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**The Effect of
the Australian
Superannuation
Guarantee on Household
Saving Behaviour**

Ellis Connolly

RDP 2007-08

THE EFFECT OF THE AUSTRALIAN SUPERANNUATION GUARANTEE ON HOUSEHOLD SAVING BEHAVIOUR

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Abstract

Individual pension accounts are growing in importance as a pillar of retirement incomes policy in the developed world. Policy-makers have generally assumed that by introducing pre-funded pension schemes, they can increase household wealth and thereby raise retirement incomes. However, there has been relatively little empirical work to confirm this. This paper focuses on the effect of Australia's system of compulsory pension accounts, the 'Superannuation Guarantee', on household saving behaviour.

Microeconomic data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey, are used to explore three related questions:

- i. Have compulsory pension accounts increased household wealth?
- ii. What effect do compulsory pension accounts have on voluntary saving for retirement?
- iii. Do compulsory pension accounts influence the timing of retirement?

This paper finds that Australia's compulsory pension accounts increased household wealth. Voluntary saving for retirement in pension accounts also appeared to increase slightly, possibly due to the added convenience of being able to make contributions directly into these pension accounts. Finally, there is no evidence of a significant effect on retirement intentions. Overall, the results suggest that Australia's compulsory pension accounts have increased household wealth and raised self-funded retirement incomes.

JEL Classification Numbers: E21, G2, G11

Keywords: superannuation, household saving, pension reform, HILDA

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THE EFFECT OF THE AUSTRALIAN SUPERANNUATION GUARANTEE ON HOUSEHOLD SAVING BEHAVIOUR

Ellis Connolly

1. Introduction

Individual pension accounts are growing in importance as a pillar of retirement incomes policy in developed economies. However, the framework adopted differs from country to country. Australia, Sweden and Switzerland have introduced compulsory accounts, while in the United Kingdom employees automatically receive accounts with an option to opt-out. At the same time, the debate on social security reform in the United States centres on whether funds should be diverted into individual accounts. Policy-makers around the world have generally assumed that introducing such pre-funded pension schemes improves retirement incomes and increases household wealth. However, there has been relatively little empirical work that tests this assumption.

This paper focuses on the effect that Australia's system of compulsory pension accounts (the 'Superannuation Guarantee') has had on household saving. This scheme, which was introduced over 1986–1992, requires employers to pay a percentage of their employees' earnings into individual pension accounts.¹ The accounts are managed by private sector pension funds and cannot be accessed until the employee retires after the age of 55.² The initial contribution rate was set at 3 per cent of labour income in 1986 and gradually increased to 9 per cent by 2002. The scheme has raised pension plan coverage from around 40 per cent of the workforce in 1983 to 90 per cent since the mid 1990s.³

Australia's system provides a natural experiment since a small share of employees do not receive employer contributions to pension accounts. As a result, it is

¹ The initial scheme was known as Award Superannuation from June 1986. The broader Superannuation Guarantee scheme was introduced in July 1992.

² The Preservation Age is 55 for persons born before 1 July 1960 and rises to 60 for persons born after 30 June 1964.

³ For a more comprehensive description of retirement incomes policy in Australia, see Edey and Gower (2000), Connolly and Kohler (2004) and Bateman and Kingston (forthcoming).

possible to compare households that received contributions with those that did not. Using data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey, this paper attempts to answer three related questions:

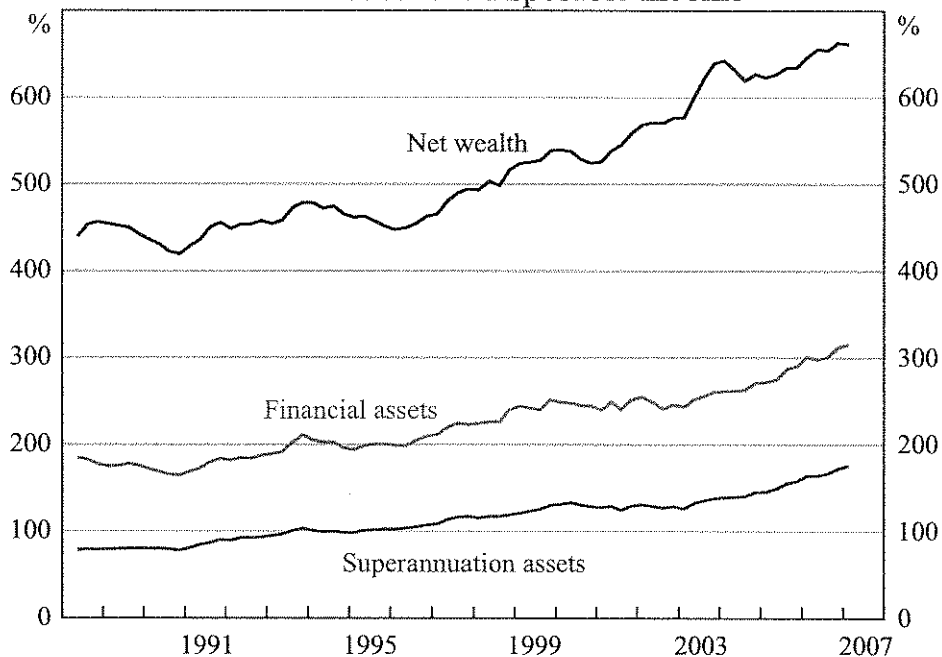
- i. Have compulsory pension accounts increased household wealth?
- ii. What effect do compulsory pension accounts have on voluntary saving for retirement?
- iii. Do compulsory pension accounts influence the timing of retirement?

Turning to the first question, compulsory pension accounts will raise wealth if households do not increase consumption to fully offset the growth of their pension accounts. In a life-cycle model with no financial constraints, households who view their pension accounts as perfect substitutes for other assets would reduce those other assets (or, if need be, borrow) so as to offset compulsory contributions to their pension accounts, leaving their net wealth unchanged. However, if some households are financially constrained, they may not be able to do this. Furthermore, households might not view their pension accounts as perfect substitutes for other forms of saving. For instance, households may value the balance in their retirement account less than a more liquid investment if they are financially constrained. Finally, tax incentives could lead households to voluntarily save a higher share of their wealth in pension accounts, although the effect on net wealth is theoretically ambiguous due to offsetting income and substitution effects.

While this first question has not been addressed directly in the literature, there are several related findings. When the scheme was introduced, the Australian Government projected that for every dollar contributed to the pension accounts, other savings would fall (be 'offset') by 30 to 50 cents. Using macroeconomic data, Connolly and Kohler (2004) find that the offset is likely to be in this range, with a point estimate of 38 cents. However, the balance in pension accounts reflects not only contributions, but investment returns. Dvornak and Kohler (2007) examine the effect of increases in wealth (including investment returns) on consumption, although they do not examine the impact of compulsory pension accounts in particular. According to Dvornak and Kohler, a one dollar increase in stock market wealth (including pension accounts) results in consumption rising by between six and nine cents. Since compulsory pension account balances reflect

both contributions and investment returns, these two papers can provide us with reasonable upper- and lower-bound estimates of the effect of the accounts on household wealth. One could expect that compulsory pension accounts would increase wealth by between 62 cents in the dollar (the effect of compulsory pension contributions in Connolly and Kohler) and 94 cents in the dollar (the effect of stock market wealth in Dvornak and Kohler). Broadly consistent with this, aggregate pension (superannuation) assets have increased significantly over the past two decades, rising by almost 100 percentage points as a share of household income, while financial assets and total net wealth have increased by around 130 and 230 percentage points respectively as a share of household income (Figure 1).

Figure 1: Household Wealth
Ratio to household disposable income



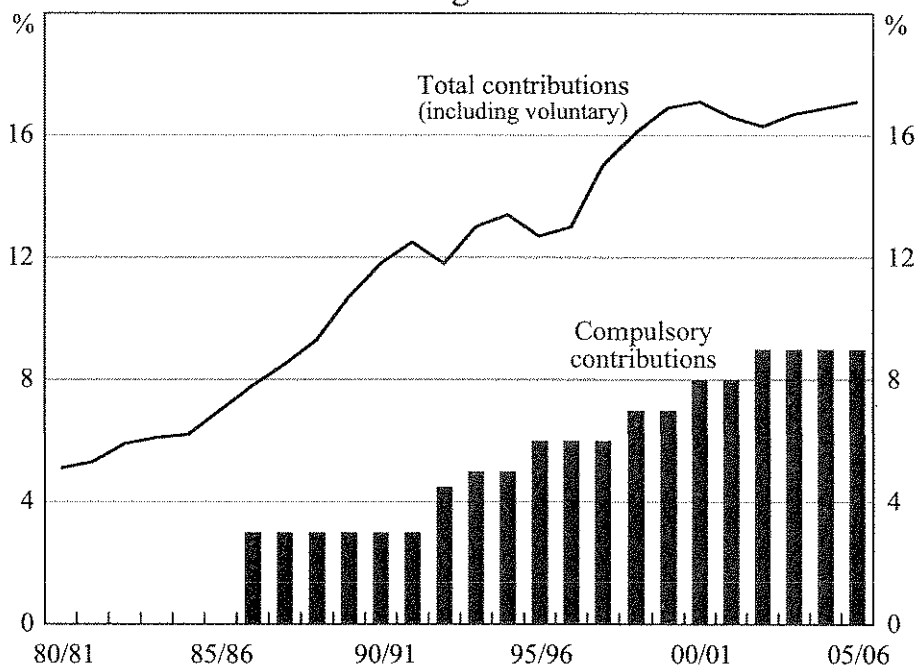
Sources: ABS; RBA

For the purpose of analysing retirement incomes, it is possible to decompose household saving into three parts: compulsory pension contributions, voluntary pension contributions and non-pension saving. In answering the second question above, I define voluntary retirement saving as making voluntary contributions to pension accounts, where these funds cannot be accessed until retirement.⁴

⁴ Non-pension saving can also be consumed in retirement. However, only contributions to pension accounts are guaranteed to be for the purpose of retirement saving, as a result of the preservation rules.

Compulsory pension accounts will only increase retirement incomes if households do not reduce their voluntary retirement saving in response. Since compulsory and voluntary pension contributions are close substitutes, households could be expected to reduce their voluntary contributions in response to an increase in compulsory contributions. On the other hand, the implementation of a compulsory pension account scheme might actually increase voluntary saving for retirement by shifting household preferences. For instance, if these accounts alert households to the importance of retirement planning, then they may choose to save more for retirement (Mariger 1997 and Elmendorf and Liebman 2000 make similar arguments in the context of the US debate on pension reform). Furthermore, by automatically providing households with pension accounts, the compulsory system may make it more convenient for them to save.⁵ Some employers also provide employees with saving incentives such as matched contributions. In aggregate, total contributions to pension accounts (including voluntary contributions) have increased since 1986, broadly in line with the rising compulsory contribution rate (Figure 2).

Figure 2: Contributions to Pension Accounts
Per cent of wages and salaries

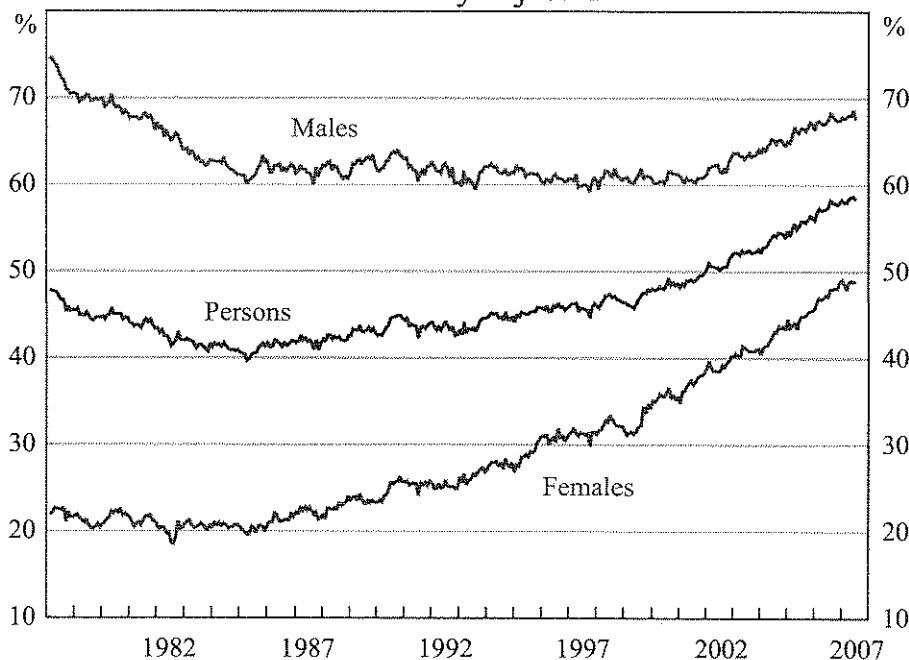


Sources: ABS; Australian Taxation Office; RBA

⁵ This is analogous to the finding of Madrian and Shea (2001) that households are more likely to save in 401(k) accounts in the US if they are automatically enrolled by their employer.

The third question is whether compulsory pension accounts could also influence the timing of retirement. If contributions are not completely offset by reductions in other saving, households with compulsory pension accounts will accumulate more wealth as they approach retirement than households without accounts. Assuming that leisure is a normal good, these households would prefer to retire early (Freebairn 2004). However, Samwick (1998) and Gustman and Steinmeier (2001) find that the level of wealth has only a small effect on the retirement decision. Compulsory pension accounts could also influence the retirement decision by emphasising to households the importance of retirement planning, encouraging them to work longer to achieve an acceptable standard of living in retirement. In aggregate, the labour force participation rate of persons aged 55 to 64 has been increasing since 1986, mainly due to higher female participation, but also due to a recent turnaround in male participation among this age group (Figure 3). It is worth noting, however, that since the analysis in this paper is based on data for the 2002 to 2003 period, it says nothing about any effects on saving and retirement behaviour associated with the changes to superannuation announced in the 2006 Budget.

Figure 3: Participation Rate of 55–64 Age Group
Seasonally adjusted



Sources: ABS; RBA

The remainder of the paper is structured as follows: in Section 2, the methodology is outlined; in Section 3, the dataset is introduced; in Section 4 the results are analysed; and the conclusions are drawn in Section 5.

2. Methodology

2.1 Identification Strategy

The aim is to estimate the effect of compulsory pension accounts on household wealth, retirement saving and the timing of retirement. Australia's system provides a natural experiment, as around 8 per cent of employees did not receive employer contributions to pension accounts in August 2002 (ABS 2003b). Therefore, households that received contributions can be compared with those that did not. The main exemptions from making compulsory contributions are for the employers of individuals earning less than \$450 per month, those under 18 years of age who work less than 30 hours a week and certain jobs such as transport drivers, household employees and providers of child care in the home.⁶ Those who are not remunerated as employees, such as independent contractors and the self-employed, are also exempt. Finally, there may be a small percentage of employers who are avoiding making contributions despite being legally required to do so. Such employers are likely to be part of the underground economy, which the ABS (2003a) has estimated to be up to 2 per cent of GDP.

The key assumption underlying the identification strategy is that the decision of the Government and employers as to whether employees receive compulsory pension contributions is exogenous with respect to the employees' unobserved taste for saving, after controlling for covariates. This assumption is analogous to the 401(k) eligibility experiment of Poterba, Venti and Wise (1996) for the US, where it was assumed that employers choose whether their employees are eligible to contribute to a 401(k) plan. It is then possible to measure the effect of eligibility by comparing eligible employees to ineligible employees.

⁶ Some persons in the following occupations may not receive pension contributions: artists, painters, photographers, journalists, transport drivers, army reservists and child care and personal services workers in the home (who work for not more than 30 hours per week).

One way to test the validity of this identification strategy would be to compare the two groups before the introduction of compulsory pension accounts. Unfortunately, the data required to conduct such an analysis are not available for Australia. Instead, the subjective saving behaviour of both groups can be examined subsequent to the introduction of compulsory pension accounts. I find that the two groups have similar reasons for saving, horizons for saving and appetites for risk (see Appendix A, Table A1).⁷ However, if compulsory pension accounts were to fundamentally alter household saving behaviour, then comparing the two groups after the introduction of the accounts may not reflect their behaviour in the absence of such accounts.

The obvious violation of this identification assumption is the self-employment exemption. The self-employed may choose not to remunerate their household as ‘employees’ so as to avoid having to pay (and receive) compulsory pension contributions. This decision could be correlated with their unobserved taste for saving. I control for this in several ways: employers and own-account workers are excluded from the sample; and for persons who are employees of their own business, self-employment is included as a covariate and also interacted with the variable measuring whether or not households receive compulsory pension contributions.

2.2 Household Wealth

To measure the effect of compulsory pension accounts on wealth, I estimate the following regression:

$$\frac{W}{Y_i} = \alpha_1 + R_i\beta_1 + X_i\gamma_1 + \varepsilon_{i1} \quad (1)$$

where: $\frac{W}{Y_i}$ is a measure of the wealth-to-income ratio; R_i is a dummy variable that takes the value 1 if household i receives compulsory pension contributions and 0 otherwise; X_i is a matrix of covariates; α_1 , β_1 and γ_1 are parameters; and ε_{i1} is an independent and identically distributed error term. I estimate the effect on the

⁷ Pence (2002) conducted a very similar exercise for 401(k) participants, but with the added advantage of access to subjective saving behaviour data that pre-dated the widespread adoption of 401(k)s. She concluded that participation in 401(k)s did not appear to fundamentally alter saving behaviour.

wealth-to-income ratio since compulsory contributions to pension accounts should be proportional to labour income. If compulsory contributions have a positive effect on the wealth-to-income ratio, then $\beta_1 > 0$. To reduce the influence of outliers in the wealth distribution on the estimates, median regression is used with bootstrapped standard errors.

To obtain an estimate of the effect of a marginal increase in compulsory pension account balances on household wealth, I estimate the following regression specification:

$$W_i = \alpha_2 + A_i\beta_2 + X_i\gamma_2 + \varepsilon_{i2} \quad (2)$$

where: A_i is an estimate of the value of the compulsory pension account of household i ; and β_2 is a parameter that measures the marginal effect of a dollar of saving in compulsory pension accounts on net wealth.

2.3 Voluntary Saving for Retirement

The decision of households to make voluntary contributions to their pension accounts can be modelled as a function of whether they receive compulsory pension account contributions:

$$P(V_i = 1 | R_i, X_i) = G(\alpha_3 + R_i\beta_3 + X_i\gamma_3) \quad (3)$$

where V_i takes the value 1 if household i makes voluntary contributions and 0 otherwise. Since V_i is a dummy variable, this regression is estimated as a probit model, where G is the standard normal cumulative distribution function. If $\beta_3 > 0$, there is a positive relationship between employers making compulsory contributions and employees making voluntary contributions (and vice versa if $\beta_3 < 0$). Since the magnitudes of the coefficients in a probit model have no straightforward economic interpretation, marginal effects (the estimated changes in the probability in response to changes in regressors) are reported.

The magnitude of the effect on voluntary saving for retirement can also be modelled using data on the share of income that households voluntarily contribute to their pension accounts as the regressand. In this case, V_i is continuous, but has a lower threshold of 0 per cent, since households cannot make withdrawals from

their retirement accounts prior to retirement. Hence a tobit model is estimated and marginal effects are reported. If the marginal effect is greater than zero, then compulsory accounts result in employees making larger voluntary contributions.

2.4 Retirement Intentions

Since Australia's compulsory pension accounts policy has only been operating fully since 1992, it is too early to estimate the effect of compulsory accounts on retirement outcomes. Instead, to obtain some preliminary evidence, I estimate the effect on the retirement intentions of working household members aged over 45. There are two variables that can be analysed. First, it is possible to examine whether household members actually have an intended age of retirement:

$$P(R_i^e = 1 | R_i, X_i) = G(\alpha_4 + R_i\beta_4 + X_i\gamma_4) \quad (4)$$

where R_i^e takes the value 1 if at least one household member aged over 45 has an intended retirement age and 0 otherwise. Whether household members have an intended retirement age could be considered a partial indicator of the extent to which the household has engaged in retirement planning. If $\beta_4 > 0$, then compulsory pension accounts increase the likelihood that households have an intended age of retirement.

Second, the effect on the average intended age of retirement can be examined (for those households where at least one person specified an intended retirement age):

$$R_i^e = \alpha_5 + R_i\beta_5 + X_i\gamma_5 + \varepsilon_{i5} \quad (5)$$

where R_i^e is the average intended age of retirement of working household members over the age of 45. If $\beta_5 < 0$, then compulsory accounts encourage early retirement.

2.5 Controlling for Other Factors Affecting Saving

The aim is to develop a model of saving behaviour where, after controlling for covariates, the decision of the government and employers as to whether households receive compulsory pension contributions is exogenous with respect to households'

unobserved taste for saving.⁸ Therefore, in the matrix of covariates, X_i , I include: household income, age, gender and health condition of the household head, which affect saving through the permanent-income and life-cycle hypotheses; whether someone in the household is self-employed; the industry in which the household head works, since institutional arrangements for pensions differ by industry; and the subjective job insecurity of the household head, to control for the fact that households not receiving pension contributions are more likely to be casually employed or on contract, and may have a greater precautionary motive for saving.

Other covariates typically used in wealth regressions are also included: the education level of the household head, as an indicator of human capital and possibly of financial sophistication; the marital status of the household head and family size, which can affect households' saving; location, which is an important explainer of property value; and the number of years the household head has spent in the workforce, which controls for households' exposure to pension account accumulation and income flows.⁹ Where a covariate is a continuous variable (such as age and income), it is specified using a quadratic form (with a linear and a squared term) to allow for potential non-linearities.

3. Data

This paper uses the confidentialised unit record dataset from the HILDA Survey (Release 3.0), a household-based panel study that began in 2001 from a reference population of all members of private dwellings in Australia. Wave 1 of the panel consisted of 7 682 households and 19 914 individuals. In Wave 2, conducted between 21 August 2002 and 19 March 2003, a special module collected comprehensive and detailed wealth data from each household. The key question that measures whether households receive compulsory pension contributions is: 'Does your employer/business make contributions into a superannuation scheme on your behalf?'

⁸ Ideally, I would also model intra-household decisions, since the employment experiences and characteristics of different household members could affect household saving. However, many components of wealth have only been surveyed on a household basis, so the modelling of intra-household decisions is beyond the scope of this paper.

⁹ See, for example, Poterba *et al* (1996) and Pence (2001).

Table 1 displays characteristics for five different samples to allow separate analysis of the effect of the reform for low-income and high-income households and to determine whether the presence of financial constraints is important, as theory would suggest. The first sample is the full sample, which includes all households where the household head is aged below 65 years and where someone in the household is employed and either receives or does not receive compulsory pension contributions.¹⁰ The second sample is a subset of this full sample, including only households with below-median incomes, while the third sample includes only those with above-median incomes. The fourth sample is based on the full sample, but is limited to households where the household head indicated that they are financially constrained, following the definition in La Cava and Simon (2003).¹¹ The fifth sample includes all non-financially constrained households. I analyse financially constrained households separately since they are likely to have greater difficulty offsetting compulsory saving in pension accounts. Selecting households on this basis may also help to reduce unobserved heterogeneity, since households facing financial constraints may share saving behaviours that cannot otherwise be observed.

Around 6.5 per cent of households in the full sample do not receive compulsory pension contributions. This is broadly consistent with ABS estimates of the proportion of employees not covered by the system. By income, the proportion not covered ranges from 9.6 per cent for below-median-income households to 3.4 per cent for above-median-income households. The latter group is quite small, so results for the above-median-income sample should be interpreted with a greater degree of caution.

¹⁰ This excludes households for which no definitive answer was given to the question of whether employer contributions were made. The household head is defined as the most important provider of income. A hierarchy of characteristics is used to determine the household head: i. income; ii. labour income; iii. labour force status; and iv. age, with characteristics lower down the hierarchy only used in case of a tie between household members.

¹¹ The financially constrained are defined as responding 'yes' to any of the following questions: having difficulty raising \$2 000 in an emergency (for example, would need to borrow funds, sell an asset or could not raise the funds); difficulty paying utility bills on time; difficulty paying mortgage/rent on time; pawned or sold something; went without meals; was unable to heat home; asked for financial help from friends or family.

Table 1: Characteristics of Samples

	Full sample	Below-median income	Above-median income	Financially constrained	Non-financially constrained
No compulsory pension contributions (per cent)	6.5	9.6	3.4	8.0	4.8
Median household disposable income (\$)	49 705	33 398	70 145	46 520	54 239
Age of household head (years)	40	38	42	39	41
Makes voluntary super contributions (per cent)	36.8	24.3	49.4	32.1	42.2
Median net financial wealth (\$)	73 630	37 060	127 250	49 830	108 000
Median net wealth (\$)	223 100	106 734	390 500	155 613	333 700
Number of households	4 379	2 190	2 189	2 336	2 043

Source: HILDA Survey, Release 3.0

Two measures of net wealth are considered in this paper. The narrow definition of wealth includes financial wealth ('net financial wealth'); while the broad definition also includes business equity and housing equity ('net wealth').¹² Since private businesses and houses are rarely traded, the accuracy of business and housing equity data is likely to be lower than it is for financial assets data, where prices are updated by financial markets. The narrow measure is equivalent to the net financial wealth measure used in the 401(k) literature by Poterba *et al* (1996). The two wealth measures are also constructed including and excluding pension assets so that the effect of receiving compulsory pension contributions can be broken into the effect on pension assets and the effect on other assets.

Unfortunately, it is not possible to measure directly the size of each household's compulsory pension account, C , since most households are also allowed to make voluntary contributions into the same account. Instead, I construct an estimate by taking the wages and salaries of employees who reported receiving pension contributions and extrapolate it back to 1992, when the Superannuation Guarantee was introduced, using data on average earnings by industry from the ABS. I then obtain the compulsory pension contributions by multiplying wages and salaries in each year by the contribution rate in that particular year, adjusting for the taxation

¹² Housing/business equity is defined as housing/business assets minus housing/business debts.

of contributions. If the employees report that they were employed for less than 10 years (the length of time since the Superannuation Guarantee was introduced), I assume contributions have only been made for the number of years that they have been employed. I then cumulate the contributions into a stock using aggregate pension fund investment returns data adjusted for the taxation of investment income.

Job mobility is a potential source of measurement error in our estimates since we can only observe whether contributions were being made when respondents were surveyed during 2002/03. Nevertheless, as long as employees move between jobs where their contributions status remains unchanged, our measure remains sound. In the full sample, the household head spent, on average, 7.3 years in their current job (the median time was 4 years). However, the average period that the household head spent in the same occupation was 10.2 years while the median was 7 years. Assuming that jobs in the same occupation would be likely to offer similar working conditions, then job mobility may not be such a large source of measurement error. Furthermore, since the contribution rate gradually increased over the 1990s from 3 per cent to 9 per cent, wages in earlier years receive less weight in estimates of pension account balances.

3.1 Compulsory Pension Coverage

The bulk of the households not receiving compulsory pension contributions appear to fall into at least one of the exemptions. The first five rows of Table 2 show the percentage of the sample that fall within the exemptions. Another indicator of whether households are exempt is if tax is withheld from income. Employees who earn below the tax-free threshold do not need to have income tax withheld and are exempt, along with independent contractors and the self-employed, who are not remunerated through wages and salaries. Cumulatively, the exemptions appear to cover 77.5 per cent of the households where no working household members receive compulsory pension contributions.

The remaining households that do not receive compulsory pension contributions may have jobs in the underground economy. These households represent 1.4 per cent of the full sample, consistent with estimates of the size of the underground economy. Drawing on research by the ABS (2003a), I can identify several factors that may be correlated with such jobs, including: no leave entitlements or an

impermanent contract; small workplaces; or service industries where remuneration outside the tax system may be more prevalent.¹³ Cumulatively, 97.8 per cent of the households not receiving compulsory pension contributions can be explained by the exemptions or the factors correlated with jobs in the underground economy.

Table 2: Explaining Compulsory Pension Coverage

	Characteristics of the household head				
	No compulsory pension contributions ^(a)		Compulsory pension contributions ^(b)		Probit model of coverage
	Per cent	Cumulative (per cent)	Per cent	Cumulative (per cent)	Marginal effect ^(c) (per cent)
Labour income less than \$450 per month	47.5	47.5	7.9	7.9	-3.6***
Self-employed	20.8	58.5	6.6	13.2	-5.1***
Under 18 and working fewer than 30 hours/week	1.1	58.8	0.0	13.2	-25.5*
Work in industry with exemption	5.6	62.0	5.3	17.9	-0.2
Income tax not withheld or not receiving wage/salary	59.9	77.5	8.2	19.2	-16.7***
No leave entitlements or impermanent contract	55.6	94.7	22.9	38.3	-10.2***
Fewer than 20 workers in workplace	71.1	96.5	38.1	55.7	-0.9*
Service industries with low coverage rates	52.1	97.8	26.8	63.6	-1.7***
Pseudo R ²					32.6

Notes: *** and * represent significance at the 1 and 10 per cent levels, respectively, for the test of the underlying coefficient being 0.

(a) 6.5 per cent of full sample

(b) 93.5 per cent of full sample

(c) The marginal effect is for discrete change of dummy variable from 0 to 1

Source: HILDA Survey, Release 3.0

¹³ As measured by the ABS, the industries with lower employer superannuation coverage are: agriculture, forestry & fishing, construction, retail trade, hospitality, cultural & recreational services and personal & other services.

A probit model confirms that most of the factors in Table 2 significantly reduce the probability that the household will receive compulsory pension contributions. The only factor that is statistically insignificant is ‘work in an industry with exemption’. This result may be due to employment-by-industry data not being sufficiently disaggregated to distinguish the exemptions accurately. Even so, many households not receiving compulsory pension contributions have similar characteristics to those who do: 64 per cent of the households receiving contributions share at least one of the characteristics listed in Table 2. This can give us some confidence that households not receiving compulsory pension contributions represent a reasonable control group, since they do not appear to be intrinsically different from many of the households receiving contributions.

4. Empirical Results

4.1 Household Wealth

Table 3 presents the results for the estimated median effect of receiving compulsory pension contributions on the wealth-to-income ratio (Equation (1)). For the full sample, receiving contributions significantly increases the net financial wealth-to-income ratio by 20.3 per cent of income. When I disaggregate this into the contribution from pension assets and other assets, the effect is mainly due to an increase in pension assets of 15.8 per cent of income. Households do not appear to be offsetting the increase in pension assets by reducing other financial wealth, since the point estimate for the effect on non-pension assets is positive (4.4 per cent) and statistically insignificant. When business and housing equity are added to obtain a measure of total net wealth, the results are not statistically significant but the effect is still economically sizeable, at 46.7 per cent of income.

The results for the sub-samples show that the effect of receiving contributions on the financial wealth-to-income ratio is positive and generally significant at the 10 per cent level. For below-median-income households, the effect on financial wealth is 21.1 per cent of income and appears to be dominated by an implied effect on pension assets of 17.4 percentage points. When the net wealth-to-income ratio is used, the results are insignificant for the sub-samples. While it is likely that net wealth is measured less accurately than financial wealth, reducing the precision of our estimates, the effect of receiving contributions on net wealth is economically significant for all the samples. The point estimates are larger for below-median-

income and financially constrained households than when net financial wealth is used, however, the differences are not likely to be statistically significant.

Table 3: Effect of Compulsory Pension Contributions on Household Net Wealth to Gross Income Ratio

	Full sample	Below-median income	Above-median income	Financially constrained	Non-financially constrained
Net financial wealth					
Including assets in pension accounts	20.3** (10.0)	21.1* (11.5)	61.2** (30.0)	15.9 (10.1)	56.4* (30.4)
Excluding assets in pension accounts	4.4 (5.3)	3.8 (5.3)	14.7 (14.7)	3.7 (5.0)	9.6 (16.0)
<i>Implied effect on pension assets</i>	15.8	17.4	46.5	12.2	46.8
Net wealth					
Including assets in pension accounts	46.7 (28.7)	36.1 (36.3)	59.8 (65.1)	20.9 (31.0)	55.3 (52.0)
Excluding assets in pension accounts	4.2 (20.0)	14.9 (29.8)	11.2 (44.5)	-10.6 (25.7)	54.7 (54.8)
<i>Implied effect on pension assets</i>	42.5	21.2	48.6	31.6	0.6

Notes: Standard errors are in brackets. ** and * represent significance at the 5 and 10 per cent levels, respectively. Top-coded net wealth and gross income observations have been excluded.

While the results in Table 3 suggest that compulsory pension contributions have a positive effect on net wealth, they only provide an imprecise estimate of the magnitude of the effect. More precise estimates of the marginal effect of a dollar of compulsory pension assets on household wealth can be obtained by estimating Equation (2), with the results presented in Table 4.¹⁴ Overall, the results suggest that marginal increases in compulsory pension account balances largely flow through to increases in household wealth. For the full sample, an extra dollar in compulsory pension accounts increases net financial wealth by 91 cents, suggesting an offset of only 9 cents through reductions in other assets. This appears to occur mainly through reductions in non-pension financial wealth, which falls by a statistically significant 19 cents; it should be noted that the equivalent coefficient in Table 3 was positive, though insignificant. When the broadest

¹⁴ See Appendix A, Table A4 for the complete set of estimates from the net financial wealth model for the full sample.

measure of wealth is used, there does not appear to be evidence of any offset, with household saving increasing by 133 cents for every extra dollar in compulsory superannuation. While this point estimate implies that pension assets increase by more than a dollar in response to an extra dollar of compulsory pension assets (partly offset by a reduction in non-pension financial wealth), this estimate is not significantly different from 1. In other words, the results for the broader measure of net wealth are once again imprecisely estimated and should be treated with a high degree of caution.

Table 4: Marginal Effect of Compulsory Contributions on Household Wealth
Net wealth as a per cent of gross household income

	Full sample	Below-median income	Above-median income	Financially constrained	Non-financially constrained
Net financial wealth					
Including assets in pension accounts	0.91*** (0.15)	0.77*** (0.20)	0.83*** (0.27)	0.93*** (0.20)	0.85 (0.84)
Excluding assets in pension accounts	-0.19** (0.10)	0.09 (0.11)	-0.30** (0.12)	-0.08 (0.09)	-0.38** (0.18)
<i>Implied effect on pension assets</i>	<i>1.10</i>	<i>0.69</i>	<i>1.12</i>	<i>1.02</i>	<i>1.23</i>
Net wealth					
Including assets in pension accounts	1.33 (1.02)	0.71 (0.53)	0.88 (0.61)	0.34 (0.46)	0.99 (0.80)
Excluding assets in pension accounts	-0.41 (0.36)	-0.28 (0.45)	-0.91 (0.41)	-0.79 (0.36)	-0.77 (0.77)
<i>Implied effect on pension assets</i>	<i>1.74</i>	<i>0.99</i>	<i>1.79</i>	<i>1.13</i>	<i>1.76</i>

Notes: Standard errors are in brackets. *** and ** represent significance at the 1 and 5 per cent levels, respectively. Top-coded net wealth and gross income observations have been excluded.

The results for the sub-samples show that the effect of an extra dollar in compulsory pension accounts on net financial wealth is largest for financially constrained households, whose financial wealth increases by 93 cents for every extra dollar in their compulsory pension accounts. In contrast, the effect on non-financially constrained households is smaller at 85 cents and is not statistically significant (the difference between the two estimates is also likely to be statistically insignificant). This is consistent with our expectations, since financially constrained households would have less opportunity to reduce holdings

of other assets to offset compulsory saving. The marginal effect of compulsory contributions on net financial wealth for above-median-income households is 83 cents, close to the effect for below-median-income households of 77 cents. In particular, above-median-income households (and non-financially constrained households as well) appear to have a larger stock of non-pension saving with which to offset compulsory contributions. Their financial wealth excluding pension assets falls by 30 cents for every extra dollar in compulsory pension accounts, while the non-pension assets of below-median-income households are not significantly affected. Interestingly, compulsory contributions appear to have more than a dollar-for-dollar effect on the pension assets of above-median-income households (and those households who are non-financially constrained). This result may be due to high-income earners making voluntary pension contributions to take advantage of their concessional tax treatment.

Overall, it would be reasonable to characterise the results in Table 4 as suggesting that household wealth increases by around 70 to 90 cents for every extra dollar in compulsory pension accounts, with the effect most pronounced for financially constrained households. This is broadly consistent with our expectations as outlined in the introduction.

4.2 Voluntary Saving for Retirement

Receiving compulsory pension contributions appears to have a positive influence on the propensity of households to voluntarily save for their retirement in pension accounts. The results of a probit model on whether households make voluntary contributions (Equation (3)) are presented in Table 5. For all the samples, the probability of making a voluntary contribution increases when households receive compulsory pension contributions and the effect is statistically significant at the 5 per cent level. In the full sample, the probability of making voluntary contributions is 19 per cent higher if the household receives compulsory contributions.

It is somewhat surprising that the effect on voluntary retirement saving is positive, since we would expect households to first offset compulsory contributions in pension accounts by reducing voluntary contributions. It is possible that compulsory pension contributions lead to higher voluntary pension contributions by highlighting the importance of retirement saving and making it more

convenient. This result is similar to findings for the United States by Madrian and Shea (2001), where households are more likely to voluntarily save in pension accounts if they are automatically enrolled by their employer.¹⁵ Nevertheless, households could still offset their retirement saving by reducing non-pension wealth, such as housing equity or other investments.

Table 5: Effect of Compulsory Contributions on Voluntary Retirement Saving
Marginal effect, per cent

	Full sample	Below-median income	Above-median income	Financially constrained	Non-financially constrained
Whether make voluntary contributions	18.6***	14.7***	15.5**	17.1***	19.5***
Voluntary contributions as per cent of labour income	1.5***	0.9***	1.7**	0.8***	2.0***

Notes: The marginal effect is for discrete change of dummy variable from 0 to 1. *** and ** represent significance at the 1 and 5 per cent levels, respectively, for the test of the underlying coefficient being 0.

To quantify the effect on voluntary retirement saving, Table 5 also presents the results of a tobit model where the regressand is the size of voluntary contributions as a per cent of income. The marginal effect of compulsory contributions is to increase voluntary contributions by around 1.5 per cent of income in the full sample. The marginal effect is estimated to be around 1 per cent of income for below-median-income and financially constrained households, compared with closer to 2 per cent for above-median-income and non-financially constrained households, implying that financial constraints do, to some extent, restrict the ability of households to save more for retirement.

The magnitude of the effect across the samples appears small but is economically significant, particularly if the extra 1.5 per cent of saving each year occurs throughout the working life of the household. Under conservative assumptions regarding investment returns on assets in these accounts, over a 40-year working life, this extra saving would cumulate after tax so as to increase the wealth of the

¹⁵ Covick (2002) suggested that means-testing arrangements on social security programs could also help to explain why some households may choose to voluntarily save more for retirement in response to a compulsory saving scheme.

household by 75 per cent of pre-retirement income.¹⁶ Assuming a replacement rate of 40 per cent of pre-retirement income, this extra saving would fully fund around 2 years of retirement. Over a 25-year retirement period, this would boost the replacement rate by around 5 percentage points.

4.3 Retirement Intentions

Table 6 presents results for the estimated effect of compulsory contributions on the average retirement intentions of households where at least one household member is still working and aged between 45 and 64. First, I find that households who receive compulsory contributions are no more likely to report an intended age of retirement (Equation (4)). Of the households where at least one member specified an intended age of retirement, receiving compulsory contributions did not have a significant effect on the average intended age of retirement (Equation (5)). These results are broadly consistent whether or not households were below the median income or were financially constrained.

	Marginal effect				
	Full sample	Below-median income	Above-median income	Financially constrained	Non-financially constrained
Whether have retirement intentions (per cent)	-1.4	-6.0	0.5	-0.2	-5.7
Age intend to retire (years)	1.3	2.4*	-0.5	0.9	1.2

Notes: The marginal effect is for discrete change of dummy variable from 0 to 1. * represents significance at the 10 per cent level for the test of the underlying coefficient being 0.

These results suggest that compulsory pension contributions do not have a significant effect on the retirement intentions of households. This is somewhat surprising given the importance of these contributions to retirement incomes. It is possible that the Superannuation Guarantee is affecting retirement intentions in several ways that could possibly be offsetting each other. For instance, the increase in net wealth due to compulsory pension accounts could bring forward the retirement age of households, assuming leisure is a normal good. However, these

¹⁶ Assuming that nominal labour income grows by 4 per cent, nominal returns to pension funds average 7 per cent and that contributions and returns are taxed at 15 per cent.

households may decide to delay retirement if the Superannuation Guarantee makes them aware that they need to save more to achieve their desired standard of living in retirement.

There are some caveats that should be taken into account when interpreting this result. In particular, it should be noted that household members aged over 45 in 2002/03 would have only been exposed to compulsory pension contributions for a fraction of their working life, while younger household members will be exposed to the system for their entire working life. Therefore this result may not be so relevant to the wider working population. Also, it is possible that retirement intentions are a poor indicator of when households will actually retire, as many household members may not have planned their retirement in detail at this stage.

4.4 Robustness Tests using Matching Estimators

An alternative way of estimating the effect of compulsory pension contributions on household saving behaviour is to use matching estimators. The technique is analogous to using the covariates, X_i , in the models in Section 2 to find a ‘financial twin’ for each household not receiving compulsory contributions from the group of households receiving contributions.¹⁷ After obtaining the closest match for each household not receiving compulsory contributions, the effect of the Superannuation Guarantee on household wealth, retirement saving and retirement intentions can be calculated.

The results are presented in Appendix A, Tables A2 and A3, and suggest that the regression results presented above are broadly robust to the use of this alternative estimation technique. In particular, compulsory pension contributions appear to have a sizeable effect on household net financial wealth and net total wealth. Households receiving compulsory contributions also appear more likely to voluntarily save for retirement in pension accounts. The only significant difference with the regression results above is that households receiving contributions intend to retire later when the matching estimator is used.

¹⁷ See Abadie *et al* (2004).

5. Conclusions

Australia's experience with compulsory pension accounts is a useful case study since the reforms have been operating for over 15 years. This paper finds that Australia's pension accounts increased household wealth, with an extra dollar in their compulsory pension accounts adding between 70 and 90 cents to household wealth. This result is consistent with some households facing financial constraints that prevent them from fully offsetting the compulsory contributions employers make on their behalf by reducing other assets or borrowing. Voluntary saving for retirement also appeared to increase slightly. This result may be due to the Superannuation Guarantee making households more aware of the need to save for retirement, or the added convenience of being able to make contributions directly into pension accounts set up by their employer. Finally, empirical estimates suggest that there is no significant effect on intentions regarding the timing of retirement. These results suggest that compulsory pension accounts can increase household saving and expected retirement incomes.

Appendix A: Tables of Results

Table A1: Compulsory Pension Coverage and Saving Behaviour

	Marginal effect, per cent				
	Full sample	Below median income	Above median income	Financially constrained	Not financially constrained
Whether saving	6.8**	6.8*	3.6	6.6*	3.8
Saving for education	-2.0	-1.5	3.1	-3.4	0.4
Saving for family reasons	2.3	1.0	2.5	1.6	5.9
Saving for home	5.3	1.1	15.2**	3.2	10.8
Saving for retirement	8.1*	5.7	9.1	4.4	8.5
Saving for ill health/emergencies	-0.8	-3.6	8.2	-5.1	11.4
Saving for future/no reason	6.6*	4.9	6.8	4.4	7.2
Time horizon for saving greater than 5 years	0.2	-1.1	3.9	-2.7	4.0
Above-average financial risk-taking	-4.2	-1.9	-12.0	-1.1	-23.7***

Notes: The marginal effect is for discrete change of dummy variable measuring compulsory pension coverage from 0 to 1. Other factors affecting saving, outlined in Section 2.5, have been controlled for. ***, ** and * represent significance at the 1, 5 and 10 per cent levels, respectively, for the test of the underlying coefficient being 0.

Table A2: Effect of Compulsory Pension Contributions on Household Wealth to Gross Income Ratio

	Full sample, median treatment effect	
	Regression	Matching estimator
Financial wealth		
Including assets in pension accounts	20.3	48.9
Excluding assets in pension accounts	4.4	12.7
<i>Implied effect on pension assets</i>	<i>15.9</i>	<i>36.2</i>
Net wealth		
Including assets in pension accounts	46.7	28.5
Excluding assets in pension accounts	4.2	-2.9
<i>Implied effect on pension assets</i>	<i>42.5</i>	<i>31.4</i>

Note: Standard errors have not been calculated for the median matching estimator.

**Table A3: Effect of Compulsory Pension Contributions on
Voluntary Saving for Retirement and the Timing of Retirement**
Full sample, average treatment effect

	Regression	Matching estimator
Whether make voluntary contributions	18.6***	10.7***
Voluntary contributions as per cent of labour income	1.5***	0.9*
Whether have retirement intentions	-1.4	-3.2
Age intend to retire (years)	1.3	5.2***

Note: *** and * represent significance at the 1 and 10 per cent levels, respectively.

Table A4: Model of Net Financial Wealth

	Coefficient	Standard error	Coefficient	Standard error
Compulsory super contributions	0.91***	0.15	58.49	4 893.76
Compulsory super contributions & self-employed	-0.38	0.65	3 957.06	5 269.38
Self-employed	38 239.85**	15 457.97	3 283.80	10 532.51
Age	-3 448.46***	1 310.07	28 862.37*	17 419.80
Age ²	59.92***	17.54	9 327.89	10 377.75
Gender	-603.35	3 359.91	3 940.05	7 352.46
Persons in household	1 511.99	4 930.28	29 715.37**	12 433.54
Persons in household ²	-75.08	675.75	15 763.10*	9 275.01
Household disposable income	0.10	0.25	-5 752.06	6 583.16
Household disposable income ²	7.73×10^{-6} ***	2.52×10^{-6}	-1 435.59	8 763.11
Years employed	179.10	973.62	7 084.61	7 564.81
Years employed ²	59.24**	24.95	6 387.86	4 635.50
Health condition	5 611.67	6 239.80	8 893.68	9 302.66
Health condition affecting work	-8 289.60	7 930.21	12 454.03	12 433.45
Job security	-36.47	153.14	21 716.26	21 521.39
Job security ²	-1.19	2.24	1 185.60	5 766.65
Finished high school only	16 259.02***	4 145.47	3 401.67	3 783.38
Finished degree	15 610.21***	5 182.85	6 269.09	6 716.18
Finished diploma only	13 866.49***	3 501.26	1 456.78	4 283.72
Married	-1 183.68	4 190.40	-3 308.02	4 934.84
Divorced	-25 599.47***	4 987.74	-3 091.47	5 788.47
Widowed	-28 751.74*	15 046.15	-7 027.52	8 833.35
De facto	-13 407.14***	4 564.14	-786.37	5 492.58
Agriculture, forestry & fishing	3 062.69	9 660.75	-14 512.94	10 906.46
Mining	29 010.77	18 539.55	-964.81	7 606.57
Utilities	87 567.48**	39 030.13	9 875.42	35 617.71
Construction	-5 728.81	6 209.44	14 460.36	17 069.42
Wholesale trade	-239.85***	6 173.07	22 435.35	20 228.94

Notes: The Pseudo R² is 0.18. ***, ** and * represent significance at the 1, 5 and 10 per cent levels, respectively.

References

Abadie A, D Drukker, JL Herr and GW Imbens (2004), 'Implementing Matching Estimators for Average Treatment Effects in Stata', *The Stata Journal*, 4(3), pp 290–311.

ABS (Australian Bureau of Statistics) (2003a), 'The Underground Economy and Australia's GDP', in 'Australian Economic Indicators', Cat No 1350.0, 30 September, pp 13–19.

ABS (2003b), 'Employee Earnings, Benefits and Trade Union Membership, Australia', Cat No 6310.0, 31 March.

Bateman H and G Kingston (forthcoming), 'Comparative Performance of Retirement Income Systems in the Anglosphere', *Accounting, Accountability and Performance*.

Connolly E and M Kohler (2004), 'The Impact of Superannuation on Household Saving', RBA Research Discussion Paper No 2004-01.

Covick O (2002), 'What Can Governments Do to Lift National Saving?', in O Covick (ed), *Policies to Boost Australian Saving: How? And Why?*, Wakefield Press, Adelaide, pp 24–39.

Dvornak N and M Kohler (2007), 'Housing Wealth, Stock Market Wealth and Consumption: A Panel Analysis for Australia', *Economic Record*, 83(261), pp 117–130.

Edey M and L Gower (2000), 'National Saving: Trends and Policy', in D Gruen and S Shrestha (eds), *The Australian Economy in the 1990s*, Proceedings of a Conference, Reserve Bank of Australia, Sydney, pp 277–311.

Elmendorf DW and JB Liebman (2000), 'Social Security Reform and National Saving in an Era of Budget Surpluses', *Brookings Papers on Economic Activity*, 2, pp 1–72.

Freebairn J (2004), 'Some Long-run Labour Market Effects of the Superannuation Guarantee', *Australian Economic Review*, 37(2), pp 191–197.

Gustman AL and TL Steinmeier (2001), 'Retirement and Wealth', *Social Security Bulletin*, 64(2), pp 66–91.

La Cava G and J Simon (2003), 'A Tale of Two Surveys: Household Debt and Financial Constraints in Australia', RBA Research Discussion Paper No 2003-08.

Madrian BC and DF Shea (2001), 'The Power of Suggestion: Inertia in 401(k) Participation and Savings Behavior', *Quarterly Journal of Economics*, 116(4), pp 1149–1187.

Mariger RP (1997), 'Social Security Privatization: What it Can and Cannot Accomplish', Board of Governors of the Federal Reserve Finance and Economics Discussion Series No 1997-32.

Pence KM (2001), '401(k)s and Household Saving: New Evidence from the Survey of Consumer Finances', Board of Governors of the Federal Reserve Finance and Economics Discussion Series No 2002-6.

Pence KM (2002), 'Nature or Nurture: Why Do 401(k) Participants Save Differently than Other Workers?', Board of Governors of the Federal Reserve Finance and Economics Discussion Series No 2002-33.

Poterba JM, SF Venti and DA Wise (1996), 'How Retirement Saving Programs Increase Saving', *Journal of Economic Perspectives*, 10(4), pp 91–112.

Samwick AA (1998), 'New Evidence on Pensions, Social Security, and the Timing of Retirement', *Journal of Public Economics*, 70(2), pp 207–236.

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