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Retirement in Australia: A Closer Look at the Financial Incentives

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Abstract

In Australia, labour force participation among older people, particularly men over the age of 55, has been declining over the last 30 years. Previous research has found that in many OECD countries, the retirement income system actually provides incentives for older workers to retire early rather than remain in the work force. We use data from the first five waves of the Household, Income and Labour Dynamics in Australia (HILDA) survey to identify any financial incentives present in the Australian retirement income system. Following Gruber & Wise (2004), we model retirement behaviour where individuals retire in the period that the present value of their lifetime retirement income is maximised. We also utilise an option value model that considers the trade-off between utility drawn from leisure and utility drawn from labour income. Our findings suggest that for men the Australian retirement system provides incentives to retire early, while for women financial incentives are less significant, as the factors that influence women's retirement behaviour are more commonly found to be family related, rather than financial incentives.

1. Introduction

This paper models the financial incentives facing mature age Australians who are deciding whether to continue in paid work or to exit the labour force. The aim is to determine whether the current superannuation and age pension system in Australia actually makes older people better off if they stop working rather than continue in the labour force. The models that we have developed extend to Australia an influential line of research initiated by Stock and Wise (1990), Coile and Gruber (1999) and Gruber and Wise (1999, 2004). In Gruber and Wise (2004), models of this type have been developed for twelve industrialised countries, which in all cases have workforce conditions and particularly retirement income arrangements quite different from Australia's. In ten of the twelve countries social security systems are shown to provide incentives to exit the labour force early.

In making the decision about when to retire, mature workers face two competing sets of financial incentives: the longer they remain in the labour force, the larger their retirement income will usually be when they do retire, but more years of work also mean fewer years of retirement. If the increase in annual retirement income due to postponement of retirement is not large enough to offset the shorter period of retirement income receipt, they have a financial incentive to exit the labour force.

Studies concerning Australian retirement behaviour have long focused on financial aspects of retirement decisions (see among others Woodland, 1987; Freebairn, Porter and Walsh, 1989; Atkinson, Creedy and Knox, 1996; Atkinson and Creedy, 1996; Atkinson and Creedy, 1997; Bacon, 1999, Jefferson (2005), Felmingham et al. (2006)). We aim to add to this literature by introducing an econometric analysis based on micro data to study the financial incentive effects on retirement outcomes.

This paper is organized as follows; section two describes the Australian retirement income system and the key elements that are likely to either encourage or discourage early retirement, section three provides information about the Household, Income and Labour Dynamics in Australia (HILDA) data that is used in this study, section four describes the construction of the financial incentive measures. Section five contains the results from estimating binary response models of retirement including these incentive

measures, and section six uses these models to simulate the effects of policy changes on the probability of leaving the labour force. Section seven concludes.

2. Australia's Retirement Income System

The Australian retirement income system is made up of three elements, which have become known as the three pillars. Firstly, a publicly funded means tested age pension; second, the mandatory private superannuation system, and third, voluntary saving, including voluntary superannuation and other long term saving through property, shares and managed funds. The Australian government provides incentives such as the deferred pension bonus plan and the senior Australians' tax offset to encourage older workers to remain in the labour force and, from 1 July 2007, will abolish taxes on superannuation benefits for those who are aged 60 or over at the time they claim their superannuation benefits.

The Age Pension

The age pension was introduced in 1908 and since that time has served as the social welfare safety net for the elderly, providing a modest benefit on the basis of need. The Australian Government has legislated to maintain the single rate age pension at a minimum of 25% of male average earnings and, as retirees solely reliant on the age pension pay no income tax, this translates to a net of tax replacement rate of 37% (Bateman and Piggot, 2001). The pension is payable to men aged 65 and over and women aged 62 and over, and is subject to means tests by which the amount of pension received is determined by a person's income or assets, whichever determines the lower rate of pension.[1] In 2002, around 82% of the population of age pension age received an age pension or similar payment and 67% of age pensioners were paid the maximum rate of pension (FaCS, 2002).

[1] The eligibility age for women is being increased to age 65 by the year 2014. Details of the means tests for the age pension are provided in appendix Table A1.

The Deferred Pension Bonus Plan

In July 1998, the deferred pension bonus plan was introduced. This scheme offered individuals reaching pension age a financial incentive to remain in the workforce. This scheme offers a once only, tax free, lump sum bonus to people who continue working instead of claiming an age pension or service pension. The amount of bonus depends on the amount of basic age pension the individual would be entitled to when they leave the workforce, the length of time they have been a member of the pension bonus scheme, and whether they are single or partnered during the time they are deferring the pension. A maximum of five years accruing membership can be taken into account for the bonus. The maximum amount of pension bonus payable, effective from March 2007, is $1283.30 for singles and $1071.70 for partnered people who defer retirement for one year and who would have been entitled to a full age pension, and increases to $32083.60 for singles and $26792.40 for partnered people who deferred their retirement for five years.

The Senior Australians' Tax Offset

The Senior Australian Tax (SATO) offset provides a further incentive for older people to continue working beyond age pension eligibility age. Introduced in July 2000, the SATO reduces the amount of tax payable by senior Australians who would be eligible for an age pension, but continue working. As of 1 July 2005, single people who meet the eligibility criteria for this tax offset can earn up to $21,968 per year ($36,494 for couples) before having to pay any income tax.

Disability Support Payment and other types of income support

There are several income support payments available to people who have not yet reached age pension eligibility age. The most commonly received income support payments for men and women over 55 but not yet eligible for the age pension are the disability support payment (DSP), unemployment benefits (NewStart Allowance and Mature age allowance) and service pension (a pension available to service men and women from the age of 60). These pensions are means tested and subject to particular eligibility requirements. A major policy concern in Australia, as in other OECD

countries (OECD, 2002), is whether mature age people who cannot get a job or who no longer want to work stay on government benefits such as the disability support payment (DSP) and NewStart until they become eligible for the age pension. The HILDA Survey data indicates that in 2003, the most common type of income support for men and women who consider themselves retired, but are still below age pension age was the Disability Support Pension.

Superannuation

Prior to the superannuation guarantee in 1992, superannuation coverage in Australia was low, and mainly limited to white collar workers. Tax concessions for voluntary superannuation contributions were first introduced in 1915 and strengthened in 1936, however the superannuation industry was largely unregulated and benefit standards were poor (Bateman and Piggot, 2001). Superannuation became more widely available in the 1970's through negotiation on its inclusion in industrial awards, but by 1974, only 32.2% of wage and salary earners (40.8% of male wage and salary earners and only 16.5% of females) were covered by superannuation (Treasury, 2001).

The 1986 National Wage Case provided for a minimum level of superannuation for employees covered by awards, when half of the negotiated 6% wage rise was to be paid in the form of a 3% employer superannuation contribution. This produced an immediate jump in superannuation coverage in the public sector to over 90 per cent (ABS, 1993). In the private sector, superannuation coverage increased progressively over the next four years, and, after the introduction of compulsory award-based superannuation in 1991, superannuation coverage increased to 79% of employees. In 1992, the government introduced the "superannuation guarantee", which requires employers to make superannuation contributions into an approved fund on behalf of their employees. Initially employer contributions were 4% of earnings, with progressive increases until the target of 9% was reached in July 2002. By June 2004, 90% of employees had some form of superannuation coverage in a superannuation system that included 10 million employees and 1.1 million employers (ATO, 2003).

The superannuation co-contribution scheme, an initiative to assist eligible individuals to save for their retirement, was first introduced in July 2003. Under this scheme, the government would match personal superannuation contributions, dollar for dollar, up to a maximum of $1000 for people whose annual income was less than $28000. The scheme was extended in 2004 to cover those with incomes of up to $58000, and the maximum co-contribution available was increased to $1500. In a further attempt to encourage labour force participation of older workers, from 1 July 2007, the 15% benefits tax on superannuation payouts will be removed for people who remain in the workforce until at least age 60. This tax cut will increase retirement incomes for those who retire after the age of 60, and encourage voluntary superannuation contributions.

Superannuation benefits may be accessed in the form of a lump sum or income stream upon reaching the preservation age, currently 55, increasing to 60 by 2025. There appears to be a strong preference for taking superannuation as a lump sum payment, even though income streams are treated more favourably by the age pension means test (Mitchell and Piggott, 2000).

3. Data

The data used for this paper come from the first five waves of the Household, Income and Labour Dynamics in Australia (HILDA) Survey. Described in more detail in Watson and Wooden (2002), the HILDA Survey began in 2001 with a large national probability sample of Australian households occupying private dwellings. The survey involved interviews with all household members over the age of 15 years. In the first wave, 7683 households representing 66 percent of all in-scope households were interviewed, generating a sample of 15,127 persons who were eligible for interviews, of whom 13,969 were successfully interviewed. Almost all of the wave 1 interviews were conducted during the period between 24 August 2001 and 21 December 2001. A crucial feature of the HILDA Survey data is the special wealth module which was included in 2002, in which detailed information was collected on individual and household level wealth (assets and debts), including superannuation holdings.

Compared with European and North American models, the data requirements for Australian modelling of the incentives to retire early are markedly different and are in fact substantially met by the HILDA Survey. For Australian research we need to know the value of individuals' superannuation and also the value of other household assets, because these are what determine retirement income. In 2002 the HILDA Survey collected superannuation and wealth data (and will do so again in 2006). In Europe and North America, by contrast, the data requirements for models include individual lifetime earnings profiles, since these are what determine final retirement income. In Australia such earnings profiles are not needed, except for individuals in defined benefit schemes, and even for them the HILDA data about superannuation and wealth holdings in 2002 give us enough information to estimate future retirement income under different scenarios of continued work versus labour force exit.

Sample Selection

The sample used for modeling consists of men and women between 55 (the superannuation preservation age) and 70 years of age. We further restrict our sample to those in paid employment when the HILDA Survey began in 2001 and who had superannuation and household wealth data from wave 2 of the HILDA Survey. Given that all the men and women in the sample were employed in 2001, we only use their data from 2002 onwards in our regressions. Each of these individuals remains in the sample until they exit employment, leaving a total of 2318 observations from 589 individuals.[2]

[2] Re-entry into the labour force for people aged 55 to 70 is relatively uncommon, with 8% of people aged between 55 and 70 who were employed in 2001 leaving the labour force and then re-entering during the period from 2002 to 2005.

4. Financial Incentives to Retire

When deciding whether to retire from the labour force or continue working, mature age workers face two competing sets of incentives: the longer they remain in the labour force, the larger their retirement income will usually be when they do retire, but more years of work also mean fewer years of retirement. If the increase in annual retirement income due to postponement of retirement is not large enough to offset the shorter period of leisure, they have a financial incentive to exit the labour force ('retire early'). Hence, the main hypothesis is that, in each observed period, the probability of mature age people working will be influenced by the strength of financial incentives to do so.

The starting point for the calculations of financial incentives to retire is the present value of expected total lifetime retirement income, or social security wealth (SSW). In this paper SSW is calculated as a combination of income from the old age pension, other income support schemes, and/or from superannuation.[3]

For a worker who is S years old and plans to retire at age R, SSW is defined as:

$$SSW_s(R) = \sum_{t=R}^{T} B(r)_t . \alpha_t . \delta^{t-S} \qquad (1)$$

Where $B(r)_t$ is the net retirement income at age t (from pensions and superannuation), T is the age of certain death (here assumed to be 102), α_t is the probability of surviving until at least age t, given survival until age t-1 and δ is the discount factor.[4] [5]

[3] The third component of retirement income, voluntary savings, is not explicitly included in the calculations of SSW, as our aim is to identify financial incentives that can be changed by government policy (i.e. by altering the eligibility rules for income support schemes or regulations on how and when superannuation can be collected). Voluntary savings is allowed to affect total income support receipt (via the assets tests for age pensions and other income support) and therefore have an indirect effect on retirement income.

[4] The conditional probabilities that are required for these calculations were derived from age and gender specific Australian Life Tables (ABS Catalogue 3302.0).

[5] A standard discount rate of 3% is used.

Financial incentive measures

For each individual we calculate three different incentive measures: the SSW accrual (Fields & Mitchell (1984), Haussman & Wise (1985), Suyoshi (1989)), the peak value (Coile and Gruber (1999)), and the option value (Stock and Wise (1990)).

SSW Accrual

Our first financial incentive measure compares potential lifetime retirement income if a person chooses to retire now with potential lifetime retirement income if the person chooses to continue to work for one more year. The difference between social security wealth if a person chooses to retire now and social security wealth if they continue working for one more year is referred to as the accrual in social security wealth.

$$\text{SSW Accrual} = SSW_t - SSW_{t-1} \qquad (2)$$

In order for the accrual measure to be positive, the increase in the future benefits due to postponement of retirement should offset the fact that the individual will receive the benefit for one less year. If the accrual is positive, there is a financial incentive to continue working. However, if social security wealth in one year's time is lower than social security wealth if the person retires now (i.e. a negative accrual), then there is a disincentive to remain in the labour force—the person gives up an extra year of retirement and their total expected social security wealth over the rest of their lifetime is less than if they had retired one year earlier.

Peak Value

SSW accrual only takes account of the benefit of working one extra year versus retiring immediately. The peak value measure, suggested by Coile and Gruber (1999), is based on an assumption that individuals considering work versus retirement have a lifetime perspective, rather than basing their decision only on the year ahead.

The peak value is the difference between the maximum possible value of expected social security wealth and expected social security wealth if the person retires now.[6]

The peak value can be defined by following equation:

$$Peak = \max(SSW_R) - SSW_t, R > t \qquad (3)$$

Investigating all possible future retirement ages allows us to identify nonlinearities in the SSW profile, which would not be apparent when only one extra year of work is considered. For example, for a person who would be eligible for the deferred age pension bonus, a small negative accrual in year *t* could be followed by a small positive accrual in year *t+1,* and an even larger positive accrual in year *t+2*.

Option Value

So far, the financial incentive measures have only considered income once the individual has retired. An alternative measure, the option value (Stock and Wise (1990)) considers the labour-leisure tradeoff by incorporating utility of consumption into the analysis. The option value is based on the idea that individuals' decisions about when to retire may be based on a desire to maximise utility during their remaining lifetime. They are thought of as balancing the utility gained from leisure in retirement, coupled with a certain retirement income, against the disutility of working coupled with a certain labour income.

Following Stock and Wise (1990), utility of consumption is represented by an isoelastic utility function in after tax income, $u(Y) = Y^{\gamma}$. The utility gained from work, or, as a proxy, the utility assumed to be derived from labour income, W_t, is given as:

$$U_W(W_t) = W_t^{\gamma} \qquad (4)$$

[6] It should also be noted that if SSW for an individual is maximum at time *t*, then the peak of the SSW process will be attained with immediate retirement, and the peak value will be exactly the same as the accrual value. Also, beyond the optimal retirement age (after SSW has peaked) the peak value calculation also collapses to the one-year accrual measure.

In order to capture the increased value of utility from leisure compared to utility from work, retirement income is given a higher weight than income from employment. Hence, the indirect utility of retirement income is:

$$U_R(B(r)_t) = (\kappa B(r)_t)^{\gamma} \qquad (5)$$

where $\kappa > 1$.

Overall, the option value is the expected gain in utility from postponing retirement to the optimal retirement age, or, in other words, the option value is the maximum utility difference between retiring at any future age and retiring now. Option value can be expressed as:

$$OV_a = \max_h (V_h - V_a), \quad h = a + 1, ..., R \qquad (6)$$

where V_a is the total expected utility of retiring at age *a,* and

V_h is the total utility of retiring at age *h* (*h* > *a*)

The total expected utility of retiring at age *a* is defined as:

$$V_a = \sum_{t=a+1}^{T} \alpha_t \delta^{t-a} [\kappa B(r)_t]^{\gamma} \qquad (7)$$

and the utility drawn from retiring at a later age, *h,* is defined as:

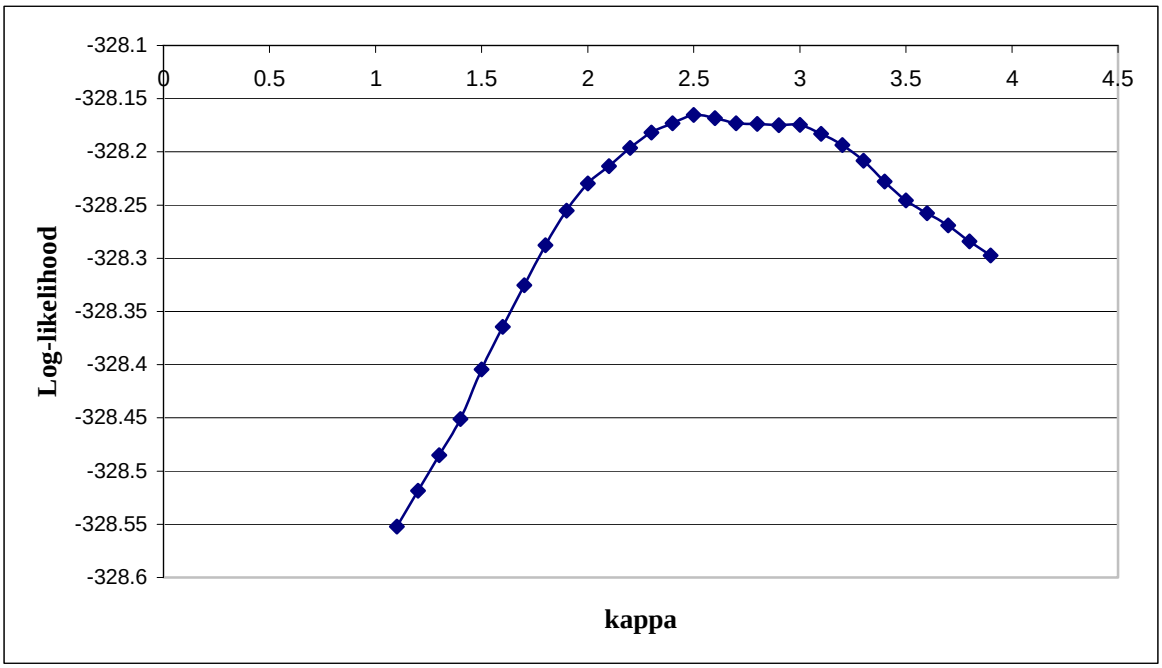
$$V_h = \sum_{t=a+1}^{h} \alpha_t \delta^{t-a} W_t^{\gamma} + \sum_{t=h+1}^{T} \alpha_t \delta^{t-a} [\kappa B(r)_t]^{\gamma} \qquad (8)$$

where W_t is the expected after-tax wage at age *t* , κ is the parameter to account for the disutility of labour.[7]

[7] Following Blundell et al. (2004), we set $\gamma = 0.75$. Reasonable changes to these values do not affect the significance of the option value variable in regressions.

A grid search algorithm was used to determine the value of the parameter κ . We estimate probit models of retirement (see section 5 for details) for positive values of κ (by increasing κ by 0.1 each time). The value of κ is chosen where the log likelihood value of the regressions is maximized. $\kappa = 2.5$ produced the highest log likelihood value. Figure 1.0 summarises the results from the grid search.

Figure 1.0: Grid search for kappa



Note: The grid search is computed for the model with linear age specification. See Table 1.3 for the complete set of control variables.

Tables 1.1 and 1.2 summarise the values of the financial incentive variables described above for men and women between the ages of 55 and 70.

Table 1.1 Financial incentive measures (medians), Men 55-70

Age	SSW_0 ($)	Accrual ($)	Peak Value ($)	Option Value
55	263816	5086	28466	70705
56	270645	4408	24622	63298
57	273369	4344	20038	56554
58	258774	4023	18980	54775
59	246856	2902	13190	41837
60	250549	2145	7681	32599
61	239014	2053	3821	22029
62	263663	1364	3296	20460
63	234848	1142	1142	14597
64	210030	682	682	13764
65	176005	-3425	-3425	10886
66	167289	-1748	-1060	10902
67	206388	-2577	-2577	8494
68	224066	-1248	-1248	7027
69	160506	-139	-139	4063
*70	144475	-5566	-5566	-1206

Note: * indicates fewer than 20 cases for men of this age.

The median level of social security wealth (if the person chooses to retire immediately) is generally higher for men who have not yet reached the age of 65 than for men aged 65 or older. Median social security wealth accrual decreases with age and becomes negative at age 65, indicating that, in terms of social security wealth, many men would be better off to retire at this age rather than continue working. The median levels of peak value and option value also decrease with age. From the age of 65 onward, peak value is negative, and the median peak value at ages from 63 onwards (with the exception of age 66) is equal to accrual, indicating that at least 50% of men at these ages would maximise their social security wealth by retiring either in one year's time (for men aged 63 and 64 where the peak value is positive) or immediately (men aged 65 and over).

Table 1.2 Financial incentive measures (medians), Women 55-70

Age	SSW_0 ($)	Accrual ($)	Peak Value ($)	Option Value
55	202783	4307	19925	58849
56	209042	3617	16621	42437
57	218577	2959	10997	36619
58	218180	2797	8810	34614
59	238064	2288	5209	24168
60	233055	2876	3678	27462
61	242605	-1995	-1994	18143
62	238423	-2737	-2737	16913
63	240327	-1829	-1829	13664
64	231866	-1155	-1155	8020
65	213688	614	767	5441
66	217720	-6086	-6086	-1400
*67	206650	-6252	-6252	-1934
*68	154735	-6513	-6513	704
*69	62918	723	3649	10141
*70	238860	-2180	-2180	709

Note: * indicates fewer than 20 cases for men of this age.

The median levels of social security wealth (and hence dollar accrual) are lower for women than for men. This is a result of the fact that women generally have lower superannuation balances than men do. As was the case for men, median SSW accrual becomes negative once women have reached age pension eligibility age. Peak value and option value were also lower for women, but showed the same pattern of decreasing with age.

5. Estimated Financial Incentives and the Probability of Retirement

In this section we present estimates of the impact of the financial incentive variables on retirement decisions by modeling the conditional probability of exit from employment. The probability of exiting labour force at time *t* for an individual *i* can be expressed as:

$$\Pr(R_{it} = 1) = \Phi(\beta' X_{it} + \delta I_{it}) \qquad (9)$$

Where R_{it} is 1 if the individual *i* has left the labour market in period *t*. X_{it} is a matrix of observed characteristics, I_{it} represents one of the financial incentive measures (i.e

accrual, peak value or option value) and $\Phi()$ is the normal cumulative distribution function.

The key hypothesis to be tested is that the higher an individual's accrual, peak value, or option value due to continuation in paid work, rather than taking retirement, the less likely it will be that he or she retired from the workforce. So, a priori we expect negative coefficients for the effects of these financial incentive measures.

Our approach is to estimate probit regressions, pooling all five years of HILDA data (2001-2005), but excluding the cases for the first year as we have selected only people who were employed in that year.[8] The explanatory variables included in the model are shown in Table 1.3.

Table 1.3 Variables Included in Multivariate Analyses – Men and Women Aged 55 to 70

		Men		*Women*	
		Mean	S.D.	Mean	S.D.
Accrual	Change in SSW if continue working for one extra year ($)	3673	5707	2189	4308
Peak value	Maximum possible increase in SSW if continue working ($'0000)	23649	42210	17170	27122
Option value	Measure of maximum possible utility from work-leisure combination	50328	50468	44563	45117
Age	Age at time of interview	59.68	3.60	59.10	3.34
Household net worth	Household net worth ($'0000)	101.26	111.14	82.14	91.73
Other household Income	Income from other family members ($)	28267	47668	38224	55084
Resident children	Has resident dependent children	0.27	0.44	0.18	0.38
Home owner	Owns home outright	0.69	0.46	0.67	0.47
Health condition	Long term health condition or disability (self-reported)	0.23	0.42	0.23	0.42
Years of education	Years of education, e.g. year 12 education = 12, bachelor degree = 15	12.85	2.17	12.65	2.10
Work experience	Percentage of years in paid work since leaving full time education	0.97	0.05	0.78	0.20
Partner employed	Partner/spouse currently employed	0.51	0.50	0.44	0.50
Partner not employed	Partner/spouse not currently employed	0.36	0.48	0.18	0.38
Job satisfaction	Job satisfaction in the previous year (out of 100)	80.41	17.64	80.37	19.82

The reasons for including the remaining explanatory variables are more straightforward. Previous studies of the factors associated with deciding whether to

[8] We also estimated several random effect models, the results were not significantly different from the pooled regression results.

retire or continue working (Woodland, 1987; Norris and Bradbury, 2001; Knox, 2003; Borland, 2005; Cai and Kalb, 2005; Cobb-Clark and Stillman, 2005) have shown that age, gender, health, education, work experience, carer responsibilities, pension eligibility, and owning a home outright are all important determinants of retirement. Not being partnered seems to encourage a longer working life, while men and women who have a partner who has left the labour force are more likely to retire themselves (Knox, 2003; Warren, 2006). Knox (2003) also found that, for men, flexible work hours and a stress-free work environment led to later retirement.

Based on these previous studies the expectations about the explanatory variables used in our model are as follows. It was expected that the older individuals were, the less likely they would be to remain in work. People in wealthier households and households where other members have high incomes would be less likely to need to continue working, and so more likely to retire. It was hypothesised that mature age people with resident dependent children would be more likely to continue in work, as they need more current income than people who do not have children to support. People who own their home outright would be less likely to remain in work as they require less cash income to achieve any given standard of living, once their mortgage has been paid off.

People with a long term health condition or disability would be less likely to be employed – many would be unable to work or have difficulty finding jobs. Naturally, the prevalence of new ill-health conditions (or the worsening of existing ones) makes employment harder to maintain from both the employer's and employee's point of view. For individuals whose health is compromised a dollar received from retirement income is likely to have considerably more utility than a dollar earned from work.

People with higher levels of education and higher levels of work experience are hypothesised to be more likely to remain in work, because they could presumably earn higher wages. However, some of those able to earn high wages might have decided that they had saved enough for a comfortable retirement and so decided to leave the labour force.

Those who were more satisfied with their job would be less likely to leave the labour force than those who were dissatisfied. Finally, it was expected that those whose partner remained in work were more likely to have kept working themselves. The idea here is that many couples presumably choose to coordinate their activities and retire at the same time.

Regression Results

Table 1.4 and 1.5 provide estimates of the marginal effects of the financial incentive measures, together with other influences on the work versus retirement decision for men and women. It can be seen that, while the signs of marginal effects of the financial incentive variables are as expected for both men and women, the effect of all of the financial incentive variables on the decision to work rather than retire are statistically significant for men, but only accrual is significant for women, and only at the 10% level. In other words, for men but not women, the desire to maximise lifetime income appears to have a significant effect on decision-making.

This Australian result is parallel to Gruber and Wise's (2004) results for most of the 12 countries they studied. In seeking to understand the gender difference, it is reasonable to point out that in most households men are still the main earners, so that it is their continuation or exit from the workforce which is going to make most difference to the household's lifetime income. Women are less likely to be in work, and on average their incomes and superannuation savings are lower. There is also a great deal of international evidence that, compared with men, they are more influenced by non-monetary factors, including whether their partner continues in work and whether they have continuing caring responsibilities, including responsibility for children still living at home (Gruber and Wise, 2004). In Australia, Warren (2006) confirmed that the factors influencing women's retirement decisions were substantially different from men's, and were more commonly based on family considerations rather than financial incentives.

Table 1.4 Decisions to Continue Working or Retire Marginal effects from Probit Regressions, Men 55-70

	Accrual		Peak		Option Value	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Financial Incentive	-0.0434**	0.015	-0.0080**	0.003	-0.0040*	0.002
Household net worth	-0.0001**	0.000	-0.0001*	0.000	-0.0001**	0.000
Age	0.0008	0.002	0.0014	0.002	0.0014	0.002
Own home outright	0.0751**	0.016	0.0713**	0.015	0.0754**	0.016
Income of other household members	-0.0002	0.002	-0.0001	0.002	0.0001**	0.002
Long term health condition	0.0658**	0.013	0.0637**	0.013	0.0670*	0.013
Resident children	-0.0640**	0.017	-0.0611**	0.017	-0.0637*	0.017
Partner employed	-0.0145	0.021	-0.0187	0.020	-0.0222	0.021
Partner not employed	0.04156*	0.019	0.0368*	0.019	0.0359+	0.019
Education (years)	0.0018	0.003	0.0018	0.003	0.0017	0.003
Work experience (%)	-0.2290*	0.111	-0.2214*	0.110	-0.2294*	0.114
Job satisfaction in previous year	-0.0003	0.000	-0.0003	0.000	-0.0003	0.000
Constant	-0.0265	0.164	-0.0549	0.158	-0.0543	0.169
Sample size	1308		1308		1308	
Log-Likelihood	-326.254		-326.196		-328.166	

Notes: Robust standard errors are in parenthesis + significant at 10%; * significant at 5%,** significant at 1%
** significant at 1%. Regression results from the model with age category dummies are reported in appendix.

Table 1.5 Decisions to Continue Working or Retire Marginal effects from Probit Regressions, Women 55-70

	Accrual		Peak		Option Value	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Financial Incentive	-0.0481+	0.027	-0.0040	0.005	-0.0024	0.003
Household net worth	-0.0002	0.000	-0.0002**	0.000	-0.0002	0.000
Age	0.0034	0.003	0.0060**	0.003	0.0058+	0.003
Own home outright	0.0486*	0.022	0.0491*	0.022	0.0487*	0.022
Income of other household members	0.0029	0.002	0.0030**	0.002	0.0029 +	0.002
Long term health condition	0.0162	0.020	0.0176*	0.020	0.0176	0.020
Resident children	-0.0450+	0.025	-0.0428*	0.026	-0.0427+	0.026
Partner employed	0.0006	0.024	-0.0010*	0.025	-0.0012	0.025
Partner not employed	0.0678*	0.024	0.0678*	0.025	0.0675*	0.025
Education (years)	0.0008	0.004	-0.0003**	0.005	-0.0003	0.005
Work experience (%)	-0.0623	0.046	-0.0627*	0.045	-0.0618	0.045
Job satisfaction in previous year	-0.0010*	0.000	-0.0010**	0.000	-0.0010*	0.000
Constant	-0.3008	0.204	-0.4366	0.184	-0.4231*	0.192
Sample size	1010		1010		1010	
Log-Likelihood	-301.956		-303.097		-303.117	

Notes: See Table 1.4

Turning to non-financial variables, for both men and women owning their home outright increased the probability of retiring, as did having a partner who had already left the workforce, and having resident dependent children had a negative influence on leaving the workforce.

For men, a striking result concerns the effect of health. Having a long term health condition or disability which has lasted for six months or more is the variable most strongly related to the decision to exit the labour force. These results suggest that, keeping other things equal, having a long term health condition or disability increases the probability of retirement by around 9%.[9] It is also the case that men with more years of work experience tend to stay in work longer than those who have less work experience. This is likely to be because they earn more, and perhaps because they enjoy their work more.

For women, confirming earlier results, 'family' variables appeared to be more important than for men. The evidence in Table 1.6 indicates that women are strongly influenced in their decision to continue in work or retire by their partner's employment status. For women, having a partner who is not in the labour force increases the probability of retiring by about 8%. Furthermore, women with higher levels of job satisfaction were more likely to remain in the labour force.

Financial incentives to retire, by age cohort

The previous results suggest that for men, the retirement income system in Australia does create financial incentives to retire, but are there incentives to retire from the labour force 'early', that is, before age pension eligibility age? In order to test the impact of financial incentives before and after age pension eligibility, the regressions were run separately for men aged 55 to 59, 60 to 64 and 65 to 70; and for women aged 55 to 60 and 61 to 70.[10] Tables 1.6 and 1.7 show the marginal effects for the financial incentive variables for men and women, by age group.[11]

[9] In this context it is important to note that around 30% of HILDA respondents who answered detailed questions about their reasons for retirement in the 2003 questionnaire reported that health was a major reason for exiting the labour force.
[10] Women were divided into only 2 age groups because age pension eligibility age is earlier (61 in 2002 compared to 65 for men) and the number of women still working after the age of 60 is relatively small.
[11] Complete regression results are available from the authors upon request..

Table 1.6 Financial Incentives to Retire – Marginal Effects, Men, by age cohort

	Age Group			
	55-59	60-64	65-70	Total (55-70)
Accrual ($)	**0.0047**	**-0.0534**$^{+}$	**-0.1880****	**-0.0434****
	(0.0079)	(0.0282)	(0.0719)	(0.0145)
Peak Value	**-0.0008**	**-0.0166***	**-0.0833****	**-0.0080****
	(0.0011)	(0.0074)	(0.0349)	(0.0027)
Option Value	**0.0001**	**-0.0088**$^{+}$	**-0.0518****	**-0.0039***
	(0.0008)	(0.0046)	(0.0210)	(0.0017)

Notes: Robust standard errors in parentheses. $^{+}$ significant at 10%; * significant at 5%; ** significant at 1%. Full results are available from the authors upon request.

For men aged between 55 and 59, the financial incentive variables are not significant and the signs of the coefficients for SSW accrual and option value are not as expected. For men aged between 60 and 64, and also for men aged between 65 and 70, all three financial incentive variables are significant and the signs are as expected. For men between 65 and 70, the marginal effects of the financial incentive variables are larger. These results suggest that financial incentives to retire early do exist, particularly for men between the ages of 60 and 64, and once age pension eligibility age has been reached, the financial incentives to retire are much stronger.

Table 1.7 Financial Incentives to retire – Marginal Effects, Women, by age cohort

	Age Group		
	55-60	61-70	Total (55-70)
Accrual ($)	**-0.0467**	**-0.0513**	**-0.0481**$^{+}$
	(0.0357)	(0.0565)	(0.0265)
Peak Value ($'0000)	**-0.0049**	**-0.0248**	**-0.0040**
	(0.0041)	(0.0192)	(0.0047)
Option Value ($'0000)	**-0.0039**$^{+}$	**-0.0066**	**-0.0024**
	(0.0024)	(0.0134)	(0.0028)

Notes: Robust standard errors in parentheses. $^{+}$ significant at 10%; * significant at 5%; ** significant at 1%.

When the regressions were run separately for women before and after age pension eligibility age, the signs of the marginal effects of all three financial incentive variables were all as expected. However, for women aged between 55 and 60, only option value was significant, and only at the 10% level, and for women aged between 61 and 70 none of the financial incentive variables were significant, confirming the conclusion that financial incentives have little importance in women's decisions to retire.

These results suggest that for men aged between 60 and 64 there are significant financial incentives to retire from the labour force, and once age pension eligibility age had been reached, the incentive to retire is much stronger. For women the financial incentives before age pension eligibility age are not significant, but there appears to be a weak incentive to retire once age pension eligibility age has been reached.

6. Simulating Policy Changes

To illustrate the effects of the financial incentive variables on retirement behaviour, we simulate the effect of delaying age pension eligibility by three years. The pension income components of the incentive measures are recalculated so that age pension is only received after the age of 68 for men and 64 for women. The probabilities of receiving other types of income support are extended by three years, based on the probability of receiving DSP, NewStart, Mature Age Allowance or Service Pension at the age of 64 for men and 60 for women. Receipt of the deferred pension bonus is also delayed by three years. The models are re-estimated with the new financial incentive variables, holding everything else constant.

Following Gruber and Wise (2004), we use three different specifications for the policy simulation. The simulations differ from each other by the use of age indicators. The first simulation method (S1) uses a linear age specification, the second method (S2), uses age indicators and the third method (S3), uses age indicators in the estimation and adjusted age indicators in the simulations. The third method aims to capture the long run effect of the policy reform by approximating the change in the social norm of the retirement age. For example, to simulate the social norm shift due to the three year eligibility delay, the age indicator for a given age is taken to be the estimated age indicator three years prior to the given age. In other words, the effects of the age indicators were shifted by three years to calculate the simulated retirement rates. The basic idea is that once the 3 year delay is introduced, the "normal" retirement age will shift to 68 for men and 64 for women. Therefore, the retirement rate spikes that we observe under current policy environment (at age 65 for men and at 61 for women) will shift to 68 for men and 64 for women.

Simulation method S3 is expected to produce the most pronounced effect in the predicted retirement rates due to the policy change, while S2 is expected to produce the least. One can argue that the figures produced by S2 will underestimate the true effect hence can be seen as lower boundaries. Similarly, method S3 will probably overestimate the true effect; hence the figures will serve as upper boundaries of the true effect of the policy reform. We also expect that the method that uses the linear age specification (method S1) will predict retirement rates within these boundaries.

Figures 1 to 3 compare the predicted probability of retirement for men when the age pension eligibility age is 65 and when eligibility age is raised to 68. The results are produced using accrual and option value models.[12] Using SSW accrual as the financial incentive measure (and method S1), Figure 1 shows that when age pension eligibility age is increased, the predicted probability of retiring for men aged between 65 and 67 is lower, and higher for men aged 68 and 69. When the linear age variable is used, the predicted probability of retiring at the age of 65 is 12.9%, compared to 15.7% for the base case, and at the age of 69, the predicted probability of retiring is 22.2% when pension eligibility age is increased by three years, compared to 19% for the base case. When age indicators are used (method S2) in Figure 2, the predicted probability of retiring at the age of 65 drops from 29.3% to 26% when age pension eligibility is delayed. In Figure 3, we approximate the long run effect of the policy change by shifting all age specific behaviour by three years in addition to the change in the accrual measure. The simulated retirement rates are drastically different than the rates that are predicted using the current policy environment. We see that the delay in age pension age shifts the expected retirement age by 3 years for men. A big drop in retirement rates at age 65 is followed by a significant increase in the predicted retirement rate at age 68. Under the policy reform, the predicted retirement rate for men at age 65 drops from 29.3 % to 8 %. By contrast, following the policy change the retirement rate at age 68 increases to 35 % from its initial predicted value of 14 %. Using the option value measure, there is hardly any difference in the predicted probability of retiring whether the age pension becomes available at the age of 65 or 68 when the change in age specific behaviour is not taken into account (Figures 4 and 5). The predicted probability of retiring at each age is increased by only around 0.2% and

[12] Figures using Peak Value model are available upon request.

0.5% at age 70 when linear age is used. The retirement rates under policy reform are significantly different than base case only when we use method S3. In Figure 6 we observe the same 3 year shift in the retirement age that we observe in the accrual model. However, this difference is entirely due to the change in the age specific behaviour rather than the change in the option value variable.

For women, using the accrual measure, the probability of retirement between the ages of 61 and 63 is lower if the pension age is delayed and for 64 and 65 year old women the probability of retirement is higher. When the linear age variable is used (Figure 7), the predicted probability of retiring for women aged 61 drops from 13.2% in the base case to 10.5%. For women aged 65, the predicted probability of retiring increases from 13.3% to 15.6%. Using option value (Figures 10 to 12) the effect of increasing age pension eligibility age on predicted probabilities of retiring is very small, in Figure 11 the decrease in the probability of retiring is shown to be around 0.2% at each age.

Figure 1: Effect of delaying pension eligibility on predicted probability of retirement, Men aged 55 to 70, using linear age and dollar accrual

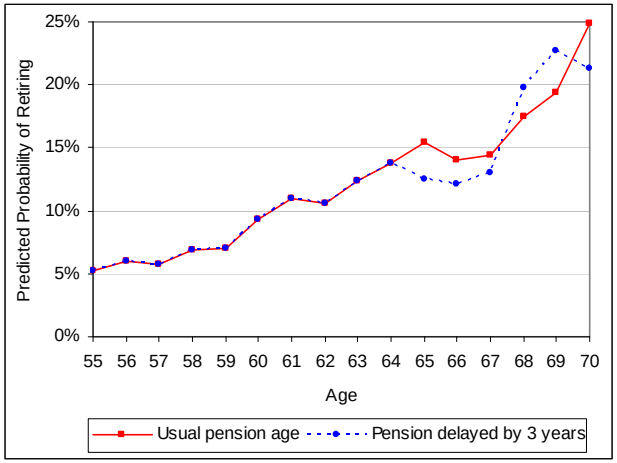


Figure 2: Effect of delaying pension eligibility on predicted probability of retirement, Men aged 55 to 70, using age dummies and dollar accrual

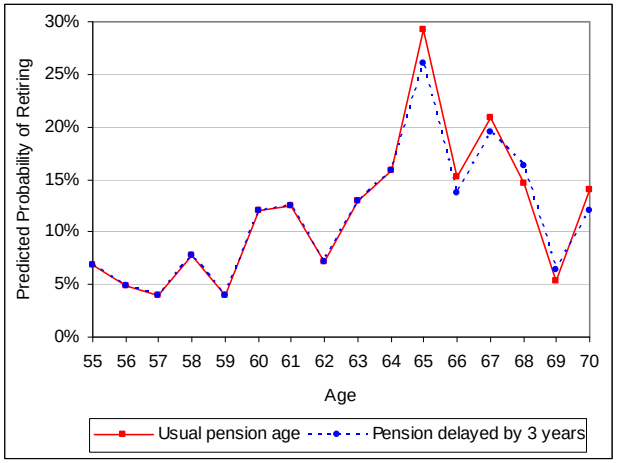


Figure 3: Effect of delaying pension eligibility on predicted probability of retirement, Men aged 55 to 70, using age dummy shift and accrual

Figure 4: Effect of delaying pension eligibility on predicted probability of retirement, Men aged 55 to 70, using linear age and option value

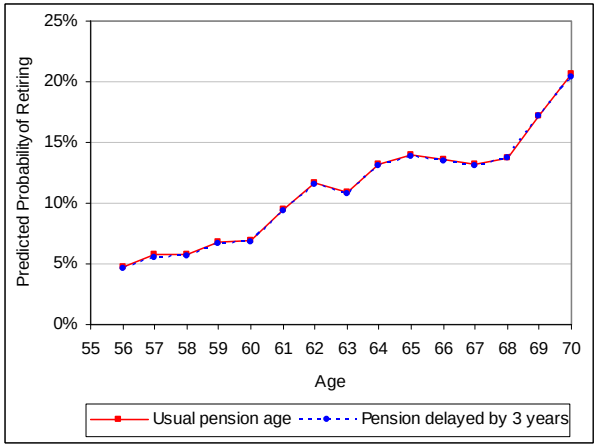


Figure 5: Effect of delaying pension eligibility on predicted probability of retirement, Men aged 55 to 70, using age dummies and option value

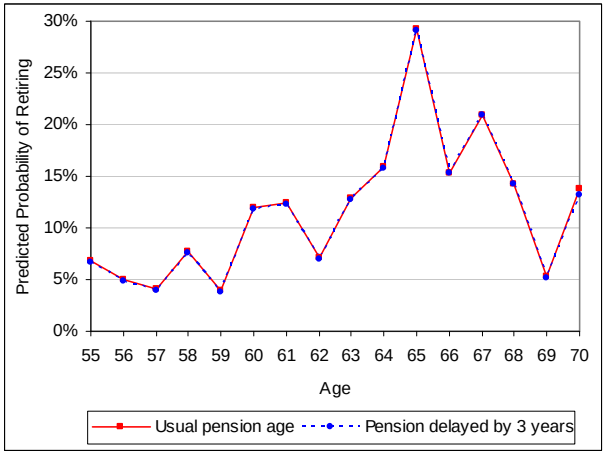


Figure 6: Effect of delaying pension eligibility on predicted probability of retirement, Men aged 55 to 70, using age dummy shift and option value

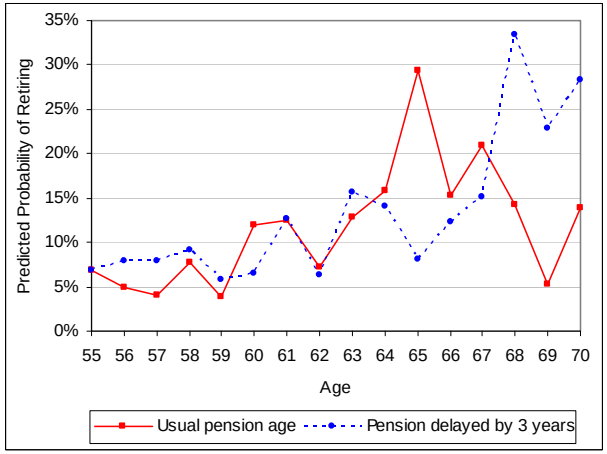


Figure 7: Effect of delaying pension eligibility on predicted probability of retirement, Women aged 55 to 70, using linear age and accrual

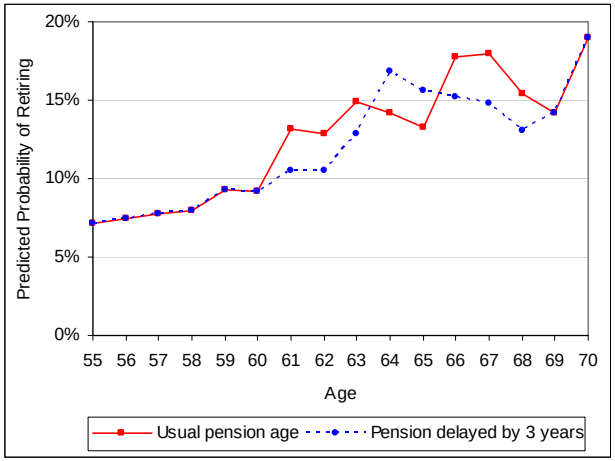


Figure 8: Effect of delaying pension eligibility on predicted probability of retirement, Women aged 55 to 70, using age dummies and accrual

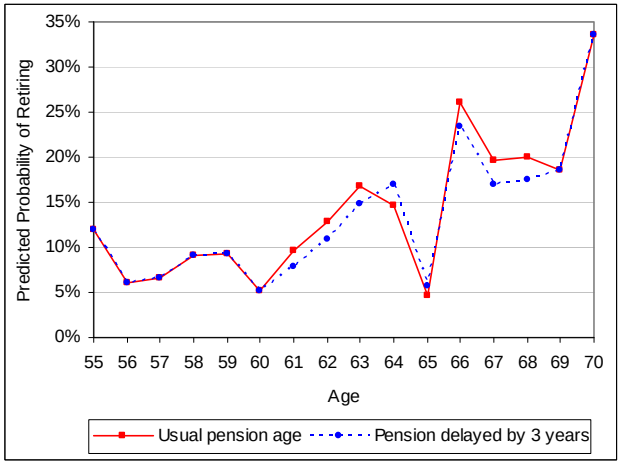


Figure 9: Effect of delaying pension eligibility on predicted probability of retirement, Women aged 55 to 70, using age dummy shift and accrual

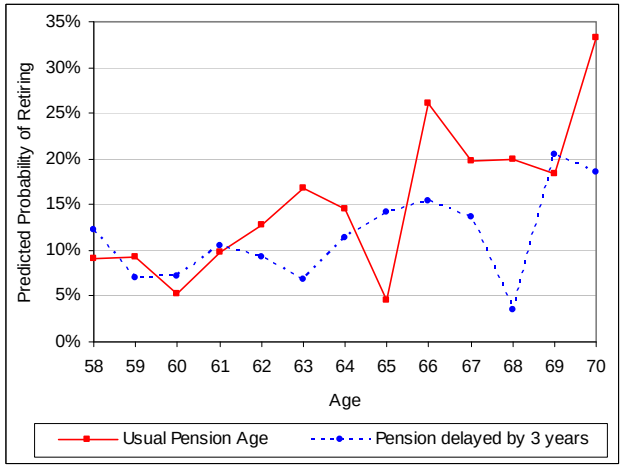


Figure 10: Effect of delaying pension eligibility on predicted probability of retirement, Women aged 55 to 70, using linear age and option value

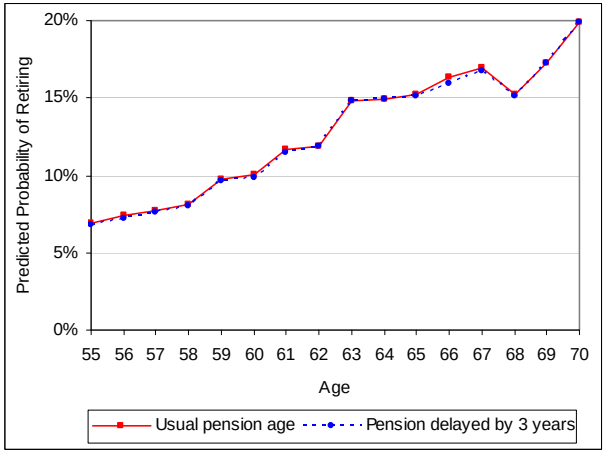


Figure 11: Effect of delaying pension eligibility on predicted probability of retirement, Women aged 55 to 70, using age dummies and option value

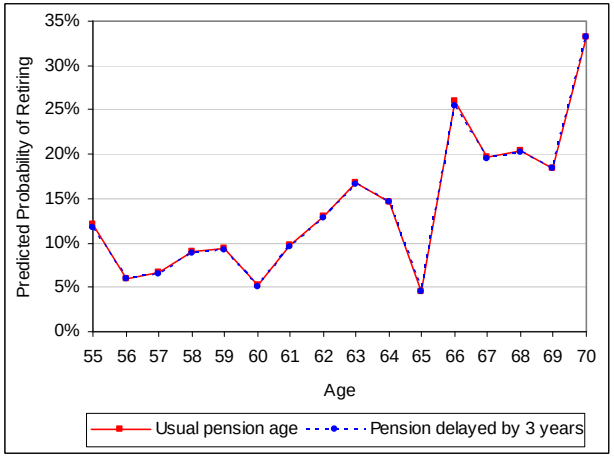
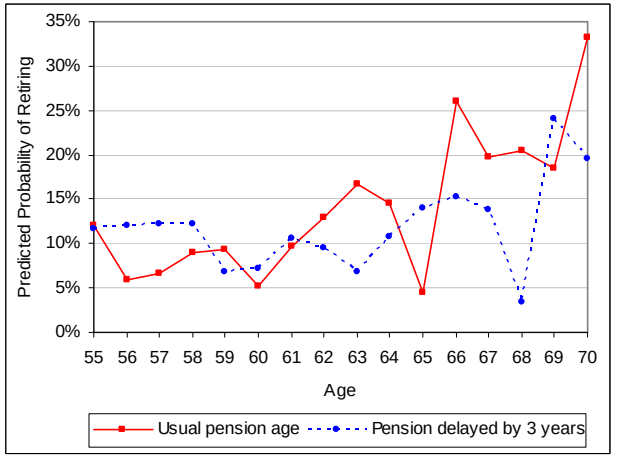


Figure 12: Effect of delaying pension eligibility on predicted probability of retirement, Women aged 55 to 70, using age dummy shift and option value



7. Conclusions

This paper provides an evaluation of the financial incentives for retirement underlying the Australian retirement system using a sample of men and women aged between 55 and 70 from the HILDA Survey. Overall, our results confirm the value of the Gruber and Wise (2004) approach to modeling the effects of financial incentives on the workforce decisions of mature age people, particularly mature age men. We find that for men, the Australian retirement system provides financial incentives to retire, while for women financial incentives are less significant, as the factors that influence women's retirement behaviour are more commonly found to be health and family related, rather than financial incentives. When those who have already reached age pension eligibility age are considered separately, the financial incentives to retire for men are stronger than before, indicating that, for those who are eligible to receive the age pension, there are strong incentives not to continue in paid work past age pension eligibility age.

Our policy simulations show that, in the short term, delaying age pension eligibility age by three years will provide some incentive to remain in work until age pension eligibility age has been reached. However, according to our simulations, the major effect of this policy reform will be in the long run, when the social norm of retirement age is shifted towards the new "normal" retirement age.

Appendix

Calculations of expected retirement income

For each individual, expected annual retirement income is calculated for each remaining year of life. Life expectancy tables (ABS, 2006) are used to predict survival rates and age of death.[13] Expected retirement income is defined as the sum of pension income and income from superannuation. All incomes are discounted back to present values (2002 prices), using a standard discount rate of 3%.

It is assumed that until retirement, superannuation is invested at a rate of 6% (real). It is also assumed that when an individual eventually retires, superannuation is invested at the same rate. Upon retirement, the accumulated assets are assumed to be drawn down in equal amounts each year until the age of life expectancy. [14] Beyond their life expectancy, individuals are assumed to rely solely on the age pension. Use of an alternative rate of return of 4% did not substantially change interpretation of the key results relating to financial incentives. For people with potential annual retirement incomes of more than $24000, superannuation income is assumed to be taxed at 15% (a figure intended to reflect average actual rates).[15]

Pension income

Potential age pension income is calculated based on 2002 payment rates. In 2002, the full age pension was $429.40 per fortnight for a single person and $358.40 (each) for couples. For each person, age pension eligibility was checked against both the income test and the assets test, and the amount of age pension then allocated according to whichever test gave the lower amount of pension. For most people, this was the income test.

[13] We have considered mortality rates that vary with respect to personal attributes (i.e. alcohol and tobacco use). However, non-response was a serious problem. Hence, we use a basic definition of the mortality rate that is only age and gender specific.

[14] Due to this assumption the effect of financial incentives may be underestimated in our models. Most retirees draw their superannuation as a lump sum and it is a common strategy for people with low retirement savings to invest on household assets to eventually `fall back' on age pension.

[15] Following announcements in the 2006 budget, from 1 July 2007 superannuation will no longer be taxed for men and women who retire after the age of 60.

Under the income test in 2002, the first $34000 ($57400 for pensioner couples) of financial assets were deemed to earn 2.5%, and financial assets over these amounts were deemed to earn 4% - actual income from financial assets was not counted. Single people could earn up to $116 per fortnight and still receive the full pension, and for each dollar over this amount, the pension was reduced by 40 cents. Couples could earn a combined amount of $204 before their pension was affected, but for each dollar over this amount their combined pension was reduced by 40 cents.

Under the assets test in 2002, the age pension was reduced by $3 per fortnight according to home ownership and marital status, as shown in Table A.1.

Table A.1: Asset test thresholds for age pension in 2002

Family Situation	*For full pension*	*For part pension*
Single homeowner	Up to $145250	Less than $290500
Couple homeowners (combined)	Up to $206500	Less than $447500
Single non-homeowner	Up to $249750	Less than $395000
Couple non-homeowners (combined)	Up to $311000	Less than $552000

For those who would be eligible for an age pension, but continue working beyond age pension eligibility age the deferred pension bonus amount is added to social security wealth. While working for one extra year beyond pension eligibility age has only a very small impact on SSW (an extra $800 for couples and $1000 for singles), people who would be eligible for a full age pension but continue working for an extra five years beyond age pension eligibility age receive a lump sum payment of around $25000 if they are single and $21000 if they have a spouse or partner.

For people under age pension eligibility age, it is assumed that, if they were not working, they would be eligible for another type of government income support (e.g. Newstart payments, mature age allowance, service pension, or disability support pension) subject to appropriate eligibility and means tests, until they reached age pension eligibility age.[16]

For men under the age of 65 and women under the age of 62, potential income support from the sources mentioned above is calculated in 2002 values, using the income and

[16] For people who would have been eligible for a full or part age pension, but continue working after age pension eligibility age, the lump sum they would receive when they retire is calculated (9.4% of age pension foregone, for a maximum of five years) is calculated and included in the social security wealth calculation measure.

assets tests appropriate for that year. Potential income from government pensions is then allocated to the individual by multiplying the probability of receiving that type of income support for a person of that age and gender. The amount of income support that would be received is then allocated, subject to means tests based on individual circumstances.[17]

For disability support pension and the service pension, the payment rates and means tests are the same as for the age pension. However, the payment rates for Newstart allowance and mature age allowance are slightly lower, and, while the assets test is the same for all pensions, the income test for Newstart and mature age allowance are stricter than those for age pension and DSP. As a result, our calculations of expected pension incomes for people under age pension age usually result in lower values than expected pension income once age pension age is reached.

[17] Probabilities by age and gender were calculated using HILDA income support data.

Table A.2 Decisions to Continue Working or Retire: Marginal effects from Probit Regressions, Men 55-70 (Dummy variables for age)

	Accrual		Peak		Option Value	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Financial Incentive	-0.03265*	0.013	-0.00720*	0.002	-0.00360*	0.002
House hold Net Wealth	-0.00014*	0.000	-0.00012*	0.000	-0.00013*	0.000
56	-0.02568	0.027	-0.02728	0.027	-0.02786	0.027
57	-0.03351	0.028	-0.03768	0.026	-0.03899	0.028
58	-0.00626	0.024	-0.00803	0.024	-0.00979	0.025
59	-0.04241	0.030	-0.04540	0.029	-0.04802	0.030
60	0.00646	0.025	0.00060	0.025	0.00045	0.026
61	-0.00073	0.026	-0.00802	0.025	-0.00934	0.027
62	-0.03195	0.030	-0.03698	0.029	-0.03895	0.031
63	-0.00384	0.028	-0.01137	0.027	-0.01207	0.029
64	0.00601	0.029	0.00063	0.028	0.00049	0.030
65	0.04928	0.031	0.05031	0.030	0.05328	0.032
66	0.00327	0.039	0.00399	0.036	0.00443	0.039
67	0.02516	0.043	0.02425	0.041	0.02580	0.044
68	-0.01632	0.044	-0.01732	0.042	-0.01850	0.044
69	-0.08892	0.057	-0.09086*	0.055	-0.09597*	0.059
70	-0.04543	0.051	-0.03668	0.047	-0.03752	0.050
Own home outright	0.07046**	0.015	0.06678**	0.014	0.07068**	0.015
Income of other household members	0.00063	0.002	0.00076	0.002	0.00086	0.002
Long term health cond'n	0.06431**	0.012	0.06168**	0.012	0.06485**	0.012
Resident children	-0.06495**	0.016	-0.06181**	0.016	-0.06446**	0.016
Partner employed	-0.02062	0.019	-0.02242	0.018	-0.02571	0.019
Partner not employed	0.03560+	0.018	0.03244+	0.017	0.03154	0.018
Education (years)	0.00193	0.003	0.00188	0.003	0.00186+	0.003
Work experience (%)	-0.21650+	0.113	-0.20436+	0.110	-0.21110+	0.115
Job satisfaction in previous year	-0.00030	0.000	-0.00029	0.000	-0.00032	0.000
Constant	0.03378	0.130	0.03808	0.126	0.04369	0.132
Sample size	1308		1308		1308	
Log-likelihood	-316.96		-315.682		-317.519	

Notes: See Table 1.4

Table A.3 Decisions to Continue Working or Retire: Marginal effects from Probit Regressions, Women 55-70

	Accrual		Peak		Option Value	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Financial Incentive	-0.03810	0.029	-0.00488	0.005	-0.00297	0.003
House hold Net Wealth	-0.00017	0.000	-0.00018	0.000	-0.00017	0.000
Age categories (55 is omitted)						
56	-0.06077+	0.035	-0.06144+	0.036	-0.06224+	0.036
57	-0.05465+	0.033	-0.05454+	0.033	-0.05543+	0.033
58	-0.02757	0.033	-0.02800	0.034	-0.02870	0.034
59	-0.03555*	0.036	-0.03581	0.037	-0.03748	0.037
60	-0.08005+	0.045	-0.08235+	0.045	-0.08339+	0.046
61	-0.05219	0.046	-0.03875	0.041	-0.03886	0.041
62	-0.02094	0.045	-0.00848	0.044	-0.00894	0.044
63	-0.00714	0.047	0.00163	0.045	0.00004	0.046
64	-0.01310	0.052	-0.00546	0.051	-0.00860	0.052
65	-0.10528+	0.078	-0.10185	0.079	-0.10631	0.079
66	0.03831	0.058	0.05960	0.053	0.05618	0.053
67	0.00952	0.069	0.03024	0.063	0.02675	0.064
68	0.02898	0.079	0.05079	0.077	0.04666	0.079
69	0.02620	0.087	0.03143	0.088	0.02534	0.089
70	0.08315	0.093	0.09756	0.090	0.09275	0.090
Own home outright	0.04740*	0.021	0.04778*	0.021	0.04724*	0.021
Income of other household members	0.00281	0.002	0.00280*	0.002	0.00277	0.002
Long term health cond'n	0.01572	0.019	0.01657	0.019	0.01652	0.019
Resident children	-0.04984*	0.025	-0.04806+	0.025	-0.04786+	0.025
Partner employed	0.00010	0.024	-0.00117	0.024	-0.00136	0.024
Partner not employed	0.06826**	0.023	0.06748**	0.023	0.06695**	0.024
Education (years)	-0.00008	0.004	-0.00040	0.004	-0.00032	0.004
Work experience (%)	-0.06269	0.044	-0.06220	0.043	-0.06113	0.044
Job satisfaction in previous year	-0.00099*	0.000	-0.00099*	0.000	-0.00099*	0.000
Constant	-0.06086	0.077	-0.05842	0.076	-0.05484	0.076
Sample size	1010		1010		1010	
Log-likelihood	-295.822		-296.059		-296.057	

Notes: See Table 1.4

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