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Abstract

This paper provides new evidence of coordination of retirement by mature age couples in Australia. Two complementary estimation approaches are used to highlight the importance of taking the household decision-making context into account when modeling the retirement behaviour of partnered men and women. First, a single risk hazard model provides insights into the influences of a spouse's characteristics on the retirement decision of the individual. Second, a competing-risks framework is used to examine the retirement behaviour of couples exiting from a situation in which both are in paid employment. There is strong evidence of coordination of retirement by mature age couples in Australia due to complementarities in leisure and, for women, because of caring responsibilities. In particular, the results suggest that women may delay their own retirement if their partner has a financial incentive to continue in the labour force; or retire early to care for a partner who is in poor health.

JEL classification: D130, J260

Keywords: Retirement, older workers, households, leisure, complementarity

1. Introduction

As a growing number of women approach old age with substantial work histories, the topic of couples' retirement is becoming increasingly important. Because of the need to balance the preferences and constraints of both partners, decisions about retirement in couple households are likely to be made jointly, rather than by the individuals alone. The decision about whether one or both members of a couple should leave the labour force depends on many factors, including preferences for joint leisure time, work-limiting health conditions, caring responsibilities, pension eligibility and the resulting change in household income if one or both members of the couple are no longer in paid employment.

The prevalence of joint retirement among couples has important implications for retirement policy, as any policy that increases the incentive for one member of a couple to leave the labour force is likely to have additional 'spillover' effects on the labour force participation of their spouse. For example, policies which encourage individuals to delay their retirement, such as the gradual increasing of the qualifying age for the Age Pension, may have a twofold effect in couple households if the result is that both members of a couple delay their retirement due to a preference for leisure time spent together. On the other hand, policies such as the abolition of tax on superannuation taken after the age of 60 may create an incentive for both members of a couple to retire early, particularly if the resulting increase in superannuation wealth allows them to achieve their target level of retirement savings sooner than they otherwise would have. Therefore, the inclusion of spousal characteristics in the analysis of the retirement decisions of partnered men and women is important, as it enables the significance of cross-spousal effects to be determined. If these effects are important, modeling the retirement behaviour of partnered men and women without considering the characteristics and preferences of their partner may lead to errors in predicting the impact of a change in Social Security policy on retirement behaviour (Deschryvere, 2005).

This paper provides new evidence of coordination of retirement by mature age couples in Australia, and is the first to incorporate measures of relationship satisfaction, decision making power in the household, and financial incentives faced by both members of the couple and into models of retirement decisions in couple households. Two complementary estimation approaches are used to demonstrate the importance of taking the household decision-making context into account when modeling the retirement behaviour of partnered men and women. First, a single risk hazard model provides insights into the influences of a spouse's characteristics on the retirement decision of the individual. Second, a competing-risks framework is used to examine the retirement behaviour of couples exiting from a situation in which both are in paid employment.

There is strong evidence of coordination of retirement among Australian couples, with over 20% of retired individuals who were living with a spouse or partner at the time of their retirement

coordinating their retirement with their spouse. This coordination of retirement is due to complementarities in leisure and, for women, because of caring responsibilities. In particular, the results suggest that women may delay their own retirement if their partner has a financial incentive to continue in the labour force; or retire early to care for a partner who is in poor health.

The remainder of this paper is organised as follows. Section 2 gives a brief overview of the existing literature on retirement decisions in couple households. Section 3 describes data from the Household, Income and Labour Dynamics in Australia (HILDA) survey and outlines the econometric analysis. The results of the analysis are presented in section 4 and section 5 concludes.

2. Previous Studies of Retirement Decisions in Couple Households

While most studies of the retirement process have concentrated on the retirement behaviour of individuals, and particularly of men, much less is known about the joint labour force behaviour of older couples. However, with the increase in labour force participation of older women, attention is shifting towards the issue of the labour supply of older couples. A growing body of literature suggests that joint retirement among couples is relatively common. In the United States, Hurd (1990), Gustman and Steinmeier (1994 and 2000), Blau (1998), Smith and Moen (1998) and Coile (2004) using data from the United States New Beneficiary Survey (NBS), the National Longitudinal Survey of Mature Women (NLS), the Retirement History Survey (RHS), the Cornell Retirement and Well Being Study and the Health and Retirement Study (HRS) respectively, all find evidence of coordinated retirement among couples. For example, Hurd (1990) finds that in couples where both the husband and the wife retired after the age of 54, 25% retired within one year of their spouse. Evidence of couples coordinating the timing of their retirement has also been found for Germany (Blau and Riphahn, 1999), Austria (Zweimuller et al., 1996), Denmark (An, Christensen and Datta Gupta, 2004), Brazil (Queiroz, 2006), Canada (Baker, 1999) and the United Kingdom (Schirle, 2008).

Four main hypotheses have been put forward to explain the tendency of couples to retire at around the same time. The most common explanation for joint retirement is the 'complementarities in leisure' hypothesis. That is, many people have a preference to spend leisure time in retirement with their spouse rather than retiring alone, and therefore couples choose to retire at around the same time. Another explanation for couples coordinating their retirement is that of 'assortative mating'. This theory describes the fact that individuals tend to choose a partner who shares similar preferences about work and leisure, and due to this similarity in preferences, the timing of their retirement coincides (Deschryvere, 2005). Poor health or chronic illness may influence individual retirement, and may also increase the necessity of care-giving, thereby influencing the spouse's retirement behaviour (Jimenez-Martin and Labeaga, 1999). Another, less commonly accepted, explanation for joint retirement is that economic factors affecting both members of the couple cause a positive correlation between retirement dates.

Several methods have been used to examine the retirement behaviour of couples. For example, Hurd (1990), Gustman and Steinmeier (2000 and 2002) and Maestas (2001) assume that household preferences are given by a household utility function and estimate structural models of joint retirement. Blau (1998), Blau and Riphahn (1999), Jimenez-Martin and Labeaga (1999) and Zweimuller et al. (1996) use multinomial logistic models to explain the joint labour market states of husbands and wives. Johnson and Favreault (2001), Michaud (2003) and Coile (2004) estimate reduced form models exploring the cross-effects of one spouse's characteristics on the retirement decision of the other spouse. An, Christensen and Datta Gupta (2004) and Pozzoli and Ranzani (2009) analyse the joint distribution of the durations until retirement for husbands and wives.

2.1 Preferences for Joint Leisure Time

Regardless of the empirical strategy used, most studies find that the probability of one spouse exiting employment is much higher if the other spouse is not employed, and identify complementarities in leisure as an important factor in explaining the joint retirement of couples (Gustman and Steinmeier, 2000, 2002, and 2004; Jiménez-Martín and Labeaga, 1999; Blau and Riphahn, 1999, Pozzoli and Ranzani, 2009; Smith and Moen, 1998). For example, Gustman and Steinmeier (2002) estimate that the effect of having a spouse who has left the labour force is equivalent to that of being one year older for men and three-quarters of a year older for women. Gustman and Steinmeier (2000) find a coincidence of spouses retiring together, despite the younger age of wives, and suggest that one reason for coordination of retirement is because of joint tastes for leisure. Jiménez-Martín and Labeaga (1999) find that the likelihood of retirement for a working spouse increases substantially once their partner has retired, particularly if the wife is the working spouse. Similarly, Smith and Moen (1998) find that while the retirement behaviour of wives is strongly influenced by their husband's retirement, the husband's retirement decision is less likely to be influenced by the wife's retirement.

Gustman and Steinmeier (2004) use a measure of how much each spouse values spending time in retirement with their partner to examine the effect of preferences for joint leisure time on the retirement decisions of couples. They find that for women, the husband's retirement status influences her retirement decision only if she values spending time in retirement with her husband. For husbands, the effect of having a wife who is already retired is roughly doubled if he enjoys spending time in retirement with his wife, but there is some effect even if he does not. Maestas (2001) also finds that couples with high levels of complementarity in leisure retire within a shorter time interval than couples who do not place a high value on leisure time spent together, and that this effect is enhanced if the wife is the main decision-maker in the household. Zweimuller et al. (1996) find a high and positive correlation of unobservable factors in the retirement process of both spouses, which they conclude could be attributed to preferences for joint leisure.

2.2 The Effects of Health on Couples' Retirement Decisions

Besides the standard evidence that poor health increases the likelihood of retirement for individuals, there is also some evidence that having a partner who has a chronic illness or long-term health condition has a significant impact on the retirement decision. In studies that examine the effect of a partner's health on retirement, clear asymmetries in the effect of health have been found. Several studies have shown that for women, but not for men, having a partner in poor health increases the probability of retirement (Jiménez-Martín and Labeaga, 1999; Queiroz, 2006, Pozzoli and Ranzani, 2009). That is, women are much more likely than men to retire in order to care for their partner. One possible explanation for this result is the fact that men are more commonly the main breadwinner for the household. Therefore, the impact on household income if the husband retires early to care for his wife is likely to be much larger than if the wife retires to care for her husband.

Similarly, in studies examining the factors associated with joint retirement of couples, results indicate that the health of the husband has a much larger impact on the probability of joint retirement than the wife's health does. Blau and Riphahn (1999) find that wives are less likely to leave the labour force if their husband has a chronic health condition and is still working, but more likely to retire if their husband has already left the labour force. However, husbands are less likely to stop working if their wife has a chronic health condition, regardless of the wife's labour force status. An, Christensen and Datta Gupta (2004) also find that the wife's poor health induces the husband to continue working, and conclude that this is likely to be due to the cost of purchased care for the wife.

Somewhat differently, Blau (1998) finds that if a wife is employed and her husband is not, poor health of the husband reduces the probability of the wife retiring. He suggests that this result is due to the fact that health insurance provided by the wife's employer may be particularly valuable to a couple when the husband is in poor health and covered by his wife's health insurance plan. Kapur and Rogowski (2006) also examine the role of employer provided health insurance in the retirement decisions of working couples in the United States. They find that the probability of joint retirement is more than doubled if the wife has retiree health insurance.[1]

2.3 Financial Incentives and Couples' Retirement Decisions

Most previous studies of financial incentives to retire (for example Stock and Wise, 1990; Gruber and Wise, 2004) assume that a husband's retirement decision is unaffected by his wife's labour force participation; and that there are no spillover effects arising from the financial incentives faced by one member of a couple on their partner's retirement decision. However, there is some limited evidence

[1] The effect of health insurance on couple's retirement decisions is particularly relevant in the United States, where health insurance is commonly provided by employers until the age of 65, when eligibility for public health insurance begins (Blau and Gilleskie, 2006) and options for purchasing private health insurance are limited because of high premium costs (Kapur and Rogowski, 2006). However, one would expect that private health insurance coverage would have no significant impact on the retirement decisions of mature age Australians, as all Australians are covered by Medicare and it is quite uncommon for employers in Australia to provide private health insurance for their employees.

suggesting that, because of complementarities in leisure, the retirement decision of any individual who is living with a spouse or partner will be affected not only by their own Social Security or pension entitlements, but also the entitlements of their spouse.

Blau (1998) finds that husbands exit employment sooner and are less likely to re-enter the labour force if their wife has pension coverage. Blau and Riphahn (1999) find that higher expected Social Security benefits of a wife are associated with the increased likelihood of labour force exit of husbands, but only if the wife has already left the labour force. Coile (2004) finds that men are very responsive to their wife's financial incentives, but women are not responsive to their husband's incentives. She concludes that this difference may be due to asymmetric complementarities in leisure. That is, husbands' enjoyment of retirement may depend much more on their wife also being retired than vice versa.

Kapur and Rogowski (2006) examine the effects of individual financial incentives on the joint retirement status of couples. They find that for couples in which the husband has high expected pension benefits from postponing retirement, the wife is more likely to retire before the husband. However, in couples where the wife has a high level of expected benefits from delaying retirement, joint retirement is more common. Quite differently, Baker (1999) uses a difference-in-difference approach to analyse the effects of the introduction of the spouse allowance in Canada. This allowance, which was designed to assist couples living on one pension, provided benefits that were previously available only after the age of 65 for women aged between 60 and 64 who were married to men aged 65 or older. The impact of this policy change was that husbands and wives both reduced their labour supply.

2.4 Retirement Decisions of Couples in Australia

The end of the 20th century saw a significant reversal of a long-term trend of declining labour force participation among older men in Australia. Combined with continued growth in labour force participation among older women, labour force participation among mature age Australians is currently at its highest level on record. Several factors are likely to have contributed to this change, including lower levels of unemployment; a decline in the number of people becoming eligible for the Service Pension at age 60; changes in employers' attitudes about older workers; and policy changes such as increases in Age Pension eligibility age for women and the introduction of 'transition to retirement' pensions which allow older workers to reduce their working hours and supplement their labour income with superannuation. Compared to the previous generation, the current cohort of men and women approaching retirement are healthier and better educated, thus able to continue working until a later age; and they have higher expectations about living standards in retirement, which may result in their delaying retirement until these expectations can be realised. With the ongoing increase

in labour force participation of older people, those who have a preference for spending leisure time with their spouse may choose to delay their own retirement until their partner is ready to retire.

In Australia, information about the joint retirement of couples is very limited. While several studies (see for example, Thomson, 2007; Cobb-Clark and Stillman, 2009; Zucchelli et al., 2010; and Warren and Oguzoglu, 2011) have included partner's labour force status or health status in the set of variables used to explain the retirement decisions of individuals, little is known about the coordination of retirement among Australian couples. Wolcott (1998) used data from the Australian Institute of Family Studies' Later in Life Families Study to examine the retirement behaviour of couples. She found that in dual earner couples, the retirement of one partner often affects the retirement timing of the other. However, women who did not (re-) enter the labour force until after their children were in school were more likely to remain in paid work after their husband had retired. Further, while some couples preferred joint retirement regardless of its impact on retirement income; for others, retirement decisions were influenced by anticipated family income and potential retirement benefits.

Based on interviews with women aged between 54 and 90 in metropolitan Victoria in 1997, Whiting (1998) found that many women felt that it would not be 'right' to continue working after their partner had retired. For many of these women, the timing of their retirement was centred around when their husband wanted to retire. For some, the decision to retire was made because of a preference for spending leisure time with their husband. However, others expressed feelings of wanting to continue longer in paid work, but being pressured by their husband to retire at the same time.

Using data from the Household Income and Labour Dynamics in Australia (HILDA) Survey, Knox (2003) found that among couples who were both employed, there was some tendency for men and women to intend to retire at the same time as their partner. However, among women in high income households, it was more common to express an intention to retire before their partner's intended retirement date. Quite differently, DeVaus and Wells (2003) used data from the Healthy Retirement Project and the first wave of the HILDA Survey to explore changes in marital quality following retirement and found evidence of considerable changes in marital quality in the years following retirement.

3. Empirical Estimation of Couples' Retirement Decisions

The impact of spousal characteristics and preferences on retirement behaviour is estimated using a duration analysis approach, similar to that used by Pozzoli and Ranzani (2009).[2] Two complementary estimation approaches are used. First, a single risk model provides insights into the influences of a spouse's characteristics on the retirement decision of the individual. The aim of the single risk approach is to identify the impact of individual, spousal and household characteristics on the retirement decision of the individual. Second, a competing-risks framework is used to examine the retirement behaviour of couples exiting from a situation in which both are in paid employment to three possible retirement states: husband retired and wife employed, wife retired and husband employed and joint retirement. The competing risk model identifies the impact of the preferences and characteristics of both members of the couple on the timing of their retirement. Of these two approaches, the preferred method depends on the specific question being addressed. The single risk approach provides insights into the impact of the characteristics and preferences of one member of a couple on the retirement decision of their spouse, but provides no information about the timing of retirement of an individual relative to the retirement of their spouse. Compared to the single risk model, the competing risks model provides additional insights into the factors affecting the timing of retirement of individuals relative to their spouse.

3.1 Single Risk Framework

As the duration variable of interest (time to retirement) is available in interval censored form (yearly intervals), the appropriate approach to modeling the retirement duration is a discrete time hazard model. The basic concept of duration analysis is the hazard rate, that is, the probability that an event occurs given it has not happened previously. In this context, the hazard rate for an individual in period *t* of an employment spell is the probability of leaving employment after having been employed for *t*–1 consecutive periods. The hazard for individual *i* in period *t* is equal to the conditional probability of ending an employment spell at each value of *t*. The discrete-time hazard rate for individual *i* in period *t*, h_{it} is

$$h_{it} = P(T_t = t \mid T_t \geq t; X_{it}) \tag{1}$$

where X_{it} is a vector of covariates that may vary with time and T_t is a discrete random variable representing the observed duration of employment from the age of 55 until retirement.

[2] Pozzoli and Ranzani (2009) estimate single and competing risk models of retirement in couple households in Europe. However, the characteristics of the spouse included in their models are limited to age, health, education and employment status.

A commonly used specification for the baseline hazard is the complementary log-log hazard function:

$$h_{it} = 1 - \exp(-\exp(X_{it}\beta + \theta(t))) \quad (2)$$

where $\theta(t)$ is the baseline hazard.

For the specification of the baseline hazard, a piecewise constant hazard model is used, including dummy variables for seven 2-year age groups (55-56, 57-58, …, 69-70). It is assumed that the hazard rate is constant within each of the seven intervals, but differs between them (Jenkins, 2005).[3]

An attractive feature of the complementary log-log model is that it is the discrete-time analogue of the continuous time proportional hazards model proposed by Cox (1972). Therefore the complementary log-log estimates have the same underlying parameters as the proportional hazard model, and the coefficients have a relative risk interpretation as in the Cox proportional hazard model. That is, the antilog of a coefficient on an explanatory variable measures the proportional change in the underlying hazard due to a unit change in that variable (Jenkins, 2005).[4]

In addition to accounting for the influence of observed individual heterogeneity, unobserved heterogeneity, or 'frailty' must also be incorporated. Failure to account for unobserved heterogeneity may lead to biased estimates. In particular, the model may over-estimate the degree of negative duration dependence, or under-estimate the degree of positive duration dependence (Jenkins, 2005). Incorporating unobserved heterogeneity, the complementary log-log specification becomes:

$$h_{it} = 1 - \exp(-\exp(X_{it}\beta + \theta(t) + e_i)) \quad (3)$$

By definition, individual unobserved heterogeneity e_i is not observed. When estimating duration models, it is necessary to derive the contribution for each observation to the log-likelihood. Therefore, the distribution of e_i must be specified. A standard approach is to assume e_i follows a certain distribution with distributional parameters to be estimated. For the complementary log-log model, a Gamma distribution with unit mean and a finite variance as proposed by Meyer (1995) is a common form for unobserved heterogeneity.[5]

[3] The reason for aggregating over two-year time intervals, rather than estimating a model with a fully non-parametric baseline hazard, is that there are insufficient observations to identify the model for a shorter time interval of one year.

[4] Complementary log-log estimates and logit estimates are very similar when the hazard rate is small (less than 0.25), but above this level the two functions begin to diverge noticeably.

[5] For complementary log-log models, e_i can also be assumed to follow a Normal distribution. However, when a Normal distribution is assumed, there is no convenient closed-form solution for the survivor and density functions (Jenkins, 2005). Estimation results in this paper are presented using both the Normal and Gamma distributions.

3.2 Competing Risks Framework

The single risk framework can be extended to a multinomial logistic model, so that retirement behaviour can be examined at a couple level. From a situation in which both members of a couple are employed, they can exit to one of three states: (1) husband retired and wife employed; (2) wife retired and husband employed; (3) joint retirement.[6] The couple receives a certain level of utility at each choice alternative and chooses the alternative that maximises utility. The discrete time hazard out of (joint) employment into one of the three exit states *j* is the probability of making a transition in the *t*-th interval, conditional on both members of the couple remaining in employment until the beginning of the interval:

$$h_{ijt} = \frac{\exp(\beta_0^j + \beta^j x_{it} + \theta_k^j)}{1 + \sum_1^3 \exp(\beta_0^{j'} + \beta^{j'} x_{it} + \theta_k^{j'})} \tag{4}$$

For couple *i* where *j* = 1, …J is the set of destination states, x_{it} is a vector containing individual characteristics, β_0^j is the destination specific intercept term, β^j is a vector of destination specific parameters and θ_k^j is the destination specific baseline hazard. As with the single state model, a piecewise constant hazard model is used, including dummy variables for the age groups, and θ_k^j is constant within each of the intervals but differs between them.[7]

In the multinomial logit model, unobserved heterogeneity can be incorporated by including a variable with a specific distribution. Then, the probability of making choice *j*, conditional on observed characteristics x_{it} that vary between individuals and over time and unobserved effects α_i that are time constant has the following form:

$$h_{ijt} = \frac{\exp(\beta_0^j + \beta^j x_{it} + \theta_k^j + \alpha_i)}{1 + \sum_1^3 \exp(\beta_0^{j'} + \beta^{j'} x_{it} + \theta_k^{j'} + \alpha_i)} \tag{5}$$

Unobserved heterogeneity in the competing risks model is represented by a single random effect, which is assumed to follow a Normal distribution.

[6] One shortcoming of this model is that couples in which one member retires before their annual interview and the other retires soon after that interview, and within twelve months of their spouse, are not included in the category of 'joint retirement'. Using the calendar information available in the HILDA Survey data may overcome this problem. However, Watson (2009) shows that there is an issue with recall error in the calendar data, with 17% of employment spells and 15% of spells not in the labour force in the first seven waves of HILDA not able to be matched exactly from one year to the next.

[7] As there are insufficient observations to identify the competing risks model using two-year age groups, the age group of the husband is aggregated so that the control group is couples in which the husband is aged 55-60. Couples in which the husband is aged between 67 and 70 are also grouped into one category.

3.3 Data and Variable Construction

The data used in this article come from the first eight waves of the Household, Income and Labour Dynamics in Australia (HILDA) Survey. Described in more detail in Wooden and Watson (2007), the HILDA Survey began in 2001 with a large national probability sample of Australian households occupying private dwellings. In the first wave, 7683 households were interviewed, generating a sample of 15,127 individuals who were eligible for interview, of whom 13,969 were successfully interviewed.[8] Almost all of the wave 1 interviews were conducted during the period between 24 August 2001 and 21 December 2001. The members of the initial sample of households formed the basis of the panel to be pursued in each subsequent wave, with each interview being approximately one year apart. In later waves, interviews are also sought with household members who have reached 15 years of age and any non-sample members who are residing with an original sample member. By wave 8, the total number of completed interviews was 12,785. This group was made up of 9,354 respondents who were interviewed in wave 1; 1,523 who were members of the original sample but under the age of 15 in wave 1; 236 who were adult members of the original sample but did not respond in wave 1; and 1,672 persons who joined the sample in subsequent waves.

For the single risk models, the sample used consists of men and women who were aged between 55 and 70 and living with a spouse or de facto partner in the first wave of the HILDA Survey. The sample is further restricted to those who were in paid employment in the first period they were observed and had superannuation and wealth data from either wave 2 or wave 6 of the HILDA Survey. Each individual remains in the sample until they exit employment, separate from their spouse, or they or their partner are not interviewed. This gives a total of 2099 person-year observations.[9] For the competing risks model, the sample is restricted to married and de facto couples in which the husband is between the age of 55 and 70 and both are in paid employment in the first observation period. Each couple remains in the sample until one or both members of the couple leave employment, the couple separates, or one or both members of the couple are not interviewed, giving a total of 891 couple-year observations.

[8] Residents of Australia aged 15 years or older were eligible to be interviewed.

[9] It should be noted that the sample used for estimation is not representative of the population — 7% of men and 16% of women had retired before the age of 55, and it is likely that by restricting the sample to those who are still working, a wealthier sub-sample of the population is being considered. The proportion leaving the sample as a result of separation, divorce or the death of their spouse is relatively small. Among those who were aged 55 to 70 and married in 2001, 95% of men and 89% of women were still married in 2008. Among those who were aged 55 to 70 and in a de facto relationship in 2001, 89% of men and 78% of women were living with a partner, or spouse, in 2008. Unemployment rates among the mature age population are quite low and it is assumed that most retirement is voluntary. Re-entry into the labour force for people aged 55 to 70 is also relatively uncommon, with 8% of men and women aged between 55 and 70 who were employed in 2001 leaving the labour force and then returning during the period from 2002 to 2008.

The explanatory variables used in the econometric models can be categorised into four groups: duration dummies, demographic variables, indicators of human capital and measures of the lifetime budget constraint of the couple.[10] A detailed description of the explanatory variables and sample summary statistics is provided in Appendix Table A.1.

For the specification of the baseline hazard in the single risk model, dummy variables for seven two-year age groups are included with 'Age 55–56' as the control group. The age difference between the spouses is included as a set of three dummy variables, one indicating that the wife is two or more years older than the husband, another indicating that the husband is two to four years older than the wife, and a third for couples in which the husband is five or more years older than the wife.

In addition to the standard demographic variables such as age, health and education, additional explanatory variables are necessary to account for the couple's budget constraint, decision-making power within the household, and preferences for joint leisure.[11] The couple's lifetime budget constraint is incorporated into the model by the inclusion of the 'Option Value' of the husband and the wife, as well as a measure of household net worth.[12]

The Option Value measure, developed by Stock and Wise (1990), represents the maximum utility difference between retiring at any future age and retiring immediately. The Option Value may be expressed as:

$$OV_a = \max_h \left(\left(\sum_{t=a+1}^{h} \alpha_t \delta^{t-a} W_t^{\gamma} + \sum_{t=h+1}^{T} \alpha_t \delta^{t-a} [\kappa B(r)_t]^{\gamma} \right) - \left(\sum_{t=a+1}^{T} \alpha_t \delta^{t-a} [\kappa B(r)_t]^{\gamma} \right) \right) \quad (6)$$

where $h = a + 1, \ldots, R$

W_t = Expected after-tax wage at age *t,*

$B(r)_t$ = expected annual income from pensions and superannuation at age *t*

α_t = probability of surviving at least until age *t* given survival until age *t-1*

δ = discount factor=1/(1+r) , (r is assumed to be 0.03)

T = age of certain death (here assumed to be 102)

κ = parameter to account for the disutility of labour, and

γ = degree of risk aversion.[13]

[10] Changes in the demand for labour are likely to have some influence on the decision about when to retire. However, there were no major fluctuations in macroeconomic conditions during the period of observation and the inclusion of measures such as the unemployment rate and the annual percentage change in Gross Domestic Product were found to have no significant impact on the results. Therefore, these indicators have been omitted from the model.

[11] Maestas (2001) adapts the collective model of household labour supply (described in Blundell et. al, 2002) to a lifecycle utility maximisation model and provides a formal framework for thinking about the retirement decisions of couples. Based on this framework, an empirical model of couples' retirement decisions should account for the potential labour income and potential retirement income of both members of the couple, the decision-making power within the couple and preferences for joint leisure time, as well as the factors which influence individual retirement decisions of both members of the couple, such as age, health, and education.

[12] Questions about household wealth are not included in each year of the HILDA Survey. For years when the wealth questions were not asked, it is assumed that household wealth increases at a real rate of 6% per annum.

[13] Following Blundell et al. (2002), κ and γ are set to 1.5 and 0.75 respectively. Reasonable changes to these values do not affect the significance of the Option Value variable in regressions. Wages are assumed to increase at a real rate of 1.5% per annum. For those whose partners are not employed, wages are estimated using a Heckman selection model.

The Option Value measure is preferred over other financial incentive measures, such as the Accrual and Peak values described by Gruber and Wise (2004), because it is the only measure that incorporates potential labour income, potential income from pensions and superannuation, as well as time preferences and survival probabilities.[14] Negative coefficients for the effects of the Option Value for the individual are expected. That is, the higher the utility from continuing to work, the lower the likelihood of retirement.[15] However, the size and significance of the incentive measures of the spouse are uncertain, depending upon whether the income effect in the financial incentive outweighs the effect of the preference for joint leisure. For example, a weak complementarity of leisure effect and the income effect may roughly cancel each other out, leading to no overall response to spouses' incentives, while a strong complementarity of leisure effect may outweigh the income effect, so that a large financial incentive for one member of a couple to keep working encourages both spouses to stay in the labour force (Coile, 2004).

Decision-making power within the household is accounted for by the inclusion of a measure of the level of the husband's control over household savings and investment in the previous year.[16] In order to capture preferences for joint leisure time, measures of the relationship satisfaction of the husband and wife in the previous year are included as explanatory variables. The duration of the relationship (sum of years married and cohabiting) and the relationship satisfaction of the husband and wife in the previous year are also included as explanatory variables. It is hypothesised that the longer a couple has been married or living together, the more influence one spouse will have on the other's labour force behaviour, and the higher the level of relationship satisfaction, the more likely that the couple will have a preference for leisure time spent together.

The demographic variables included in the model account for the health, cultural background, household composition and age difference of the couple. Indicators of the health status of both members of the couple are included in the form of a dummy variable indicating whether the individual has a health condition that limits their ability to work. There may also be cross-effects of the health of one member of a couple on their spouse. The spouse might increase their labour supply

[14] Expected income from pensions and superannuation is calculated according the income and assets tests for the Age Pension and the taxation rates for superannuation income that were in place in 2002, as these rules would be most likely to apply for the majority of the reference period. For further information about the calculation of potential retirement income, refer to Warren and Oguzoglu (2011).

[15] In this sample, average Option Value is higher for women than for men. This is due to the fact that the average age of the women in this sample is lower than that of men; and as average levels of superannuation are lower for women than for men, women forego less in terms of potential retirement income by continuing on paid work until they reach age pension eligibility age.

[16] Each year, respondents are asked to specify who makes the decisions about saving, investment and borrowing within their household. The responses of the husband and wife are averaged on a scale of 0 to 100, so that couples who agree that the wife is the main decision-maker have a score of zero, those who agree that these decisions are made together have a score of 50 and those who agree that the husband is the main decision-maker have a score of 100. If the husband says that he is the main decision-maker and the wife says that they decide together, their score will be 75. If the wife says that she is the main decision-maker and the husband says that decisions are shared, the couple's score is 25.

to make up for the lost income resulting from their partner leaving employment, or reduce their labour supply in order to care for their spouse.

Indicators of the human capital of both members of the couple are included in the form of a set of education dummies, a measure of labour market experience (percentage of time since leaving full-time education spent in paid employment) and occupational status. These variables capture both earning capacity and employment opportunities.[17]

Indicators of the cultural background (born in a mainly English speaking or non-English speaking country) of both the husband and the wife are included to account for any cultural differences that may affect the timing of retirement relative to one's spouse. A dummy variable indicating the presence of resident children is also included. It is presumed that those with children still living at home will be less likely to leave the labour force. Those who own their home outright are likely to need less income than those who are renting or paying off a mortgage. Therefore, an indicator of outright home ownership is included. A dummy variable for living in a major city is included to account for the broad differences in labour market conditions and costs of living between metropolitan and non-metropolitan areas. Individuals with high levels of job satisfaction are presumed to be more likely to remain employed. Job satisfaction in the previous year is included for the individual in the single risk model and for both members of the couple in the competing risks model. To capture the effects of preferences for joint retirement, an indicator of whether the individual's spouse is employed is included in the single risk model.

4. Results

Before proceeding to the estimation of couples' retirement decisions, we present some descriptive evidence about the coordination of retirement among mature age couples who have already retired, and the retirement intentions of those who have not yet retired. Average transition rates, computed by comparing the distribution of couples in each (joint) labour force state in each year, conditional on their labour force state in the previous year, are presented in Table 1.

Table 1: Labour Force Transitions of Couples, Husband Aged 55 to 70, 2001–2008 (%)

Joint Labour Force	*Joint Labour Force State at Time t*				
State at Time t-1	*Both Employed*	*Husband Employed*	*Wife Employed*	*Both not Employed*	*Total*
Both Employed	83.8	7.5	5.3	3.3	100.0
Husband Employed	10.4	71.6	*0.6	17.6	100.0
Wife Employed	11.9	*1.8	74.4	12.2	100.0
Both not Employed	0.6	3.0	1.9	94.4	100.0
Total	30.0	16.7	9.5	43.8	100.0

Notes: Population weighted results. *Estimate not reliable.

[17] Wages are likely to be endogenous to transition rates and are not observed for non-workers. Therefore, occupational status is used as a proxy for earning ability for both the husband and the wife. For those who are not in paid employment at the time of interview, occupational status of their most recent job is used. For more information about the occupational status scale, see McMillan, Beavis, and Jones (2009).

During the eight year period from 2001 to 2008, the majority of mature age couples (74%) were either in joint retirement (i.e. both not employed) or joint employment (husband and wife both employed). There was a relatively high degree of persistence in the joint labour force status of couples from one year to the next, with 94% of couples who were both not in paid employment and 84% couples who were both employed still in the same situation one year later. There is also some evidence of joint retirement. Of the 16% of couples who had made a transition out of the "both employed" category, 20% had moved to a situation in which neither member of the couple was employed. Furthermore, compared to couples who were both employed in the previous period, there is a greater likelihood of both members of a couple being out of the labour force if one member of the couple was not employed in the previous year.

While the joint labour force status of mature age couples remained relatively stable from one year to the next, 30% of couples who were in joint employment in 2001 had moved into joint retirement by 2008 (Table 2). Among couples who had moved from joint employment to joint retirement during this period, 51% had retired within one year of their spouse, and a further 16% had retired within two years of their spouse's retirement.

Table 2: Labour Force Transitions of Couples, Husband Aged 55 to 70, 2001–2008 (%)

Joint Labour Force State in 2001	*Joint Labour Force State in 2008*				
	Both Employed	*Husband Employed*	*Wife Employed*	*Both NLF*	*Total*
Both Employed	42.9	15.1	11.7	30.4	100.0
Husband Employed	*5.3	31.0	*0.0	63.7	100.0
Wife Employed	12.0	*7.3	49.0	31.8	100.0
Both NLF	*3.2	4.8	4.2	87.8	100.0
Total	20.4	15.2	10.2	54.2	100.0

Notes: Population weighted results. * Estimate not reliable.

Partnered men and women who were already retired at the time of their 2007 interview were asked about the timing of their retirement, relative to their spouse or partner. Of the 65% of men and 31% of women who had retired after their spouse, 25% of men and 44% of women retired within one year of their spouse's retirement. Among those who retired before their spouse, 24% of men and 13% of women said that their spouse had retired at around the same time. These figures suggest that at least 20% of people who were living with a spouse or partner at the time of their retirement had retired within one year of their spouse.

The HILDA Survey data also provide evidence of couples intending to coordinate their retirement in the future. Differences in the planned retirement date, based on the planned retirement age of husbands and wives who were both still in paid employment in 2007, are shown in Table 3. Almost 30% of mature age couples who are not yet retired intend to coordinate the timing of their retirement. Furthermore, the proportion of couples who intend to retire within one year of each other increases with the age of the husband — from 25% of couples in which the husband is aged between 55 and 59 to 35% of couples in which the husband is in the 60 to 64 age group. Among couples who both reported a planned retirement age, the proportion expecting to coordinate their retirement increases to

41%, and this proportion again increases with the age of the husband. This increase in expectation of joint retirement may be a result of couples giving more serious consideration to the timing of their retirement as they get closer to actually retiring.

Table 3: Absolute Difference in Planned Retirement Date, Couples, Husband aged 55 and over and both still in paid employment, 2007 (%)

Difference in Husband's and Wife's	*Age Group of Husband*			
Planned Retirement Date	55-59	60-64	65+	Total
1 Year or Less	25.3	35.3	*30.2	28.8
2 Years	14.5	8.9	*2.9	11.5
3 Years	10.4	4.0	*4.0	7.8
4 Years	*6.2	*7.6	*1.2	6.0
5 Years or More	20.9	9.4	11.2	16.4
One or both members of the couple either do not intend to retire or have no definite plans about retirement age	22.8	34.9	50.4	29.5
Total	100.0	100.0	100.0	100.0
Expected Retirement Pattern^				
Joint Retirement (both retire in the same year)	32.8	54.2	61.0	40.9
Wife Retires First	39.7	27.2	*27.9	35.4
Husband Retires First	27.5	18.6	*11.1	23.7
Total	100.0	100.0	100.0	100.0

Notes: Population weighted results. *Estimate not reliable. ^ The sample is further restricted to couples in which both partners specified a planned retirement age.

In couples where one or both members said that they did not intend to retire, or that they had no definite plans about the timing of their retirement, the most common scenario was one in which the husband had a planned retirement date and the wife had no definite retirement plans. This was the case for 31% of the couples in this category. Presumably, this is a result of the fact that a large proportion of wives are younger than their husbands, and for them, retirement is too far off to make any serious plans.[18] For a further 25% of couples, the wife had specified a date by which she planned to retire and the husband said that he did not intend to retire at all.

In summary, descriptive evidence shows that while the most common pattern of retirement for Australian couples who have already retired was one in which the wife retires before her husband, there is also some evidence of couples coordinating their retirement. Furthermore, among mature age couples who are both still in paid employment, at least one in five couples intend to retire at around the same time.

4.1 Results for the Single Risk Hazard Model

Results for complementary log-log models with and without unobserved heterogeneity for men and women are shown in Tables 4 and 5 respectively.[19] While the differences in the estimates with and without unobserved heterogeneity are relatively small, likelihood ratio tests indicate that unobserved

[18] Among couples in this sample, the husband was, on average, 3.64 years older than the wife.

[19] Estimating separate models for men and women ignores the fact that many of these men and women come from the same household. However, a fully interacted model using a pooled sample of men and women and clustering on couple ID, rather than person ID, does not change the significance of the coefficients, and the magnitude of the coefficients is different only at the third decimal place.

heterogeneity is statistically significant for men and women. This may be an indicator of complementarity in leisure that is not captured by the other variables included in the model.

Because of the non-linear nature of the complementary log-log model, the coefficients do not have a straightforward interpretation. However, the antilog of the coefficients can be interpreted as the hazard ratio. Hazard ratios are centred around 1, with a hazard ratio between 0 and 1 indicating a decrease in the probability of retirement and a hazard ratio above 1 indicating an increase in the probability of retirement. For example, the hazard ratio for men with a partner who is currently employed is 0.135 in the model with gamma distributed frailty. This result indicates that for men who have a partner who is currently employed, the hazard of retirement is 13.5% of the hazard rate for those whose partner is not employed.

For men, health is found to be the most important determinant of retirement behaviour. Having a work-limiting health condition more than triples the estimated hazard of retirement. The likelihood of retirement also increases substantially for men in households where the family home is owned outright; and is higher among men who completed year 12 compared to those who did not. As expected, men with a higher Option Value have a lower retirement hazard. A 1,000 unit increase in Option Value reduces the hazard of retiring by approximately 2 percentage points.[20] While the coefficients of the duration variables are not statistically significant, the duration variables at ages 65-66 and 67-68 become statistically significant when the Option Value measure is excluded from the model, reflecting eligibility for the Age Pension at age 65 that was previously captured by the Option Value measure.

Among mature age men who are living with a spouse or partner, the hazard of retirement decreases with the amount of control that they have over household decisions about saving and investment. It may be the case that men who have more control over decisions about savings and investment also have more control over decisions about when to retire. Alternatively, this may be a reflection of their earning capacity. That is, those with higher earning capacity may also have more control over saving and investment decisions within the household. The likelihood of retirement is also lower for men who had higher levels of job satisfaction in the previous year, with a 1 point increase in job satisfaction reducing the hazard of retirement by approximately 1 percentage point.

[20] Estimates using alternative financial incentive measures are provided in Appendix Table A.2. Estimates using the Peak value (the maximum expected gain in lifetime retirement income from continuing in employment) are very similar to those using the Option Value. Estimates using the one-year Accrual measure (the maximum expected gain in lifetime retirement income from continuing in employment for one year) are slightly larger in magnitude, with a $1,000 increase in Accrual reducing the likelihood of retirement by approximately 6 percentage points. This is to be expected given the one-year Accrual measure represents an immediate change to which individuals should be more responsive.

Table 4: Probability of Retirement, Partnered Men Aged 55 to 70 and Employed in the Previous Year, Complementary log-log Estimates (Exponentiated Coefficients)

	No control for unobserved heterogeneity		*Normally distributed frailty*		*Gamma distributed frailty*	
	Hazard Ratio	Standard Error	Hazard Ratio	Standard Error	Hazard Ratio	Standard Error
Husband						
Age (Control = 55-56)						
Age 57-58	0.501	[0.373]	0.563	[0.434]	0.596	[0.465]
Age 59-60	0.738	[0.475]	0.867	[0.630]	0.703	[0.523]
Age 61-62	1.288	[0.815]	1.619	[1.176]	1.400	[1.033]
Age 63-64	1.181	[0.744]	1.473	[1.098]	1.353	[1.037]
Age 65-66	1.256	[0.810]	1.619	[1.269]	1.717	[1.397]
Age 67-68	1.442	[0.985]	1.942	[1.574]	2.299	[1.959]
Age 69 and over	0.502	[0.363]	0.665	[0.575]	0.800	[0.722]
Work-limiting Health Condition	3.509***	[0.651]	3.955***	[0.819]	4.070***	[0.881]
Country of Birth (Control = Australian Born)						
MESB	0.882	[0.224]	0.919	[0.273]	0.994	[0.316]
NESB	1.485	[0.453]	1.577	[0.524]	1.761	[0.609]
Education (Control = Year 11 or Below)						
Degree	0.769	[0.231]	0.692	[0.247]	0.560	[0.215]
Certificate	0.943	[0.193]	0.971	[0.219]	0.968	[0.230]
Year 12	1.855**	[0.555]	1.911*	[0.734]	2.084*	[0.831]
Occupational Status	0.997	[0.004]	0.997	[0.005]	0.996	[0.005]
Experience	0.991	[0.010]	0.985	[0.012]	0.983	[0.015]
Option Value	0.979***	[0.004]	0.977***	[0.004]	0.980***	[0.005]
Relationship Satisfaction (*t* -1)	1.011*	[0.006]	1.010*	[0.008]	1.010	[0.008]
Job Satisfaction (*t* -1)	0.991	[0.006]	0.990*	[0.006]	0.989*	[0.006]
Wife						
Age Difference (Control = Less than 2 Years Age Difference)						
Wife 2 or More Years Older	0.822	[0.304]	0.808	[0.336]	0.867	[0.379]
Husband 2 to 4 Years Older	1.204	[0.239]	1.227	[0.292]	1.275	[0.322]
Husband 5 or More Years Older	0.733	[0.209]	0.720	[0.232]	0.813	[0.276]
Employed	0.193***	[0.041]	0.161***	[0.039]	0.135***	[0.035]
Work-limiting Health Condition	0.955	[0.197]	1.060	[0.234]	1.092	[0.261]
Country of Birth (Control = Australian Born)						
MESB	1.903**	[0.476]	1.912**	[0.592]	1.598	[0.539]
NESB	0.849	[0.310]	0.803	[0.313]	0.788	[0.321]
Education (Control = Year 11 or Below)						
Degree	0.817	[0.289]	0.941	[0.329]	1.033	[0.382]
Certificate	1.184	[0.229]	1.214	[0.287]	1.304	[0.324]
Year 12	0.340***	[0.135]	0.289***	[0.125]	0.253***	[0.118]
Occupational Status	1.006	[0.005]	1.005	[0.006]	1.007	[0.006]
Experience	1.006*	[0.003]	1.007*	[0.004]	1.007*	[0.004]
Option Value	1.005***	[0.001]	1.005***	[0.002]	1.004**	[0.002]
Relationship Satisfaction (*t* -1)	0.994	[0.005]	0.993	[0.005]	0.993	[0.006]
Household						
Own Home Outright	1.889***	[0.418]	2.168***	[0.601]	1.923**	[0.557]
Resident Children	0.710	[0.169]	0.698	[0.175]	0.629*	[0.169]
Relationship Duration	0.986	[0.010]	0.986	[0.012]	0.991	[0.013]
Household Net Worth	0.926	[0.060]	0.925	[0.056]	0.941	[0.057]
Major City	0.829	[0.156]	0.783	[0.162]	0.759	[0.167]
Household Decision-maker (*t* -1)	0.476*	[0.187]	0.396**	[0.164]	0.405**	[0.181]
Log-likelihood	-448.639		-447.219		-417.581	
lnsig2u			-0.687	(0.720)		
sigma_u			0.709	(0.255)		
rho/ gamma variance			0.234	(0.129)	0.500	(0.345)
Likelihood-ratio test of rho/gamma var = 0			2.84**		62.12***	

Note: ***, ** and * represent statistical significance at the 1%, 5% and 10% levels respectively.

For partnered men, the probability of retirement increases with their level of relationship satisfaction in the previous year. This may be an indicator of a preference for joint retirement among couples with high levels of relationship satisfaction. However, when gamma distributed frailty is included in the model, this result is no longer statistically significant.[21]

The results concerning partner's characteristics show some evidence of complementarity in leisure. Compared to those whose partner is not in paid employment, men with a partner who is employed have a substantially lower hazard of retirement.[22] Men whose partner's highest level of education is Year 12 have a lower hazard of retirement than those whose partner did not complete Year 12. On the other hand, partner's Option Value has a small but statistically significant positive effect on the hazard of retirement. It may be the case that some men whose wife has a strong financial incentive to continue working may not be willing to delay their own retirement until their wife is ready to retire. [23] However, given that the retirement decisions of partnered women are more likely to influenced by non-monetary factors such as caring responsibilities than financial considerations (Gruber and Wise, 2004), it stands to reason that men are not likely to base their decisions about retirement on the financial incentives faced by their wives.

Turning now to the results for women, Table 5 shows that while health is a very important determinant of men's retirement behaviour, having a work-limiting health condition does not appear to have a significant impact on the retirement decisions of partnered women. For women, occupational status, labour market experience, job satisfaction and having children still living at home all reduce the hazard of retiring.[24]

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[21] It is likely that those with high levels of relationship satisfaction are more likely to have a preference for leisure time with their partner. When partner's labour force status is interacted with relationship satisfaction in the previous year, the results from the model with Gamma distributed frailty show that compared to men who had high levels of relationship satisfaction (80 or higher out of 100) in the previous year and whose partner was employed, the hazard of retirement was 9.24 times higher among men with high levels of relationship satisfaction and a partner who was not employed, but only 5.98 times higher among men with low levels of relationship satisfaction and a partner who was not employed.

[22] It may be problematic to treat partner's employment status as exogenous, as income from the Age Pension and other types of income support depend on partner's income. Therefore, the financial incentive measures depend to some extent on whether an individual is part of a couple, and whether their partner is employed. When the model is estimated without the indicator of partner's employment status, the Option Value remains highly significant, but the measure of control over household decisions is no longer statistically significant.

[23] In calculating the Option Value for partners who were not in paid employment during the observation period, the potential labour market income component of the Option Value measure was estimated using a Heckman selection model. This may result in an over-estimate of the Option Value for partners who are not employed. However, the estimation results change very little when partner's Option Value is excluded from the model, and when alternative measures of financial incentives that do not consider potential labour income are substituted for the Option Value measure (Table A.2).

[24] For men, their own occupational status and the occupational status of their partner appear to have no significant impact on the retirement decision. However, for women, the probability of retirement is reduced as occupational status increases. When the occupational status measure is substituted for 1-digit indicators of occupation based on the ANZSCO 2006 occupation scale, we find that for men whose occupation is a labourer, the hazard of retirement is almost doubled. For women, the probability of retirement is reduced among those who are in professional occupations, and increased among women who are machinery operators or drivers, presumably due to the more physically demanding nature of these occupations. The likelihood of retirement is also higher for women whose spouse or partner's current or most recent occupation was as a machinery operator or driver.

Table 5: Probability of Retirement, Partnered Women Aged 55 to 70 and Employed in the Previous Year, Complementary log-log estimates (Exponentiated Coefficients)

	No control for unobserved heterogeneity		*Normally distributed frailty*		*Gamma distributed frailty*	
	Hazard Ratio	Standard Error	Hazard Ratio	Standard Error	Hazard Ratio	Standard Error
Wife						
Age (Control = 55-56)						
Age 57-58	1.676	[1.177]	1.725	[1.465]	1.208	[1.012]
Age 59-60	2.076	[1.402]	2.473	[2.110]	2.034	[1.685]
Age 61-62	2.364	[1.662]	2.844	[2.543]	2.195	[1.919]
Age 63-64	3.257	[2.428]	4.984	[4.982]	4.759	[4.670]
Age 65-66	3.714*	[2.934]	6.618*	[7.048]	6.774*	[7.123]
Age 67-68	1.358	[1.335]	2.342	[2.865]	2.466	[3.037]
Age 69 and over	1.969	[1.908]	2.800	[3.851]	2.543	[3.456]
Work-limiting Health Condition	0.951	[0.315]	0.865	[0.329]	0.959	[0.370]
Country of Birth (Control = Australian Born)						
MESB	1.869	[0.802]	2.054	[1.037]	2.089	[1.085]
NESB	1.070	[0.586]	0.982	[0.682]	1.277	[0.874]
Education (Control = Year 11 or Below)						
Degree	1.170	[0.572]	1.163	[0.665]	1.228	[0.706]
Certificate	0.804	[0.260]	0.747	[0.272]	0.878	[0.316]
Year 12	3.964**	[2.131]	4.295*	[3.231]	3.926*	[2.943]
Occupational Status	0.981***	[0.006]	0.978**	[0.009]	0.979**	[0.008]
Experience	0.988**	[0.006]	0.987**	[0.007]	0.989	[0.007]
Option Value	1.005	[0.004]	1.007	[0.005]	1.007	[0.005]
Relationship Satisfaction (*t* -1)	1.022*	[0.013]	1.023**	[0.012]	1.020*	[0.012]
Job Satisfaction (*t* -1)	0.983***	[0.007]	0.976***	[0.008]	0.976***	[0.008]
Husband						
Age Difference (Control = Less than 2 Years Age Difference)						
Wife 2 or More Years Older	0.740	[0.383]	0.747	[0.423]	1.029	[0.569]
Husband 2 to 4 Years Older	0.878	[0.310]	0.896	[0.339]	0.910	[0.351]
Husband 5 or More Years Older	0.429*	[0.205]	0.350*	[0.189]	0.485	[0.259]
Employed	0.264***	[0.093]	0.198***	[0.073]	0.193***	[0.071]
Work-limiting Health Condition	0.770	[0.245]	0.681	[0.237]	0.579	[0.211]
Country of Birth (Control = Australian Born)						
MESB	1.668	[0.682]	1.728	[0.851]	1.546	[0.757]
NESB	0.814	[0.357]	0.729	[0.397]	0.600	[0.338]
Education (Control = Year 11 or Below)						
Degree	0.991	[0.519]	1.212	[0.730]	1.234	[0.767]
Certificate	0.803	[0.254]	0.887	[0.337]	0.898	[0.345]
Year 12	0.362	[0.224]	0.340	[0.232]	0.399	[0.275]
Occupational Status	1.000	[0.007]	0.996	[0.008]	0.994	[0.008]
Experience	1.030	[0.033]	1.023	[0.019]	1.023	[0.020]
Option Value	0.993	[0.005]	0.991	[0.006]	0.990*	[0.006]
Relationship Satisfaction (*t* -1)	0.984	[0.010]	0.981*	[0.011]	0.986	[0.011]
Household						
Own Home Outright	1.331	[0.447]	1.543	[0.620]	1.489	[0.596]
Resident Children	0.446**	[0.171]	0.279**	[0.151]	0.267**	[0.147]
Relationship Duration	0.995	[0.018]	0.998	[0.019]	1.006	[0.020]
Household Net Worth	0.769*	[0.108]	0.729*	[0.118]	0.695**	[0.117]
Major City	1.070	[0.276]	1.172	[0.366]	1.280	[0.409]
Household Decision-maker (*t* -1)	0.252**	[0.166]	0.197**	[0.146]	0.212**	[0.159]
Log-likelihood	-228.109		-225.626		-214.040	
lnsig2u			0.067	(0.637)		
sigma_u			1.034	(0.330)		
rho/ gamma variance			0.394	(0.152)	0.780	(0.458)
Likelihood-ratio test of rho/gamma var = 0			6.27***		29.45***	

Note: ***, ** and * represent statistical significance at the 1%, 5% and 10% levels respectively.

For women, their own Option Value has no significant impact on the hazard of retirement. This result confirms previous findings that for men, but not for women, the desire to maximise remaining lifetime income, or the utility derived from it, is an important consideration in making the decision about when to retire (Gruber and Wise, 2004; Warren and Oguzoglu, 2011). In seeking to understand this gender difference, it is reasonable to point out that on average, superannuation savings of women are lower than those of men; and in most households, men are still the main earners. Therefore, it is the husband's continuation or exit from the labour force that is going to have the most impact on the household's lifetime income. There is also a great deal of international evidence that compared with men, women are more influenced by non-monetary factors including continuing caring responsibilities and a preference for spending time with their spouse and other family members (Gruber and Wise, 2004).

While their own Option Value has no significant impact on the retirement hazard for women, their husband's Option Value reduces the likelihood of retirement by approximately 1 percentage point per 1,000 units. Although this result is only significant at the 10% level, it suggests that some women may delay their own retirement if their husband has a financial incentive to continue in paid work.[25]

Compared to women who did not complete high school, the retirement hazard for women whose highest level of education is Year 12 is substantially higher. As was the case for men, having a partner who is employed reduces the retirement hazard substantially, and those with higher levels of relationship satisfaction have slightly higher hazards of retirement. The latter result suggests that there is some evidence of complementarity in leisure.[26]

For women, the level of the husband's control over decisions about household savings and investments has a significant negative effect on the probability of retirement. Again, this may be a reflection of the husband's earning capacity, as husbands with a higher earning capacity may also have more control over decisions about saving and investment.

In summary, the single risk hazard models provide some evidence of a preference for coordinated retirement among mature age couples. For partnered men, health is a very important determinant of retirement behaviour; and financial considerations, such as potential retirement income and home ownership, are also significant factors in the decision about when to retire. On the other hand, partnered women do not appear to base their retirement decisions on their own health or potential

[25] When alternative measures of financial incentives are used, partner's financial incentives are not statistically significant for women (Table A.2). This suggests that the husband's potential labour income, which is only captured by the Option Value measure, is a more important consideration than the potential increase in his expected lifetime retirement income from delaying retirement.

[26] For women, the difference in the hazard of retirement resulting from the interaction of partner's employment status and their own relationship satisfaction is not as large as that for men. Compared to women who had high levels of relationship satisfaction in the previous year and whose partner was employed, the hazard of retirement was 4.26 times higher among women with high levels of relationship satisfaction and a partner who was not employed, and 3.62 times higher among men with low levels of relationship satisfaction and a partner who was not employed.

retirement income. However, it appears that some women may delay their own retirement if their husband has a financial incentive to continue working, possibly due to complementarities in leisure. Furthermore, having a partner who is employed reduces the retirement hazard substantially for both men and women, which also suggests a preference among couples to retire together rather than retiring alone.

4.2 Results for the Competing Risks Model

Results for the competing risks model, with and without unobserved heterogeneity are shown in Tables 6 and 7 respectively. For ease of interpretation, the relative risk ratios (the anti-logged values of the coefficients) are reported. The relative risk ratio measures the impact of a change in that variable on the probability of exiting employment to that destination, relative to the probability of remaining in employment. For example, in the model without unobserved heterogeneity, the relative risk ratio for the husband's Option Value is 0.978 for the destination state of 'husband retires first' (Table 6). According to this result, the probability of the husband retiring first, relative to the probability of both members of the couple remaining in employment, is reduced by 2.2 percentage points for every 1,000 units of the husband's Option Value.

When unobserved heterogeneity is included in the model in the form of a random effect, the results are, in general, not substantially different from those of the model without unobserved heterogeneity. The main difference between the two sets of results is that the magnitude of the coefficients is reduced slightly when unobserved heterogeneity is included. For the outcome of the wife retiring before the husband, the education level of both the husband and the wife become insignificant in the model with unobserved heterogeneity. Relationship duration also becomes statistically insignificant once unobserved heterogeneity is controlled for. The remainder of the discussion of the results of the competing risk model refers to the estimates in which unobserved heterogeneity is included in the model (Table 7).

From Table 7, it is immediately evident that some regression coefficients vary by destination state. The likelihood of a husband retiring before his wife is mainly due to health considerations, and to a lesser extent to financial considerations. More specifically, the probability of the husband retiring before his wife is ten times higher among couples in which the husband has a work-limiting health condition. Owning a home outright triples the odds of a husband retiring before his wife; while the odds of a husband retiring before his wife decrease slightly with the husband's Option Value, labour market experience and household net worth. However, none of the wife's attributes are significant for this outcome.

Table 6: Competing Risks Estimates, without Unobserved Heterogeneity (Relative Risk Ratios)

	Husband retires first		*Wife retires first*		*Joint retirement*	
	RRR	S.E.	RRR	S.E.	RRR	S.E.
Husband						
Age (Control = 55-60)						
Age61-62	2.770**	[1.332]	0.752	[0.315]	2.260	[1.468]
Age63-64	1.638	[0.916]	0.765	[0.348]	4.066**	[2.618]
Age65-66	1.961	[1.379]	0.628	[0.385]	5.991**	[4.944]
Age67-70	1.938	[1.473]	1.080	[0.630]	6.359**	[5.573]
Work-limiting Health Condition	7.498***	[2.834]	0.941	[0.367]	4.124***	[1.823]
Country of Birth (Control = Australian Born)						
MESB	0.702	[0.388]	0.971	[0.450]	0.666	[0.477]
NESB	1.011	[0.544]	0.452	[0.252]	1.021	[0.709]
Highest Level of Education (Control = Year 11 or Below)						
Degree	1.182	[0.728]	0.351*	[0.198]	2.489	[2.002]
Certificate	0.880	[0.401]	0.549*	[0.190]	1.130	[0.523]
Year 12	1.585	[1.046]	0.302*	[0.196]	1.970	[1.409]
Occupational Status	0.995	[0.009]	1.012	[0.008]	0.986	[0.010]
Experience	0.956	[0.027]	0.987	[0.025]	0.982	[0.037]
Option Value	0.978***	[0.008]	0.985**	[0.006]	0.982*	[0.010]
Job Satisfaction (*t* -1)	0.998	[0.010]	1.034***	[0.011]	0.987	[0.011]
Relationship Satisfaction (*t* -1)	1.003	[0.014]	0.966***	[0.010]	1.014	[0.019]
Wife						
Age Difference Between Husband and Wife (Control = Less than 2 Years Age Difference)						
Wife 2 or More Years Older	0.284	[0.377]	0.896	[0.856]	4.531	[4.366]
Husband 2 to 4 Years Older	1.349	[0.747]	1.065	[0.379]	1.078	[0.541]
Husband 5 or More Years Older	1.219	[0.780]	0.298**	[0.156]	0.237*	[0.185]
Work-limiting Health Condition	1.106	[0.581]	0.822	[0.369]	0.836	[0.447]
Country of Birth (Control = Australian Born)						
MESB	2.042	[1.177]	3.766***	[1.876]	2.385	[1.804]
NESB	1.769	[1.154]	1.168	[0.739]	0.535	[0.543]
Highest Level of Education (Control = Year 11 or Below)						
Degree	2.301	[1.335]	1.753	[0.853]	0.361	[0.322]
Certificate	1.671	[0.770]	0.595	[0.237]	0.406*	[0.221]
Year 12	0.416	[0.316]	2.662*	[1.399]	0.137*	[0.163]
Occupational Status	1.008	[0.010]	0.981**	[0.009]	0.979	[0.013]
Experience	1.006	[0.009]	0.986**	[0.006]	0.994	[0.008]
Option Value	1.001	[0.003]	0.998	[0.003]	1.006	[0.005]
Job Satisfaction (*t* -1)	1.006	[0.010]	0.967***	[0.007]	0.972***	[0.010]
Relationship Satisfaction (*t* -1)	0.992	[0.010]	1.020*	[0.011]	1.001	[0.013]
Household						
Resident Children	1.381	[0.617]	0.287**	[0.139]	1.304	[0.717]
Relationship Duration	0.963*	[0.019]	0.971*	[0.017]	1.029	[0.036]
Household Net Worth	0.579**	[0.129]	0.802**	[0.089]	0.873	[0.111]
Own Home Outright	2.595*	[1.380]	1.065	[0.380]	0.647	[0.306]
Major City	0.893	[0.361]	2.256**	[0.713]	3.424***	[1.567]
Household Decision-maker (*t* -1)	0.695	[0.542]	5.371**	[3.669]	0.252	[0.261]
Log likelihood = -464.263						
N = 916						
Pseudo R2 = 0.2342						

Note: ***, ** and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Table 7: Competing Risks Estimates, with Unobserved Heterogeneity (Relative Risk Ratios)

	Husband retires first		*Wife retires first*		*Joint retirement*	
	RRR	S.E.	RRR	S.E.	RRR	S.E.
Husband						
Age (Control = 55-60)						
Age61-62	3.274**	[1.706]	0.847	[0.384]	2.643	[1.822]
Age63-64	2.051	[1.261]	0.864	[0.438]	5.075**	[3.548]
Age65-66	2.462	[1.911]	0.848	[0.587]	8.415**	[7.605]
Age67-70	2.525	[2.129]	1.464	[0.999]	9.244**	[8.889]
Work-limiting Health Condition	10.416**	[4.625]	1.169	[0.523]	5.199***	[2.553]
Country of Birth (Control = Australian Born)						
MESB	0.732	[0.449]	0.844	[0.456]	0.684	[0.523]
NESB	1.022	[0.630]	0.388	[0.252]	0.933	[0.718]
Highest Level of Education (Control = Year 11 or Below)						
Degree	1.060	[0.767]	0.383	[0.257]	2.623	[2.355]
Certificate	0.799	[0.417]	0.613	[0.257]	1.212	[0.635]
Year 12	1.522	[1.141]	0.351	[0.261]	2.201	[1.784]
Experience	0.940*	[0.031]	0.975	[0.030]	0.966	[0.040]
Occupational Status	0.994	[0.010]	1.015*	[0.009]	0.989	[0.011]
Option Value	0.975***	[0.009]	0.982**	[0.007]	0.980*	[0.010]
Job Satisfaction (*t* -1)	0.998	[0.011]	1.036***	[0.013]	0.988	[0.012]
Relationship Satisfaction (*t* -1)	0.999	[0.015]	0.962***	[0.011]	1.008	[0.020]
Wife						
Age Difference Between Husband and Wife (Control = Less than 2 Years Age Difference)						
Wife 2 or More Years Older	0.195	[0.299]	0.871	[0.992]	3.583	[4.022]
Husband 2 to 4 Years Older	1.356	[0.825]	1.076	[0.466]	0.982	[0.548]
Husband 5 or More Years Older	0.881	[0.637]	0.228**	[0.138]	0.162**	[0.136]
Work-limiting Health Condition	0.985	[0.559]	0.812	[0.405]	0.833	[0.482]
Country of Birth (Control = Australian Born)						
MESB	2.648	[1.765]	4.885***	[2.871]	2.865	[2.354]
NESB	1.814	[1.364]	1.314	[0.985]	0.610	[0.665]
Highest Level of Education (Control = Year 11 or Below)						
Degree	2.633	[1.738]	1.511	[0.872]	0.336	[0.311]
Certificate	1.741	[0.915]	0.617	[0.290]	0.479	[0.281]
Year 12	0.404	[0.340]	2.354	[1.491]	0.098*	[0.131]
Experience	1.003	[0.010]	0.985**	[0.007]	0.994	[0.009]
Occupational Status	1.008	[0.012]	0.981*	[0.010]	0.977*	[0.014]
Option Value	1.003	[0.004]	0.999	[0.003]	1.008	[0.005]
Job Satisfaction (*t* -1)	1.002	[0.011]	0.963***	[0.009]	0.969***	[0.010]
Relationship Satisfaction (*t* -1)	0.992	[0.011]	1.025**	[0.013]	1.005	[0.015]
Household						
Resident Children	1.290	[0.646]	0.236***	[0.129]	1.141	[0.688]
Relationship Duration	0.963*	[0.022]	0.971	[0.019]	1.034	[0.038]
Household Net Worth	0.945**	[0.022]	0.977*	[0.012]	0.985	[0.013]
Own Home Outright	2.992*	[1.759]	1.009	[0.418]	0.708	[0.371]
Major City	0.915	[0.409]	2.265**	[0.843]	3.435**	[1.728]
Household Decision-maker (*t* -1)	0.644	[0.563]	7.818**	[6.328]	0.245	[0.273]
Log likelihood = -461.458						
N = 916						
Variance of random effect = 0.937 (0.585)						

Note: ***, ** and * represent statistical significance at the 1%, 5% and 10% levels respectively.

Turning to the scenario in which the wife retires before her husband, it is evident from Table 7 that the characteristics and preferences of both members of the couple have a significant impact on the likelihood of this outcome. For example, the likelihood of a wife retiring before her husband increases with the husband's job satisfaction and occupational status, and decreases with the husband's Option Value. The latter result suggests that some women may delay retirement if their husband has a financial incentive to do so. The husband's level of relationship satisfaction in the previous year also

has a significant effect on the likelihood of this outcome. This suggests that in couples where the husband has a high level of relationship satisfaction, the wife may delay her own retirement in order to retire at the same time as her husband. However, women with high levels of relationship satisfaction in the previous year are more likely to retire before their husband. One possible explanation for this result is that for women, high levels of relationship satisfaction do not necessarily coincide with a stronger preference for joint retirement.

Women born in an English speaking country other than Australia are more likely to retire before their husbands, as are women living in major cities and the odds of a wife retiring before her husband increase with the decision-making power of the husband. Conversely, the likelihood of a wife retiring before her husband decreases with the wife's occupational status, labour market experience and job satisfaction, and are decreased substantially the husband is at least 5 years older than his wife, and also if the couple has children still living at home.

Compared to couples in which the husband is aged between 55 and 60, the odds of joint retirement are increased considerably if the husband is aged 65 or older. In couples where the wife is younger than the husband, this may be a result of both members of the couple reaching Age Pension eligibility age.[27] The odds of joint retirement are substantially higher if the husband has a work-limiting health condition, which implies that women are likely to retire in order to care for their husband, but the opposite is not the case. It also appears that for couples, the coordination of retirement differs between rural and urban areas, as the likelihood of joint retirement is higher among couples living in major cities. On the other hand, the probability of joint retirement decreases with the job satisfaction of the wife, and is also reduced if the husband is at least five years older than his wife. These results suggest that women with high levels of job satisfaction and women who are at least five years younger than their husband are less likely to be willing to retire early in order to coordinate their retirement with their spouse. The likelihood of joint retirement also decreases with the husband's Option Value. Although this result is only significant at the 10% level, it suggests that both members of a couple may delay retirement if the husband has a financial incentive to do so.[28]

As the purpose of the competing risks model is to determine the factors associated with the timing of retirement for couples, it is interesting to examine the effects of financial incentives at a couple level, rather than at an individual level. For example, the one-year Accrual for the couple if the husband and the wife both delay retirement for one year (i.e. the gain in total expected remaining lifetime

[27] This result should be interpreted with caution due to the limited number of couples in these age categories.

[28] Estimates of the competing risk model using alternative financial incentive measures are provided in Table A.3. As was the case for the single risk model, the individual Accrual and Peak values for the wife are not statistically significant; the results concerning the Peak value for the husband are very similar to those for the Option Value; and the magnitude of the effect of the one-year Accrual for the husband are larger than those of the Peak or Option Value measures. However, for the outcome of the husband retiring first, the Peak value is not statistically significant. This result suggests that for this outcome, potential labour income foregone if the husband retires (which is captured by the Option Value measure but not the Peak value) is a more important consideration than his potential retirement income from pensions and superannuation.

retirement income for the couple if the husband and wife both delay retirement for one year); or the Peak value of the couple — the maximum possible gain in total expected remaining lifetime retirement income for the couple if the husband and wife both delay retirement until a later date. Estimates of the competing risk model using alternative financial incentive measures are provided in Table A.3.

When the individual Option Values are replaced by the one-year Accrual for the couple, the estimation results indicate that the likelihood of the wife retiring first, and also that of joint retirement, decrease by 4 to 5 percentage points for every $1,000 of the Accrual value of the couple. In other words, if there is an overall financial incentive for the couple to delay retirement for one year, the likelihood of joint retirement and the wife retiring before her husband is reduced. Similarly, when the individual Option Values are replaced by the Peak value for the couple, the likelihood of the wife retiring first is reduced by 1.5 percentage points for every $1,000 of the couple's Peak value. These results support the conclusion that women may delay their retirement if their husband, or the couple overall, has a financial incentive to continue working.[29]

In summary, competing risks models examining the timing of an individual's retirement relative to their spouse indicate that the situation in which a husband retires before his wife is likely to be a result of his own poor health, and to a lesser extent to financial considerations. However, none of the wife's attributes are significant for this outcome. On the other hand, the odds of a wife retiring before her husband are affected by the characteristics and preferences of both members of the couple; increasing with the husband's job satisfaction, occupational status and decision-making power within the household; and decreasing with the occupational status, labour market experience and job satisfaction of the wife; if the couple has resident children and if the husband is older than the wife by five years or more. The likelihood of the wife retiring before her husband decreases with the husband's Option Value, which suggests that women may delay retirement if their husband has a financial incentive to remain in employment. Using 'couple level' measures of financial incentives further supports the conclusion that women may delay their retirement if their husband, or the couple overall, has a financial incentive to continue working. The odds of joint retirement increase considerably if the husband has a work-limiting health condition. This result suggests that women are likely to retire in order to care for their husband, but the opposite is not the case, presumably due to the reduction in household income resulting from the husband leaving paid employment to care for his wife.

[29] These combined measures of the financial incentives faced by couples do not account for differences in the financial incentives faced by husbands and wives. For example, one member of a couple may have a strong financial incentive to delay retirement, but the other may not. Including the difference between the Accrual values of the husband and the wife in addition to the couple level Accrual does not change the result concerning couple's Accrual (Table A.3). When the individual Peak values of the husband and the wife are included along with the Peak value of the couple together, the results indicate that the likelihood of the husband retiring first is reduced with the couple's overall Peak value, but increases with the Peak value of the wife. This result is similar to that of the single risk models for men, which suggest that men are not likely to delay their own retirement in response to the financial incentives faced by their wife.

5. Conclusion

Descriptive evidence from the HILDA Survey shows that, while the most common pattern of retirement for Australian couples is one in which the wife retires before the husband, there is some evidence of couples coordinating their retirement. Furthermore, among mature age couples who are not yet retired, at least one in five intend to retire at approximately the same time.

Single and competing risk duration models are estimated to investigate the determinants of the retirement decisions of partnered men and women. Both models provide evidence of a preference for coordinated retirement among mature age couples. For partnered men, their own health is a very important determinant of retirement behaviour; and financial considerations, such as potential retirement income and home ownership, are also significant factors in the decision about when to retire. However, partnered women do not appear to base their retirement decisions on their own health or potential retirement income, but may delay their own retirement if their partner has a financial incentive to continue working. Furthermore, competing risk estimates show that the likelihood of joint retirement is considerably higher if the husband has a work-limiting health condition. That is, women are likely to retire to care for their husband, but the opposite is not the case.

The models estimated in this paper show that Australian couples' retirement choices are determined by individual and job characteristics, and also to some extent by partner's and couple's characteristics. These results suggest that complementarity in leisure is an important consideration in the retirement decisions of partnered men and women. This finding has important implications for policymakers. It implies that any policy affecting the retirement decision of one member of a couple, for example, changes to the eligibility requirements for the Age Pension, will have flow-on effects to the retirement behaviour of their partner. Therefore, modeling the retirement behaviour of partnered men and women without considering the characteristics and preferences of their partner is likely to lead to errors in predicting the impact of changes in Social Security policy on retirement behaviour.

APPENDIX

Table A.1: Variables Included in Multivariate Analyses

	Men		*Women*		*Couples*	
	Mean	S.E.	Mean	S.E.	Mean	S.E.
Individual Information						
Age 57 or 58	0.116	0.008	0.186	0.015	0.123	0.011
Age 59 or 60	0.190	0.010	0.220	0.016	0.201	0.013
Age 61 or 62	0.225	0.011	0.247	0.017	0.230	0.014
Age 63 or 64	0.191	0.010	0.154	0.014	0.195	0.013
Age 65 or 66	0.121	0.009	0.082	0.011	0.109	0.010
Age 67 or 68	0.080	0.007	0.048	0.008	0.075	0.009
Age 69 and older	0.054	0.006	0.022	0.006	0.041	0.007
Work-limiting health condition	0.152	0.009	0.123	0.013	0.164	0.012
Born in a mainly English speaking country	0.147	0.009	0.100	0.011	0.144	0.012
Born in a non-English speaking country	0.130	0.009	0.094	0.011	0.126	0.011
Degree qualification	0.210	0.011	0.185	0.015	0.211	0.013
Trade certificate, diploma or other certificate level qualification	0.422	0.013	0.298	0.018	0.414	0.016
Highest qualification is Year 12	0.074	0.007	0.034	0.007	0.084	0.009
Occupation status in current job	50.250	0.645	50.439	0.859	50.387	0.814
Percentage of years in paid work since leaving full-time education	96.861	0.187	76.215	0.850	97.292	0.172
Option Value (’000)	46.262	1.067	61.630	1.961	48.942	1.370
Job satisfaction in the previous year (out of 100)	81.598	0.440	83.583	0.637	81.146	0.585
Relationship satisfaction in the previous year (out of 100)	89.314	0.376	87.004	0.586	88.657	0.492
Partner Information						
Wife older than husband by 2 or more years	0.062	0.006	0.181	0.015	0.024	0.005
Husband 2 to 4 years older than wife	0.336	0.012	0.311	0.018	0.318	0.015
Husband 5 or more years older than wife	0.357	0.013	0.157	0.014	0.434	0.016
Indicator of whether partner is employed	0.579	0.013	0.742	0.017	0.879	0.011
Work-limiting health condition	0.167	0.010	0.225	0.016	0.118	0.011
Born in a mainly English speaking country	0.102	0.008	0.142	0.013	0.088	0.009
Born in a non-English speaking country	0.091	0.008	0.119	0.012	0.070	0.008
Degree qualification	0.201	0.010	0.260	0.017	0.225	0.014
Trade certificate or other certificate level qualification	0.206	0.011	0.386	0.019	0.225	0.014
Highest qualification is Year 12	0.091	0.008	0.087	0.011	0.080	0.009
Occupational status in current or most recent job	47.286	0.574	50.533	0.944	76.228	0.764
Percentage of years in paid work since leaving full-time education	65.789	0.735	94.645	0.329	50.345	0.722
Option Value (’000)	70.944	1.362	48.582	1.586	73.248	1.795
Relationship satisfaction in the previous year (out of 100)	86.187	0.462	89.618	0.480	85.895	0.581
Job satisfaction in the previous year (out of 100)	-	-	-	-	81.277	0.607
Household Information						
Own home outright	0.771	0.011	0.777	0.016	0.749	0.014
Has resident children under the age of 15	0.227	0.011	0.142	0.013	0.235	0.014
Total time cohabiting with and/or married to current partner (years)	33.64	0.257	34.72	0.373	32.39	0.340
Household Net Worth (Total assets – Total Debt, $’000)	141.12	4.919	145.40	7.581	146.42	6.352
Live in a major city	0.571	0.013	0.521	0.019	0.515	0.017
Husband’s decision-making power in previous year (out of 100)	0.574	0.006	0.474	0.008	0.543	0.007
Alternative Financial Incentive Measures						
Accrual ($’000)	-3.130	0.023	-2.238	0.213	-2.417	0.248
Partner’s Accrual ($’000)	0.471	0.190	-2.360	0.275	0.912	0.244
Peak Value ($’000)	1.057	0.533	2.082	0.808	2.696	0.731
Partner’s Peak Value ($’000)	15.422	0.908	1.941	0.665	17.711	1.304
Accrual For Couple ($’000)	—	—	—	—	-1.504	0.378
Peak Value for Couple ($’000)	—	—	—	—	11.740	1.373
N	1458		681		916	

Table A.2: Single Risk Estimates Using Alternative Financial Incentive Measures, Complementary log-log Estimates (Exponentiated Coefficients)

	No control for unobserved heterogeneity		*Normally distributed frailty*		*Gamma distributed frailty*	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Men						
Option Value (‘000)	0.979***	[0.004]	0.977***	[0.004]	0.980***	[0.005]
Partner’s Option Value (‘000)	1.005***	[0.001]	1.005***	[0.002]	1.004**	[0.002]
Accural ($‘000)	0.944***	[0.012]	0.933***	[0.014]	0.932***	[0.015]
Partner’s Accrual ($‘000)	1.020*	[0.012]	1.027*	[0.015]	1.028*	[0.103]
Peak Value ($‘000)	0.972***	[0.011]	0.967***	[0.009]	0.971***	[0.010]
Partners Peak Value ($‘000)	1.007***	[0.002]	1.007**	[0.003]	1.006	[0.004]
Women						
Option Value (‘000)	1.005	[0.004]	1.007	[0.005]	1.007	[0.005]
Partner’s Option Value (‘000)	0.993	[0.005]	0.991	[0.006]	0.990*	[0.006]
Accural ($‘000)	0.986	[0.024]	0.988	[0.032]	0.985	[0.031]
Partner’s Accrual ($‘000)	0.986	[0.025]	0.972	[0.028]	0.970	[0.028]
Peak Value ($‘000)	0.997	[0.013]	1.001	[0.014]	1.003	[0.015]
Partners Peak Value ($‘000)	0.987	[0.015]	0.983	[0.015]	0.976	[0.016]

Note: ***, ** and * represent statistical significance at the 1%, 5% and 10% levels respectively. Social Security Wealth (SSW) is the present value of expected total remaining lifetime income from the Age Pension and superannuation. SSW Accrual is the difference in SSW the individual continues working for one year, compared to SSW from immediate retirement. The Peak value is difference between the maximum possible value of SSW from continuing in employment until a later date, and SSW from immediate retirement. If there is no potential gain in SSW from delaying retirement until a later date, the Peak value is equal to the Accrual value.

Table A.3: Competing Risks Estimates using Alternative Financial Incentive Measures, with Unobserved Heterogeneity (Relative Risk Ratios)

	Wife retires first		*Husband retires first*		*Joint retirement*	
	RRR	S.E.	RRR	S.E.	RRR	S.E.
Husband’s Option Value	0.982**	[0.007]	0.975***	[0.009]	0.980*	[0.010]
Wife’s Option Value	0.999	[0.003]	1.003	[0.004]	1.008	[0.005]
Husband’s Accrual	0.929***	[0.023]	0.943**	[0.028]	0.916**	[0.034]
Wife’s Accrual	0.999	[0.026]	1.006	[0.029]	0.992	[0.039]
Husband’s Peak Value	0.970**	[0.015]	0.978	[0.016]	0.956*	[0.024]
Wife’s Peak Value	0.995	[0.007]	1.006	[0.006]	1.006	[0.011]
Accrual for Couple	0.962**	[0.015]	0.974	[0.018]	0.952**	[0.020]
Accrual for Couple	0.963**	[0.016]	0.974	[0.018]	0.953**	[0.020]
Difference between Husband’s and Wife’s Accrual	0.964*	[0.019]	0.968	[0.023]	0.961	[0.030]
Peak Value for Couple	0.985**	[0.007]	0.991	[0.007]	0.989	[0.010]
Peak Value for Couple	1.001	[0.020]	0.973**	[0.014]	1.010	[0.034]
Husband’s Peak Value	0.968	[0.028]	1.010	[0.020]	0.944	[0.046]
Wife’s Peak Value	0.995	[0.014]	1.021**	[0.009]	1.000	[0.025]

Note: ***, ** and * represent statistical significance at the 1%, 5% and 10% levels respectively. Social Security Wealth (SSW) is the present value of expected total remaining lifetime income from the Age Pension and superannuation. SSW Accrual is the difference in SSW the individual continues working for one year, compared to SSW from immediate retirement. The Peak value is difference between the maximum possible value of SSW from continuing in employment until a later date, and SSW from immediate retirement. If there is no potential gain in SSW from delaying retirement until a later date, the Peak value is equal to the Accrual value. The Accrual value for a couple is the sum of the Accrual values of the husband and the wife. The Peak value for a couple is the difference between the maximum possible gain in combined SSW for the husband and the wife if they both delay retirement until a later date, compared to their combined SSW if they both retire immediately. Estimates not accounting for unobserved heterogeneity are very similar, the significance of the coefficients does not change and their magnitude differs only at the third decimal place.

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