per capita* consumption level to sustain. Third, our model does not account for economies of household size in consumption, but NZS does - it pays couples only 54% more than the rate for individuals.<sup>12</sup>

**Table 8 – Median prescribed saving rates, consumption replacement rates and retirement consumption**

Wealth quintile	Ages 45-54			Ages 55-64		
	$s_{at}$	$R_c$	$C_r$	$s_{at}$	$R_c$	$C_r$
Non-partnered individuals						
1	11	89	18,300	0	100	11,200
2	21	79	20,100	2	98	13,700
3	21	79	24,200	9	91	15,100
4	18	82	26,600	20	80	20,500
5	1	99	35,300	0	100	29,500
<b>Total</b>	<b>14</b>	<b>86</b>	<b>23,100</b>	<b>1</b>	<b>99</b>	<b>15,800</b>
Couples						
1	23	77	39,000	18	82	27,600
2	25	75	44,500	26	74	33,200
3	26	74	50,900	29	71	36,600
4	25	75	58,700	26	74	46,200
5	1	99	81,200	0	100	70,700
<b>Total</b>	<b>23</b>	<b>77</b>	<b>50,600</b>	<b>22</b>	<b>78</b>	<b>37,700</b>

Note:  $s_{at}$  = prescribed after-tax saving rate,  $R_c$  consumption replacement rate,  $C_r$  retirement consumption. Entries for  $s_{at}$  and  $R_c$  are percentages.

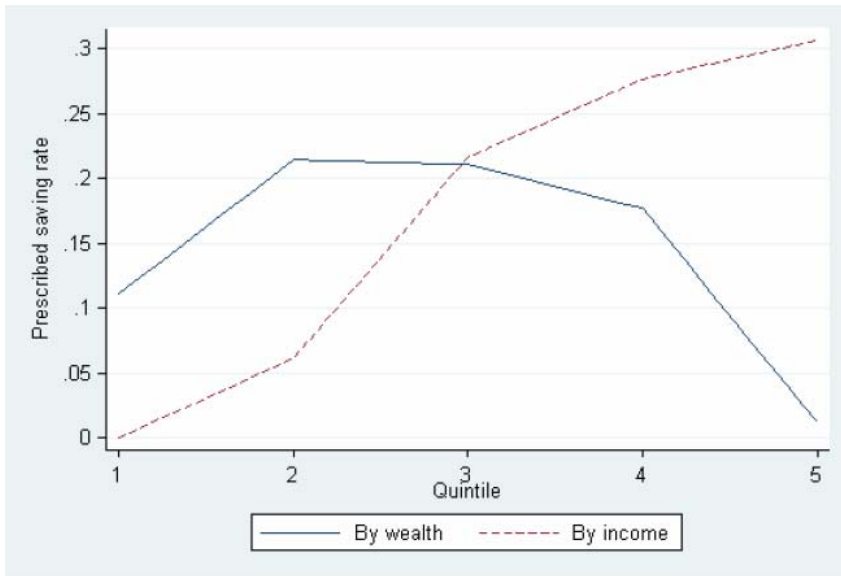
Across the wealth distribution, there is little variation in median prescribed saving rates for the lowest four quintiles. For non-partnered individuals aged 45-54, for example, the median prescribed saving rate ranges from 11% for quintile 1 to 21% for quintile 2, while it is almost zero for the 20% wealthiest people. 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 median retirement consumption 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 (Figure 6). While the 20% lowest earners should save no more for retirement, the 'typical' household in the top income quintile will need to save a third of their after-tax income to smooth consumption over the life cycle.

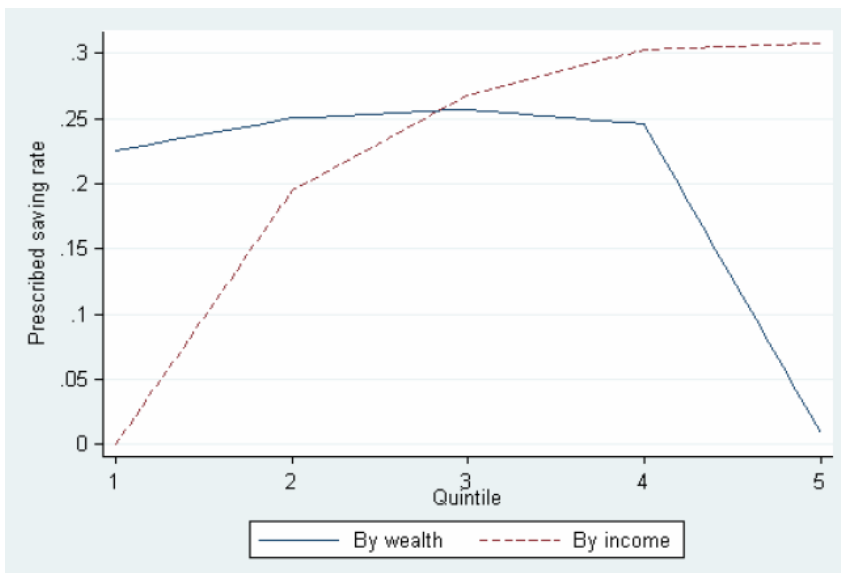
<sup>12</sup> In 2003, NZS after-tax payment was \$12,756 for non-partnered individuals (who live alone) and \$19,624 for couples.

**Figure 6 – Median prescribed saving rates by wealth and income quintiles**

(a) Non-partnered individuals aged 45-54



(b) Couples aged 45-54



Note: Saving rates here are expressed as a proportion of after-tax income.

Our model prescribes no further saving for 25% of couples and 41% of non-partnered individuals aged 45-64. These households either are earning too little or hold significant wealth.<sup>13</sup> 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 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.

<sup>13</sup> These results are current as at November 2006. An enhanced modelling approach (Le et al, 2007) suggests that these results are very conservative and possibly understate the share of population who are prescribed a negative saving rate.

We must stress that we do not advise against saving. These results just mean that no more saving for retirement is required for those households if they are to retire at 65, given our assumptions in Section 4. It may still be advisable that they save for things other than retirement, for a different objective than consumption smoothing, for early retirement, more bequests, or simply as a buffer against uncertainties about health, life expectancy and so on.

Our prescribed saving rates appear high, as they are based on conservative assumptions. First, we assume pre-retirement consumption will be sustained throughout retirement. Yet 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 been underestimated due to some technical problems with the questionnaire. In a subsequent paper (Le et al, 2007) we will examine if actual household saving is in line with the required level.

## 5.2 Potential contribution of home equity

Ageing population and longer life expectancies have led to an extensive debate on mechanisms for funding retirement income. From the private perspective, discussion centres on the need for more aggressive saving rates before retirement, accepting a lower level of 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.<sup>14</sup>

Home equity can be released pre-retirement through equity withdrawal for more liquid forms of investment. After 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 income and so decrease the level of required savings.

Section 5.1 assumes that 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 home equity will be equal to their share in the gross value of the house.<sup>15</sup> 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 6, 59% of all property owners have a mortgage liability, compared with only 8% among those older than 64. The latter rate is even lower (7%) when property investors are excluded. The average mortgage debt is also considerably lower among the older people.

Table 9 shows the extent to which home equity withdrawal affects the required saving rate. The relative impact is similar across the distribution. If the house is to be retained and bequeathed, the median prescribed after-tax saving rate for couples aged 55-64 is 23%. This rate drops to 22% when 10% of home equity is withdrawn, and to 15% when half of housing wealth is to be released. At the 90th percentile, the prescribed saving rate falls from 49% to 47% and 43% respectively. By construction, lower prescribed saving rates mean higher replacement rates and higher retirement consumption. 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.

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<sup>14</sup> See Davey (2005) for a recent New Zealand perspective.

<sup>15</sup> Some houses may not be wholly owned by an individual or a couple.

**Table 9 – Effect of home equity withdrawal on prescribed saving rates**

Percentile	Ages 45-54				Ages 55-64			
	25th	50th	75th	90th	25th	50th	75th	90th
<b>Non-partnered individuals</b>								
Retain the house	0	16	30	38	0	5	31	44
Withdraw 10% of home equity	0	15	29	36	0	2	29	43
Withdraw 30% of home equity	0	14	27	34	0	0	26	40
Withdraw 50% of home equity	0	12	26	32	0	0	23	38
<b>Couples</b>								
Retain the house	8	25	33	39	0	23	39	49
Withdraw 10% of home equity	7	24	32	38	0	22	37	47
Withdraw 30% of home equity	5	22	30	36	0	19	34	44
Withdraw 50% of home equity	3	21	29	35	0	15	31	43

Note: See Table 7, page 11.

The effect of home equity withdrawal appears modest; it is only noticeable when households halve the size of their home. However, 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,<sup>16</sup> this analysis suggests that reverse equity mortgages or 'downsizing' has a limited role in easing the need for saving.

## 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 that prevailing in other countries.

Overall, one in six households have some form of investment property; nearly half of these own a rental property. As the ownership rate drops drastically after age 65, rental property provides a very minor source of income for households in retirement. Apparently, investment in rental property is often liquidated once the household head reaches 65. The pattern of ownership of investment property in New Zealand generally matches that observed in Australia and the USA.

What role does housing play in the wealth portfolio? According to the aggregate data for the household sector, the share of housing wealth in total wealth was 73% in December 2005.<sup>17</sup> 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.

<sup>16</sup> For an example of the use of home equity as a buffer against unexpected income shocks, see Hurst and Stafford (2004).

<sup>17</sup> See <http://www.rbnz.govt.nz/statistics/monfin/HHAandL2005webcopy.xls>.

Close to one half of property-owning households are outright owners, while among mortgage debtors, about one half have debt under 50% of the property value.

In addressing the role of home equity in retirement income we adopt a life cycle model of consumption smoothing. We find that even if half 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, the results given in this paper suggest that it should not be viewed as a substitute for 'adequate' levels of retirement saving.

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# Appendices

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## 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, so 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, i.e., 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.<sup>18</sup> 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 people who also own that property. We assume equal ownership shares among owners.

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<sup>18</sup> 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
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. <sup>19</sup>
Household items	No data	We ignore household items in the calculation of wealth, as these assets depreciate over time and they can not easily be liquidated. These assets are also valued inconsistently across individuals. <sup>20</sup>
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. <sup>21</sup> 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.'

<sup>19</sup> We acknowledge that investment properties are normally more highly geared (for tax benefits), so such division of mortgages would tend to overstate borrowing for owner-occupied properties.

<sup>20</sup> 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.

<sup>21</sup> Informal communications and unpublished notes from staff of Statistics New Zealand.

## 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 (i.e., income net of taxes and saving) be equal before and after retirement, as given by:

$$Y_p - T_p - S = Y_r - T_r \quad (1)$$

where:

$Y_p$  = pre-retirement gross income;

$T_p$  = pre-retirement taxes;

$S$  = savings;

$Y_r$  = retirement gross income;

$T_r$  = 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:

$$1 - (T_p/Y_p) - s = R - (T_r/Y_p) \quad (2)$$

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:

$$s = (1 - t_p) - (1 - t_r)R \quad (3)$$

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 retirement income flow ( $Y_r$ ) can be converted to a lump sum at retirement by applying an annuity factor ( $\alpha$ ).<sup>22</sup> This expresses the stream of 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:

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

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:

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

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:

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

where:

$Y_a$  = actual income in year  $t = 1, \dots, T$ ;

$T$  = number of years from the person's current age until the pre-determined age of retirement;

$g$  = annual growth rate of income;

$r$  = after-tax real rate of return on savings;

$$Z = \sum_{t=1}^T (1+g)^t (1+r)^{T-t}.$$

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<sup>22</sup> The annuity factor is given by  $[(1+r)^n - 1]/r(1+r)^n$ , where  $n$  is the number of years for which the annuity is to be paid and  $r$  is defined in equation (6).

Using (5) and (6) we can solve for the saving rate:

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

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

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

It is argued that in the context of the New Zealand system of income tax, 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,  $T_r = 0$ . With this simplification the saving rate is no longer dependent on the replacement rate:

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

and from (3), the replacement rate can be derived as:

$$R = 1 - t_p - s \quad (10)$$

## C Additional tables

**Appendix Table 1 – Home ownership: by income quintile**

Income quintile	Ownership rate	Share in total owners
1	49.7	16.7
2	54.2	18.2
3	58.7	19.7
4	67.0	22.4
5	68.8	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	316,800	304,100
25-34	5.3	224,000	161,800
35-44	9.6	279,900	210,800
45-54	12.3	330,100	246,100
55-64	11.9	349,000	241,000
65-74	5.2	349,100	212,200
75+	1.8	238,400	183,600
Total	7.9	305,800	224,000

Note: See Table 2, page 4.

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

Income quintile	Ownership rate (%)	Mean value	Median value
1	1.2	164,100	121,200
2	3.0	244,100	171,300
3	6.8	264,300	197,700
4	9.6	272,300	201,000
5	19.0	355,100	249,100
Total	7.9	305,800	224,000

Note: See Table 2, page 4.

**Appendix Table 4 – Gearing ratios for property-owning households: by age**

Age	Mean	Median
18-24	0.47	0.43
25-34	0.52	0.53
35-44	0.37	0.35
45-54	0.26	0.21
55-64	0.12	0
65-74	0.03	0
75+	0.01	0
Total	0.25	0.11

**Appendix Table 5 – Composition of net wealth for couples**

Wealth quintile	Housing	Pension	NZS	Other	Total
Ages 45-54					
1	24,500	1,800	314,100	-1,100	339,200
2	107,300	8,800	327,600	50,900	494,600
3	178,500	17,800	329,100	115,900	641,400
4	269,600	27,900	328,300	238,000	863,900
5	473,900	35,600	328,400	1,197,800	2,035,700
Total	210,600	18,400	325,500	319,700	874,100
Ages 55-64					
1	30,400	3,100	334,600	20,200	388,300
2	116,600	10,200	345,300	79,000	551,000
3	221,100	20,900	345,200	140,000	727,200
4	319,700	28,800	342,300	297,400	988,200
5	444,600	39,500	346,300	1,264,200	2,094,600
Total	226,200	20,500	342,700	359,000	948,300

Note: Entries are mean values. Housing wealth is net equity in the principal residence, while other properties are included in 'other' wealth.

**Appendix Table 6 – 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