RETIREMENT INCOME REVIEW

The impact of the Age Pension assets test on pre-retirement savings behaviour

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EXECUTIVE SUMMARY

Research Question and Rationale

The purpose of this report is to provide insights into the impact that the Age Pension assets test has on savings behaviour pre-retirement. This responds to one of the key research questions commissioned by Commonwealth Treasury as part of the 2020 Retirement Income Review.

Method

Our approach explores the 2007 and 2017 changes in the Age Pension assets test to examine whether, and to what extent, these changes impacted asset portfolio allocation and labour supply behaviour of households approaching retirement.

Using the Household Income and Labour Dynamics in Australia (HILDA) survey, we compare the savings, asset allocation and labour supply behaviour of households that were directly affected by the reform, compared to similar households that remained unaffected. We apply econometric techniques to control for factors other than the introduction of the Age Pension assets test taper reforms that may coincidentally be driving behavioural changes.

Our primary evaluation approach uses a difference-in-differences (DiD) method to examine the impact of the assets test reforms on behaviour around both the lower assets test threshold (which differentiates full from part-entitlement to Age Pension) and the upper threshold (which separates part-entitlement from zero entitlement). For validation, we apply a second approach using regression discontinuity to examine the degree to which asset accumulation and labour supply behaviours are affected by the lower and upper assets test taper thresholds.

To assess changes in wealth we apply a 'flow' measure of savings, which examines changes in net wealth before and after the reforms. This measure incorporates four separate data points. We also apply a 'stock' measure of changes in the value of assets between two data points.

Key Findings

Overall we find that reforms to the Age Pension assets test was positively correlated with changes in household asset allocation behaviour prior to retirement for households that were very close to the upper threshold of the Age Pension assets test. The upper threshold is the point at which having additional assets in excess of this value would lead to zero entitlement of the Age Pension.

Savings and Wealth Accumulation – 2007 Age Pension Reforms

- In contextualising the impacts of the 2007 reforms it is important to note that the period of assessment coincided with the Global Financial Crisis (GFC). This period saw households accumulate lower net savings (changes in net wealth) in the post-GFC period than pre-GFC.
- There is no statistical difference in the pre-retirement savings of households that were eligible for part-rate Age Pension before the taper rate change as compared to those who were expected to be full rate Age Pensioners.
- Households that became eligible to the Age Pension as a result of the 2007 taper rate reform saw their net savings fall by $219,200 less between 2006 and 2010 compared to those that remained ineligible for Age Pension - equivalent to annual effect of $54,800 over the period.
- Net assessable assets increased by $154,400 more for new part-pension holders between 2006 and 2010, compared to those that remained ineligible for the Age Pension.
- These findings suggest that households who became eligible to receive the Age Pension were more likely to hold higher levels of assessable assets under the Age Pension assets test. Overall, their savings in the form of assessable assets were 4.0 per cent higher per year between 2007 and 2010.
- There is no strong evidence of a change in employment propensities among pre-retirement households who fall within the assets test taper range compared to those who do not.
- Average hours worked among pre-retirement households were also not significantly affected by changes in the assets test taper.

Savings and Wealth Accumulation – 2017 Age Pension Reforms

- **Initial indications are that the 2017 assets test reforms, which scaled back the generosity of the 2007 reforms by tightening the asset test, show a reverse pattern of reduced savings and asset accumulation.** However, these results were not statistically significant.
- This is most likely due to the timing of the 2017 Age Pension assets reform relative to the dates of collection of the HILDA wealth modules providing limited information on post-reform behaviour.

The regression discontinuity estimations provide confirmation of these impacts. Specifically, the reduction in the upper assets test threshold, as a result of the higher assets test taper rate, is associated with an average reduction in household savings over the five waves of savings and wealth data between 2002 and 2018. The regression discontinuity incorporates both the 2007 and 2017 changes to the assets test.

Summary

The separation of two distinct treatment groups is a significant improvement over previous studies. By applying tighter restrictions to the treatment and control groups, the overall treatment effects associated with the Age Pension assets test reform are more precisely defined, and in our study are found to be significantly smaller than other studies. The classifications of treatment and control groups in both the Whelan *et al*. (2018) and Cho and Sane (2014) studies are broader and more heterogeneous, with open-ended classification of the control groups. As a result, these studies are unable to pinpoint the effects of the Age Pension assets test reforms. Instead their models compares the savings and asset accumulation behaviour of households with wealth and savings portfolios that are very different in both size and composition. As such, their empirical findings are likely to overestimate the effects of the Age Pension assets test reforms.

The separation of two distinct treatment groups also allows us to test the empirical outcomes from the difference-in-difference analysis more accurately against the predictions of a simplistic two-period savings model, such as used in Whelan et al (2018). For example, the model would predict savings to be disincentivised among people expected to become eligible for the Age Pension through the taper rate reduction in 2007 as their assets became subject to the taper (substitution effect) and because of increased pension payments (income effect). This report shows that the impact of changes to the Age Pension taper rate on pre-retirement savings behaviour cannot be explained by this model.

To rationalise the empirical findings requires the underlying theoretical framework to be expanded to accommodate other explanations of savings behaviour. This includes the role of compulsory superannuation as opposed to voluntary savings; the degree to which people have uncertainty or misperception regarding their future pension entitlement, and the drivers of asset portfolio allocation between assessable and non-assessable assets. As such, it warrants further investigation to understand how the change in the assets test taper affects pre-retirement savings.

THE THREE PILLARS OF RETIREMENT

The Australian retirement income system is characterised as comprising of 'three pillars'.[1] The first pillar is the means-tested Age Pension, which is publicly funded. The second pillar is the Superannuation Guarantee (SG), which is based on mandated superannuation contributions from employers. The third pillar is non-compulsory savings, such as voluntary superannuation contributions, other private savings, and income generating assets.

These three pillars have largely evolved independently of one another, though various reforms have been introduced to take into account the interaction of superannuation and the Age Pension, as well as to encourage private retirement savings and reduce reliance on the publicly funded Age Pension.

The Age Pension in Australia

The first pillar of the Australian retirement income system, the means-tested Age Pension, was first introduced in NSW in 1900, followed by Victoria later that year, and Queensland in 1908. In January 1901, the Commonwealth of Australia was formed and given authorisation under the written constitution to legislate in respect to Age Pensions (ABS, 1988). The Commonwealth did not exercise this power until 1908 when the Invalid and Old age Pensions Act 1908 (was introduced. The Act commenced on 15 April 1909, with eligible men and women receiving the payment once they reached 65 years of age. The female eligibility age was reduced shortly after, in 1910, to age 60 (Nielson, 2010). Prior to this, there was no social security system in Australia, with relief to those in need being provided by voluntary organisations and occasionally government grants (ABS, 1988). The goal of the Age Pension was poverty alleviation, with proponents arguing that people have a right to live comfortably in old age due to their lifetime contributions to the community (Smith & Hetherington, 2016).

Today, the Age Pension is one of the most relied upon income streams for retirees, with approximately 62.5% of people over the age of 64 receiving either a full or part Age Pension in June 2019.[2] The level of entitlement to the Age Pension is subject to both an income and assets test, with thresholds for full and part pension entitlement. When income or assets exceed the respective part pension thresholds, a nil rate is applied. The maximum Age Pension payment is typically uprated each year to keep pace with standards of living and as at June 2020 stands at $648.70 per fortnight for a member of a couple and $860.60 per fortnight for singles.

The Superannuation Guarantee (SG)

The second pillar of the Australian retirement income system, the Superannuation Guarantee (SG), was announced in 1991 to further prepare people for retirement and to reduce reliance on public pensions. The SG officially commenced on 1 July 1992 and required employers to contribute a minimum of 3 per cent of an employee's earnings to their superannuation fund (Superannuation Guarantee (Administration) Act, Commonwealth, 1992).

Contributions were progressively increased from 3% to 9% between 1992 and 2002 to further improve retirement savings and lessen the fiscal burden of the Age Pension. On 1 July 2014, the SG was increased to its current rate of 9.5%. This is relatively low in comparison to the OECD average of 18.1% in 2018 (OECD, 2019). The SG rate is set to increase further from 30 June 2021, with five annual increases bringing the SG to 12% by July 2025 (ATO, 2020).

Significant Aged Pension and Superannuation Reforms

There have been two significant reforms to the Age Pension assets test over the last two decades which serve to provide us with an identification strategy for the impact of assets tests on the savings and work decisions of Australian households. In the May 2006-07 Federal budget, the plan to

[1] The three pillar typology is based on the World Bank's classification (World Bank, 1994).
[2] Author's calculation based on data from (Department of Social Services ,2019) and (Australian Bureau of Statistics, 2019).

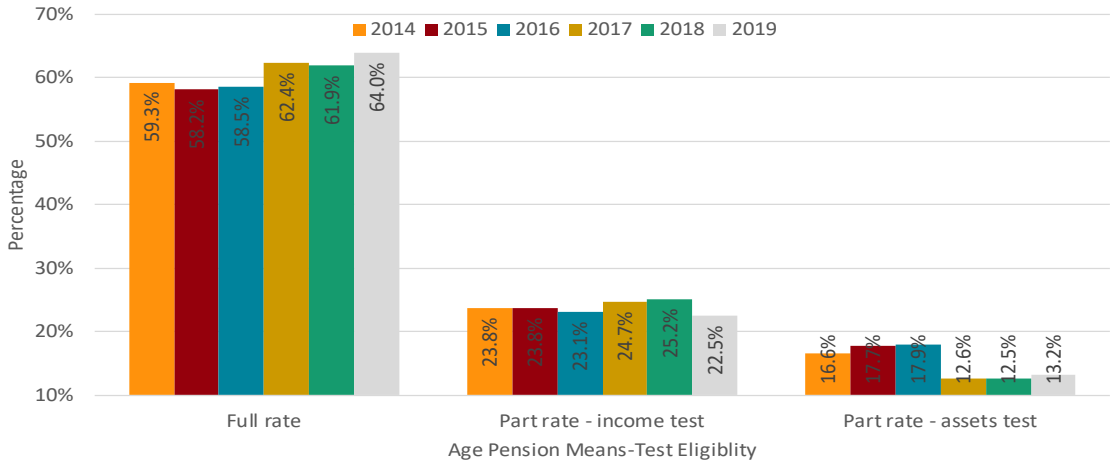
simplify and streamline superannuation was announced, with the goal of improving retirement incomes, work force participation and savings (Commonwealth of Australia, 2006).

In **September 2007** the plan was rolled out with no changes to the original draft. The Age Pension assets taper rate was reduced from $3 to $1.50 per fortnight for each $1,000 in assessable assets. The motivations for the September 2007 reform were to "*increase incentives for saving for retirement and workforce participation*" (Harmer, 2008). This taper reduction meant that age pensioners could accumulate assessable assets to a greater portfolio value and still receive some pension. For example, the September 2007 taper reduction meant that a homeowner couple could hold assets to the value of more than $850,000 and retain entitlement to at least some Age Pension, which was $320,000 more than under the pre-September 2007 system.

In **January 2017**, the Age Pension assets taper rate was doubled again from $1.50 to $3 for each $1,000 in assessable assets, returning to the taper rate that was in place before 2007. This came alongside a number of other reforms to the Age Pension system, including an increase in the free area for assets below which full pension was paid. For homeowner singles, the asset value threshold for eligibility to full pension rose from $209,000 to $250,000 (up 19.6%) while for homeowner couples combined, the threshold rose from $296,500 to $375,000 (up 26.5%).

Figure 1 shows the binding rates for the Age Pension means-test for the period between September 2014 and September 2019. This shows that after the increase in the Age Pension assets test taper rate, in January 2017, there was a 5.3 percentage point drop in the number of individuals who received part-rate Age Pension.

Figure 1 **Age Pension Means-Test Binding Rates, 2014 to 2019 (September)**



Source: Bankwest Curtin Economics Centre | Author's calculations from Payment Demographic Data, 2014 to 2019, Department of Social Service.

There have also been a number of significant reforms in relation to superannuation over the years. In the May 2006-07 Federal budget, plans were announced to simplify and streamline superannuation, with the goal of improving retirement incomes, work force participation and savings. One of the key reforms was that superannuation benefits paid from a taxed superannuation fund were changed to be tax free for people over 60 years of age for both lump sum payments and income streams (See Commonwealth of Australia, 2006 for more information).

Prior to the change, superannuation paid as a lump sum could involve multiple taxation components, leading to many people having to pay for professional advice to decide how to take their benefits. The government estimated that professional advice ranged from $3,000 to $10,000 in 2006, depending on complexity. Furthermore, superannuation from an income stream was taxed at marginal tax rates, with some deductions based on eligibility criteria. The impact of this was a negative effect on work incentives, as once people began to withdraw income from their superannuation, they would pay higher taxes on their work income.

The Incentive Structure of Retirement Income and Taxation Systems

The ultimate goal of a well-designed retirement income system is to incentivise as far as possible self-funded retirement, while providing a safety net for individuals and households. However, the interaction of the three pillars of the Australian retirement income system together with their interaction with the taxation system creates a complex incentive structure for individuals prior to and entering into retirement.

Age Pension Safety Net

The means tested Age Pension in effect provides an income safety net for individuals in their retirement. This safety net will to a degree also incentivise individual and household savings and wealth behaviour prior to retirement. In particular, the presence of public income security partially crowds out private incentives to save for retirement. Furthermore, the means testing of the Age Pension in Australia augments this crowding-out of private retirement savings (Barret and Tseng, 2008). The provision of a retirement income stream safety net through the Age Pension also provides an incentive for individuals to take the superannuation guarantee in the form of a lump sum as opposed to either a fixed-term or lifetime income stream. The fact that many current retirees did not convert superannuation savings into a secure income stream for their retirement can be reconciled as a rational response to this incentive structure (Barret and Tseng, 2008).[3] However, there has been recent evidence to show that this behaviour has started to change as the superannuation guarantee matures and incentives have been put in place. For example, in 2006/2007 only 13.6% of retired individuals had their main source of income sourced from superannuation or annuity (Australian Bureau of Statistics, 2008). By 2016/2017, this had increased to 24.2% (Australian Bureau of Statistics, 2020).

Taxation Treatment of Income Streams

Although the Age Pension can reduce the incentive to take the superannuation guarantee in the form of an annuity for some individuals and households, the different taxation treatments of retirement income streams can provide an incentive to purchase an income stream from a taxed superannuation fund as opposed to purchasing an annuity with money outside of the superannuation system. This is due to the income stream from a taxed superannuation fund being classed as non-taxable income, while the income stream from an annuity purchased with money outside of the superannuation system is classed as taxable income. Hence, gross income annuities of equivalent value purchased directly by superannuation and purchased by savings money do not produce the same net income (Atkinson, Creedy, and Knox, 2001).

Exemption of the principal home from assets test

The exemption of the principal home from the Age Pension assets test combined with the exemption from imputed rent and capital gains tax provides individuals with an incentive to reallocate their assets portfolio when they become eligible for the Age Pension. This combination of tax treatments of housing and retirement savings assets gives a strong incentive for older taxpayers to invest the maximum in their primary residence and defer downsizing for as long as possible (Disney, 2009).[4]

A two-period model of consumption and savings

Economic theory has been used to provide theoretical predictions regarding the impact of age pension reform on voluntary savings using a stylised two-period model of consumption and savings (see Woodland, 2016). Under this two-period representation, consumption and savings choices are governed by preferences over current and future consumption, with one savings instrument that is assumed to be assessable for the purpose of age pension entitlement in period 2.

[3] Barret and Tseng (2008) assertion is based on data on the main source of current income from the ABS's 2006-07 Retirement and Retirement Intentions, Cat No. 6238.00.

[4] Disney (2009) is a theoretical assertion, which is not based on empirical data.

People are assumed to differ according to the income y_1 they are able to allocate between consumption c_1 and savings a_1 in pre-retirement (period 1), and their preferences $U(c_1, c_2)$ over current consumption versus future (period 2) consumption c_2.

Pension entitlement $\mathrm{P}(a_1)$ adds to consumption c_2 in retirement (period 2) along with income y_2 and savings a_1 to give the following outcomes:

$$c_1 = y_1 - a_1; c_2 = y_2 + a_1 + P(a_1)$$
$$U(c_1, c_2) = u(y_1 - a_1) + u(y_2 + a_1 + P(a_1)$$

The maximum pension P_{full} is received in retirement if savings a_1 fall short of a threshold a_{full}, while the value of the age pension $P(a_1)$ reduces at a rate t of assets in excess of the threshold a_{full} until pension eligibility is exhausted[5] at savings a_0:

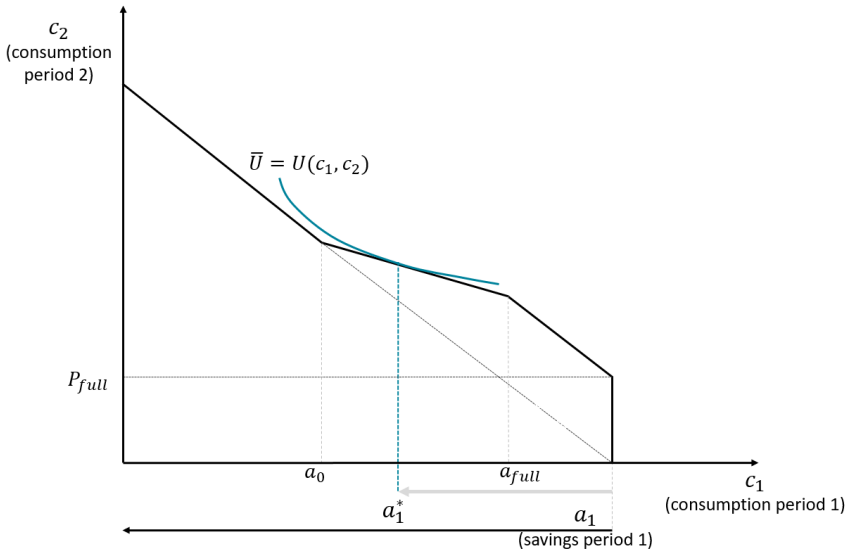
$$P(a_1) = \max\left[0, P_{full} - t.\mathbf{1}(a_1 > a_{full})(a_1 - a_{full})\right]$$

The 'optimal' savings choice a_1^* under this representation is assumed to maximise preferences $U(c_1, c_2)$ subject to an intertemporal budget constraint of the form $c_1 + c_2 = y_1 + y_2 + P(y_1 - c_1)$:

$$\max_{a_1} u(y_1 - a_1) + u(y_2 + a_1 + P(a_1))$$

Figure 2 provides an illustration of one such 'optimal' savings outcome under the two-period representation in which the decision maker chooses a level of savings a_1^* in pre-retirement (period 1) that would result in part-pension eligibility in retirement (period 2).

Figure 2: **A two-period model of consumption and savings**



Predicted responses to Age Pension assets test reforms using a two-period savings model

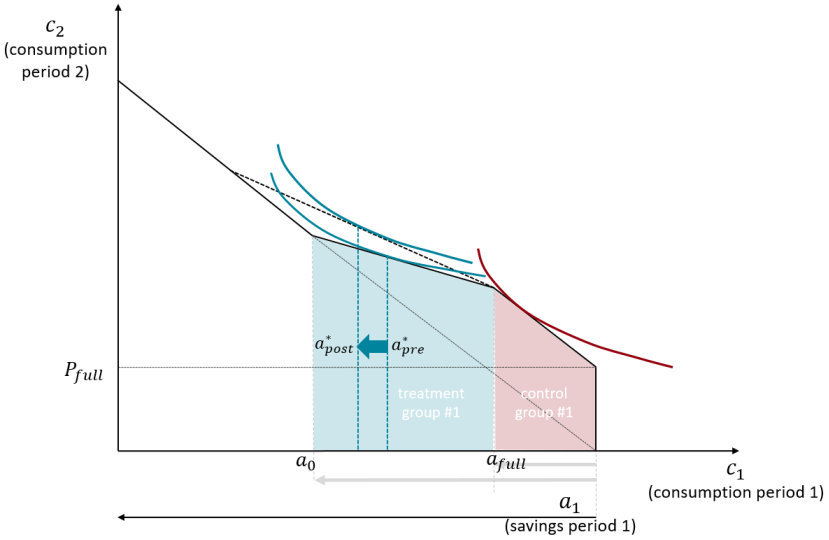
The two-period model of consumption and savings predicts *different* savings responses to a reduction in the age pension assets test taper, depending on a person's pre-reform entitlement.

The first prediction relates to the savings incentives for a person who is entitled to a part pension in retirement under the pre-reform assets test given their choice of savings a_{pre}^* (treatment group #1 in **Figure 3**) compared to someone who is entitled to a full pension (control group #1). A lower assets

[5] The savings threshold $a_0 = a_{full} + \frac{1}{t}P_{full}$ for receipt of any age pension is determined by the maximum pension entitlement, the asset threshold a_{full} for receipt of the maximum pension, and the asset test taper rate t.

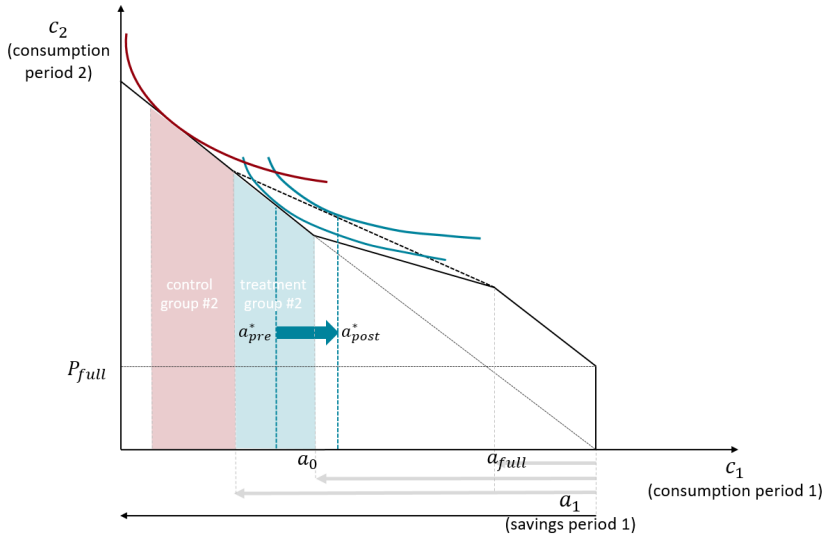
test taper (the hashed budget line) will increase the level of savings that a person can accrue and still remain eligible for a part-pension during retirement. This may drive *either* an increase *or* a decrease in post-reform savings, depending on the relative size of the substitution effect of a lower assets test taper, and the income effect from increased pension entitlement. For illustration, **Figure 3** shows an increase in savings from a^*_{pre} to a^*_{post} following the reduction in the assets test taper.

Figure 3: **Increased savings incentives for existing part-pensioners**



A second prediction relates to the savings incentives for a person who *becomes* entitled to a part pension under the post-reform assets test (treatment group #2 in **Figure 4**) in comparison to someone who remains ineligible to any pension (control group #2). The lower assets test taper would unambiguously drive a *decrease* in post-reform savings (from a^*_{pre} to a^*_{post} in **Figure 4**). This is because the substitution effect created by bringing someone into the age pension assets test acts in the same direction as the income effect from increased pension entitlement.

Figure 4: **Reduced savings incentives for newly eligible part-pensioners**



In this report, we undertake an econometric analysis of retirement savings patterns over the course of the 2007 and 2017 reforms to the Age Pension assets test taper. This allows us to test whether the theoretical predictions under the two-period framework match the empirical evidence, and if not, what enhancements to the theory provide a better understanding of how retirement savings decisions are made.

EXISTING LITERATURE

There is a small body of Australian research that has investigated the relationship between the incentive structures of the retirement income system and how this structure impacts on savings behaviour of individuals prior to retirement.

Key studies include Cho and Sane (2013); Whelan *et al*. (2018) and Cobb-Clark and Hildebrand (2011). All three studies seek to assess the impact of changes to the age pension test on savings in the form of assets and make use of the HILDA survey to test household behavioural changes prior to reaching Age Pension eligibility.

Cho and Sane (2013) use a difference-in-difference methodology to assess the impact of the 2007 Age Pension asset test changes on pre-retirement savings behaviour of households. They find that changes to the Age Pension assets taper rate led to households deemed to be directly impacted by the change having 1.8 per cent more financial savings than those household that were considered to be unconstrained by the assets test.[6] The authors attest that the more generous asset test introduced in 2007 allowed households to accumulate more non-housing wealth prior to reaching the pension eligibility age.

In their 2018 study, Whelan *et al.* also apply a difference-in-difference approach to assess the 2007 changes. Their findings suggest that savings prior to the change to the assets test were up to $100,000 lower among those affected by the assets test reform compared to those that remained unaffected, but $300,000 more post reform. However, the study shows that the post reform results appear to be driven far more by a large fall in savings of those unaffected by the taper reduction, rather than by an increase in the savings among those affected by the change in the taper rate.

Whelan *et al*. (2018) point to a number of limitations associated with their findings, noting that savings behaviour is defined as a change in net wealth of household, and thus may include valuation effects. The inclusion of valuation effects will, in turn, influence the estimated impact of the reduction in the assets taper rate. This is particularly relevant to the 2006 to 2010 period in which there was a downturn in the macroeconomic environment associated with the global financial crisis.

Cobb-Clark and Hildebrand (2011) found that there was little evidence to suggest that healthy couple households respond to incentives embedded in the means tests determining pension eligibility by reallocating assets. However, they did find evidence to suggest that healthy couples hold less pension and more financial wealth once the spouse has also reached pension age in comparison to healthy couples in which only the head is of pension age. They also found evidence of a relationship between poor health and asset allocation. Specifically, single individuals in poor health who were above pension age held significantly less financial wealth and significantly more housing wealth than younger singles who were also in poor health.

A fourth study by Hulley *et al.* (2013) examined the decumulation pattern of Australian Age Pensioners over the period 2002 to 2006. Their empirical analysis used data from the 2002 and 2006 waves of the HILDA survey, with the sample used in the model restricted to homeowners who received the Age Pension for a full year, and whose incomes came largely from asset returns. The econometric modelling was conducted using a pooled ordinary least squares (OLS) model. Interestingly, their findings suggest that wealthier households do not decumulate rapidly in retirement, with those on the steeper assets taper continuing to add to their wealth over the sample period. Conversely, their findings also suggest that less wealthy pensioners reduce their wealth on average from year to year, particularly those in poor health.

[6] Cho and Sane's control group were pre-retirement households either below or above the pension asset test thresholds. This selection captures *both* those in receipt of the full pension, *and* those with no pension at all. The treatment group consists of households with non-housing wealth between the full and part pension threshold prior to the reform. Households were considered to be pre-retirement if they were aged between 50-64 years in 2006.

Table 1**: Summary of key Australian studies**

Study	*Key Findings*
Cho and Sane (2013) ***Means-tested Aged-Pension and Savings, Working Paper, Australian School of Business, University of New South Wales.***	***Data*** *HILDA Waves 2, 6 and 10 (2002, 2006 and 2010)* ***Method*** *Propensity score matching and a difference-in-difference approach are used to assess changes in the 2007 Age Pension asset test.* ***Findings*** *Changes to the 2007 Age Pension asset taper rate are found to result in the treatment group having 1.8% more in financial savings ($110,926K) compared to those that were unconstrained by the assets test.*
Whelan, S., Dynan, L. and Atalay, K.(2018) ***Asset portfolio retirement decision: the role of the tax and transfer system, for the Australian Housing and Urban Research Institute.***	***Data*** *HILDA Waves 2, 6, 10 and 14 (2002, 2006, 2010 and 2014)* ***Method*** *Difference-in-difference approach to assess changes to the 2007 Age Pension asset test.* ***Findings*** *The authors found that changes to the 2007 asset taper rate led to those household affected by the reform having approx. $300,000 more in savings than households that were unaffected. These results were driven by a large significant fall in savings of the control group rather than an increase in savings by the treatment group.*
Cobb-Clark, D.A. and Hildebrand, V.A. (2011) ***Portfolio allocation in the face of a means-tested public pension. Review of Income and Wealth, Vol 57 No 3.***	***Data*** *HILDA Waves 2 and 6 (2002 and 2006)* ***Method*** *Systems regression and difference-in-difference methods are used to examine the drivers of savings and asset portfolio allocation, including Age Pension eligibility.* ***Findings*** *The study finds no statistically significant evidence of differences in savings and asset portfolio allocation between households that have become eligible for the Age Pension and those which have not.*
Hulley, McKibbin, Pedersen and Thorp (2013) ***Means-Tested Public Pensions, Portfolio Choice and Decumulation in Retirement. Economic Record, Vol. 89, No.284.***	***Data*** *HILDA Waves 2 and 6 (2002 and 2006)* ***Method*** *Pooled ordinary least squares to examine the decumulation patterns of pensioner households.* ***Findings*** *Poorer households decumulate wealth at around 5% on average compared to better-off households who decumulation at around 3% on average, despite a steeper wealth tax rate.*

In summary, key studies that specifically examine the impact of the 2007 Age Pension assets test taper rate reduction (Cho and Sane, 2013; Whelan et al., 2018) conclude that this led to an increase in savings among households that were affected by the reduced taper. Cobb-Clark and Hildebrand (2011) find little evidence that households respond to incentives embedded in the Age Pension means tests by reallocating assets. One exception to this result related to single pensioners in poor health, who were found to reallocate their assets in order to maximize eligibility for the Age Pension.

Hulley *et al.* also find little evidence that households intentionally reallocate their asset portfolios in such a way as to maximise their eligibility for the Age Pension. Notably, they also found single pensioners in poor health to be an exception. They conjecture that this may be due to the supplementary benefits individuals receive on the Age Pension, such as those associated with pharmaceutical and medical expenses.

Labour Supply Decisions

The decision to retire or remain in the labour force is often a complex one for mature age workers, with a number of factors influencing the decision to retire or remain in the labour force. Individual financial, health and households factors, as well as individual preferences and labour market demand for mature age workers all play a role (Productivity Commission, 2015). And retirement itself is not necessarily a permanent state.

There is a small body of research which has investigated the factors that may affect the decision to retire or remain in the labour force of mature aged individuals in Australia. Factors in the research included policy changes to the retirement income system, macroeconomic indicators, and the preferences and circumstances of individuals. Importantly, it should be noted that the body of research does not include an analysis of the impact of changes in the Age Pension assets test taper rate. However, the existing literature does provide evidence on a range of factors that may affect the retirement decision of mature aged individuals in Australia.

In respect of the effects of policy changes to the retirement income system, Headey, Freebairn and Warren (2010) investigated the effects of policy changes implemented between 2005 and 2007 on mature age labour force participation between 2005 and 2007. One of the policy changes, which came into effect in July 2005, made it possible for individuals aged 55 and over to collect their superannuation as an income stream and continue in paid work with reduced hours. Another policy change, which came into effect on 1 July 2007, allowed individuals aged 60 and over to collect all of their superannuation lump sum, tax-free. In addition, the taxation of superannuation accounts in the pension phase was also abolished.

The authors modelled the effects of these policy changes on the labour force participation of individuals aged 55 to 69 years using a longitudinal random effects probit model and HILDA data from waves 1 to 8. They found that people in ill health were more likely to retire, while those with a longer prior work experience or with an employed partner both reduced the likelihood of retirement. These findings are similar for both men and women. Outright home ownership increased the propensity to retire, whereas those with outstanding mortgages remained in work for longer. In addition, having a relatively high paid partner also increased the likelihood of retirement.

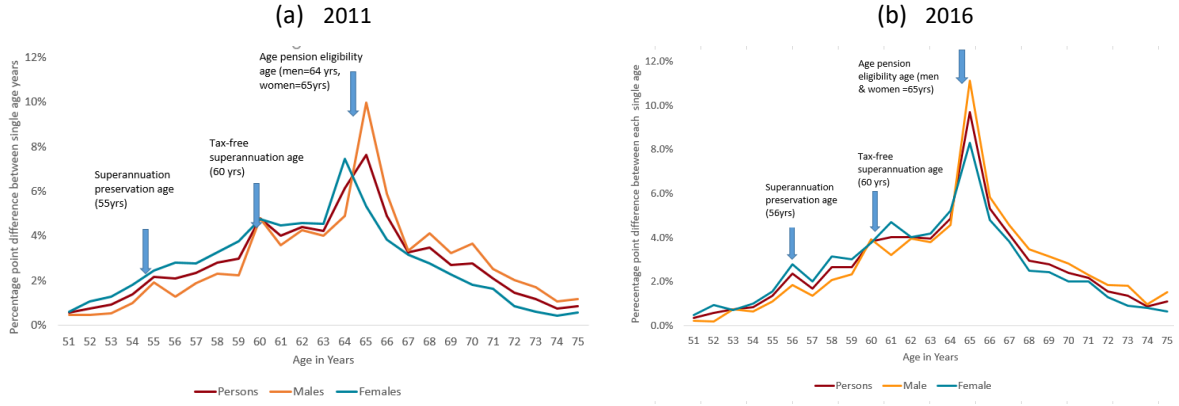
Ryan and Whelan (2013) analysed the impact of changes to the female retirement age on female labour force participation using a difference-in-difference approach. The authors found that lifting the Age Pension eligibility age increased the likelihood of women retiring at around 62 years of age. They note that the result is consistent with a pattern whereby those most directly impacted by the increase in the Age Pension eligibility age between 2001 and 2008 did in fact delay retirement.

Atalay and Barrett (2015) also examined to what extent the change in age eligibility for the Age Pension contributed to an increase in the labour force participation of women. Similar to Ryan and Whelan (2013), they find a significant response to the increases in the eligibility age for the Age Pension, with an increase in the Age Pension age by a year inducing a decline in the probability of retirement by 12 percentage points.

The relationship between retirement choices and eligibility ages for different pillars of the retirement income system is evident from an examination of retirement rates by age for men and women in Australia. **Figure 5** (a) shows a series of spikes in retirement rates for 2011 at the superannuation preservation age (55), the tax-free superannuation age (60), and most notably the Age Pension eligibility age (64 for women and 65 for men) in that year. **Figure 5** (b) looks at the equivalent age-related retirement rates for 2016 when the superannuation preservation age was 56, the tax free superannuation age was 60, and the pension age was 65 for both women and men.

Comparing the two figures shows that spikes in retirement ages generally follow at the superannuation preservation age, the tax-free superannuation age, and most notably at the Age Pension eligibility age. The one exception was the spike in the retirement rate for women at 61, which is one year after the tax-free superannuation age. These changes highlight the importance of the retirement income system's key policy 'ages' in explaining retirement behaviour.

Figure 5: **Change in annual retirement rates at each year of age in 2011 and 2016**



Note: Change in annual retirement rates is calculated as the percentage point difference in persons classified as 'not in the labour force' between two age groups. **Source:** Bankwest Curtin Economics Centre | Author's calculations from the ABS Census of Population and Housing, 2011 & 2016.

There is also strong evidence in the literature that mature age couples in Australia coordinate their retirement decisions. For example, Warren (2015) investigated the impact of spousal characteristics and preferences on the retirement decision of couples using a competing-risk framework. She found that for partnered men, their own health is the most important determinant of their retirement decision, while for partnered women, the decision to retire early is more likely to occur if their partner has poor health. Home ownership, education level and relationship satisfaction also played an important role in the retirement decisions of couples.

Blau and Riphahn (1999) investigated the labour supply behaviour of older married couples in Germany and found similar results, with a greater probability of one spouse retiring if the other spouse is not employed. In addition, women were more likely to exit the labour force if their partners earn a relatively high wage or retired early due to a chronic health condition. However, men were less likely to exit the labour force if their female partner had a chronic health condition. They show that higher wages are associated with a stronger attachment to the workforce.

Notably, they also suggest that the complementarity in leisure is an important determinant of the labour force choices of older couples in Germany, with couples having a strong desire to spend leisure time together.

In summary, the findings from studies into factors that affect the retirement decision show that ill health is a key determinant among men. For women, having to care for others - particularly a partner with poor health - is a key determinant in retirement decisions. A number of other factors will also drive retirement choice including work and relationship satisfaction, educational attainment and wages, wealth and home ownership status. Finally, there is evidence that various policy settings including eligibility age to access various retirement income streams has a noticeable impact on the age at which individuals retire.

METHODOLOGICAL APPROACH

THE HILDA SURVEY

The data source that we use in this study is The Household, Income and Labour Dynamics in Australia (HILDA) survey. HILDA is a longitudinal dataset that collects detailed information each year on household income, economic wellbeing, measures of labour market activity, and socio-demographic characteristics. The panel originally consisted of around 13,000 responding persons living in more than 7,000 households. In 2011 a top-up sample was recruited, which saw the sample increase to more than 17,000 responding persons across 9,500 households. Every four years the HILDA survey includes a wealth module, which collects detailed information on the holdings of financial and non-financial assets and liabilities. Wealth modules are included in the 2002, 2006, 2010, 2014 and 2018 HILDA surveys.

EMPIRICAL SPECIFICATION

In order to measure how the Age Pension asset test impacts savings and labour supply behaviour pre-retirement, we exploit the 2007 and 2017 changes in the Age Pension asset test (AT) thresholds. These reforms are likely to have induced a modification in household behaviour in terms of asset allocation and consumption (savings) patterns and can therefore be used to identify a causal effect between AT thresholds and household savings and labour supply behaviour.

The main empirical challenge is to clearly identify if the asset test of the Age Pension has an impact on a households financial decision-making. In other words, we need to test if it is the asset test thresholds that are causing a change in household behaviour, not something else. This is also referred as the identification or causality problem.

The 2007 and 2017 Age Pension reforms provide a “natural experiment” that we use to identify the impact of the assets test on household savings behaviour. We employ two complementary empirical approaches that takes advantage of these changes: a difference-in-difference approach and a regression discontinuity approach. These econometric methods have been widely used in economics to analyse the consequences of changes in public policy and the repercussions on household’s well-being and wealth allocation.

OUTCOME VARIABLES

As our primary objective is to examine the asset portfolio behaviour of individuals and households as they approach retirement and there are different incentive structures associated with each of these, we assess both changes in the net wealth of households as well as individual asset classes. This approach follows Cobb-Clark and Hildebrand (2011), Cho and Sane (2013) and Whelan et al.(2018). The assets that we examine and their definitions are outlined in Table 2.

SAMPLE SELECTION

We have made a number of refinements to our sample in order to capture households that are approaching retirement and remain as stable as possible in their composition. This includes keeping households that have remained in a stable relationship across the policy intervention periods, households that have consistently remained as a single income unit and households that are able to be observed in the wealth modules of interest. For example for the 2017 policy changes, households need to be surveyed in both the 2010, 2014 and 2018 HILDA.

We have also restricted our sample to households where the household reference person was aged between 50-64 years in the period immediately prior to the policy change. For couples, the household reference person is defined as the oldest person in the relationship.

Table 2**: Outcome Variables**

Savings	**Definition**
Savings Net Wealth (includes both assessable and non-assessable assets)	Total value of assets held ***minus*** outstanding debt (including mortgages, personal loans and credit cards).
Asset Class	**Definition**
Net Assessable Assets (assessable assets only)	Total value of assets held ***minus*** outstanding debt (including personal loans and credit cards). Excluding net home equity.
Net Financial Assets (assessable assets)	Total value of household equity investments, cash investments, trusts, bank accounts, insurance policies and superannuation ***minus*** credit card debt, vehicle debt and other debt.
Net Home Equity (non-assessable asset)	Current value of main home if owned by the households ***minus*** current mortgages/debts owed by household on main home.
Net Other Property Equity (assessable assets)	Current value of other housing property (including holiday and other houses), if owned by the household ***minus*** current debt from other housing property (including holiday and other houses), if owned by the household.
Superannuation (assessable assets)	The sum of retiree and non-retiree superannuation.

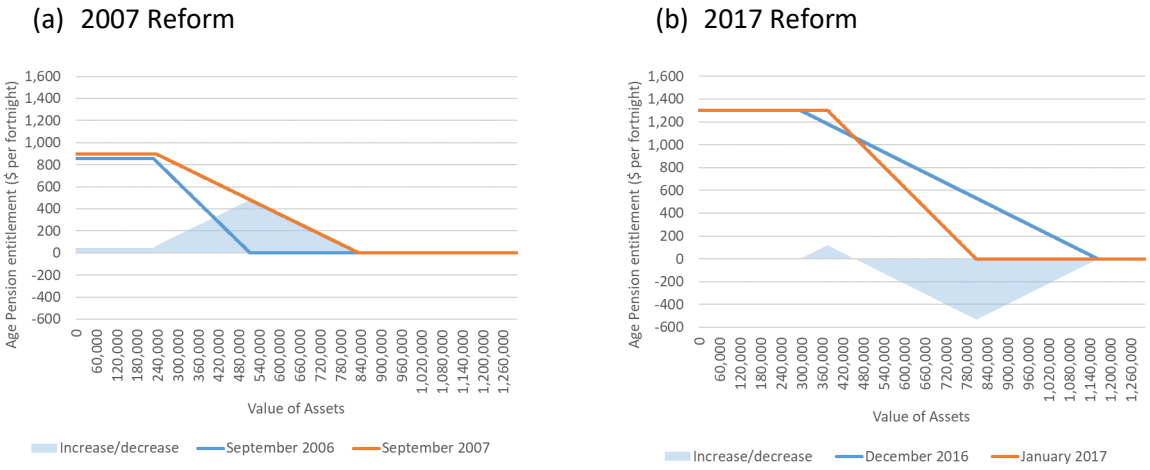
Changes in the Age Pension asset test

In September 2007, the Age Pension assets taper rate was reduced from $3 to $1.50 per fortnight for each $1,000 in assessable assets. The motivation for the September 2007 reform were to "increase incentives for saving for retirement and workforce participation" (Harmer, 2008).

This taper reduction meant that Age Pensioners could accumulate assessable assets to a greater portfolio value and still receive some pension, as shown in Panel (a) of Figure 6. For example, the September 2007 taper reduction meant that a homeowner couple could hold assets outside the family home to the value of more than $850,000 and retain entitlement to at least some Age Pension – $320,000 more than under the pre-September 2007 system.

In January 2017 this policy was effectively reversed and the Age Pension assets taper rate increased from $1.50 to $3 for each $1,000 in assessable assets (Figure 6, panel b). This change also included increasing the free area for assets below which full pension was paid. For single homeowners, the asset value threshold for eligibility to full pension rose from $209,000 to $250,000 (+19.6%) while for homeowner couples, the threshold rose from $296,500 to $375,000 (+26.5%).

Figure 6: **Effects of 2007 and 2017 Age Pension asset test taper rate reforms on pension entitlements among couple households**



Source: Calculations from EVITA, Centrelink and the Commonwealth Government Social Security guide.

Difference-in-differences approach

Our desire in the empirical evaluation section of this report is to evaluate the impact of the Age Pension assets test reform on the savings or asset accumulation behaviour *Y* for a section of the Australian population that we regard to be an 'in-scope' for the reform.

We annotate groups according to treatment status *T*, where *T*= 0 for individuals who do not receive treatment (the "control" group) and *T*=1 for those who do receive treatment (the "treatment group"). Individuals in the control and treatment groups are observed over two time periods *t*, where *t*=0 indicates the pre-reform period *before* the treatment group receives treatment, and *t*=1 indicates the post-reform period *after* the treatment group receives treatment.

Each savings or wealth outcome Y_i for person *i* over time is modelled by a relationship of the form:

$$Y_i = X_i\beta + \alpha T_i + \gamma t + \delta\,(T_i \times t) + \varepsilon_i$$

where X_i represents a series of explanatory variables thought to influence the outcome Y_i and ε_i is a random disturbance term. The coefficient α on treatment variable T_i captures any systematic differences in outcome Y_i between the treatment and control groups, while γ represents a common time trend.

The coefficient δ on the interaction between treatment and time captures the differential effect of the reform on the outcome of interest for the treatment group relative to the control group – the so-called "treatment effect".

A simple estimate of the treatment effect can be captured by constructing the difference in the average difference in outcomes between the control and treatment groups over the period of the reform, while a more nuanced measure additionally takes account of other factors X_i that may also influence the outcome over time and across individuals through the use of linear regression. We employ both approaches in our empirical evaluation of the Age Pension assets test reform.

Selection of control and treatment groups

Appropriately defining control and treatment groups is one of the most challenging aspects of the difference-in-difference modelling approach. To ensure the validity of the experiment, the control and treatment groups need to be otherwise broadly similar with the exception being one group is affected by the reform and the other is not. In order to achieve this comparability, we have selected two control and treatment groups for each policy reform (Table 3).

Table 3**: Control and treatment groups for 2007 and 2017 Age Pension asset test changes**

<table>
<tr><th>2007 reform</th><th colspan="2">Control and Treatment Groups</th></tr>
<tr><td rowspan="5">Before September 2007

The Age Pension assets taper rate was $3 for each $1,000 in assessable assets (including superannuation assets but excluding the family home).

After September 2007

The Age Pension assets taper rate was reduced from $3 to $1.50 for each $1,000 in assessable assets in Sept 2007.

Age Pension maximum rates were increased by $59.95 more than regular indexing for singles than couples in Sept 2009.

Income test tapers increased from 40% to 50% (for singles), 20% to 25% (for couples).</td><td colspan="2">Comparison group 1</td></tr>
<tr><td>Control group 1

Households where the reference person is aged 50-64 years in 2006 with assessable assets below the post-2007 threshold for full entitlement to Age Pension ($236,000 for homeowner couples)</td><td>Treatment group 1

Households where the reference person is aged 50-64 years in 2006 with assessable assets between the pre-2007 threshold for full and part entitlement to Age Pension ($415,000+ for homeowner couples)</td></tr>
<tr><td colspan="2">Comparison group 2</td></tr>
<tr><td>Control group 2

Households where the reference person is aged 50-64 years in 2006 with assessable assets within $500K above the post-2007 threshold for part-entitlement to Age Pension ($856,000 for homeowner couples)</td><td>Treatment group 2

Households where the reference person is aged 50-64 years in 2006 with assessable assets between the pre and post 2007 thresholds for part-entitlement to Age Pension ($530,000 for homeowner couples)</td></tr>
<tr><th>2017 reform</th><th colspan="2">Control and Treatment Groups</th></tr>
<tr><td rowspan="5">Before 1 January 2017

The Age Pension assets taper rate was $1.50 for each $1,000 in assessable assets (including superannuation assets but excluding the family home).

After 1 January 2017

The Age Pension assets taper rate was increased from $1.50 to $3 for each $1,000 in assessable assets.

The Age Pension asset test free area was increased from $209,000 to $250,000 for singles (up 19.6%) and from $593,000 to $750,000 for couples (up 26.5%).</td><td colspan="2">Comparison group 1</td></tr>
<tr><td>Control group 1

Households where the reference person is aged 50-64 years in 2014 with assessable assets below the pre-2017 threshold for part-entitlement to Age Pension ($296,500 for homeowner couples).</td><td>Treatment group 1

Households where the reference person is aged 50-64 years in 2014 with assessable assets between the pre-2017 thresholds for full and part-entitlement to Age Pension ($810,000 for homeowner couples)</td></tr>
<tr><td colspan="2">Comparison group 2</td></tr>
<tr><td>Control group 2

Households where the reference person is aged 50-64 years in 2014 with assessable assets up to $500K above the pre-2017 free area for part-entitlement to Age Pension ($375,000 for homeowner couples)</td><td>Treatment group 2

Households where the reference person is aged 50-64 years in 2014 with assessable assets between the pre and the post-threshold for part-entitlement to Age Pension ($816,000 for homeowner couples)</td></tr>
</table>

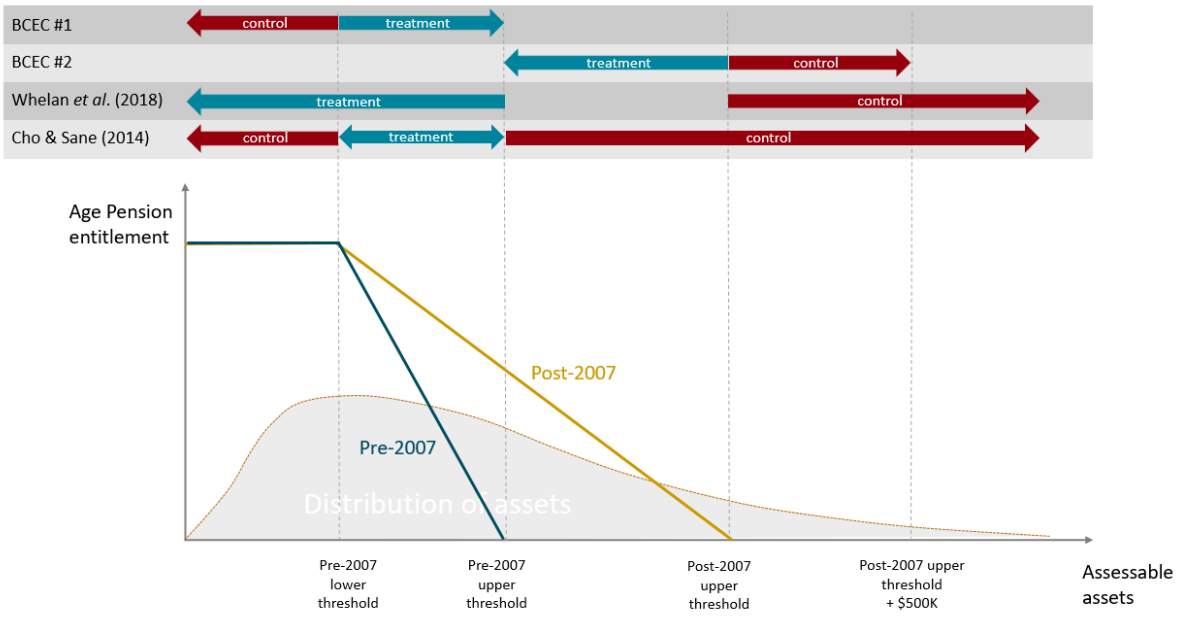
RESULTS

DIFFERENCE-IN-DIFFERENCES: SAMPLE SELECTION CRITERIA

Relatively few Australian studies have sought to examine the impacts of the Age Pension assets test on savings behaviour. The main comparators are a 2014 report by Cho and Sane, and a 2018 study for AHURI (Whelan et al. 2018). Their approach differs from our study in a number of respects, principally in relation to the inclusion within the estimating sample of a wide range of household types (and potentially transitions in family status), as well as the breadth of the control and treatment groupings selected. This has led to significant heterogeneity in the household characteristics among those collected into each group, with the result that the treatment effects are more reflective of savings patterns of very wealthy ("control") households versus those that have more modest wealth portfolios ("treatment").

These considerations, together with our earlier exposition of savings incentives under a two-period representation of savings choices, informed our selection of *two* control and treatment groups for the 2007 and 2017 Age Pension asset test changes, as laid out Table 3 and compared in Figure 7.

Figure 7: **A comparison of control and treatment group ranges**

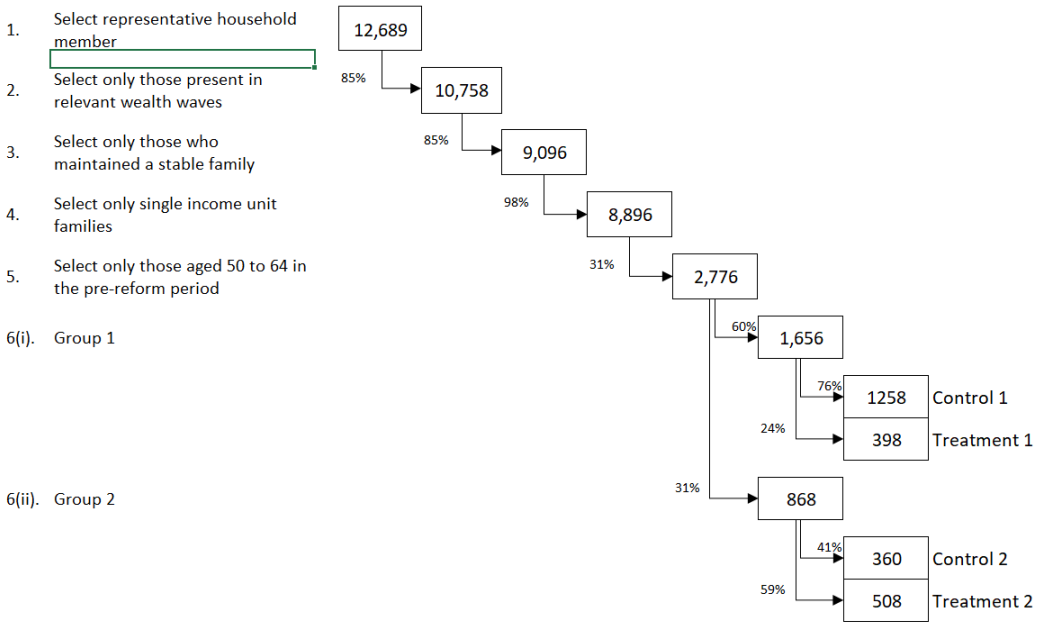


In a similar vein to Cobb-Clark and Hildebrand (2011), we apply a number of selections to generate household groups that are as similar as possible, given the characteristics of the evaluation design. We do so by progressively selecting data according to the following conditions:

1. Select the reference person in each HILDA household;
2. Select only those households that are present in each of the relevant HILDA wealth waves (covering the prior to pre-treatment, the pre-treatment and post-treatment periods);
3. Select households that maintain stable family relationships across relevant wealth waves;
4. Select households comprising a single income unit across relevant wealth waves;
5. Select only household reference persons aged 50 to 65 in the pre-treatment period.

The sequential application of these selections leads to the following estimating sample for the 2007 Age Pension assets test reform, with counts aggregated over the 2006 and 2010 HILDA surveys.

Figure 8: **Sample selections for 2007 Age Pension asset test reform: aggregate sample counts**



Source: Authors' calculations based on HILDA waves 6 and 10. Counts represent the aggregate number of observations over the HILDA waves 6 and 10.

Tighter (closed) bounds are imposed on the control and treatment groups in all evaluations, using the design laid out in Table 3. This ensures that control and treatment groups are more similar to each other, save for the fact that one group is affected by the reform and the other is not.[7] The relative proximity between the control and treatment groups, and the relatively narrow asset range in comparison to earlier studies, makes it more reasonable to invoke the **'parallel trends'** assumption in the difference-in-differences method, which requires that in the absence of a treatment, the gap between the control and treatment group remains constant over time.

Table 4 compares the estimated treatment effects that derive from imposing progressively tighter bounds on the evaluation sample. The treatment effects presented show the difference in a measure of 'savings' (defined as the difference in net wealth between successive HILDA wealth waves) from the 2007 Age Pension assets test taper reform. Given that HILDA wealth waves occur every fourth year (2002, 2006, 2010, 2014 and 2018), we present treatment effects as *annual* real differences in savings between the treatment and control groups.

A range of observable factors may drive the savings and wealth behaviours of households, and it is important to test whether such observed heterogeneity needs to be controlled for when evaluating the impact of Age Pension reforms on savings and asset accumulation behaviour. For this reason, we present treatment effects both in the form of raw average differences between the control and treatment groups, and through full difference-in-differences regressions including extra controls for household type (single and couple), housing status, the number of children and total household disposable income.

[7] Control and treatment groups are defined according to family type, homeowner status and the value of assets that are assessable for the purpose of Age Pension eligibility, relative to the Age Pension assets test thresholds. This places limits on the similarity between the two groups.

Because savings and wealth outcomes in this evaluation design may differ on average between the control and treatment groups, what appears as a treatment effect when expressed in absolute dollar values may actually represent a smaller effect when expressed as a percentage change.[8]

For this reason, we validate the strength of estimated treatment effects by adding a third series that shows the annualised *percentage* difference between the control and treatment groups based on a logarithmic specification for each wealth measure.

Table 4**: Estimated impacts of 2007 Age Pension reform: sensitivity of selection criteria**

			Upper Threshold	
	AHURI specification, no selection	AHURI specification, trimmed	BCEC 2007 - bounds on control and treatment	BCEC 2007 - bounds on control and treatment, trimmed
	(1)	(2)	(3)	(4)
Before:				
Control	1070.0	317.6	488.6	443.0
Treatment	87.8	96.9	237.7	254.7
Difference (T vs C)	-982.2 ***	-220.7 ***	-250.9 ***	-188.3 ***
s.e	68.3	23.4	64.8	46.9
After:				
Control	-87.7	-75.4	96.6	96.1
Treatment	106.7	83.8	174.5	133.2
Difference (T vs C)	+194.4 ***	+159.2 ***	+77.9	+37.2
s.e	68.3	22.4	64.8	46.9
Difference (post vs pre)				
Control	-1,157.7	-393.0	-391.9	-346.9
Treatment	+18.8	-13.1	-63.1	-121.4
Treatment effect (annual equivalent)	**+294.1 *** **	**+95.0 *** **	**+82.2 *** **	**+56.4 *** **
s.e	24.2	8.1	22.9	16.6
Treatment effect (annual, added controls)	**+293.8 *** **	**+92.0 *** **	**+82.2 *** **	**+54.8 *** **
s.e	24.1	7.7	22.7	15.8

Note: Estimates are flagged as statistically significant (Sig.) at 1% (***), 5% (**) and 10% (*).
Source: Authors' calculations based on HILDA wave 18.

The first column (1) of Table 4 uses the evaluation settings described in Whelan et al. (2018), and shows a highly significant estimated annualised savings effect from the 2007 assets test reform of $294K when no additional controls are included, and a similar outcome when controls are added.

It is important to note, however, that the mean difference between the control and treatment groups in column (1) prior to the reform are substantial. This is caused by the upper range of assets being unbounded for the control group, and considerable differences in the characteristics of households between the two groups. The sample also includes some extreme outliers. Each of these factors makes the parallel trends assumption harder to support.

The model specification in column (2) of Table 4 excludes the top and bottom 2% of households according to their observed savings pre-treatment, as well as households that have transitioned in family or income-unit status over the period. The effect of trimming the evaluation sample is to reduce the estimated annualised treatment effect to $95K (or $92K including additional controls).

Column (3) shows the effect of tighter bounds around the control group, as specified in Table 3. This stronger selection reduces the pre-treatment savings gap between the control and treatment groups, and further reduces the estimated treatment effect on savings, to $82.2K per annum.

[8] To show this, suppose average pre-reform savings are valued at $20,000 for a control, and $30,000 for a treatment group. Suppose further that savings grow by 10% for both groups across the reform period. In this case, the raw treatment effect in absolute terms is ($330,000-$300,000) – ($220,000 - $200,000) = $10,000. However, the *percentage* treatment effect is (10% - 10%) = 0.

Finally, the fourth column (4) of Table 4 trims the top and bottom 2% of households according to observed pre-treatment savings. This serves to tighten the standard errors of the estimated treatment effect, and further reduce the size of the annualised savings effect to $56.4K in the absence of controls, and $54.8K when additional controls are included.

This exercise has highlighted how important the careful selection of the evaluation sample is, to retain as much similarity as possible between the control and treatment groups, and to account for the presence of extreme outliers. By doing so, it becomes more reasonable to appeal to the parallel trends assumption in empirical difference-in-differences evaluation.

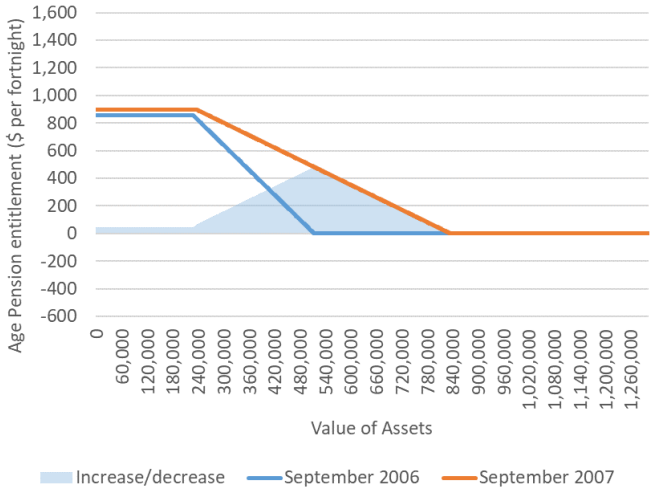
Based on this comparison, our preferred model specification applies the selection criteria in column (4) of Table 4.

THE ESTIMATED IMPACT OF THE 2007 AGE PENSION ASSETS TEST REFORM

We first evaluate the impact of the 2007 Age Pension assets test reforms, the main element of which was a reduction in the assets withdrawal taper from 3 per cent to 1.5 per cent. The effect of this reform was to extend the value of assessable assets for which eligibility to at least part of the Age Pension would be retained (the orange schedule in Figure 9).

This reform led to a higher pension entitlement for those **above the pre-reform lower assets test** threshold for full pension and **below the post-reform upper assets test threshold** for part pension entitlement (shown by the blue triangle in Figure 9). The greatest increase in Age Pension entitlement accrued to those whose assessable assets took them to the upper threshold of the pre-2007 system (the peak of the blue triangle in Figure 9).

Figure 9: **Effects of 2007 asset test reforms on Age Pension entitlements: couple homeowners**



Source: Calculations from EVITA, Centrelink and the Commonwealth Government Social Security guide.

We undertake two separate evaluations to assess the effects of different structural elements of the 2007 Age Pension reforms. The first set of evaluations compare savings and wealth outcomes for those who remain entitled to a **full pension** (a control group with assessable assets below the pre-reform lower threshold in Figure 9) with a treatment group of households whose **part pension** entitlements increase post-reform (those with assessable assets between the pre- and post-reform upper thresholds). We refer to this selection as **GROUP 1**, and present the corresponding evaluation results in Table 5.

Savings and wealth effects around the 2007 lower assets test threshold

The reform impacts presented in Table 5 show very little difference in behavioural responses between those entitled to **full pension** (the control group) and those whose **part pension** entitlement increased in response to the 2007 asset test reform (the treatment group). For example, annualised 'savings' (proxied by the change in net wealth) for those above the lower asset test threshold fell by only $9.2K compared to full pensioners in the absence of controls, or $11.2K with controls (the latter significant at 10%).

Most of this (albeit modest) savings effect comes through changes in the annual value of assessable assets – falling by $10.1K ($12.0K) per year more for **part pensioners** compared to those with **full pension** entitlement. All other treatment effects for individual asset classes are both small in magnitude and statistically insignificant.

The main take-home here is that the 2007 asset test reform exerted relatively little influence on the behaviours of **part pensioners** (the treatment group) relative to those on a **full pension** (the control group).

The limited behavioural response could be for a number of potential reasons. The added future financial benefit for part pensioners of being in receipt of a greater amount of pension may either be not transparent, or not large enough in amount, to incentivise change.

There could also have been a limit in the capacities of households to increase savings, especially over a period where financial assets increased only relatively modestly. Households were effectively able to hold more assessable assets than before and still gain access to some aged pension, yet the GFC over the period would have imposed constraints on the extent of savings and asset accumulation for a share of households.

Table 5**: Estimated impacts of 2007 Age Pension reform: GROUP 1 - full pension entitlement (control) versus part entitlement (treatment)**

	SAVINGS	ASSET VALUE					
	Savings (change in net wealth)	Net wealth	Net assessable assets	Net financial assets	Net home value	Net other property value	Super assets
	($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	($'000s)
Pre-reform (2006)							
Control	62.9	357.2	104.8	57.6	383.4	143.4	76.9
Treatment	233.4	1127.3	608.5	382.8	519.3	312.8	331.7
Post-reform (2010)							
Control	61.1	420.5	139.8	78.9	411.9	142.6	95.0
Treatment	134.7	1204.5	603.3	400.2	578.0	280.2	335.8
Difference (post vs pre)							
Control	-1.8	+63.3	+35.0	+21.3	+28.5	-0.8	+18.2
Treatment	-98.7	+77.2	-5.2	+17.4	+58.6	-32.6	+4.0
Treatment effect (annual equivalent)	**-9.2**	**+3.5**	**-10.1 ****	**-1.0**	**+7.5**	**-8.0**	**-3.5**
s.e	6.7	10.9	4.8	4.5	8.4	14.9	4.5
Treatment effect (annual, added controls)	**-11.1 ***	**+3.2**	**-12.0 ****	**-2.3**	**+6.4**	**-7.1**	**-4.4**
s.e	6.3	8.5	5.0	4.3	8.1	14.7	4.3
Treatment effect (% annual change, added controls)	**(a)**	**-1.1%**	**-3.9%**	**-5.4%**	**+1.6%**	**-3.8%**	**-5.8% ***
s.e		0.023	0.031	0.037	0.018	0.061	0.035

Note: (a) The percentage change estimate for the net savings measure will not give a meaningful value due to the use of the logarithmic specification on an outcome (change in net wealth) that includes a significant share of negative observations. Estimates are flagged as statistically significant (Sig.) at 1% (***), 5% (**) and 10% (*).
Source: Authors' calculations based on HILDA waves 2, 6 and 10.

Savings and wealth effects around the 2007 upper assets test threshold

The second set of evaluations compare outcomes for those who remain entitled to **zero pension** (a control group of households with assessable assets above the post-reform upper threshold in Figure 9) with a treatment group of households who become entitled to **part pension** (those with assessable assets valued between the pre- and post-reform upper thresholds). We refer to these two selections of families as **GROUP 2**, and present the corresponding evaluation results in Table 6.

Both the control and treatment groups had lower savings in the period following the 2007 reforms. The control group saw net wealth increase by $443K on average in the four years between 2002 and 2006 and the treatment group an increase in net wealth of $254K on average. Following the reforms, savings in the form of net wealth increased by only $96K on average for the control group between 2006 and 2010 and $133K on average for the treatment group.

Despite savings (the change in wealth accumulation) falling for both groups across the period of the 2007 reform, the reduction in annualised savings was $56.4K lower among part-pension holders on average after the 2007 reforms, compared to those with zero pension entitlement – significant at 1%. The savings effect was very similar ($54.8K) with additional controls added to the evaluation model.

Again, the impacts of the global financial crisis are likely to have affected financial savings through the erosion of superannuation balances and among households. A key assumption here is that these impacts were felt and absorbed by both groups in similar ways.

The positive impact on asset accumulation for those brought into the Age Pension system as a result of the 2007 assets test reform were found across the assets portfolio. The value of overall net wealth rose by $42.7K more per year than those retaining zero pension entitlement. Net assessable assets increased in value by an estimated $44K per year more for new part-pension holders, and overall net financial assets by $26.2K), with some evidence of additional growth in the value of investment property (rising annually by $9.1K).

The significance of these effects remains when we look at whether the *percentage* changes in savings and asset accumulation are different for those brought into part entitlement compared to those with no entitlement.

Table 6**: Estimated impacts of 2007 Age Pension reform: GROUP 2 - zero pension entitlement (control) versus part entitlement (treatment)**

	SAVINGS	ASSET VALUE					
	Savings (change in net wealth)	Net wealth	Net assessable assets	Net financial assets	Net home value	Net other property value	Super assets
	($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	($'000s)
Pre-reform (2006)							
Control	443.0	1923.4	1311.6	675.9	593.8	511.3	414.1
Treatment	254.7	1113.2	602.0	387.0	503.5	296.5	332.6
Post-reform (2010)							
Control	96.1	1874.1	1168.6	605.1	657.6	435.2	428.8
Treatment	133.2	1234.5	634.9	421.2	569.8	256.9	352.9
Difference (post vs pre)							
Control	-346.9	-49.3	-142.9	-70.8	+63.8	-76.1	+14.7
Treatment	-121.4	+121.3	+32.9	+34.2	+66.3	-39.7	+20.2
Treatment effect (annual equivalent)	**+56.4 *** **	**+42.7 ** **	**+44.0 *** **	**+26.2 ** **	**+0.6**	**+9.1**	**+1.4**
s.e	16.6	21.3	14.6	12.7	11.4	15.2	9.5
Treatment effect (annual, added controls)	**+54.8 *** **	**+38.5 ** **	**+38.6 *** **	**+21.8 * **	**+1.5**	**+9.3**	**-2.3**
s.e	15.8	19.0	13.1	12.2	10.9	15.1	9.1
Treatment effect (% annual change)	**(a)**	**+3.6% ** **	**+4.0% ** **	**+3.3%**	**+3.2%**	**+2.0%**	**+1.2%**
s.e		0.013	0.016	0.033	0.022	0.039	0.036

Note: (a) The percentage change estimate for the net savings measure will not give a meaningful value due to the use of the logarithmic specification on an outcome (change in net wealth) that includes a significant share of negative observations. Estimates are flagged as statistically significant (Sig.) at 1% (***), 5% (**) and 10% (*). Full regression results are shown in Appendix A.
Source: Authors' calculations based on HILDA waves 2, 6 and 10.

Overall, these findings suggest that the 2007 assets test reform led to positive savings and asset accumulation effects for those brought into the pension system as a result.

Part-pension entitlement compared to zero entitlement delivers greater value than the direct financial pension benefit, with a Pensioner Concessions card providing reduced cost health care and medicines, reductions in rates and energy bills, and cheaper public transport.

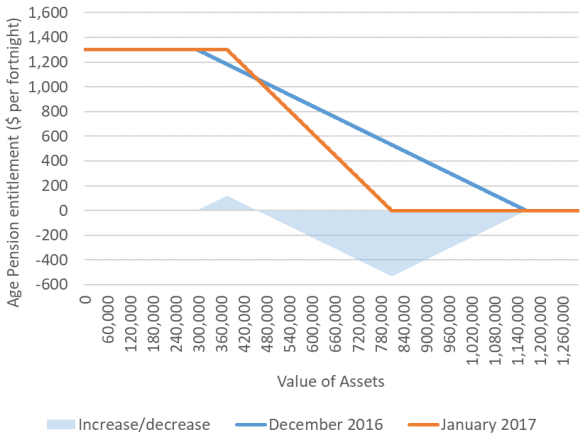
The greater generosity of the assets test looks to have incentivised part pensioners to increase their savings and wealth accumulation in the knowledge that they would retain these extra benefits.

THE ESTIMATED IMPACT OF THE 2017 AGE PENSION ASSETS TEST REFORM

The 2017 Age Pension assets test reform reversed the main element of the 2007 reforms, through an increase 1.5 per cent to 3 per cent in the assets test taper. The effect of the 2017 reform was to lower the value of assessable assets that provides eligibility to at least part pension.

Offsetting measures provided some degree of compensation, in the form of an extension to the lower asset test threshold below which full pension is paid. Despite this, the overall impact on pension entitlement was negative over most asset ranges.

Figure 10: **Effects of 2017 asset test reforms on Age Pension entitlements: couple homeowners**



Source: Calculations from EVITA, Centrelink and the Commonwealth Government Social Security guide.

Savings and wealth effects around the 2017 lower assets test threshold

The findings from Table 7 again show very little difference in behaviours around the 2017 lower assets test threshold, with savings and wealth responses that are both very small and statistically insignificant for part pensioners whose entitlement reduced because of the 2017 asset test reform.

According to these results, the incentive effects around the lower assets test threshold look to be inconsequential.

Table 7**: Estimated impacts of 2017 Age Pension reform: GROUP 1 - full pension entitlement (control) versus part entitlement (treatment)**

	SAVINGS	ASSET VALUE					
	Savings (change in net wealth)	Net wealth	Net assessable assets	Net financial assets	Net home value	Net other property value	Super assets
	($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	($'000s)
Pre-reform (2014)							
Control	114.1	1013.9	590.3	407.8	459.0	356.1	345.8
Treatment	105.8	1010.4	566.7	387.6	480.4	296.7	333.8
Post-reform (2018)							
Control	218.3	1209.6	675.7	479.4	565.4	287.1	427.1
Treatment	220.4	1210.6	653.3	467.8	577.2	224.0	403.4
Difference (post vs pre)							
Control	+104.2	+195.7	+85.4	+71.6	+106.5	-68.9	+81.3
Treatment	+114.6	+200.3	+86.7	+80.2	+96.8	-72.8	+69.6
Treatment effect (annual equivalent)	**+2.6**	**+1.1**	**+0.3**	**+2.2**	**-2.4**	**-1.0**	**-2.9**
s.e	7.6	11.4	7.5	6.5	6.8	10.7	5.6
Treatment effect (annual, added controls)	**+2.0**	**+1.1**	**+0.8**	**+2.7**	**-2.1**	**-0.7**	**-2.1**
s.e	7.3	10.5	6.9	6.1	6.6	10.7	5.1
Treatment effect (% annual change, added controls)	**(a)**	**-0.1%**	**+0.0%**	**+0.2%**	**-1.3%**	**-2.8%**	**+0.2%**
s.e		0.010	0.013	0.017	0.015	0.054	0.018

Note: (a) The percentage change estimate for the net savings measure will not give a meaningful value due to the use of the logarithmic specification on an outcome (change in net wealth) that includes a significant share of negative observations. Estimates are flagged as statistically significant (Sig.) at 1% (***), 5% (**) and 10% (*).
Source: Authors' calculations based on HILDA waves 10,14 and 18.

Savings and wealth effects around the 2017 upper assets test threshold

Table 8 shows there to be some savings and wealth effects around the 2017 upper assets test threshold, and while the magnitudes of the treatment effects are generally the reverse of those for 2007, as one would expect, the size and significance of these effects are both low.

Annual savings fell by $11.7K more among part-pension holders compared to those with zero pension entitlement, and by $8.2K when additional controls are added. However, both results are statistically insignificant. The net value of other investment property fell by $10.1K more for the treatment group, but again not significantly so.

So why might we see lower effects for the 2017 reform, given that the impacts on pension entitlements are at least as large in size and opposite in direction to the incentives created by the 2007 reform?

Part of the answer lies in the timing of the reform relative to the dates of collection of the HILDA wealth modules. The latest HILDA wealth wave was collected one year after the implementation of the 2017 assets test reforms on 1 January 2017.

There may have been some announcement effects, with people responding in advance of 1 January 2017 in anticipation of the upcoming reform. However, it may be that behavioural reactions have yet to fully work through for a significant share of the treatment group impacted by the reform.

If this is the case, the evaluation effects for the 2017 reform will be understated at this stage.

Table 8**: Estimated impacts of 2017 Age Pension reform: GROUP 2 - zero pension entitlement (control) versus part entitlement (treatment)**

	SAVINGS	ASSET VALUE					
	Savings (change in net wealth)	Net wealth	Net assessable assets	Net financial assets	Net home value	Net other property value	Super assets
	($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	($'000s)
Pre-reform (2014)							
Control	242.2	1970.3	1336.4	843.3	605.3	475.4	520.0
Treatment	185.8	1441.6	919.4	624.9	535.3	348.1	533.6
Post-reform (2018)							
Control	392.8	2208.9	1440.8	921.8	721.3	403.1	601.1
Treatment	289.6	1682.4	1001.2	715.6	666.3	235.5	625.9
Difference (post vs pre)							
Control	+150.6	+238.6	+104.4	+78.5	+116.0	-72.3	+81.1
Treatment	+103.9	+240.8	+81.8	+90.6	+131.0	-112.6	+92.3
Treatment effect (annual equivalent)	**-11.7**	**+0.5**	**-5.6**	**+3.0**	**+3.8**	**-10.1**	**+2.8**
s.e	26.3	29.7	19.3	18.1	14.8	15.3	14.4
Treatment effect (annual, added controls)	**-8.2**	**+4.1**	**-4.5**	**+5.6**	**+4.5**	**-10.2**	**+5.0**
s.e	25.4	26.9	18.0	17.2	14.6	15.3	13.7
Treatment effect (% annual change, added controls)	**(a)**	**-0.1%**	**-1.0%**	**+0.0%**	**+2.6%**	**-5.8%**	**+1.9%**
s.e		0.018	0.020	0.034	0.032	0.054	0.034

Note: (a) The percentage change estimate for the net savings measure will not give a meaningful value due to the use of the logarithmic specification on an outcome (change in net wealth) that includes a significant share of negative observations. Estimates are flagged as statistically significant (Sig.) at 1% (***), 5% (**) and 10% (*).
Source: Authors' calculations based on HILDA waves 10,14 and 18.

REGRESSION DISCONTINUITY: METHOD

Regression discontinuity (RD) is an alternative approach to difference-in-difference modelling and has been effectively used to evaluate policy interventions related to pension reform. The basic RD framework (Imbens and Lemieux, 2008) seeks to estimate the effect of a defined policy intervention that heterogeneous economic agents are exposed to, relative to a control group of those who are either minimally affected by the policy intervention, or not affected at all.

The RD design varies from the standard difference-in-differences approach in the sense that the treatment effect is partly captured by a predictor (*ratings*) variable passing a certain threshold, as

determined by a particular policy intervention. Specifically, the RD approach is based on a model specification of the form:

$$Y_{it} = X_{it}\beta + \alpha t + f(AT_{it}) + \varepsilon_{it}$$

where Y_{it} is an outcome of interest for person i at time t, X_{it} represents a series of explanatory variables thought to influence the outcome Y_i and ε_{it} is a random disturbance term.

In addition to these variables, AT_{it} represents the *ratings* variable for household i at time t, centred at some threshold or cut-off point. Assignment to a 'treatment', and its impact on the outcome of interest, is determined in part by the ratings variable AT_{it} being on either side of the threshold.

As explained by Jacob et al. (2012), the function $f(AT_{it})$ represents the relationship between the rating variable and the outcome of interest. The rating variable can also be included in the model to correct for selection bias on observables (Heckman and Robb, 1985).

REGRESSION DISCONTINUITY: APPLICATION TO AGE PENSION REFORMS

The specific and defined nature of the Age Pension assets test taper reforms lends itself to an evaluation using a Regression Discontinuity (RD) design. While the Age Pension assets test leads to a graduated withdrawal of pension entitlement, the transition from full to part pension and (particularly) the transition from part-pension to zero pension entitlement may have a more discrete impact on households, especially if pension entitlement passports the pensioner to other pecuniary or non-pecuniary concessions or benefits.

For the purpose of our empirical analysis, we choose two ratings variables to assess the impact of the Age Pension assets test reforms on savings and wealth accumulation. The first is the difference between savings or asset values and the *lower* assets test thresholds for the Age Pension in any year, while the second specified ratings variable is the difference relative to the *upper* assets test threshold.

The RD design allows for an overall estimate of the treatment effect of the Age Pension assets taper reform. However, RD applications also give the potential to estimate potentially heterogeneous treatment effects across households according to their characteristics – for example, marital status, age or gender, family situation or financial circumstances.

REGRESSION DISCONTINUITY: IDENTIFICATION

This identification strategy relies on an exogenous cut-off point imposed on the individual or household. This cut-off point separates the treatment group from the control group but other than that it is assumed that differences between households within the area around the cut-off points are random. Consequently, identification requires that the only difference between households who exceed the threshold and those who didn't is the effect caused by the threshold itself.

The 2007 and 2017 reforms both provide an exogenous cut-off point. Before the 2007 reform, households above the upper threshold of the pre-reform cut-off point were not entitled to any Age Pension. After the reform was put in place these same households were suddenly 'treated' by the new reform. The rationale for considering RD as an option in this application is because the architecture of the AP assets test reform leads to local randomisation around the threshold under weaker assumptions than required in a classical natural experimental design.

The structure of the 2017 Age Pension assets taper reform means the required adjustment to assets to remain under the limit for part entitlement to Age Pension could be as much as $350K, which would make it difficult to select into or out of the treatment.

The graduated impact of assets tests on the Age Pension, and on savings, will be captured by assigning households to treatment or control groups according to their distance from each asset threshold, as laid out the framework in Table 3.

DETERMINANTS OF SAVINGS AND WEALTH: REGRESSION RESULTS

To assess the determinants of savings and wealth accumulation, and as a precursor to a regression discontinuity analysis, we start by estimating a series of regressions for each of the outcomes examined in our earlier difference-in-difference analysis. Data are drawn from HILDA over the five wealth modules from 2002 to 2018 inclusive, with similar selections to the earlier difference-in-difference analysis. Along with a series of controls for family status, household income, age, education and gender of household head, health status and family size, we examine whether the savings and wealth outcomes of single and couple-headed households are affected by their proximity to the Age Pension lower and upper assets test thresholds.

Along with higher voluntary savings among couples, home owners and those with greater education, Table B1 in Appendix B shows there to be no marginal impact on savings of proximity to the lower AP assets test threshold. However, Table B2 shows that proximity to the upper AP assets test threshold has a negative and significant impacts on net wealth and net home value.

These regressions offer preliminary confirmation of the distorting influence of the upper Age Pension assets test threshold, and provide us with empirical support to progress to a full regression discontinuity analysis.

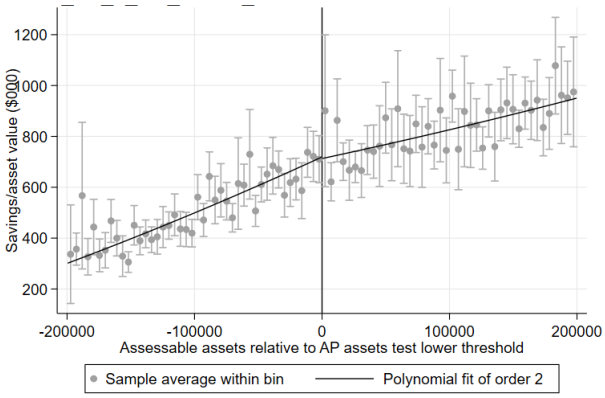
REGRESSION DISCONTINUITY: RESULTS

The regression discontinuity method seeks to identify systematic distortions in behaviour at specific structural points in the Age Pension assets test. It does so by comparing savings patterns below and above the lower and upper thresholds of the asset test, in each year that we observe savings and wealth behaviour in the HILDA data.

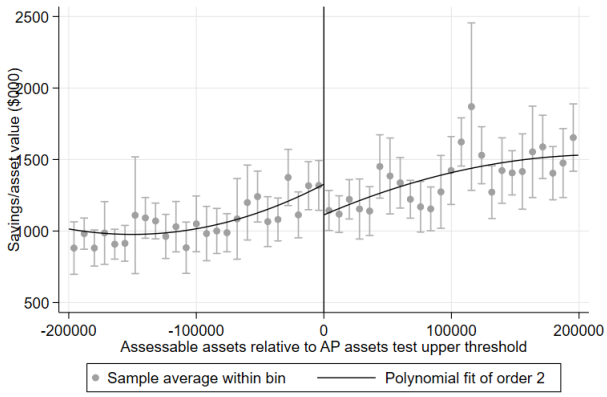
It effectively accumulates empirical evidence of behavioural distortion over time. Therefore the regression discontinuity design may represent a more reliable projection of the future trends in savings and wealth behaviour.

Figure 11: **Effects of Age Pension lower and upper assets test tapers: regression discontinuity**

(a) Lower assets test threshold



(b) Upper assets test threshold



Source: Bankwest Curtin Economics Centre | Authors' estimates using HILDA waves 2, 6, 10, 14 and 18.

For each regression, assessable assets are measured relative to the relevant assets test taper, to ensure that any discontinuity is aligned to the different thresholds for single and couple households, and between homeowners and non-homeowners.

Table 9 presents a series of regression discontinuity estimates of the extent to which the Age Pension lower and upper assets test thresholds affect savings and wealth behaviour. The first panel of Table 9 shows that the lower AP threshold imposes no significant distortions on any savings or

wealth measure. However, the second panel shows that net wealth reduces by an average of $188,300 for those above the AP upper threshold, significant at 5%. This

The estimated regression schedules in Figure 11 provides a graphical estimate of the extent of the structural shift in savings as a result of the Age Pension lower assets test threshold (panel a) and the upper threshold (panel b). The discontinuity in each regression schedule is between those with assessable assets below and above the lower and upper AP assets test thresholds.

The key (and important) take-home from this analysis is that the lower and upper thresholds for the Age Pension assets test have markedly different behavioural influence on household savings and asset accumulation. Specifically:

- the lower assets test threshold that distinguishes entitlement to full- and part-pension has essentially no meaningful effect on household savings;
- the upper assets test threshold drives a reduction in household savings of around $109,600, based on observed behaviours over the five waves of savings and wealth data between 2002 and 2018;
- the upper assets test threshold drives a statistically significant reduction in household net wealth of around $188,300, and a reduction of $176,800 in net home assets.

Table 9**: The impact of the AP assets test threshold on savings and wealth: regression discontinuity**

	SAVINGS	ASSET VALUE					
Variables	Savings (change in net wealth)	Net wealth	Net assessable assets	Net financial assets	Net home value	Net other property value	Super assets
	$1,000's	$1,000's	$1,000's	$1,000's	$1,000's	$1,000's	$1,000's
Discontinuity estimates: lower threshold							
Conventional	-42.89	13.13	8.908	5.226	5.066	1.394	26.80 *
SE	(58.25)	(72.50)	(7.919)	(17.01)	(70.10)	(8.456)	(16.23)
Bias-corrected	-33.85	20.61	10.68	2.605	11.10	-0.666	32.65 **
SE	(58.25)	(72.50)	(7.919)	(17.01)	(70.10)	(8.456)	(16.23)
Robust	-33.85	20.61	10.68	2.605	11.10	-0.666	32.65 *
SE	(68.54)	(88.38)	(9.324)	(20.29)	(85.50)	(9.953)	(18.55)
Observations to the right of the cutoff	698	862	862	862	862	862	862
Observations to the left of the cutoff	1,103	1,409	1,409	1,409	1,409	1,409	1,409
Discontinuity estimates: upper threshold							
Conventional	-87.20	-173.80 **	-37.31	-48.58	-166.80 **	2.667	-38.61
SE	(106.4)	(83.60)	(40.86)	(60.67)	(78.33)	(42.75)	(48.49)
Bias-corrected	-109.60	-188.30 **	-53.38	-57.91	-176.80 **	-10.09	-28.42
SE	(106.4)	(83.60)	(40.86)	(60.67)	(78.33)	(42.75)	(48.49)
Robust	-109.60	-188.30 *	-53.38	-57.91	-176.80 *	-10.09	-28.42
SE	(130.2)	(99.65)	(47.51)	(72.06)	(94.02)	(49.00)	(56.27)
Observations to the right of the cutoff	317	438	438	438	438	438	438
Observations to the left of the cutoff	462	655	655	655	655	655	655
Additional controls	YES	YES	YES	YES	YES	YES	YES

Notes: Estimates are flagged as statistically significant (Sig.) at 1% (***), 5% (**) and 10% (*). Local polynomial smoothing uses Epanechnikov kernel, with bandwidth selected by MSE optimisation.
Source: Authors' calculations based on HILDA waves 2, 6, 10, 14 and 18.

These results serve to reinforce the findings from the difference-in-difference approach, and show that an increase in the upper assets test taper leads to increased household savings.

SUMMARY AND CONCLUSION

This report provides insights into the impact that the Age Pension assets test has on savings behaviour pre-retirement. This responds to one of the key research questions commissioned by Commonwealth Treasury as part of the 2020 Retirement Income Review.

Our approach explores the 2007 and 2017 changes in the Age Pension assets test to examine whether, and to what extent, these changes impacted asset portfolio allocation and labour supply behaviour of households approaching retirement.

Method

Using the Household Income and Labour Dynamics in Australia (HILDA) survey, we compare the savings and asset allocation behaviours of households that were directly affected by reforms to the Age Pension assets test tapers in 2007 and 2017, compared to similar households that remained unaffected. We apply econometric techniques to control for factors other than the introduction of the Age Pension assets test taper reforms that may coincidentally be driving behavioural changes.

Our primary evaluation approach uses a difference-in-differences (DiD) method to examine the impact of the assets test reforms on behaviour around both the lower assets test threshold (which differentiates full from part-entitlement to Age Pension) and the upper threshold (which separates part-entitlement from zero entitlement). For validation, we apply a second approach using regression discontinuity to examine the degree to which asset accumulation and labour supply behaviours are affected by the lower and upper assets test taper thresholds.

Contribution

Our report adds to a relatively small literature on how the Age Pension system in Australia affects the savings behaviour of individuals prior to retirement. Three previous studies include Cho and Sane (2013), Cobb-Clark and Hildebrand (2011) and Whelan *et al*. (2018), all of which make use of the HILDA survey to test household behavioural changes prior to reaching Age Pension eligibility.

Cho and Sane (2013) and Whelan *et al*. (2018) both use a difference-in-difference approach to assess the impact of the 2007 Age Pension asset test changes on pre-retirement savings behaviour. Cho and Sane (2013) concluded that the reduction in the 2007 Age Pension assets taper rate led to an increase in the savings of those deemed to be affected by the change, compared to households who were considered to be unaffected by the assets test. Whelan et al. (2018) also reported a positive effect of the 2007 reform, but noted that their result was driven more by a large fall in savings of those unaffected by the taper reduction, rather than by an increase in the savings among those affected by the change in the taper rate.

Cobb-Clark and Hildebrand (2011) found no significant evidence to suggest that means tests that determine pension eligibility in Australia affect households' asset reallocation decisions.

The classifications of treatment and groups in both the Whelan *et al.* (2018) and Cho and Sane (2014) studies are far broader and more heterogeneous than the tighter groupings used in our study. This is especially the case for the open-ended classification of the control groups in both instances. This means that their modelled treatment effects of the Age Pension assets test capture less of the effects of the Age Pension assets test reforms, and instead compare the savings and asset accumulation behaviour of households with wealth and savings portfolios that are very different in both size and composition.

By applying tighter restrictions to the treatment and control groups, the overall treatment effects associated with the Age Pension assets test reform in our study are more precisely defined, and less exposed to contamination from factors other than the Age Pension assets test that may also affect savings and asset accumulation. By separating those affected by the Age Pension assets test taper reforms into two distinct treatment groups, we are also better able to test the empirical outcomes from a difference-in-difference analysis against the predictions of a simplistic two-period savings model, such as the one used in Whelan *et al.* (2018).

Key findings

Overall we find that reforms to the Age Pension assets test was *positively* correlated with changes in household asset allocation behaviour prior to retirement for households that were very close to the upper threshold of the Age Pension assets test. The upper threshold is the point at which having additional assets in excess of this value would lead to zero entitlement of the Age Pension.

There is no statistical difference in the pre-retirement savings of households that expected to be eligible for part-rate Age Pension before the taper rate change compared to those who expected to be eligible for the full Age Pension.

Initial indications are that the increased Age Pension assets test taper introduced in 2017 led to a reduction in household savings and asset accumulation - a reverse pattern compared to the 2007 reform. However, these results were not statistically significant. This is most likely because the collection dates for the HILDA wealth modules provided limited information on household savings behaviour after the 2017 Age Pension assets reform was implemented.

Importantly, the HILDA wealth modules used to assess the 2007 Age Pension reform (2006 and 2010) coincided with the Global Financial Crisis (GFC), a period during which households accrued lower net savings (changes in net wealth) post-GFC than they did in pre-GFC. Hence, the positive net savings effect arose because those households who became eligible as a result of the reduced Age Pension taper rate in 2007 saw their net savings fall less between 2006 and 2010 compared to those that remained ineligible for the Age Pension.

There is no strong evidence of a change in employment propensities among pre-retirement households who fall within the assets test taper range compared to those who do not. Average hours worked among pre-retirement households were also not significantly affected by changes in the assets test taper.

Conclusions

Our empirical findings suggests that standard theoretical models of savings behaviour are too restrictive in their characterisation of savings patterns, and are not able to explain the impact of changes to the Age Pension taper rate on pre-retirement savings.

If households save in a manner that is consistent with a simple two-period savings model, this would imply that people who became eligible for the Age Pension through the taper rate reduction in 2007 would have an incentive to *reduce* savings as their assets became subject to the taper (a substitution effect) and because of increased pension payments (income effect). Conversely, savings incentives should have *increased* for people who were previously entitled to the full Age Pension, but who would lose less in pension entitlement under the 2007 reforms by increasing their assets portfolio.

The presumption of the simple two-period model of savings is that people fully understand the rules of the Australian age pension system, and can accurately anticipate their future age pension entitlement. It also supposes that people are able to project the future value of their asset portfolio.

However, the savings incentives created by a relaxation of the age pension assets test will be different (and opposite to the projected by existing models) if people perceive themselves to be entitled to part pension in the future, even though the value of their assets portfolio takes them above the threshold for pension eligibility.

To rationalise these empirical findings requires the underlying theoretical framework to be expanded to accommodate other explanations of household savings behaviour. This includes the role of compulsory superannuation as opposed to voluntary savings; the degree to which people have uncertainty or misperception regarding their future pension entitlement, and the drivers of asset portfolio allocation between assessable and non-assessable assets.

Our findings warrant a reconsideration of existing economic theories to reach a better understanding of how retirement savings decisions are made, and may point the a need for strategies to address uncertainties in peoples' perceptions of pensions entitlements.

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APPENDIX A – DIFFERENCE-IN-DIFFERENCES REGRESSION RESULTS

Table A1 **Difference-in-differences regression results: 2007 Age Pension reform: GROUP 1 – full pension entitlement (control) versus part entitlement (treatment)**

	SAVINGS	ASSET VALUE					
	Savings (change in net wealth)	Net wealth	Net assessable assets	Net financial assets	Net home value	Net other property value	Super assets
Regressors							
Constant	-68.31 ***	-33.50 *	3.49	-2.53	-114.18 *	136.13 ***	8.05
SE	(12.59)	(17.44)	(8.69)	(8.67)	(59.30)	(46.04)	(10.66)
Marital status (couple=1)	11.85	85.53 ***	53.13 ***	7.28	44.67 **	56.36	20.11 **
SE	(12.38)	(16.74)	(8.39)	(8.45)	(17.10)	(39.00)	(8.92)
Homeowner status (owner/mortgagor=1)	103.85 ***	417.49 ***	18.84 **	22.11 **	449.12 ***	-84.04 **	14.45
SE	(12.53)	(17.25)	(8.61)	(8.58)	(57.89)	(40.73)	(9.82)
Number of children in family	-0.10	-21.81 **	-25.16 ***	-16.43 ***	-14.81	-12.57	-12.50 **
SE	(7.23)	(9.82)	(4.94)	(5.09)	(10.28)	(18.65)	(5.09)
Total household disposable income ($'000s pa)	1.37 ***	1.91 ***	1.73 ***	1.14 ***	0.64 ***	0.52	1.05 ***
SE	(0.17)	(0.23)	(0.11)	(0.11)	(0.23)	(0.38)	(0.12)
In treatment group (*T*=1)	95.29 ***	570.76 ***	432.28 ***	284.43 ***	107.19 ***	174.43 ***	223.65 ***
SE	(18.68)	(25.19)	(12.47)	(12.78)	(23.71)	(45.38)	(12.44)
Post-treatment (*t=1*)	-11.33	45.61 **	18.19 **	10.36	37.06 **	-11.41	6.52
SE	(11.96)	(16.39)	(8.22)	(8.26)	(18.00)	(50.13)	(9.11)
Treatment effect (*T* x *t*)	**-44.28** *	**12.92**	**-48.03** ***	**-9.18**	**25.58**	**-28.48**	**-17.58**
SE	(25.29)	(34.09)	(16.83)	(17.30)	(32.32)	(58.86)	(17.01)
	-11.1	**+3.2**	**-12.0**	**-2.3**	**+6.4**	**-7.1**	**-4.4**
R-squared	0.172	0.671	0.716	0.509	0.145	0.140	0.454
Sample size	1481	1485	1495	1493	1055	186	1168
F-statistic (p-value)	44.86 (0.000)	433.26 (0.000)	538.32 (0.000)	221.5 (0.000)	26.49 (0.000)	5.32 (0.000)	139.54 (0.000)

Note: Estimates are flagged as statistically significant (Sig.) at 1% (***), 5% (**) and 10% (*).
Source: Authors' calculations based on HILDA waves 2, 6 and 10.

Table A2 **Difference-in-differences regression results: 2007 Age Pension reform: GROUP 2 - zero pension entitlement (control) versus part entitlement (treatment)**

	SAVINGS	ASSET VALUE					
	Savings (change in net wealth)	Net wealth	Net assessable assets	Net financial assets	Net home value	Net other property value	Super assets
Regressors							
Constant	7.39	1087.93 ***	1113.44 ***	514.38 ***	-108.06	503.24 ***	278.79 ***
SE	(81.35)	(95.82)	(66.68)	(62.27)	(103.85)	(75.56)	(44.77)
Marital status (couple=1)	3.72	364.32 ***	296.26 ***	94.10 ***	52.46 *	108.53 **	38.69 *
SE	(40.14)	(48.95)	(33.59)	(31.20)	(27.46)	(42.23)	(23.31)
Homeowner status (owner/mortgagor=1)	216.85 ***	342.46 ***	-203.66 ***	-28.23	586.16 ***	-83.12	-3.29
SE	(74.84)	(88.41)	(61.63)	(57.34)	(99.80)	(69.54)	(40.47)
Number of children in family	15.84	-10.91	-31.50 *	-56.18 ***	15.11	8.33	-25.83 **
SE	(21.67)	(26.66)	(17.90)	(16.57)	(15.28)	(20.11)	(12.11)
Total household disposable income ($'000s pa)	2.49 ***	2.70 ***	1.98 ***	1.55 ***	0.80 ***	0.00	1.33 ***
SE	(0.34)	(0.39)	(0.27)	(0.26)	(0.23)	(0.34)	(0.20)
In treatment group (*T*=1)	-143.86 ***	-769.93 ***	-675.09 ***	-259.22 ***	-78.37 **	-223.99 ***	-58.05 **
SE	(45.41)	(54.60)	(37.43)	(34.90)	(31.27)	(43.98)	(26.20)
Post-treatment (*t=1*)	-367.58 ***	-67.05	-151.67 ***	-83.65 **	70.38 **	-71.01 *	7.79
SE	(49.97)	(58.91)	(40.28)	(37.94)	(34.60)	(42.38)	(28.96)
Treatment effect (*T* x *t*)	**219.03** ***	**153.96** **	**154.35** ***	**87.17** *	**6.01**	**37.08**	**-9.15**
SE	(63.31)	(76.17)	(52.23)	(48.79)	(43.73)	(60.58)	(36.49)
R-squared	0.150	0.414	0.491	0.170	0.111	0.117	0.097
Sample size	772	802	810	788	684	364	714
F-statistic (p-value)	20.49 (0.000)	81.94 (0.000)	112.29 (0.000)	24.03 (0.000)	13.13 (0.000)	7.9 (0.000)	11.91 (0.000)

Note: Estimates are flagged as statistically significant (Sig.) at 1% (***), 5% (**) and 10% (*).
Source: Authors' calculations based on HILDA waves 2, 6 and 10.

APPENDIX B – REGRESSION DISCONTINUITY RESULTS

Table B1 **Linear regression results: impact on savings/asset values of AP lower asset threshold**

	SAVINGS	ASSET VALUE					
	Savings (change in net wealth)	Net wealth	Net assessable assets	Net financial assets	Net home value	Net other property value	Super assets
	$1,000's	$1,000's	$1,000's	$1,000's	$1,000's	$1,000's	$1,000's
Regressors							
Constant	-24.91	-266.34 **	317.47 ***	142.88 ***	-583.80 ***	72.90 ***	198.93 ***
SE	(139.14)	(98.14)	(18.34)	(31.39)	(95.24)	(21.38)	(28.07)
Assessable assets ($'000s)	0.21	1.46 ***	1.15 ***	0.78 ***	0.31 **	0.19 ***	0.62 ***
SE	(0.17)	(0.12)	(0.02)	(0.04)	(0.12)	(0.03)	(0.03)
Proximity to AP lower test threshold x couple	**25.53**	**-4.52**	**1.79**	**8.09**	**-6.32**	**4.99**	**0.39**
SE	(40.61)	(28.92)	(5.41)	(9.25)	(28.07)	(6.30)	(8.27)
Proximity to AP lower test threshold x single	**-23.09**	**-25.21**	**-3.39**	**11.82**	**-21.82**	**5.68**	**-3.76**
SE	(44.22)	(31.61)	(5.91)	(10.11)	(30.68)	(6.89)	(9.04)
Age	-0.41	8.06 ***	0.35	0.98 *	7.71 ***	-0.01	-0.97 **
SE	(2.29)	(1.62)	(0.30)	(0.52)	(1.57)	(0.35)	(0.46)
Family status = couple	48.01	119.70 ***	78.55 ***	31.69 ***	41.15 **	7.36 *	45.39 ***
SE	(29.29)	(20.54)	(3.84)	(6.57)	(19.94)	(4.48)	(5.88)
Housing status = owner	102.37 ***	263.80 ***	-136.78 ***	-85.43 ***	400.58 ***	-39.12 ***	-55.48 ***
SE	(30.60)	(21.98)	(4.11)	(7.03)	(21.33)	(4.79)	(6.29)
Number of children	16.13	9.54	-4.43 **	-2.96	13.97	3.78 **	-2.26
SE	(12.45)	(8.81)	(1.65)	(2.82)	(8.55)	(1.92)	(2.52)
Real household disposable income ($'000s)	0.17	0.42 ***	-0.06 **	0.05	0.48 ***	-0.15 ***	0.16 ***
SE	(0.19)	(0.13)	(0.03)	(0.04)	(0.13)	(0.03)	(0.04)
Gender = female	28.79	9.40	-4.33	-5.38	13.73	2.55	-9.01 **
SE	(20.48)	(14.54)	(2.72)	(4.65)	(14.11)	(3.17)	(4.16)
Educated to university level	-11.90	69.78 ***	4.35	25.16 ***	65.43 ***	-5.31	21.70 ***
SE	(24.17)	(17.45)	(3.26)	(5.58)	(16.93)	(3.80)	(4.99)
Educated to high school level	14.41	38.28 **	-0.20	4.68	38.48 **	-4.36	-1.85
SE	(21.87)	(15.13)	(2.83)	(4.84)	(14.69)	(3.30)	(4.33)
In poor/fair health x couple	6.37	-39.75 *	2.58	3.82	-42.33 **	5.54	-12.07 *
SE	(31.70)	(21.56)	(4.03)	(6.90)	(20.93)	(4.70)	(6.17)
In poor/fair health x single	7.03	-30.58	-3.73	-9.78	-26.85	2.38	-11.91 *
SE	(32.60)	(23.36)	(4.37)	(7.47)	(22.67)	(5.09)	(6.68)
partner_poor_health	-7.23	2.57	7.08	33.31 **	-4.51	-10.31	6.91
SE	(70.42)	(50.21)	(9.39)	(16.06)	(48.73)	(10.94)	(14.36)
Year = 2006	-	112.10 ***	2.45	8.35	109.65 ***	-5.35	18.86 ***
SE	-	(19.91)	(3.72)	(6.37)	(19.32)	(4.34)	(5.70)
Year = 2010	-110.16 ***	112.83 ***	11.29 ***	18.22 ***	101.54 ***	-3.79	24.80 ***
SE	(25.16)	(20.18)	(3.77)	(6.45)	(19.58)	(4.40)	(5.77)
Year = 2014	-173.24 ***	76.92 ***	8.83 **	21.79 ***	68.10 ***	-7.86 *	35.56 ***
SE	(25.37)	(20.34)	(3.80)	(6.51)	(19.74)	(4.43)	(5.82)
Year = 2018	-36.94	184.68 ***	77.58 ***	89.75 ***	107.11 ***	-8.01 *	97.93 ***
SE	(27.55)	(22.05)	(4.12)	(7.05)	(21.40)	(4.81)	(6.31)
R-squared	0.055	0.369	0.862	0.530	0.223	0.123	0.505
Sample size	1801	2271	2271	2271	2271	2271	2271
F-statistic (p-value)	6.12 (0.000)	73.08 (0.000)	783.94 (0.000)	140.78 (0.000)	35.84 (0.000)	17.59 (0.000)	127.49 (0.000)

Notes: Estimates are flagged as statistically significant (Sig.) at 1% (***), 5% (**) and 10% (*). Reference year = 2002. Additional year dummy is excluded for Change in Net Wealth estimates due to multicollinearity.
Source: Authors' calculations based on HILDA waves 2, 6, 10, 14 and 18.

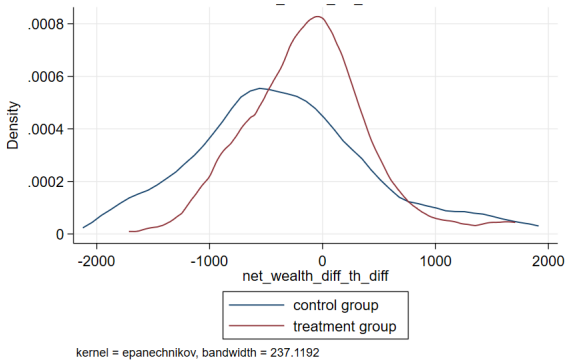
Table B2 **Linear regression results: impact on savings/asset values of AP upper asset threshold**

	SAVINGS	ASSET VALUE					
	Savings (change in net wealth)	Net wealth	Net assessable assets	Net financial assets	Net home value	Net other property value	Super assets
	$1,000's	$1,000's	$1,000's	$1,000's	$1,000's	$1,000's	$1,000's
Regressors							
Constant	109.81	-900.75 ***	228.34 ***	-245.44 **	-1129.09 ***	285.72 ***	-162.24
SE	(292.12)	(203.57)	(63.58)	(119.27)	(190.14)	(91.72)	(104.59)
Assessable assets ($'000s)	-0.07	1.68 ***	1.11 ***	0.90 ***	0.57 **	0.07	0.60 ***
SE	(0.32)	(0.23)	(0.07)	(0.13)	(0.21)	(0.10)	(0.12)
Proximity to AP upper test threshold x couple	**-129.66 ** **	**-97.96 ***	**5.45**	**-37.38**	**-103.41 ** **	**42.51 ***	**-21.79**
SE	(64.70)	(53.66)	(16.76)	(31.44)	(50.12)	(24.18)	(27.57)
Proximity to AP upper test threshold x single	**-7.24**	**-34.75**	**40.43 ***	**-46.23**	**-75.17**	**99.31 ****	**-61.56 ***
SE	(92.95)	(66.88)	(20.89)	(39.18)	(62.46)	(30.13)	(34.36)
Age	-3.71	20.63 ***	4.12 ***	8.96 ***	16.51 ***	-3.26 **	5.22 ***
SE	(4.79)	(3.39)	(1.06)	(1.99)	(3.17)	(1.53)	(1.74)
Family status = couple	146.93 **	292.28 ***	251.83 ***	113.82 ***	40.45	89.20 ***	111.30 ***
SE	(62.19)	(43.29)	(13.52)	(25.36)	(40.43)	(19.50)	(22.24)
Housing status = owner	209.08 ***	425.64 ***	-82.40 ***	-10.16	508.04 ***	-63.59 **	33.19
SE	(69.59)	(51.87)	(16.20)	(30.39)	(48.45)	(23.37)	(26.65)
Number of children	8.56	60.17 ***	2.55	6.04	57.62 ***	6.24	2.65
SE	(25.01)	(18.54)	(5.79)	(10.86)	(17.31)	(8.35)	(9.52)
Real household disposable income ($'000s)	0.32	0.58 ***	-0.14 **	0.35 ***	0.71 ***	-0.46 ***	0.39 ***
SE	(0.27)	(0.20)	(0.06)	(0.12)	(0.19)	(0.09)	(0.10)
Gender = female	-36.70	44.11	-10.65	-22.88	54.76 *	19.59	-15.11
SE	(43.37)	(30.78)	(9.61)	(18.03)	(28.75)	(13.87)	(15.81)
Educated to university level	63.52	84.16 **	2.41	27.85	81.76 **	-0.21	45.93 ***
SE	(43.44)	(31.85)	(9.95)	(18.66)	(29.75)	(14.35)	(16.37)
Educated to high school level	-96.10 *	-1.18	-10.15	-2.49	8.98	-19.82	-0.86
SE	(49.98)	(33.91)	(10.59)	(19.87)	(31.67)	(15.28)	(17.42)
In poor/fair health x couple	49.72	85.27 *	-1.57	23.21	86.84 **	-22.07	3.93
SE	(64.81)	(45.62)	(14.25)	(26.73)	(42.61)	(20.55)	(23.44)
In poor/fair health x single	-19.06	-57.47	-10.18	-12.41	-47.29	6.28	-27.90
SE	(93.31)	(65.69)	(20.52)	(38.48)	(61.35)	(29.59)	(33.75)
partner_poor_health	-33.81	-75.26	23.57	117.70 *	-98.83	-21.32	-3.45
SE	(148.23)	(117.54)	(36.71)	(68.86)	(109.79)	(52.96)	(60.39)
Year = 2006	-13.46	116.80 ***	27.83 **	25.13	88.97 **	11.50	45.42 **
SE	(53.15)	(36.30)	(11.34)	(21.26)	(33.90)	(16.35)	(18.65)
Year = 2010	-	595.37 ***	400.54 ***	197.58 ***	194.83 ***	183.61 ***	171.44 ***
SE	-	(44.59)	(13.93)	(26.12)	(41.65)	(20.09)	(22.91)
Year = 2014	-104.40 *	522.72 ***	446.35 ***	237.94 ***	76.36 *	190.65 ***	227.91 ***
SE	(61.74)	(46.33)	(14.47)	(27.14)	(43.27)	(20.87)	(23.80)
Year = 2018	3.77	292.24 ***	177.72 ***	142.24 ***	114.52 ***	53.87 ***	144.90 ***
SE	(56.05)	(40.75)	(12.73)	(23.87)	(38.06)	(18.36)	(20.94)
R-squared	0.086	0.430	0.771	0.292	0.198	0.172	0.289
Sample size	809	1093	1093	1093	1093	1093	1093
F-statistic (p-value)	4.36 (0.000)	45.08 (0.000)	200.65 (0.000)	24.55 (0.000)	14.7 (0.000)	12.38 (0.000)	24.24 (0.000)

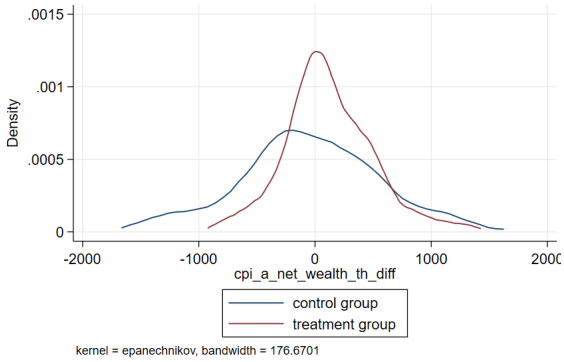
Notes: Estimates are flagged as statistically significant (Sig.) at 1% (***), 5% (**) and 10% (*). Reference year = 2002. Additional year dummy is excluded for Change in Net Wealth estimates due to multicollinearity.
Source: Authors' calculations based on HILDA waves 2, 6, 10, 14 and 18.

Figure 12: **Distribution of responses to 2007 asset test reforms: GROUP 2 - zero pension entitlement (control) versus part entitlement (treatment)**

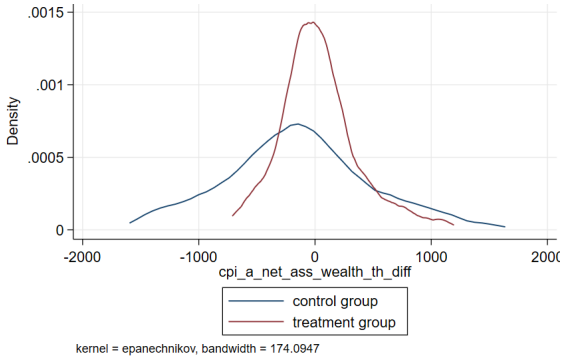
(a) savings (net wealth difference)



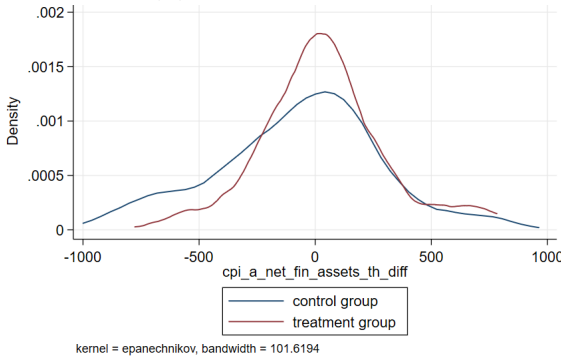
(b) total net wealth



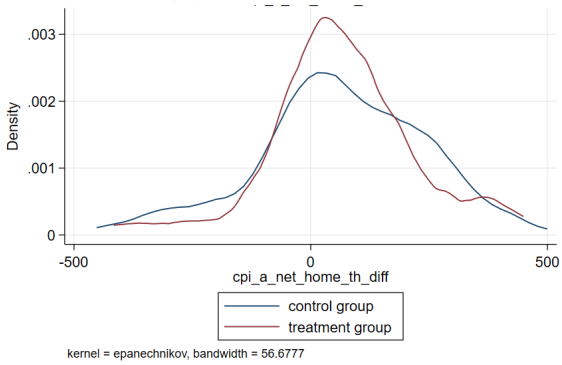
(c) net assessable assets



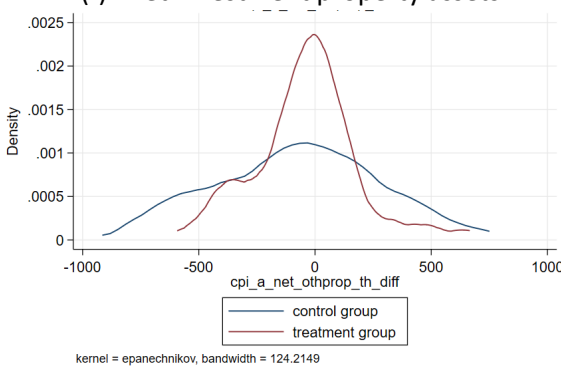
(d) net financial assets



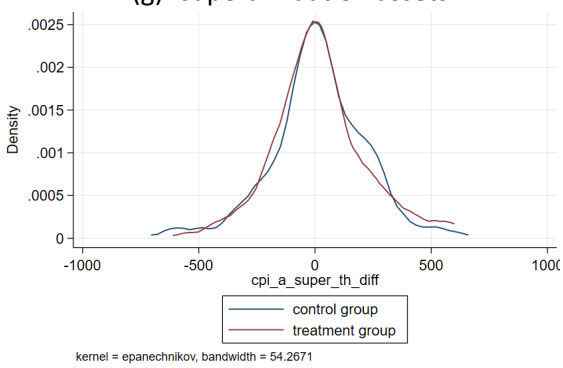
(e) net home assets



(f) net investment property assets



(g) superannuation assets



Source: Authors' calculations based on HILDA wave 18.

Table B3 **Regression discontinuity results: AP lower asset threshold**

	SAVINGS	ASSET VALUE					
Variables	Savings (change in net wealth)	Net wealth	Net assessable assets	Net financial assets	Net home value	Net other property value	Super assets
	$1,000's	$1,000's	$1,000's	$1,000's	$1,000's	$1,000's	$1,000's
Discontinuity estimate							
Conventional	-42.89	13.13	8.908	5.226	5.066	1.394	26.80 *
SE	(58.25)	(72.50)	(7.919)	(17.01)	(70.10)	(8.456)	(16.23)
Bias-corrected	-33.85	20.61	10.68	2.605	11.10	-0.666	32.65 **
SE	(58.25)	(72.50)	(7.919)	(17.01)	(70.10)	(8.456)	(16.23)
Robust	-33.85	20.61	10.68	2.605	11.10	-0.666	32.65 *
SE	(68.54)	(88.38)	(9.324)	(20.29)	(85.50)	(9.953)	(18.55)
Additional controls	YES	YES	YES	YES	YES	YES	YES
Observations	1,801	2,271	2,271	2,271	2,271	2,271	2,271
Observations to the right of the cutoff	698	862	862	862	862	862	862
Observations to the left of the cutoff	1,103	1,409	1,409	1,409	1,409	1,409	1,409
Local polynomial settings							
Bandwidth estimation (h)	70,183	48,058	44,220	44,276	50,027	49,672	49,374
Bandwidth bias (b)	108,277	73,245	73,485	72,520	75,695	81,540	89,494
Order of local polynomial (p)	2	2	2	2	2	2	2
Order of bias polynomial (q)	3	3	3	3	3	3	3

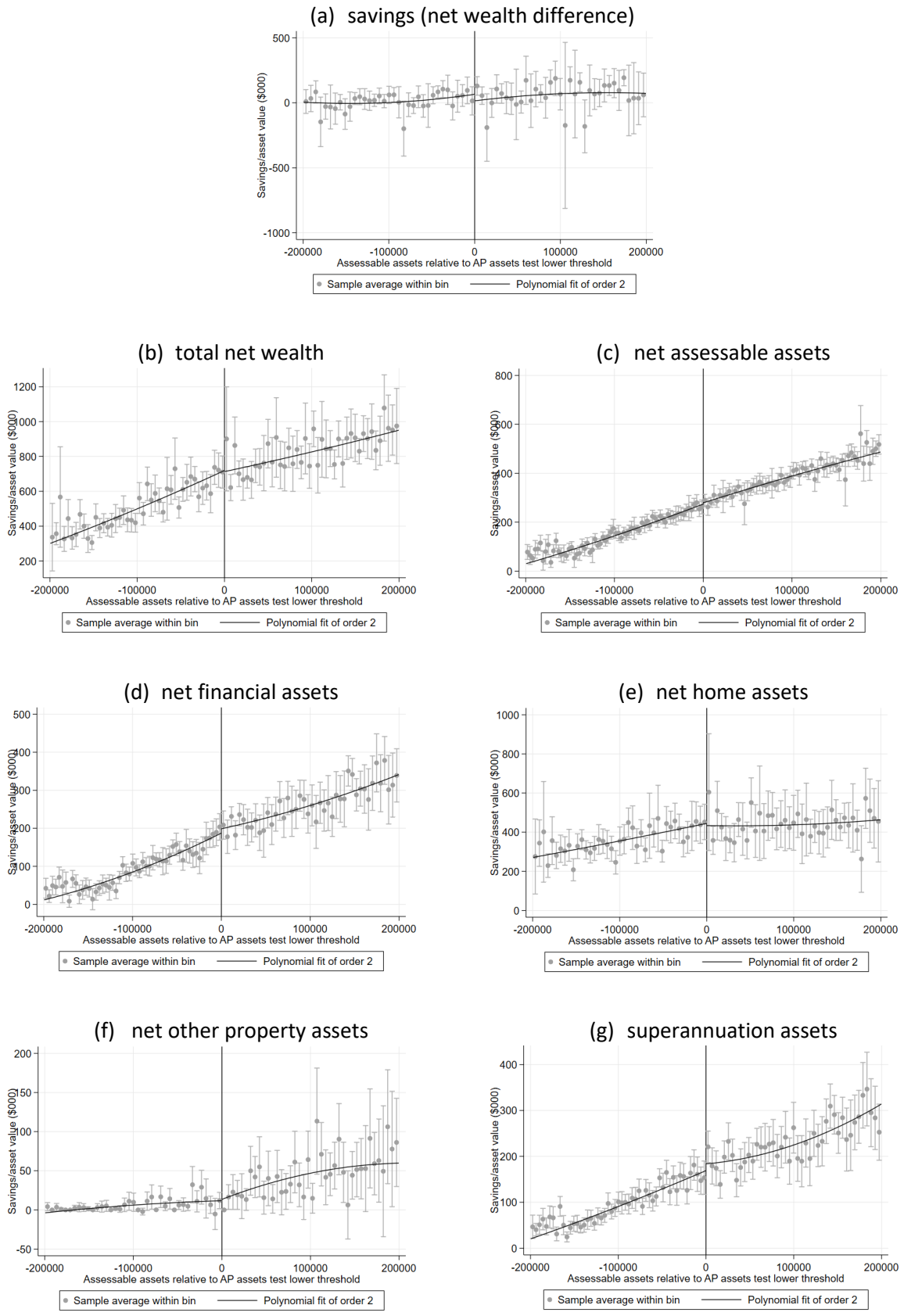
Notes: Estimates are flagged as statistically significant (Sig.) at 1% (***), 5% (**) and 10% (*). Local polynomial smoothing uses Epanechnikov kernel, with bandwidth selected by MSE optimisation.
Source: Authors' calculations based on HILDA waves 2, 6, 10, 14 and 18.

Table B4 **Regression discontinuity results: AP upper asset threshold**

	SAVINGS	ASSET VALUE					
Variables	Savings (change in net wealth)	Net wealth	Net assessable assets	Net financial assets	Net home value	Net other property value	Super assets
	$1,000's	$1,000's	$1,000's	$1,000's	$1,000's	$1,000's	$1,000's
Discontinuity estimate							
Conventional	-87.20	-173.80 **	-37.31	-48.58	-166.80 **	2.667	-38.61
SE	(106.4)	(83.60)	(40.86)	(60.67)	(78.33)	(42.75)	(48.49)
Bias-corrected	-109.60	-188.30 **	-53.38	-57.91	-176.80 **	-10.09	-28.42
SE	(106.4)	(83.60)	(40.86)	(60.67)	(78.33)	(42.75)	(48.49)
Robust	-109.60	-188.30 *	-53.38	-57.91	-176.80 *	-10.09	-28.42
SE	(130.2)	(99.65)	(47.51)	(72.06)	(94.02)	(49.00)	(56.27)
Additional controls	YES	YES	YES	YES	YES	YES	YES
Observations	779	1,093	1,093	1,093	1,093	1,093	1,093
Observations to the right of the cutoff	317	438	438	438	438	438	438
Observations to the left of the cutoff	462	655	655	655	655	655	655
Local polynomial settings							
Bandwidth estimation (h)	61,665	62,301	39,544	47,605	62,062	60,816	47,326
Bandwidth bias (b)	97,378	104,015	66,590	74,089	103,727	108,649	83,379
Order of local polynomial (p)	2	2	2	2	2	2	2
Order of bias polynomial (q)	3	3	3	3	3	3	3

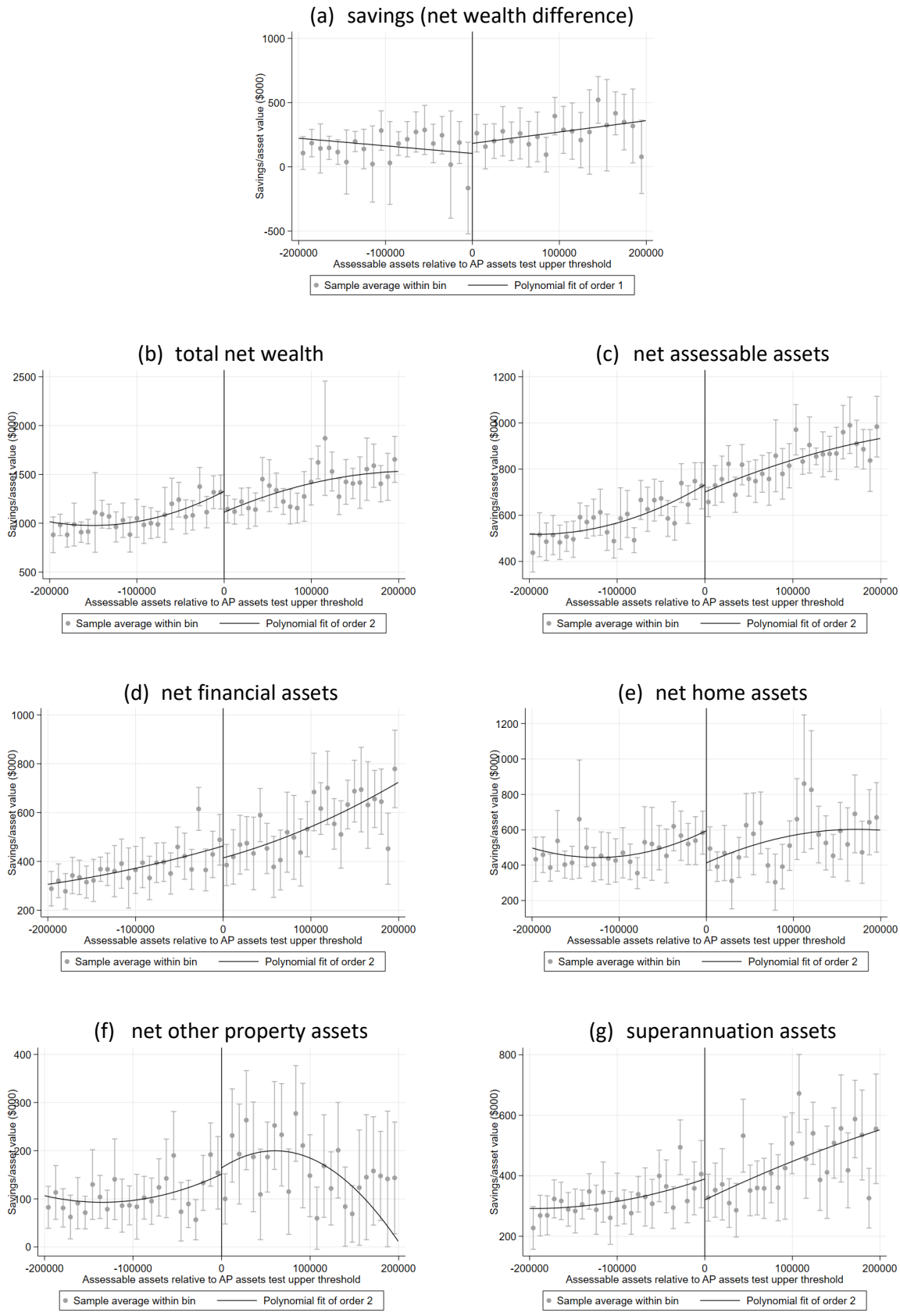
Notes: Estimates are flagged as statistically significant (Sig.) at 1% (***), 5% (**) and 10% (*). Local polynomial smoothing uses Epanechnikov kernel, with bandwidth selected by MSE optimisation.
Source: Authors' calculations based on HILDA waves 2, 6, 10, 14 and 18.

Figure 13: **Regression discontinuity estimates – impacts of the AP lower asset test threshold**



Source: Authors' estimates based on HILDA waves 2, 6, 10, 14 and 18.

Figure 14: **Regression discontinuity estimates – impacts of the AP upper asset test threshold**



Source: Authors' estimates based on HILDA waves 2, 6, 10, 14 and 18.