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How Portfolios Evolve After Retirement: Evidence from Australia

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Households in many developed economies now reach retirement with lump sums of financial wealth accumulated through defined contribution retirement plans. Managing wealth from individual accumulations and public provision is critical to retirement welfare. We study the dynamics of retirement wealth and asset allocation using the three wealth waves of the Household Income and Labour Dynamics in Australia (HILDA) panel survey. We find significant influences of ageing on asset holdings with older households preferring less risk and more liquidity, while maintaining ownership of the family home. In terms of absolute changes in wealth the average retired household accumulated in 2002-06 and decumulated 2006-10 in line with financial market trends. More diversified households did better. The probability of retired households depleting non-housing wealth to less than one month's Age Pension payment increased over the sample. Finally, in contrast to the US, the overall effect of health shocks on the wealth of retired Australian households is minimal.

JEL Classifications: D91, E21, G11
Keywords: Retirement wealth; Life-cycle saving; Public pension; Portfolio choice

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1. INTRODUCTION

As defined benefit plans migrate to defined contribution plans in many economies, an increasing proportion of workers are reaching retirement with lump sum wealth rather than lifetime pensions. Consequently, retiring households now confront the critical problem of turning their accumulations into sustainable incomes. Since rates of voluntary annuity purchase are very low in many countries (Bateman and Piggott, 2010) and health insurance is often incomplete, households frequently stay exposed to longevity uncertainty, health risks and financial market volatility throughout retirement.

Standard life-cycle theory predicts that households will anticipate the need for both longevity insurance and precautionary liquid savings and adjust their portfolios accordingly (French et al., 2006). So as defined benefit pension support declines, it becomes vital to study not only changes in total wealth but also changes to the structure of retirement portfolios. For example, in a detailed study of elderly households from the U.S. Health and Retirement Survey (HRS), Coile and Milligan (2009) find that holdings of risky assets decrease with age, especially following sharp declines in wealth caused by the death of a spouse or poor health. Sinai and Souleles (2007) emphasize the difficulty of consuming wealth that is embedded in the family home (typical of the less wealthy), compared with the relatively liquid financial assets of wealthier households.

Here we use panel data on around 900 retired Australian households to study decumulation rates and portfolio management between 2002 and 2010, as financial markets cycled from boom to bust to recovery. Portfolio dynamics of Australian retirees offer a rich case study for policymakers around the world. Since the early 1990s, almost all Australian workers have contributed to a publicly mandated, privately managed retirement savings system, similar to US 401(k) plans and the UK's Workplace Pensions.[1] Consequently, a large proportion of the panel we study reached retirement with a (typically small) defined contribution accumulation from an immature retirement savings plan, a pattern that is set to be repeated in the US and UK in coming

[1] The 'Superannuation Guarantee' was established in 1992, originally stipulating that 3% (rising to 9% over several years) of an individual's earnings be placed into a complying superannuation fund until preservation age at 55 years (now increasing to 60 years) (*Superannuation Guarantee (Administration) Act 1992* (Commonwealth)). The mandatory contribution rate will rise to 12% by 2020.

decades as auto-enrolment accelerates. Australian retirees carry substantial exposure to financial market risk into retirement and purchase longevity insurance at very low rates (Kingston and Thorp, 2005). Further, public provision for our panel is limited to a modest asset- and income-tested pension (Age Pension).[2] Australia does not have a social security pension linked to earnings history as do many similar developed countries. Around 75% of people over 65 years of age receive a full or part Age Pension, which pays about 28% of average male earnings to eligible single recipients and about 40% to couples. Consequently, the panel members do not enjoy generous public pension provision. On the other hand, the family home is excluded from the Age Pension means tests; around 80% of elderly own their home and do not run down their housing assets in retirement so our panel has a large stock of illiquid housing wealth (Bradbury, 2008; Cho and Sane, 2011; Bradbury, 2010). Finally, retired Australians are relatively well insured against health shocks with estimates of spending on health at around 3% of expenditure (Jones et al. 2008).

Existing empirical studies suggest that retirement decumulation rates are slower than theoretical predictions and that portfolio allocations are not constant through adult life. Börsch-Supan (2003) finds little indication that older German households decumulate their wealth in retirement, and similarly Love et al. (2009), using data from the HRS panel, find that comprehensive wealth balances decline much more slowly than remaining life expectancies would suggest. Similarly Hulley et al. (2012), inferring wealth of public pension recipients from Age Pension data, show that wealthier Australian households continued to accumulate in retirement while poorer retirees decumulated.

The composition of asset holdings varies over the lifecycle, typically peaking in middle age. Veld-Merkoulova (2011) finds an increasing share of risky financial investments associated with a longer planning horizon in the Netherlands; Poterba and Samwick (2001) and Hurd (2001) find large differences across ages and cohorts in the US. Ameriks and Zeldes (2000) estimate a 'hump-shaped' age effect on the fraction of household assets held in equity, peaking in mid-life

[2] The Age Pension aims to ensure that older Australians have enough funds to maintain a 'sufficient' standard of living during retirement, with payments made fortnightly. The payment is means-tested according to both income received and assets owned, with a maximum payment in 2013 of $733.70 per fortnight for singles and $1106.20 per fortnight for couples, excluding any applicable rental assistance.

(late 40s-50s). Similarly, Heaton and Lucas (2000) find a distinct decline in equity share above age 65 for US households, and Guiso, Haliassos, and Jappelli (2001) report risky asset ownership peaks in a person's 50s in Germany, Italy and the UK.[3] Coile and Milligan (2009) using panel data from the US HRS, find similar results: a reduced likelihood of holding risky assets and increased proportions of more liquid assets with increasing age. For Australia, Kohler et al. (2004) report that older households were more likely than young households to hold low-risk bonds and deposits, and are less likely to hold riskier equity investments. Reasons for the mid-life peak and subsequent decrease in risky asset holdings include declining human capital (Ibbotson, 2007), precautionary balances, especially for out-of-pocket medical expenses later in life (French et al., 2006; Frostin et al. 2008), bequest motives (Hubbard et al., 1995); and racial or cultural differences such as having a Non-English Speaking Background (NESB) (Cardak and Wilkins, 2009).

In our analysis of Australian retirees, we compare absolute levels of wealth across all three waves of the HILDA panel, measuring decumulation between 2002 and 2006, and between 2006 and 2010. We specifically focus on wealth (net of debt) and housing equity, since most Australian households do not run down their housing assets in retirement (Bradbury 2008; Bradbury 2010; Cho and Sane 2011). We calculate the rate of decumulation of retired Australian households and break down observed differences in wealth levels and decumulation rates by household characteristics and portfolio weightings. Higher wealth households tend to hold larger proportions in risky assets and experience decumulations in wealth later in the sample, along with home-owning households, also vulnerable to changes in asset values. By contrast, older households, who tended to have less exposure to investment risk experienced slower reductions in wealth during the more turbulent period.

Since the risk of exhausting wealth before the end of life is higher when rates of annuitization are lower, we investigate which households are more likely than others to run out of liquid funds, and how the prevalence of households with critically low savings balances varies from wave to wave. By applying the Oaxaca-Blinder decomposition technique (Oaxaca, 1973;

[3] Interestingly however, Guiso et al. find an exception to their results to be households in the Netherlands who see a continual increase in risky asset ownership with increasing age.

Blinder, 1973) we can attribute changes in probabilities of reaching critical wealth thresholds to either changes in the environment (such as changes to public pension regulations or shocks to financial asset returns) or changes in household characteristics. We find an increasing rate of depletion of financial wealth over the sample. Couples, households with precautionary savings motives, or home-owners are less likely to run out of financial assets when compared with Age Pension recipients, households that report bad health or English language difficulties. The main driver of these transitions into low wealth states are environmental factors (which could include social changes, changes in regulations or monetary policy, or changes in the investment landscape), rather than changes in household characteristics themselves (for example, the death of a spouse).

Thirdly, following Coile and Milligan (2009), we conduct a cross-sectional analysis of how asset holdings vary with age. Using specifications that separate age, cohort and household effects, we find that age impacts on asset allocation decisions, with decreasing holdings of risky assets such as superannuation and equity at older ages.

Finally, we investigate the effect of current health status and changes in health on asset choices during retirement. Using observations of households who report bad health, expect bad health or having a long-term medical condition, estimation results show that the wealth of retired Australians is not greatly affected by health shocks, in contrast with Coile and Milligan's (2009) work for the US. While Australian retired households have considerable exposure to financial shocks, health shocks are less damaging and probably better insured than in the US, where the elderly continue to bear substantial out-of-pocket health expenses (Fronstin et al. 2008).

2. DATA

This paper uses Australian panel data from the Household and Income Labour Dynamics (HILDA) survey that provides information on socio-demographic characteristics, wealth, health, labour market activity, and a range of other household and personal characteristics.[4] The same member households are interviewed in each annual survey ('wave'), where in waves 2, 6 and 10

[4] HILDA consumption data is only available for waves 2006 and 2010, and hence our paper focuses on the decumulation of wealth across waves rather than comparing changes in consumption.

(conducted in 2002, 2006 and 2010 respectively) a special wealth module, collected data on households' financial and non-financial assets and liabilities.

Although HILDA provides data on over 7,000 households (approximately 20,000 non-institutionalized individuals) in each wave, we include only single or coupled retired households.[5] In our sample, all household members describe themselves as fully retired from paid work and give wealth holdings in all of five specified asset classes.[6]

We create two balanced panel samples of data. After exclusions for attrition or crucial missing values, the 2002-06 sample includes 885 households and the 2006-10 sample includes 942 households. Of these, 640 appear in all three waves with non-missing wealth data. This latter group lets us see the effects of the 2007-09 financial crisis more clearly. Table 1 reports the sample means of household characteristics in different survey waves for the 2002-06 and 2006-10 samples, as well as for the subsample of households that appear in all three waves.

The 2006-10 sample are less educated and in worse health than the 2002-06 sample, but also have higher average wealth (by $100K), probably because the 302 households that joined the panel in 2006 are younger and wealthier than the 245 households who left before 2010 (see columns 7 and 8). The younger cohort may also have accumulated more financial wealth under the mandatory retirement savings system introduced in the early 1990s (the Superannuation Guarantee).

As expected, the balanced panel sample shows deteriorating health, fewer couples, lower rates of risky asset and home-ownership over time but increasing rates of financial asset depletion (lower panel). Further, the average change in wealth between 2002 and 2006 was an *increase* of $9K compared with an average *decrease* of $63K between 2006 and 2010.

PLACE TABLE 1 HERE

[5] We do not include any retired couples or singles that are living with other friends or family.

[6] Where available, we make use of HILDA's imputed wealth variables so that we maximize the number of households included in our sample. Refer to Summerfield et al. (2011) (*HILDA User Manual – Release 10*), p69-73 for more information on imputation methods used.

3. METHOD AND RESULTS

We begin with the basic question, "Do households decumulate during retirement?", then answer the related question of whether they decumulate *too quickly* by tracking the path of the sample through a series of low-wealth thresholds. Next we focus on portfolio dynamics, and the influence of aging and health, comparing the experience of Australian retirees with Coile and Milligan's (2009) report from the US Health and Retirement Survey (HRS).

HILDA reports wealth in nine asset classes: liquid assets; cash investments; superannuation; equity (stocks); principal residence; business; real estate; vehicles; and 'other savings', all of which are described and classified into the five categories below:[7]

1. *Liquid Assets/Cash Investments* – liquid assets such as bank accounts (own and joint) plus cash investments (including government bonds, corporate bonds, debentures[8], certificates of deposit, and mortgage-backed securities).[9]
2. *Superannuation and Equity* – value of superannuation holdings and life insurance (if cash-out before death is available) plus public equity (shares, managed funds (mutual funds), property trusts (real estate investment trusts and children's trust funds[10]).
3. *Principal Residence* – the value of the household's own residence.
4. *Business and Real Estate* – the value of business(es) owned by the household plus investment property (other than principal residence).
5. *Vehicles* – cars, motor homes etc.

The summation of all five categories (plus the value of 'other savings'[11]) equals *gross assets* per household. We have not adjusted these values for attributed debt so that we can most

[7] 'Other savings' (such as collectables and antiques) is not included in any of the five asset categories for our analysis in Section C (*Effecting of Ageing on Asset Holding)* or Section D (*Effects of Health on Asset Holdings*) in order to be comparable with Coile and Milligan's (2009) study. However, 'other savings' is one of the nine asset types that is summed to calculate the value of household wealth which is summarised in Table 1, and analysed in Section A (*Determinants of Wealth and Changes in Wealth)* and Section B (*Prevalence and Determinants of Probabilities Surrounding Low Financial Wealth*). A detailed variable summary can be found in Appendix A.

[8] A debenture is debt instrument that is not secured with collateral.

[9] The HILDA dataset does separately identify corporate bonds. Instead, 'cash investments' include government bonds, corporate bonds, debentures, certificates of deposit, and mortgage-backed securities. Note that the corporate bond market in Australia is very small compared with the US.

[10] We would ideally exclude the value of children's trust funds (given retirees cannot draw them down for consumption) but this is not possible due to data limitations.

[11] Other savings includes collectables, antiques, works of art, cemetery plots, or other substantial assets.

directly compare with US results from Coile and Milligan (2009) who use a very similar gross assets measure. However, we also calculate net *wealth* per household (i.e., the sum of gross assets less total debt holdings[12]) and exclude home-owner equity since most Australian households preserve housing equity (Cho and Sane, 2011; Bradbury, 2010).

A. Determinants of Wealth and Changes in Wealth

To investigate which factors impact overall wealth levels (net of home equity and household debt) in 2002 and 2006, at the beginning of each sample period, we regress wealth level on the household characteristics summarized in Table 1:

$$W_{it} = \beta_0 + \beta_1 age_i + \boldsymbol{\beta_2}' \boldsymbol{Z_{it}} + \varepsilon_{it} \quad (1)$$

here W_{it} is household wealth in period *t* (*t*=2002, 2006), net of debt and housing equity, age_{it} is the age of the head of the household in period *t*, and $\boldsymbol{Z_{it}}$ is a vector of explanatory variables. In the case of couples, we follow convention and assign the head of the household to be the adult male. There are no same-sex couples in the sample. Other explanatory variables include indicators for couple status, Age Pension receiving households, residence in a major city, and education beyond high school. We also include indicators for speaking a language other than English, and for households who report that they speak English 'poorly' or 'not at all'. Religious affiliation is classified into indicators for Christianity, Judaism, Islam, 'Other' and 'None'. (Appendix A has further details.) Precautionary savings motives are proxied by an indicator for household heads who answer the question "Which of the following comes closest to describing your (and your family's) current reason for saving?" with the answers "medical/dental expenses" or "for emergencies/in case of unemployment or illness", zero otherwise. Bequest motives are proxied by an indicator for household heads who answer the question "Which of the following comes closest to describing your (and your family's) current reasons for saving?" with the answers "education for children or grandchildren" or "to help children or other relatives".

We also incorporate indicator variables for specified types of portfolio holdings:

[12] Debt not only includes debt attributable to the assets listed above, but also credit card debt, HECS (Higher Education Contribution Scheme), car loans, investment loans, personal loans, hire purchase and overdue bills.

i. $safe\_50_{it}$, takes the value 1 if household *i* has at least 50% of their wealth invested in liquid or cash investments in time period *t*, or 0 otherwise.

ii. $superequity\_50_{it}$, takes the value 1 if household *i* has at least 50% of their wealth invested in superannuation and/or equity in time period *t*, or 0 otherwise.

iii. $businessrealestate\_50_{it}$, takes the value 1 if household *i* has at least 50% of their wealth invested in business and/or real estate in time period *t*, or 0 otherwise.

The reference group for these indicators is 'diversified' households that do not have more than 50% of their total portfolio holding in any one of these three asset classes.

Estimation results in columns 1 and 4 of Table 2 show that those households with more than 50% of wealth invested in superannuation/equity or business/real estate are wealthier than the diversified reference group, as are couples, and those with higher education. Those households who report being followers of Judaism have statistically significantly higher wealth in wave 2006, compared with those households who report being either Christian, of another religion, or having no religious affiliation. Having a long-term health condition is associated with lower wealth in both periods, possibly due to the ongoing health care costs or lower accumulations because of limited labor market participation before retirement.

PLACE TABLE 2 HERE

To compare decumulation across the two periods we regress the absolute change in wealth for each household, ΔW_{it}, on the same set of explanatory variables:

$$\Delta W_{it} = \delta_0 + \delta_1 age_{it-1} + \boldsymbol{\delta_3}' \boldsymbol{Z_{it-1}} + \varepsilon_{it} \quad (2)$$

All controls in model (2) correspond to the beginning of the decumulation period, i.e., to year 2002 for the period 1 sample, and to year 2006 for the period 2 sample.

Households with large holdings in one particular asset type (safe, superannuation/equity or business/real estate) experienced a comparatively larger decumulation in the 2006-10 period, when compared to more diversified reference households (Table 2, columns 2 and 5). Rates of decumulation differ also across several other dimensions including Age Pension payment and home ownership, though in contrast to US studies (e.g., Poterba, Venti and Wise 2010, Poterba, Venti and Wise 2013), we do not find any significant impact of education and health on changes

in wealth. Even at this aggregate level, the evidence points to Australian households being exposed to financial risks, so that diversification is some protection, though are not particularly affected by health shocks.

To get a clearer idea of the effect of ageing we fix the values of covariates at their medians and compute fitted values of wealth as age increases (Table 3, columns 1 and 3). Confirming similar findings from Kelly (2012), the fitted values show an average accumulation of wealth in the period 2002-06 across all ages presented, and an average decumulation in the period 2006-10 for households aged 84 and younger.

PLACE TABLE 3 HERE

We next use wealth level and change regression results in Table 2 to graph the evolution of expected wealth over the 2002-06 and 2006-10 periods for various household types, presented in Figure 1. Households of different ages, on average, experienced a modest wealth increase in the 2002-06 period and a decumulation in the 2006-10 period. Panel (a) shows that, after the influence of outliers has been removed, average wealth increased by about $1.6K in the first period, and decreased by $54K in the second period. Panel (b) shows that wealth decumulation in the second period has been lower for older households. For example, households aged 65 in 2006 saw an average $100K wealth decline over the next four year period, while households aged 85 in 2006 saw almost no decline. This could be partly explained by a lower exposure of older households to risky assets, a finding which will be supported in the next section of this paper. Panel (d) indicates that households with the highest exposure to equity (50% of the portfolio or more) saw the largest *decline* in financial wealth, with an average decumulation of about $360K over the 2006-2010 period.

PLACE FIGURE 1 HERE

Finally, we compute the *rate* of decumulation by regressing the difference in log wealth (again excluding family housing equity) on the controls and indicators in equation (3):

$$100 \times \log(W_{it}/W_{it-1}) = \vartheta_0 + \vartheta_1 age_{it-1} + \boldsymbol{\vartheta_3}'\boldsymbol{Z_{it-1}} + \varepsilon_{it} \qquad (3)$$

Table 2, columns 3 and 6, report the estimated coefficients. Confirming Bloxham and Betts' (2009) predictions,[13] the coefficients on $superequity\_50$ and $businessrealestate\_50$ in the 2006-10 period are negative, statistically significant and larger in absolute value than estimated for 2002-06: households with a high allocation to these categories experienced larger decumulation rates over the crisis and recovery compared with those households who did not.[14] (For robustness, we repeat this process excluding the top and bottom 5% of households by decumulation rates across 2002-06 and 2006-10. The results are similar and are available from the authors upon request.)

With this in mind, we compute fitted values for decumulation rates by age in the 2002-06 and the 2006-10 periods, setting covariates to median values (Table 3, columns 2 and 4). The results in Table 3 are conditional averages of absolute and rates of changes in net wealth. In general, average absolute wealth accumulation and average percentage changes in wealth should not necessarily be expected to have the same sign because the modest *absolute* wealth decumulation of low wealth households can be very large in terms of *rates*, while large absolute changes in wealth can make up a very small percentage of wealth of high wealth households. For example, over the 2002-06 period, 55% of households decreased their wealth holdings, decumulating on average $109.5K (83%) over four years. The remaining 45%, who increased wealth holdings, added on average $152.8K (76%), hence the average absolute change in wealth is positive even though majority of households reduced their total wealth, while the average rate of change is negative. Median wealth actually decreased from $70K in 2002 to $55.4K in 2006. Likewise, all percentiles up to the 75th decreased wealth, while 90th and higher percentiles increased wealth. Similarly, over the 2006-10 period, 60% of households decreased their wealth holdings, decumulating on average $196.7K (82%) over four years. The remaining 40%, who

[13] Bloxham and Betts (2009) predict that given higher-wealth households hold larger shares in equity and superannuation, it is likely that the declines in net worth observed in 2008 would have a greater impact on these particular households.

[14] The relatively low R-squared values for these estimations are likely due to the fact that we cannot separately observe returns on wealth (which would ideally be included as explanatory variables in our wealth analysis), and are unable to account for heterogeneity in actual investment returns across our sample. This could help explain why we observe higher R-squared values for *levels* of wealth in any one wave (Table 2, columns 1 and 4) compared to decumulation estimation. Decumulations will be affected by unobservable heterogeneity (including risk preferences and where assets are invested etc.).

increased wealth holdings, added on average $134.7K (89%), hence the average absolute and rate changes in wealth are negative. Median wealth decreased from $77.6K in 2006 to $71.9K in 2010, and all percentiles also decreased. We conclude that the majority of households of different ages decumulated over both periods, consistent with theory. However, wealthier households were able to add to their wealth in the early part of the decade, but not during the turbulence of the 2006-10 period.

Unlike results for the US, Australian households appear to be more vulnerable to financial shocks than health shocks. Moreover, education is not a significant factor in explaining changes in wealth in retirement. The fact that neither public health insurance nor public pension payments in Australian are dependent on earnings or work history may explain the disconnection with education. More complete public insurance coverage may explain the lower importance of health status. However, the increasing reliance of Australian retirees on defined contribution retirement savings and low rates of annuitization may explain why better diversified households preserve their wealth more than less diversified households, as well as the vulnerability of wealthier households to financial conditions.

B. Prevalence and Determinants of Probabilities Surrounding Low Financial Wealth

The second section of our analysis uses a balanced panel of 630 households for which data are available in all three waves.[15] We study the evolution of households into very low financial wealth states over an extended time period. We define a series of financial wealth thresholds as equal to having either 4, 12, 24 or 48 weeks of equivalent Age Pension payment stored as net wealth, excluding housing equity, and conditioning on single or couple status.[16] The dollar

[15] Results for the full unbalanced sample where comparable are very similar both quantitatively and qualitatively, and are available from the authors upon request.

[16] Age pension payments are calculated as maximum pension payment (excluding rental assistance) as outlined in the 2002, 2006 and 2010 December quarter 'Poverty Lines' publication by the Melbourne Institute of Applied Economic and Social Research, and inflated to 2010 dollars using Reserve Bank of Australia (2012) quarterly inflation figures (which are calculated based on the Consumer Price Index (CPI)).

equivalent threshold cutoffs for couples to have stored in wealth in 2010 are $2114, $5280, $10559 and $21119, and for singles the thresholds are $1050, $3149, 6298, and $12596.[17]

Tables 4A-D are transition matrices showing the frequency with which households in the balanced sample fall below each threshold, from either a previously high or low wealth state. The transition probabilities reflect total depletion rates and do not always imply a planning failure since aging households optimally drawdown their wealth. We can see from Tables 4A-D that the percentage of households below the thresholds generally increases (or at least remains constant) across all three waves.

PLACE TABLES 4A to 4D HERE

We estimated a linear probability model[18] with robust standard errors for each separate wave. The estimation fits the probability that household *i* has low financial wealth (Y_i) (a one-zero indicator variable if household wealth falls below a threshold):

$$p_{it} = p(Y_{it} = 1|M_{it}) = \beta_0 + \boldsymbol{\beta_1}'\mathbf{M_{it}} + \varepsilon_{it} \quad (4)$$

where the explanatory variables $\mathbf{M_{it}}$ are the same is in previous estimations.

We address this problem using the Oaxaca-Blinder decomposition technique, [19] decomposing changes in the transition probabilities over time into parts attributable to household characteristics and parts attributable to environmental factors. For example, household characteristics such as an increased likelihood of being widowed and/or decumulation due to aging could both increase a household's probability of falling below a threshold, whereas changes in economic, social or regulatory environments could also have similar effects. The policy implications of each are different.

Estimation results for the linear probability models for households passing through a low financial wealth threshold are reported in Tables 5A-B. A unit increase in the explanatory

[17] Refer to Appendix B for the equivalent of one week's Age Pension payment (excluding rent assistance) for couples and single households. These figures are multiplied accordingly to calculate each respective threshold of low financial wealth (4, 12, 24 or 48 weeks Age Pension saved, excluding housing equity).
[18] We also estimated logit models, but in many instances found very similar results. Hence we chose to report our results for a linear probability model due to its simplicity and ease of readability and interpretation.
[19] See Oaxaca (1973) and Blinder (1973).

variable (or switching on an indicator variable), will increase (decrease) the probability of being of low financial wealth given a positive (negative) coefficient sign. In 2002, the likelihood of reaching the lowest wealth threshold is 5.5 percentage points lower for couples than singles, and 9.39 percentage points lower for home-owners than non-homeowners, but higher by 3.25 percentage points for Age Pensioners. Households who report bad health in 2002 are more likely to be below the threshold, though the direction of causality between health and poverty cannot be inferred from this regression. Other interesting statistically significant results include the effects of portfolio allocation (low risk portfolios are linked with low wealth), precautionary savers are less likely to deplete their resources, and households with English language difficulties are more vulnerable.

PLACE TABLE 5A HERE

Increasing the wealth threshold to 12 weeks of Age Pension (Table 5B), adds living in a major city as a significant predictor of falling below threshold savings, possibly because of the higher cost of housing balanced against the attraction of increased access to services for poorer households in larger urban areas. Education becomes important and results are more consistent across waves.

PLACE TABLE 5B HERE

Estimations for thresholds 3 and 4, having less than the equivalent of 24 and 48 weeks Age Pension saved respectively, show the significance of a long-term health condition, where the presence of a long-term health condition may mean higher ongoing healthcare costs, or where poor health either does currently, or has in the past, contributed to low wealth. For threshold 4 we also find that reporting bequest motives (where the household indicates they are saving to help their children/grandchildren)[20] implies a reduced likelihood of falling below the threshold by 9.86 percentage points. These households may deliberately slow consumption to preserve a bequest.

[20] Includes saving to 'help' their children or grandchildren, or for their education.

The final step in this section is to decompose changes in transition probabilities into those changes due to the dynamics of household characteristics, and those changes due to the economic environment. We follow the Oaxaca-Blinder decomposition technique and report average predicted probabilities.[21] Starting with threshold one in 2002-06, the probability of having less than four weeks Age Pension saved (i.e., less than $1K in assets outside the family home for a single person) is 0.16%, of which -1.31% can be attributed to changes in household characteristics and 1.46% can be attributed to changes in environmental factors.

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Analysing the second period (2006-10) gives more evidence that simple ageing is not the main factor in the increased likelihood of falling below the threshold: the decomposition attributes -0.22% to changes in household characteristics and 2.29%. to changes in environmental factors. This could be due to changes in pension regulations, falling interest rates, increased utility bills, or increased rent, among other influences.

PLACE TABLE 7 HERE

Increasing the threshold to 12, 24 and 48 weeks Age Pension saved (excluding housing equity) produces similar results across both 2002-06 and 2006-10 with most changes attributable to economic/social/regulatory environmental factors (as opposed to changes in household characteristics alone).[22] The exception to these results is threshold 2 (having less than 24 weeks Age Pension saved), where rates of 'poverty' fell between 2002-06 and then increased over 2006-10, although observed changes are still mostly attributable to changes in environment rather than household characteristic changes.

[21] We also tested this technique on a number of subsamples (for example, Age Pension recipients and those households with high proportions of wealth held in risky asset types). However, we found that due to our already small sample size this process was largely influenced by noise and hence for reliability we report probabilities for the average across our sample only.

[22] Results are available from the authors upon request.

C. Effect of Ageing on Asset Holdings

The goal of this subsection is to analyze the effect of ageing on asset holdings, where we begin with a cross-sectional 'snapshot' of the gross assets of Australian retirees for the most-recent wave, 2010, in Table 8. We include *all* retired couple and single households in the 2010 HILDA survey (not only those who appear in all three surveys).

PLACE TABLE 8 HERE

The top panel shows how ownership rates of different asset types vary with age. Consistent with earlier studies (Bradbury 2008), we observe home ownership rates around 70-80% except for the oldest old, but with slowly declining ownership after age 74. Superannuation holdings reflect the relatively recent introduction of the 'Superannuation Guarantee' in 1992, with younger cohorts having longer to contribute. About one third of households own equities (separate from their superannuation investments) with a slow decrease in ownership rates at older age groups. On the other hand, rates of ownership of liquid assets and cash investments increase with age.

The second panel shows the median value of assets held by class, conditional on any strictly positive asset holding. Interestingly, the median value of the household home is almost constant across ages at around $400K, with median equity and superannuation generally declining with age. Median liquid assets (bank accounts) increase with age as predicted, although there is some variation observed in median cash investments[23] across ages. The third panel presents the share of total wealth allocated to each asset category. Shares in equity and principal residence are fairly constant across ages, in comparison to the increased share observed for liquid assets and the decreased share observed for superannuation, vehicle and real estate holdings.

However, this cross-sectional analysis approach is exposed to cohort effects (since households were born during different periods and hence their savings and overall wealth levels are exposed to different market environments across their working life). Following Coile and

[23] Cash investments include government bonds, corporate bonds, debentures, certificates of deposit, and mortgage-backed securities.

Milligan (2009) we restrict the panel to those households which are present for all three surveys.[24] And regress gross asset holdings on age and characteristics for household *i* at time *t*:

$$Asset\ holdings_{jit} = \varphi_0 + \varphi_1 age_{it} + \boldsymbol{\varphi_2}'\mathbf{X_{it}} + \gamma_t + \varepsilon_{jit} \quad (5)$$

where *Asset holdings*$_{jit}$ is the value of asset class *j* held by household *i* at time *t*, age_{it} is the age of the household, $\mathbf{X_{it}}$ is a vector of control variables, γ_t are wave dummies, and ε_{jit} is an independent and identically distributed error. The control variables include indicators of single or couple status, receipt of Age Pension, residing in a major city, post-high school education, English language proficiency, religious affiliation, expressing precautionary motives, and expressing bequest motives. Since gross assets are measured at the household level, we again follow convention and treat the adult male as the couple household head. In couple households, the personal characteristics of the household head are used as control variables but the age of the oldest household member measures household age.

We regress two measures of asset holdings on these controls: a binary variable indicating whether the household has a positive holding in each asset class; and the share of total household assets in each asset class. We use three econometric specifications with robust standard errors:[25] no fixed effects (1); cohort fixed effects (2); and household fixed effects (3).

In estimation (2), cohort dummies, C_k, group households by birth year (where two birth years form one cohort) in the following form:

$$Asset\ holdings_{jit} = \delta_0 + \delta_1 age_{it} + \boldsymbol{\delta_2}'\mathbf{X_{it}} + \gamma_t + C_k + \varepsilon_{jit} \quad (6)$$

Estimation (3) includes household fixed effects , α_i:

$$Asset\ holdings_{jit} = \beta_0 + \beta_1 age_{it} + \boldsymbol{\beta_2}'\mathbf{X_{it}} + \alpha_i + \varepsilon_{jit}, \quad (7)$$

but wave dummies cannot be included in this third specification because of the perfectly collinear relationship between age and time (See Wooldridge 2006, p. 489).

Table 9 reports estimated coefficients for the age of the oldest member of the household for each of the three specifications. (Full estimation results are available from the authors.) The table also indicates instances where the coefficient on a quadratic term in age was marginally

[24] We acknowledge that it likely that households are more likely to survive when they are wealthier, but we are unable to separately identify or control for this effect.
[25] We use OLS estimation with robust standard errors for the first two specifications.

significant for some ages using bold italic typeface (see Appendix C for detailed results on the quadratic specification). These estimations include only households where the older spouse is at least 60 years of age in 2002, to allow comparison with Coile and Milligan (2009).

Estimation of equation (5) shows that an additional year of household age lowers the probability of holding superannuation and/or equity assets by 0.67 percentage points. Extending equation (5) with a quadratic in age further shows that the probabilities of holding liquid/cash investments and principal residence peak at age 81.

PLACE TABLE 9 HERE

The second column of Table 9 reports the change in results when we incorporate cohort dummies to separate the effects of age from year-of-birth cohort (equation 6). Consistent with Coile and Milligan (2009), effects become economically and statistically weaker than for equation (5). Holdings of superannuation assets and age are significantly related and have the expected negative sign.

The third column of Table 9 incorporates household fixed effects and uses the panel structure to identify age coefficients. However since it is not possible to separately estimate both time and age effects in this specification, the coefficient on age may include both the influence of aging and exogenous changes in the external environment (or in the waves of the survey) not captured by other controls, and we interpret results with caution. We observe a decreased likelihood of participation in vehicle ownership, superannuation, equity, and business/real estate at older ages. The coefficient on holdings in cash and liquid assets is insignificantly different from zero, probably because high and relatively constant rates of participation in this class are captured by the household fixed effects. Interestingly, rates of ownership of principal residence peak at age 81 when quadratic terms in age are included, in contrast to findings by Bradbury (2008, 2010) and Cho and Sane (2011) who find Australian households are unlikely to drawdown housing equity in retirement.

The effect of age on the *share* of each asset class in portfolios is presented in panel 2 of Table 9. Using equation (5) without cohort or household fixed effects, we see a decrease in the share of superannuation/equity and vehicles (of 0.41 and 0.39 percentage points respectively),

and an increase in the proportion of principal residence and liquid/cash investments (of 0.25 and 0.61 percentage points respectively) with each additional year of age. Specifications (6) and (7), which control for cohort and household fixed effects, largely confirm that as households age they hold increasing proportions in liquid/cash investments and decreasing proportions in more risky asset types such as superannuation and equity.

Figures 2 and 3 graph the effects of age on asset class participation rates and portfolio share by age, setting other control values at medians. Coile and Milligan (2009) suggested that the shift towards cash and liquid assets could be due to 'transitory' proceeds from the sale of principal residence (for example) on their way to other asset types, older households having greater loss aversion due to their exhausted human capital (and inability to make up for potential investment losses), and the reduced mental capacity of aging households. A critical difference between the US and Australian settings is the effect of the means-tested Age Pension on portfolio decisions, since the test excludes the value of the family home.[26] Consequently, the households in the sample studied here have a strong incentive to keep their principal residence (Cho and Sane, 2011). Australian retired households needing access to liquid assets probably deplete risky financial asset holdings before liquidating housing equity.

PLACE FIGURES 2 AND 3 HERE

D. Effect of Health on Asset Holdings

Finally we look at how current health status and changes in health affect the asset holdings of Australian retirees. Specifically, following Coile and Milligan (2009), we investigate households where *either* member reports poor health, expected poor health or having a long-term health. We conduct a static analysis[27] by incorporating the three health status indicators into the household fixed effects specification (equation 7 above) to control for unobservable household heterogeneity:

[26] See http://www.humanservices.gov.au/customer/enablers/assets for further details regarding those assets included/excluded from the Age Pension assets test.

[27] Coile and Milligan (2009, p239) investigate how health shocks impact asset holdings over time via a dynamic analysis by incorporating dummies for household-wave observations corresponding to the wave immediately after/before the health 'shock'. However, the data here have only three observation points and we are limited to a static pre- and post-shock analysis.

$$Asset\ holdings_{jit} = \beta_0 + \beta_1 bad\ health_{it-1} + \beta_2 expected\ bad\ health_{it-1} + \beta_3 long\ term\ health\ condition_{it-1} + \beta_4 age_{it} + \beta_5 X_{it} + \alpha_i + \varepsilon_{jit} \quad (8)$$

where *bad health*$_{it}$ equals 1 if household *i* reports being of 'poor' health in period *t* and zero otherwise, *expected bad health*$_{it}$ equals 1 if household *i* answers 'definitely true' in period *t* to the statement "I expect my health to get worse", and *long term health*$_{it}$ equals 1 if household *i* reports having a long-term health condition, impairment or disability in period *t*.[28] This enables us to compare household observations before and after a change in reported status, as well as comparing with households who never report bad health. The estimation uses lagged values of the health statues indicators, i.e., how current asset holdings relate to health reports from the previous wave (Table 10).[29]

Households that expect bad health may need to shift out of less liquid assets into more easily accessible asset types to fund increased healthcare and hospital costs (French et al. 2006). However estimates in the first column and second panel of table 10 show a negative coefficient on the share held in liquid assets when households reported bad health in the previous wave. These households may be running down liquid assets but not yet liquidating property or investments. On the other hand, households which reported an *expectation* of bad health in the future increased the share of liquid assets possibly anticipating future expenses. Further, estimates of risky asset shares for households reporting long term health conditions are generally negative, though not statistically significant. These households may be less risk tolerant because of their reduced physical capacity.

The striking feature of these results is how few significant relationships there are. Out-of-pocket medical expenses for older Australian households are estimated to average only 3% of total household expenditure (Jones et al., 2008), or about $524 per year for households with no private health insurance (and hence fully reliant on public insurance cover provided by

[28] This indicator equals 1 if respondent answers yes to the question "Do you have any long-term health condition, impairment or disability…that restricts you in your everyday activities, and has lasted or is likely to last, for 6 months or more?"

[29] Our reported coefficients are for each health dummy variable using a linear age variable though it is worth noting that we observed the same sign coefficients of very similar magnitude under the version tested using quadratic age.

'Medicare'[30]) and increasing from $469 per year for 60-64 year olds to $753 per year for those aged 80 and above (Melivanni and Savage, 2012). By contrast, US households must manage a series of caps on public coverage for medical and pharmaceutical benefits: Fronstin et al. (2008, figure 2, p.8) estimate that for median drug expenses and additional insurance premia alone, men retiring in 2008 at age 65 need around $80K US dollar savings and women around $108K. Very serious and long-term treatments may cost much more. It follows that the effects of bad health on portfolio structure in Australia will be less than in US studies.

PLACE TABLE 10 HERE

4. CONCLUSIONS

A clear picture of decumulation patterns is critical for economists and governments dealing with population aging and recent rapid changes in retirement savings systems. Australian retirees are an especially interesting case study for comparison with other developed countries. Unlike in many European and North American economies, Australians do not contribute to an earnings-linked social security system. Instead, around 75% of retirees aged over 65 receive a modest, means-tested public pension payment unconnected to work history. Further, Australia was an early adopter of defined contribution retirement savings plans under the mandatory Superannuation Guarantee, which requires 9% of earnings for almost all workers to be paid into an accumulation plan. Very little superannuation is annuitized and consequently retirees carry exposure to financial market risk into and throughout retirement. Finally, medical provision for Australian retirees is largely free and un-capped, so that out-of-pocket expenses are modest by international standards, particularly for Age Pensioners. The results reported here illustrate the ongoing exposure to investment risk, modest public pension provision and limited exposure to health costs of the retired cohorts interviewed for the 2002, 2006 and 2010 HILDA wealth waves.

[30] All recipients of the Age Pension are eligible for a "Pensioner Concession Card" which provides heavily subsidised prescription medicine (or fully subsidised for those who fill a large number of scripts per year), fee-free doctor's visits and full coverage for a range of in-hospital treatments.

Consistent with existing Australian and international evidence, wealthier retired households hold more risky financial assets (superannuation, equity, business or real estate), and consistent with overall financial conditions at the time, the average household accumulated net wealth between 2002-06 and decumulated between 2006-10. The median household decumulated in both periods. Households with more diversified portfolios decumulated less in the second period. Other aspects of our finding highlight how household attitudes to savings, certain cultural and language characteristics and portfolio choices are related to decumulation patterns. For policy makers, the results indicate that regulated drawdown rates from phased withdrawal products should not be set too high to allow for precautionary savings, vulnerable ethnic groups may need to be targeted for assistance, and the incentives for certain portfolio biases created by means testing of pension payments should be evaluated with a view to helping retirees better manage investment risk and maintain liquidity.

Given the low rates of voluntary annuitization in Australia and other countries, do we find evidence of retirees spending too quickly and running out of money? A close examination of the number of retired households falling below minimum wealth thresholds confirms an increasing, but, not necessarily alarming, trend. The most vulnerable households are single, non-home-owning pensioners, those who report poor health or difficulties with English language. A decomposition using the Oaxaca Blinder method pointed to external factors (possibly regulatory changes, low interest rates, higher utility bills etc.) as more important than household characteristics (such as aging) in explaining the probabilities of running out of money.

Poterba and Samwick (2001) and Coile and Milligan (2009) study the evolution of retirement wealth and portfolio structure in the US. Like the US, in Australia we see declining rates of ownership of, and lower portfolio shares in, risky assets (including superannuation, equity, and business/real estate) at older ages, and a compensating increase in liquid/cash investments. In contrast to Coile and Milligan, we find investment in principal residence peaks around age 81 before dropping off very slowly.

The starkest contrast between Australia and US retired households is in the effects of poor health. Although reporting bad health or expected bad health can influence liquid asset holdings, and chronic conditions are linked to more cautious portfolio weighting, poor health and changes

in health seem to explain little about portfolio choices in the HILDA sample. Australian retirees, especially Age Pensioners are well covered for most medical expenses and do not have to pay additional premiums or large co-payments as in the US. Unsurprisingly, the key issues for retired Australians are financial market and longevity risks rather than health risks.

Continuing study of Australian retirees can give insight into international trends in retirement behavior. Data from the next wealth survey in the HILDA series will show how retirees have adjusted portfolios in the recovery from the 2007-09 financial crisis. Moreover, additional consumption data is needed to see whether and to what extent retirees smooth consumption over these (possibly unexpected) events. Finally, by that time, more of the survey sample will have participated in the mandatory retirement savings system for the majority of their working lives, bringing richer data on patterns of decumulation from wealth separate from public pension provision.

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APPENDICES

Appendix A. HILDA Variables Used

Note: where we use an underscore '_' in the variable name, there is an appropriate letter for each wave, namely 'b' for wave 2, 'f' for wave 6, and 'j for wave 10.

Variable	Description	Variable	Description
_hgage	person's age	_edhigh	Highest education level achieved
_hhtype	Household type, single or couple	_hstenr	Home owner
_hgeab, _iopeng	English language difficulties	_fisedch, _fishlpc	Bequest motives
_hgsex	gender	_hhmsr	Geographical location/region
_rtcomp, _rtcompn, _nlmact	Retirement	_hglote, _iopeng, _anengfn	Language other than English
_gh1	Bad health	_bncap	Age pension recipient (yes/no)
_gh11c	Expected health	_religb	Religion variable
_helth	Long term health	_fismed, _fisemr	Precautionary motives
_hwobani	*Liquid assets*, own bank account	_hwhmvai	*Real estate*, own home value
_hwjbani	*Liquid assets*, joint bank account	_hwhmdti	*Real estate*, own home debt
_hwcaini	*Cash investments* (bonds etc.)	_hwopvai	*Real estate*, other property value
_hwvech	*Vehicles*	_hwopdti	*Real estate*, other property debt
_hqsupei	*Superannuation*	_hwbusvi	*Business*, value
_hwinsui	*Superannuation*, life insurance	_hwbusdi	*Business*, debt
_hwcolli	*Other savings*, collectables and other assets	_pwhecdi	*Other debt*, Higher Education Contribution Scheme (HECS) debt
_hwtrusi	*Other savings*, trust funds	_pwoccdi	*Other debt*, own credit card debt
_hweqini	*Equity*, equity investments	_pwjccdi	*Other debt*, joint credit card debt
		_pwothdi	*Other debt*, car loans etc.

Appendix B. Age Pension payments, weekly, excluding rent assistance

These figures are multiplied accordingly to calculate each respective threshold of low financial wealth (i.e. 4, 12, 24 or 48 weeks Age Pension saved, excluding housing equity).

Weekly Age Pension per household (2010 dollars)

	2002	2006	2010
Couple	439.97	479.02	528.50
Single	262.41	286.77	350.55

Source: Melbourne Institute of Applied Economic and Social Research, *Poverty Lines*, December quarter 2002, 2006 and 2010

Appendix C. Predicted ownership rates and share of total assets by age

We report the estimated ownership rates and share of total assets according to age in Table A1 below for all asset types. For those assets where a quadratic age relationship was shown to exist, we report in Table A2 the extent of statistically significant marginal effects across difference ages on these asset types.

TABLE A1

Predicted Ownership Rates and Share of Total Assets According to Age

We estimate two measures of *asset holding* using coefficient output from the household fixed effects specification in Table III, and take the median value across the sample for control variables:

Linear Age Specification: $\widehat{Assetholdings}_{it} = \beta_0 + \beta_1 age_{it} + \beta_2 AgePension_{it} + \beta_3 Majorcity_{it} + \alpha_i$

Quadratic Age Specification: $\widehat{Assetholdings}_{it} = \beta_0 + \beta_1 age_{it} + \beta_2 age_{it}^2 + \beta_3 AgePension_{it} + \beta_4 Majorcity_{it} + \alpha_i$

Asset Type	With Household Fixed Effects								
	Model	Significance Level (Age)	Age						
			60	65	70	75	80	85	90
Predicted share of housholds with positive asset holdings									
Liquid/cash investments	Linear Age		1.00	1.00	0.99	0.99	0.98	0.98	0.98
Superannation/equity	Linear Age	***	0.59	0.53	0.48	0.42	0.36	0.30	0.24
Business/real estate	Linear Age	***	0.12	0.11	0.09	0.07	0.05	0.03	0.01
Principal residence	Linear Age	***	0.79	0.76	0.72	0.69	0.65	0.62	0.58
Vehicle	Linear Age	***	0.83	0.78	0.72	0.67	0.62	0.57	0.52
Superannation	Linear Age	***	0.34	0.31	0.28	0.25	0.22	0.19	0.17
Equity	Linear Age	***	0.46	0.41	0.36	0.30	0.25	0.20	0.14
Predicted share of holdings in a given asset type									
Liquid/cash investments	Linear Age	***	0.15	0.19	0.23	0.26	0.30	0.34	0.38
Superannation/equity	Linear Age	***	0.25	0.21	0.18	0.14	0.11	0.07	0.04
Business/real estate	Linear Age		0.04	0.04	0.04	0.04	0.03	0.03	0.03
Principal residence	Quadratic Age	*	0.42	0.48	0.52	0.54	0.54	0.52	0.49
Vehicle	Linear Age	***	0.08	0.07	0.06	0.04	0.03	0.02	0.00
Superannation	Linear Age	***	0.12	0.11	0.09	0.07	0.06	0.04	0.02
Equity	Linear Age	***	0.12	0.11	0.09	0.07	0.05	0.03	0.02

Notes

(1) Our sample includes 1187 households that appear in either waves 2002 and 2006, or in waves 2006 and 2010.

(2) Statistical significance on the linear age coefficient reported at the 10%, 5%, and 1% levels is indicated by one, two, or three asterisks respectively

TABLE A2

Predicted Ownership Rates and Share of Total Assets According to Age

For those assets where a quadratic age relationship was shown to exist, we estimate *asset holding* using coefficient output from the household fixed effects specification in Table 9, and take the median value across the sample for control variables according to equation:

$$\widehat{Asset holdings}_{it} = \beta_0 + \beta_1 age_{it} + \beta_2 K_{it} + \alpha_i + \varepsilon_{it}$$
$$\widehat{Asset holdings}_{it} = \beta_0 + \beta_1 age_{it} + \beta_2 age_{it}^2 + \beta_3 K_{it} + \alpha_i + \varepsilon_{it}$$

Where K_{it} are median values of sample such that *majorcity* =1, *relig_christ* =1, *badhealth* =1 and *homeown* =1

Asset Type	Age						
	60	65	70	75	80	85	90
Predicted share of holdings in a given asset type							
Principal Residence	0.42 ***	0.48 ***	0.52 ***	0.54 **	0.54	0.52	0.49

Notes

(1) Our sample includes 1187 households that appear in either waves 2002 and 2006, or in waves 2006 and 2010.

(2) We report predictions and significance level of marginal effect of age across a number of ages

(3) Statistical significance on the linear age coefficient reported at the 10%, 5%, and 1% level is indicated by one, two, or three asterisks respectively

(4) We report coefficients for our household fixed effects specification only

TABLE 1
Sample Means of Household Characteristics

Sample	Period 1 households, 2002	Period 1 households, 2006	Period 2 households, 2006	Period 2 households, 2010	Households appearing in periods 1 and 2, 2002	Households appearing in periods 1 and 2, 2006	Households appearing in periods 1 and 2, 2010	Households appearing in period 1 only, 2002	Households appearing in period 2 only, 2006
Characteristic	1	2	3	4	5	6		7	8
Age	71.528	75.528	72.194	76.194	70.273	74.273	78.273	74.804	67.788
Couple household	0.435	0.386	0.430	0.389	0.450	0.406	0.355	0.396	0.480
Greater than highschool education	0.369	0.369	0.260	0.260	0.378	0.378	0.378	0.347	0.010
Language other than English	0.090	0.090	0.066	0.066	0.091	0.091	0.091	0.090	0.013
Language difficulty	0.055	0.055	0.036	0.036	0.053	0.053	0.053	0.061	0.000
Major city	0.527	0.516	0.513	0.515	0.545	0.533	0.536	0.478	0.470
Religion: None	0.440	0.440	0.245	0.245	0.234	0.234	0.234	0.976	0.268
Religion: Christian	0.539	0.539	0.721	0.721	0.736	0.736	0.736	0.024	0.689
Religion: Islam	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.000	0.000
Religion: Judaism	0.002	0.002	0.004	0.004	0.003	0.003	0.003	0.000	0.007
Religion: Other	0.018	0.018	0.029	0.029	0.025	0.025	0.025	0.000	0.036
Received Age Pension	0.626	0.706	0.626	0.727	0.616	0.698	0.775	0.653	0.474
Reports bad health	0.095	0.148	0.117	0.160	0.078	0.122	0.164	0.139	0.106
Reports expected bad health	0.113	0.171	0.133	0.194	0.102	0.152	0.208	0.143	0.093
Reports a long-term health condition	0.551	0.757	0.677	0.781	0.509	0.713	0.802	0.661	0.603
Has at least 50% of wealth in liquid assets	0.131	0.137	0.102	0.165	0.116	0.122	0.197	0.171	0.060
Has at least 50% of wealth in superannuation or equity	0.125	0.104	0.132	0.099	0.130	0.116	0.081	0.114	0.166
Has at least in 50% of wealth in business or real estate	0.016	0.021	0.018	0.015	0.014	0.014	0.013	0.020	0.026
Home owner	0.779	0.745	0.776	0.739	0.788	0.755	0.717	0.755	0.821
Saving for bequest	0.120	0.099	0.118	0.118	0.123	0.113	0.113	0.110	0.129
Saving for precaution	0.272	0.299	0.325	0.325	0.272	0.323	0.323	0.273	0.328
Financial wealth excluding housing, $2010	$238,394	$247,402	$333,101	$270,100	$254,053	$256,936	$212,684	$197,489	$494,513
Below wealth threshold 1[(ii)]	0.063	0.079	0.063	0.072	0.055	0.064	0.077	0.086	0.060
Below wealth threshold 2[(ii)]	0.124	0.134	0.108	0.122	0.117	0.117	0.128	0.143	0.089
Below wealth threshold 3[(ii)]	0.171	0.203	0.174	0.183	0.156	0.188	0.194	0.208	0.146
Below wealth threshold 4[(ii)]	0.249	0.297	0.253	0.279	0.236	0.286	0.292	0.282	0.182
Number of households	885	885	942	942	640	640	640	245	302

Notes:

(i) Period 1 corresponds to 2002 and 2006 waves of HILDA. Period 2 corresponds to 2006 and 2010 waves of HILDA. Period 1 households appear in waves 2002 and 2006 with non-missing wealth information. Period 2 households appear in waves 2006 and 2010 with non-missing wealth information.

(ii) Wealth thresholds are indicators of whether a household has less than a particular amount stored as wealth (excluding housing equity). For threshold 1 this is having less than $2114 for a couple, or $5280 for a single. Wealth thresholds 2, 3 and 4 are defined similarly: threshold 2 is $5280 for couples and $3149 for singles; threshold 3 is $10559 for couples and $6298 for singles; and threshold 4 is $21119 for couples and $12596 for singles.

TABLE 2
Wealth Level and Wealth Growth ($2010)

Sample	Period 1 households			Period 2 households		
Dependent Variable	Wealth level, 2002	Wealth growth, level, 2002-2006	Wealth growth, %, 2002-2006	Wealth level, 2006	Wealth growth, level, 2006-2010	Wealth growth, %, 2006-2010
Variable	1	2	3	4	5	6
age	-1248.6	-376.7	0.0865	-3827.2*	2483.3**	1.060*
	(1209.30)	(867.60)	(0.54)	(1645.40)	(918.90)	(0.52)
couple	108388.4***	-33260.4*	-5.836	154612.2***	-8685.5	-9.107
	(17524.90)	(14637.10)	(7.20)	(27279.00)	(15769.80)	(7.23)
highschool_more	107247.1***	6039.3	4.54	57388.8	-21756.3	-10.78
	(18897.00)	(14871.60)	(7.34)	(29316.20)	(18506.00)	(7.81)
language_other	-73862.8*	1424.9	3.091	-78644.3	-21075.6	-12.72
	(29440.50)	(42330.20)	(16.50)	(51454.10)	(41041.90)	(17.12)
language_diff	-69818.5*	50819.2	9.662	-20072.3	9366.1	60.76*
	(34287.10)	(59606.90)	(25.52)	(82543.30)	(62221.80)	(28.62)
majorcity	24505.3	-4876.7	-9.14	48945.8*	-7578.7	-12.55
	(17973.10)	(13633.40)	(7.29)	(23538.50)	(14232.10)	(6.98)
Relig_christ	-24241.4	8866.8	-0.841	-17159.6	-5241.1	-0.362
	(17048.00)	(13388.40)	(7.62)	(30326.70)	(17229.00)	(8.09)
Relig_islam	-226235.8***	-63658.9	-126.9***	-63725.3	46266.3	61.55*
	(40247.20)	(40037.10)	(25.06)	(63112.70)	(38600.20)	(25.71)
Relig_judaism	263519.7***	259866.0**	69.89**	353021.9	-246777.9*	-110.0***
	(44755.10)	(87642.20)	(24.98)	(228087.10)	(98482.90)	(32.63)
Relig_other	-16090	-5437.3	15.88	-32976.1	6742.7	-3.618
	(83298.30)	(30256.60)	(21.74)	(76188.80)	(27859.40)	(19.47)
pension	-159331.9***	-28378.2	-0.525	-306359.4***	22938.8	-16.09*
	(20016.90)	(15223.10)	(7.95)	(31823.60)	(17554.40)	(7.71)
badhealth	-39077	14881.3	20.07	-140492.9***	25462.9	-17.93
	(29283.20)	(24572.70)	(14.23)	(30892.60)	(21242.10)	(11.15)
badhealth_exp	50893.4	-2223.5	10.42	5771.4	5303.4	11.1
	(33354.80)	(24062.00)	(12.21)	(36085.70)	(23953.00)	(10.13)
badhealth_lt	-61444.1**	-16046.9	-11.12	-65938.0*	-1152.8	-8.237
	(18726.40)	(13539.40)	(7.36)	(29682.60)	(16729.00)	(7.55)
safe	110352.6***	-15134.8	6.515	150715.9***	-119209.5***	-11.3
	(27548.40)	(20648.70)	(15.52)	(39192.40)	(23006.10)	(18.45)
superequityPROP_50	455635.0***	-73560.1*	-21.46*	591040.5***	-298057.1***	-72.56***
	(46798.70)	(34447.70)	(9.56)	(61480.00)	(35758.70)	(9.71)
buspropertyPROP_50	1369088.2***	110418.8*	25.95	470464.0***	-254869.5*	-101.6**
	(353152.60)	(51784.50)	(19.01)	(80169.90)	(123469.30)	(32.13)
home_own	178952.9***	8106.5	9.592	248792.2***	-117072.7***	-15.19
	(28616.30)	(21185.20)	(10.69)	(36092.70)	(21470.90)	(13.06)
bequest	23998	-8368.9	-1.736	26796.6	2959	11.69
	(32901.80)	(23797.40)	(10.19)	(46411.70)	(30735.50)	(11.00)
precaution	-12378.3	33789.9	8.675	59430.2*	-6486.8	-7.063
	(22862.10)	(17888.60)	(7.88)	(29093.10)	(16056.80)	(7.57)
constant	133132.3	55698.5	-14.85	416027.7***	-86836.3	-33.8
	(88010.60)	(62823.30)	(39.39)	(117276.20)	(67065.20)	(39.63)
Number of observations	867	867	836	922	922	883
Adjusted R-squared	0.5	0.022	-0.003	0.437	0.203	0.07

Notes:

(1) Statistical significance at the 10%, 5% and 1% levels is indicated by one, two, or three asterisks respectively. Robust standard errors are in parentheses.

(2) Safe is a dummy = 1 if a household has at least 50% of their wealth invested in liquid or cash investments in time period t, 0 otherwise; superequityPROP_50 is a dummy = 1 if a household has at least 50% of their wealth invested in superannuation or equity in time period t, 0 otherwise; and buspropertyPROP_50 is a dummy = 1 if a household has at least 50% of their wealth invested in business or real estate in time period t, 0 otherwise.

(3) To minimize the influence of outliers observations in the top and bottom 1 % of the distribution of the dependent variables were not included in the estimation sample.

TABLE 3

Estimated Change in Wealth Across Time, According to Age

Age	2002-2006, level, $2010	2002-2006, %	2006-2010, level, $2010	2006-2010, %
	1	2	3	4
64	18771	-20.0	-53710	-2
68	17264	-19.6	-43776	2
72	15757	-19.3	-33843	7
76	14250	-18.9	-23910	11
80	12743	-18.6	-13977	15
84	11237	-18.2	-4044	19
88	9730	-17.9	5890	23
92	8223	-17.6	15823	28
96	6716	-17.2	25756	32

Note:

These predictions are obtained using coefficients from the specification in Table 2, columns 2, 3, 5 and 6. Covariates other than age are set to their sample median values.

TABLE 4A

Threshold 1: Percentage of Households with less than 4 weeks Age Pension saved*

Low Wealth 2006

Low Wealth 2002	Yes	No	
Yes	2.4	1.7	4.1
No	**2.2**	93.7	95.9
	4.6	95.4	

Low Wealth 2010

Low Wealth 2006	Yes	No	
Yes	3.5	1.1	4.6
No	**2.9**	92.5	95.4
	6.5	93.5	

Low Wealth 2010

Low Wealth 2002	Yes	No	
Yes	2.7	1.4	4.1
No	3.8	92.2	95.9
	6.5	93.5	

TABLE 4B

Threshold 2: Percentage of Households with less than 12 weeks Age Pension saved*

Low Wealth 2006

Low Wealth 2002	Yes	No	
Yes	6.2	3.2	9.4
No	**3.2**	87.5	90.6
	9.4	90.6	

Low Wealth 2010

Low Wealth 2006	Yes	No	
Yes	6.2	3.2	9.4
No	**4.6**	86.0	90.6
	11.0	89.0	

Low Wealth 2010

Low Wealth 2002	Yes	No	
Yes	5.6	3.8	9.4
No	5.4	85.2	90.6
	11.0	89.0	

TABLE 4C

Threshold 3: Percentage of Households with less than 24 weeks Age Pension saved*

Low Wealth 2006

Low Wealth 2002	Yes	No	
Yes	10.8	4.6	13.7
No	**8.3**	84.0	86.3
	17.5	82.5	

Low Wealth 2010

Low Wealth 2006	Yes	No	
Yes	13.3	5.7	17.5
No	**7.0**	81.6	82.5
	18.1	81.9	

Low Wealth 2010

Low Wealth 2002	Yes	No	
Yes	8.9	4.8	13.7
No	9.2	77.1	86.3
	18.1	81.9	

TABLE 4D

Threshold 4: Percentage of Households with less than 48 weeks Age Pension saved*

Low Wealth 2006

Low Wealth 2002	Yes	No	
Yes	18.6	3.7	22.2
No	**8.7**	69.0	77.8
	27.3	72.7	

Low Wealth 2010

Low Wealth 2006	Yes	No	
Yes	19.5	64.6	27.3
No	**8.1**	69.0	72.7
	27.6	72.4	

Low Wealth 2010

Low Wealth 2002	Yes	No	
Yes	16.0	6.2	22.2
No	11.6	66.2	77.8
	27.6	72.4	

Notes

*Excluding housing equity

(1) Balanced sample size across all three waves of 630 households

(2) Reported values are for percentage of total households that have total wealth (excluding housing equity) less than each respective

(3) Grey shaded boxes highlight the percentage of *new* low financial wealth households in 2006 (i.e. fall below a particular threshold in period

(4) Threshold 1 is an indicator of a household having less than $2114 for a couple, or $5280 for a single, stored as wealth, excluding housing equity. Wealth thresholds 2, 3 and 4 are defined similarly: threshold 2 is $5280 for couples and $3149 for singles; threshold 3 is $10559 for couples and $6298 for singles; and threshold 4 is $21119 for couples and $12596 for singles.

TABLE 5A

Coefficients from Linear Probability Models

Threshold 1: Probability of having less than 4 weeks Age Pension saved (excl. housing equity)

$$p_i = p(Y_i = 1|M_i) = \beta_0 + \beta_1 M_i + \varepsilon_i$$

N=630	Wave		
Explanatory Variable	2002	2006	2010
age	-0.0452 *	-0.0443	-0.0342
	(0.0264)	(0.0289)	(0.0319)
agesq	0.0003	0.0003	0.0002
	(0.0002)	(0.0002)	(0.0002)
safe_50	0.0922 *	0.0442	0.0013
	(0.0505)	(0.0604)	(0.0576)
superequity_50	-0.0386 **	-0.0533 ***	-0.0665 **
	(0.0159)	(0.0204)	(0.0266)
businessrealestate_50	-0.0457	-0.0375 *	-0.0755
	(0.0330)	(0.0224)	(0.0533)
couple	-0.0550 ***	-0.0515 ***	-0.0742 ***
	(0.0141)	(0.0130)	(0.0166)
greater than high school education	-0.0230	-0.0136	-0.0328 *
	(0.0146)	(0.0154)	(0.0192)
speaks a language other than English at home	0.0105	-0.0088	0.0435
	(0.0385)	(0.0314)	(0.0472)
reports English language difficulties	0.0610	0.0942 **	0.0204
	(0.0603)	(0.0600)	(0.0665)
lives in a major city	-0.0002	0.0282	0.0208
	(0.0172)	(0.0177)	(0.0197)
age pension recipient	0.0325 *	0.0338 **	0.0419 **
	(0.0181)	(0.0156)	(0.0174)
bequest motives	-0.0068	0.0114	-0.0171
	(0.0158)	(0.0112)	(0.0126)
precautionary motives	-0.0361 ***	-0.0297 **	-0.0245
	(0.0129)	(0.0146)	(0.0186)
reports bad health	0.0943 ***	-0.0353	0.0003
	(0.0538)	(0.0250)	(0.0327)
reports expected bad health	0.0234	-0.0005	0.0106
	(0.0342)	(0.0264)	(0.0283)
reports a long-term health condition	-0.0124	-0.0098	-0.0089
	(0.0169)	(0.0194)	(0.0276)
home owner	-0.0939 ***	-0.1037 **	-0.1196 **
	(0.0339)	(0.0422)	(0.0499)
constant	1.9774 **	1.9622	1.6907 *
	(0.9646)	(1.1003)	(1.2825)
R-squared	0.1823	0.1354	0.1193

Notes

(1) Our sample of 630 retired households includes only those who appear in all three waves

(2) Robust standard errors appear in parentheses and statistical significance at the 10%, 5% and 1% level is indicated by one, two, or three asterisks respectively

(3) We report coefficients on each explanatory variable, where in the case for dummies we interpret the coefficient such that if dummy = 1 then the probability of being of low financial wealth increases (decreases) if the coefficient is positive (negative). E.g. coefficient = -0.015 reduces probability by 1.5 percentage points given dummy = 1, and a coefficient = 0.057 increases probability by 5.7 percentage points given dummy = 1

TABLE 5B

Coefficients from Linear Probability Models

Threshold 2: Probability of having less than 12 weeks Age Pension saved (excl. housing equity)

$$p_i = p(Y_i = 1|M_i) = \beta_0 + \beta_1 M_i + \varepsilon_i$$

N=630	Wave		
Explanatory Variable	2002	2006	2010
age	0.0054	-0.0409	-0.1079 **
	(0.0321)	(0.0331)	(0.0449)
agesq	-0.0001	0.0002	0.0006 **
	(0.0002)	(0.0002)	(0.0003)
safe_50	0.0074	0.0364	-0.0388
	(0.0602)	(0.0703)	(0.0638)
superequity_50	-0.0939 ***	-0.1268 ***	-0.1296 ***
	(0.0214)	(0.0276)	(0.0334)
businessrealestate_50	-0.1310 **	-0.1076 ***	-0.1218
	(0.0514)	(0.0351)	(0.0778)
couple	-0.0354	-0.0687 ***	-0.0827 ***
	(0.0232)	(0.0213)	(0.0224)
greater than high school education	-0.0503 **	-0.0463 **	-0.0420 *
	(0.0227)	(0.0214)	(0.0237)
speaks a language other than English at home	0.0181	0.0631	0.0416
	(0.0437)	(0.0542)	(0.0553)
reports English language difficulties	0.1115	0.1532 *	0.0791
	(0.0760)	(0.0832)	(0.0806)
lives in a major city	-0.0107	0.0339	0.0411 *
	(0.0234)	(0.0222)	(0.0240)
age pension recipient	0.0219	0.0139	0.0734 ***
	(0.0260)	(0.0233)	(0.0227)
bequest motives	-0.0318	0.0197	-0.0203
	(0.0249)	(0.0210)	(0.0214)
precautionary motives	-0.0424 *	-0.0171	-0.0372 *
	(0.0235)	(0.0215)	(0.0224)
reports bad health	0.1545 **	0.0113	-0.0089
	(0.0685)	(0.0391)	(0.0398)
reports expected bad health	0.0092	0.0077	0.0080
	(0.0457)	(0.0361)	(0.0338)
reports a long-term health condition	0.0207	-0.0024	0.0099
	(0.0238)	(0.0243)	(0.0316)
home owner	-0.2171 ***	-0.2046 ***	-0.2166 ***
	(0.0471)	(0.0520)	(0.0557)
constant	0.2902	2.0926 *	4.7978 ***
	(1.1690)	(1.2715)	(1.7854)
R-squared	0.1817	0.2021	0.1814

Notes

(1) Our sample of 630 retired households includes only those who appear in all three waves

(2) Robust standard errors appear in parentheses and statistical significance at the 10%, 5% and 1% level is indicated by one, two, or three asterisks respectively

(3) We report coefficients on each explanatory variable, where in the case for dummies we interpret the coefficient such that if dummy = 1 then the probability of being of low financial wealth increases (decreases) if the coefficient is positive (negative). E.g. coefficient = -0.015 reduces probability by 1.5 percentage points given dummy = 1, and a coefficient = 0.057 increases probability by 5.7 percentage points given dummy = 1

TABLE 6

Estimated Probability of Low Financial Wealth (2002 vs 2006)

Linear Probability Model

Threshold 1: Probability of having less than 4 weeks Age Pension saved*

N=630	
Probability in 2002 using 2002 parameters	5.08%
Probability in 2006 using 2002 parameters	3.77%
Probability in 2006 using 2006 parameters	5.24%
Total Change in Estimated Probability (2002-06):	0.16%
Δ due to Δ household characteristics:	-1.31%
Δ due to Δ environmental factors:	1.46%

Notes

*Excluding housing equity

(1) 'Probability in *j* using *i* parameters' means that the probability was computed using linear probability model parameters (coefficients) estimated from data in wave *j* and sample covariates (control variables) from wave *i*

(2) We report average sample predicted probabilities

TABLE 7

Estimated Probability of Low Financial Wealth (2006 vs 2010)

Linear Probability Model

Threshold 1: Probability of having less than 4 weeks Age Pension saved*

N=630	
Probability in 2006 using 2006 parameters	5.24%
Probability in 2010 using 2006 parameters	5.01%
Probability in 2010 using 2010 parameters	7.30%
Total Change in Estimated Probability (2006-10):	2.06%
Δ due to Δ household characteristics:	-0.22%
Δ due to Δ environmental factors:	2.29%

Notes

*Excluding housing equity

(1) 'Probability in *j* using *i* parameters' means that the probability was computed using linear probability model parameters (coefficients) estimated from data in wave *j* and sample covariates (control variables) from wave *i*

(2) We report average sample predicted probabilities

TABLE 8
Household Assets by Age, 2010 HILDA

Asset Type	Age						
	60-64	65-69	70-74	75-79	80-84	85-89	90+
% with positive asset holdings							
Principal Residence	72.9	79.7	80.5	73.9	73.0	70.1	52.5
Vehicle	86.0	89.8	87.8	79.8	76.5	52.8	30.0
Superanuation	46.5	51.7	41.5	30.7	17.8	15.0	2.5
Equity/stocks	32.6	46.6	41.1	37.0	30.4	34.6	25.0
Liquid Assets	98.4	97.5	99.2	99.2	98.3	96.1	97.5
Cash investments	2.3	1.7	2.0	2.9	3.0	8.7	7.5
Business	0.0	0.4	1.2	0.0	0.0	1.6	0.0
Real Estate	17.1	14.0	9.8	6.7	6.1	7.1	2.5
Other Savings	16.3	19.9	17.5	13.9	17.8	13.4	17.5
Median value, conditional on positive asset holding ('000s of $2010)							
Principal Residence	400	450	400	400	395	380	347
Vehicle	17	15	10	9	5	5	4
Superanuation	206	247	170	76	50	70	152
Equity/stocks	37	49	83	74	59	47	24
Liquid Assets	10	12	19	18	22	26	28
Cash investments	30	24	180	100	100	50	40
Business	0	152	149	0	1,000	1,029	0
Real Estate	0	350	320	328	360	385	4,872
Other Savings	15	20	17	8	5	5	1
Total Assets	464	549	456	394	392	365	270
% mean share of total assets							
Principal Residence	47.5	51.3	54.7	53.6	56.5	53.8	41.4
Vehicle	13.3	10.7	6.6	7.7	3.6	2.0	0.4
Superanuation	12.9	14.9	10.4	5.6	4.0	1.8	0.4
Equity/stocks	3.7	6.0	7.2	6.9	5.7	7.0	6.4
Liquid Assets	14.2	11.0	15.4	22.5	25.7	31.2	41.2
Cash investments	0.1	0.4	0.3	0.7	0.4	0.8	2.3
Business	0.0	0.0	0.3	0.0	0.0	0.3	0.0
Real Estate	5.7	3.8	3.5	2.7	2.6	2.6	2.6
Other Savings	2.5	1.9	1.6	0.4	1.5	0.7	5.4
# observations (2010)	129	236	246	238	230	127	40

Notes

(1) We include 1246 retired households who are present for the 2010 HILDA survey

(2) Age for couple households is set equal to the age of the oldest member of the couple

(3) Liquid assets include own or joint bank accounts; cash investments include government bonds, corporate bonds, debentures, certificates of deposit, and mortgage-backed securities; real estate is property owned by the household excluding their own home (principal residence); and other savings includes trust funds, collectables, antiques, works of art, cemetery plots, or other substantial assets

TABLE 9

Effect of Age on Asset Holdings

We regress *asset holdings* (two measures: the number of households with a positive holding in a particular asset class; and the share of total assets in a particular asset type) on *age* (age of oldest household member), control variables X, and wave dummies γ. Our control variables include *couple* (dummy=1 if couple household), *high school* (dummy=1 if household head has education level higher than high school), *major city* (dummy=1 if household lives in Sydney, Melbourne, Brisbane, Adelaide or Perth), *language other than English* (dummy=1 if household speaks a language other than English at home) and *English difficulty* (dummy=1 if household speaks English not well/not at all)

With Wave Dummies: $Assetholdings_{it} = \varphi_0 + \varphi_1 age_{it} + \varphi_2 X_{it} + \gamma_t + \epsilon_{it}$

With Wave and Cohort Dummies: $Assetholdings_{it} = \delta_0 + \delta_1 age_{it} + \delta_2 X_{it} + \gamma_t + C_j + \in_{it}$

With HH Fixed Effects: $Assetholdings_{it} = \beta_0 + \beta_1 age_{it} + \beta_2 X_{it} + \alpha_i + \varepsilon_{it}$

Asset Type	Mean	With Wave Dummies	With Wave and Cohort Dummies	With Household Fixed Effects
Proportion of households with positive asset holdings				
Liquid/Cash Investments	0.9796	***0.0002***	***0.0009***	-0.0008
		(0.0005)	(0.0008)	(0.0008)
Superannation/Equity	0.4951	-0.0067 ***	***-0.0007***	-0.0119 ***
		(0.0016)	(0.0032)	(0.0018)
Business/Real Estate	0.0889	-0.0017 *	0.0004	-0.0039 ***
		(0.0009)	(0.0023)	(0.0012)
Principal Residence	0.7530	***-0.0012***	***0.0034***	-0.0070 ***
		(0.0015)	(0.0030)	(0.0015)
Vehicle	0.7777	-0.0110 ***	***-0.0030***	-0.0101 ***
		(0.0014)	(0.0028)	(0.0015)
Superannuation	0.3014	-0.0149 ***	-0.0115 ***	-0.0056 ***
		(0.0013)	(0.0028)	(0.0017)
Equity	0.3959	-0.0007	0.0089 ***	-0.0107 ***
		(0.0015)	(0.0032)	(0.0020)
Share of holdings in asset type				
Liquid/Cash Investments	0.2036	0.0061 ***	***0.0022***	0.0075 ***
		(0.0008)	(0.0020)	(0.0013)
Superannation/Equity	0.1565	-0.0041 ***	***-0.0006***	-0.0070 ***
		(0.0012)	(0.0016)	(0.0009)
Business/Real Estate	0.0289	-0.0003	***0.0002***	-0.0005
		(0.0004)	(0.0008)	(0.0005)
Principal Residence	0.5230	0.0656 **	0.0035	***0.0027*** *
		(0.0013)	(0.0026)	(0.0014)
Vehicle	0.0714	-0.0039 ***	-0.0042 ***	-0.0027 ***
		(0.0007)	(0.0014)	(0.0007)
Superannuation	0.0786	-0.0054 ***	-0.0047 ***	-0.0029 ***
		(0.0005)	(0.0011)	(0.0007)
Equity	0.0779	0.0012 **	0.0041 ***	-0.0036 ***
		(0.0006)	(0.0010)	(0.0008)

Notes

(1) Our sample includes 1187 households that appear in either waves 2002 and 2006, or in waves 2006 and 2010.

(2) Coefficient reported is for linear age. Those coefficients reported in ***bold italics*** are also for linear age, but indicate those asset types for which the marginal effect on quadratic age was reported to be statistically significant for some ages.

(3) Standard errors appear in parentheses and statistical significance at the 10%, 5% and 1% levels is indicated by one, two, or three asterisks respectively.

TABLE 10

Simple Effects of Health on Asset Holdings

We incorporate three health status dummies into the household fixed effects specification in Table 9, and report coefficients on each (indicating the given health status change was suffered in a previous period), where: *Bad Health* = 1 if household reports having 'poor' health, 0 otherwise; *Expected Bad Health* = 1 if household answers 'definitely true' to question "Do you expect your health to get worse?", 0 otherwise; and *Long-term Health Condition* = 1 if household reports having a long-term health condition, impairment or disability that has lasted or is likely to last for 6 months or more

$$Assetholdings_{it} = \beta_0 + \beta_1 badhealth_{it} + \beta_2 expectedbadhealth_{it} + \beta_3 longtermhealthcondition_{it} + \beta_4 age_{it} + \beta_5 X_{it} + \alpha_i + \varepsilon_{it}$$

Asset Type	Mean	Median	With Household Fixed Effects		
			Bad Health	Expected Bad Health	Long-Term Health Condtion
(N = 630)					
% with positive asset holdings					
Liquid/Time Assets	0.9857	-	-0.0068	-0.0295	-0.0058
			(0.0175)	(0.0179)	(0.0094)
Superannation/Equity	0.4709	-	0.0186	0.0086	-0.0152
			(0.0361)	(0.0314)	(0.0210)
Business/Real Estate	0.0730	-	-0.0056	-0.0013	-0.0016
			(0.0236)	(0.0258)	(0.0149)
Principal Residence	0.7624	-	-0.0236	-0.0197	-0.0187
			(0.0278)	(0.0281)	(0.0142)
Vehicle	0.7767	-	-0.0180	-0.0158	0.0152
			(0.0314)	(0.0293)	(0.0140)
Superannation	0.2704	-	-0.0324	-0.0196	-0.0353
			(0.0323)	(0.0346)	(0.0172)
Equity	0.3852	-	0.0324	0.0007	0.0062
			(0.0348)	(0.0352)	(0.0223)
Share of holdings in asset class					
Liquid/Time Assets	0.2118	0.0632	-0.0464 *	0.0452 *	0.0196
			(0.0266)	(0.0247)	(0.0133)
Superannation/Equity	0.1459	0.0000	0.0084	0.0040	-0.0082
			(0.0123)	(0.0193)	(0.0099)
Business/Real Estate	0.0236	0.0000	0.0098	0.0053	0.0083
			(0.0125)	(0.0132)	(0.0073)
Principal Residence	0.5387	0.6447	0.0198	-0.0385	-0.0221
			(0.0267)	(0.0257)	(0.0151)
Vehicle	0.0620	0.0167	-0.0076	0.0149	-0.0003
			(0.0116)	(0.0129)	(0.0079)
Superannation	0.0679	0.0000	0.0040	0.0013	-0.0110
			(0.0109)	(0.0169)	(0.0072)
Equity	0.0780	0.0000	0.0044	0.0026	0.0028
			(0.0114)	(0.0135)	(0.0077)

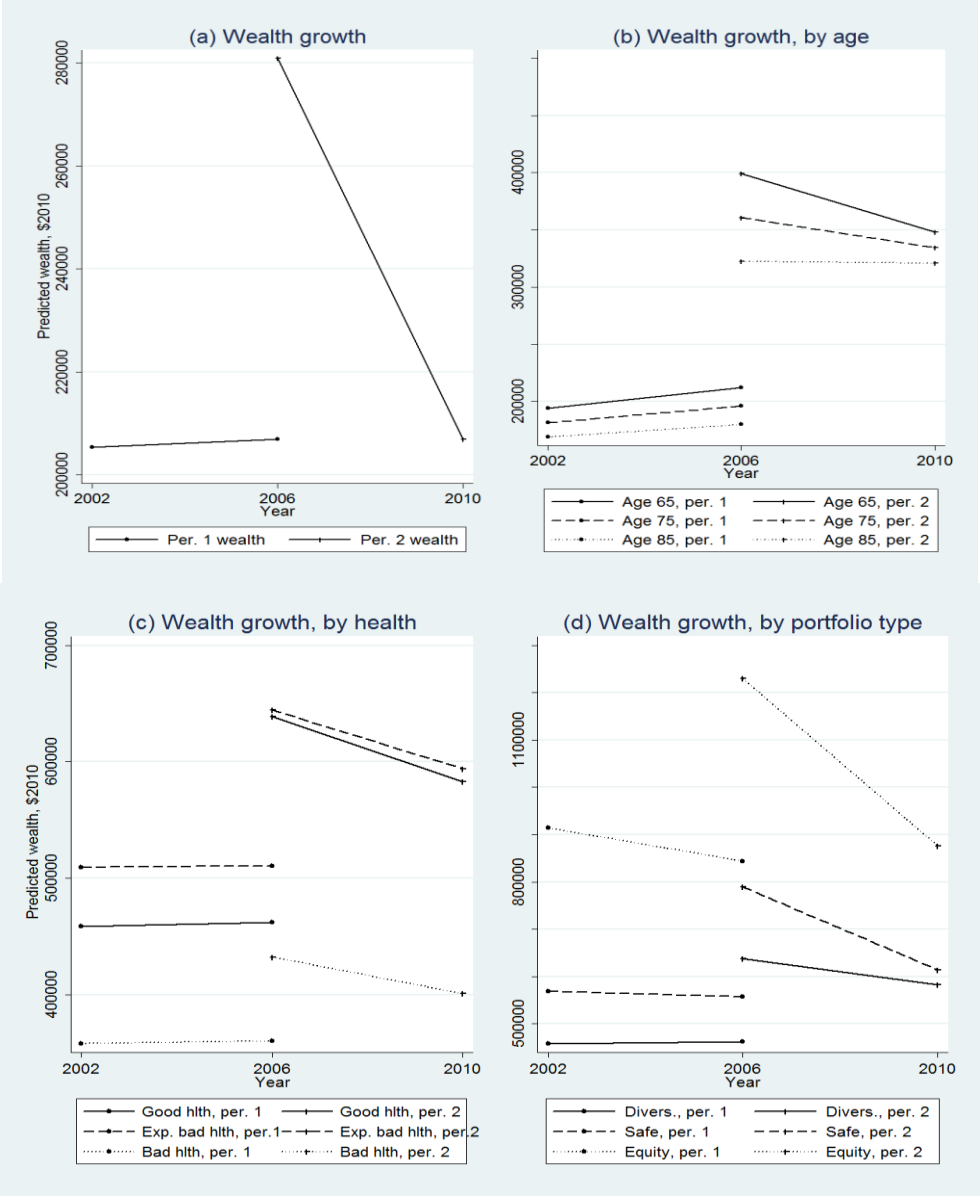
Notes

(1) Our sample includes 1187 households who appear in either waves 2002 and 2006, or in 2006 and 2010.

(2) We report the coefficient on the three health dummy variables which indicate that a particular health condition was reported in a previous period

(3) Standard errors appear in parentheses and statistical significance at the 10%, 5% and 1% level is indicated by one, two, or three asterisks respectively.

FIGURE 1
Wealth Profiles by Age, Health Status and Portfolio Structure, $2010



Notes:

(1) Period 1 profiles are estimated from the sample of households present in waves 2002 and 2006. Period 2 profiles are estimated from the sample of households present in waves 2006 and 2010.
(2) Panel (a) is constructed using sample averages of wealth after removing top and bottom 1% of observations. Panels (b)-(d) are constructed using estimates in Table 2.
(3) The profiles correspond to a median household, i.e. a single, Christian, living in a major city, homeowner with a long-term health condition and a diversified financial portfolio.

FIGURE 2

Predicted Ownership Rates According to Age

We estimate *asset holding* using coefficient output from the household fixed effects specification in Table 9, and take the median value across the sample for control variables, which takes the form:

Linear Age $\widehat{Assetholdings}_{it} = \beta_0 + \beta_1 age_{it} + \beta_2 K_{it} + \alpha_i + \varepsilon_{it}$

Quadratic Age Specification: $\widehat{Assetholdings}_{it} = \beta_0 + \beta_1 age_{it} + \beta_2 age_{it}^2 + \beta_3 K_{it} + \alpha_i + \varepsilon_{it}$

Where K_{it} are median values of sample such that *majorcity* =1, *relig_christ* =1, *badhealth* =1 and *homeown* =1

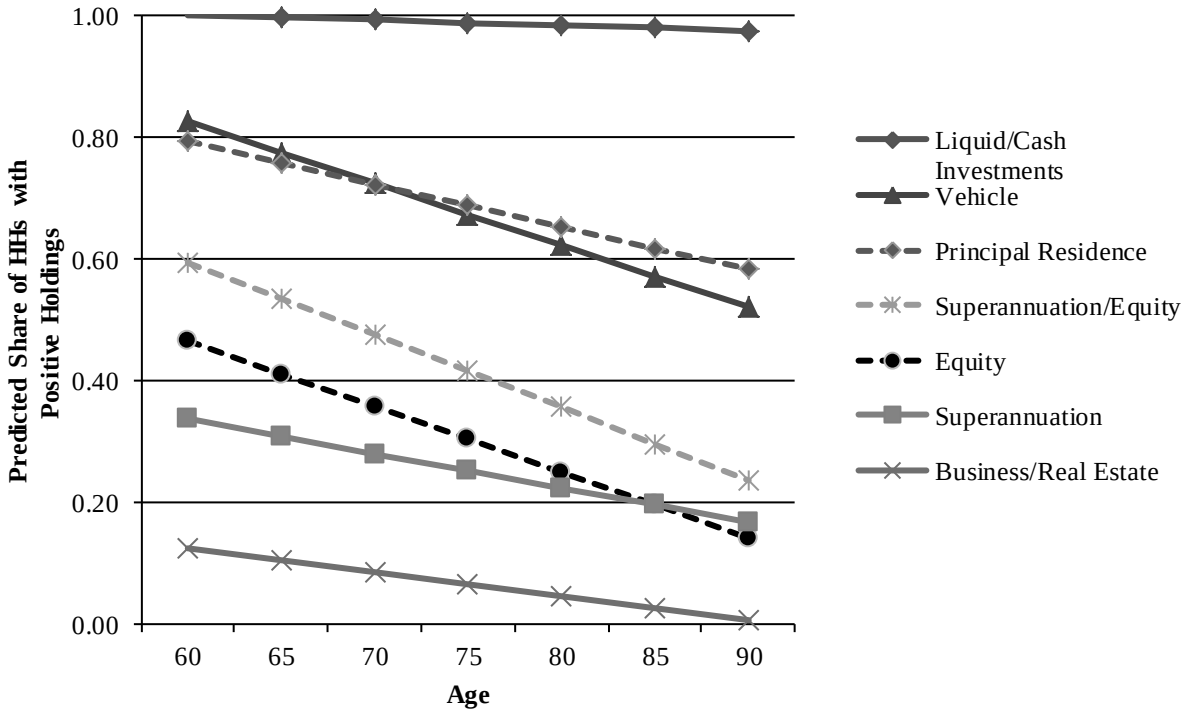


FIGURE 3

Predicted Share of Total Assets According to Age

We estimate *asset holding* using coefficient output from the household fixed effects specification in Table 9, and take the median value across the sample for control variables, which takes the form:

Linear Age $\widehat{Assetholdings}_{it} = \beta_0 + \beta_1 age_{it} + \beta_2 K_{it} + \alpha_i + \varepsilon_{it}$

Quadratic Age Specification: $\widehat{Assetholdings}_{it} = \beta_0 + \beta_1 age_{it} + \beta_2 age_{it}^2 + \beta_3 K_{it} + \alpha_i + \varepsilon_{it}$

Where K_{it} are median values of sample such that *majorcity* =1, *relig_christ* =1, *badhealth* =1 and *homeown* =1