

ISSN 0819-2642
ISBN 978 0 7340 3715 2



THE UNIVERSITY OF MELBOURNE
DEPARTMENT OF ECONOMICS

RESEARCH PAPER NUMBER 1005

September 2007

**The transition of older Australian workers
to full and partial retirement**

by

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Abstract

Older workers exiting the labour force follow diverse pathways to retirement. This paper examines the incidence and determinants of partial retirement in Australia using data from the first four waves of the HILDA Survey. Partial retirement is defined as working part-time (less than 30 hours a week), after having left full-time employment (30 hours or more a week). A multinomial logit model is used to examine a sample of older workers who were employed full-time in 2001. Their labour force status in 2004 is modelled against personal characteristics to identify the factors affecting retirement transitions. The results indicate that most factors have a similar directional impact on the likelihood of both partial and full retirement. However, many factors affect men and women differently and women are more likely to experience partial retirement than men. Overall, between one third and one half of individuals who left full-time employment experienced partial retirement.

* I would like to thank John Creedy for his extensive advice and support. In addition I would like to thank Bill Griffiths and Chris Skeels for their assistance. This work was also supported by a University of Melbourne Faculty of Economics and Commerce Kinsman Scholarship. This article uses confidentialised unit record files from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The HILDA Project was initiated and is funded by the Commonwealth Department of Families, Community Services and Indigenous Affairs (FaCSIA) and is managed by the Melbourne Institute of Applied Economic and Social Research. The findings and views reported in this article are those of the authors and should not be attributed to either FaCSIA or the Melbourne Institute.

1 Introduction

This paper examines the movement of older Australian workers into partial and full retirement. The number of older Australians is increasing and it is predicted that by 2045 25 per cent of the population will be aged over 65 (Productivity Commission 2005). If members of this large cohort follow traditional retirement paths and leave the labour force permanently in their mid-60s the participation rate is likely to significantly decline, transforming the economy. However, there are shifting influences on the labour force decisions of older workers and in recent decades retirement trends have been changing.

Overseas research suggests that older workers exit the labour force via a diverse range of pathways (Honig and Hanoch 1985). They indicate a substantial number of individuals experience a transitional period of reduced involvement in the labour force prior to complete retirement. A retirement transition may include bridging jobs, reduced working hours, short periods of retirement prior to re-entering the labour force, unemployment or some mixture of the four.

Similar research in Australia has been largely prevented by a lack of relevant data. However, the Household, Income and Labour Dynamics in Australia (HILDA) Survey, which began in 2001, can offer some insight. This paper uses the HILDA data to follow a cohort of individuals aged 50 years and over and engaged in full-time employment in 2001. Their labour force engagement is examined three years later and individuals are categorised as having remained in full-time work, moved to partial retirement or being fully retired. In this paper partial retirement is defined as working part-time (less than 30 hours a week).

The three independent alternatives of labour force status are used as the dependent variable, *retirement status*, in a multinomial logit (MNL) model. This model is used to examine the determinants influencing the choice of retirement transition. Determinants include personal characteristics such as age, gender, education and health; financial variables including proxies for net worth and wage, non-wage and government pension income; and employment characteristics such as self-employment and job satisfaction.

These variables are drawn from the discussion of Australian labour force trends and recent research examined in Section 2. Section 3 describes the data used and the MNL estimation method. Section 4 presents the results from the model for the total sample as well as for men and women separately. This section also includes some selective predictions of the change in retirement pathways with respect to age. Section 5 tests the robustness of the results, examining alternate aspects of partial retirement and changing key assumptions in the model to determine its sensitivity. Major conclusions are detailed in Section 6.

2 Retirement trends and research

This section examines the labour force trends of older workers and research into the determinants of retirement paths. It details the recent experience in the Australian labour force and considers the incidence and determinants of different retirement transitions found in past research.

2.1 Australian labour force and retirement trends

For most of the 20th century retirement age declined in Australia as net worth rose, pension and superannuation schemes expanded and individuals chose to consume more leisure later in life. Over this period Australian income per capita increased five-fold and life expectancy increased by around 20 years, providing greater opportunities for retirement (Productivity Commission 2005). However, the trend of declining labour force participation of older workers began to change in the mid 1980s when average retirement age stabilised or slightly increased. These trends are illustrated in the employment to population rate for people 45 years and over that decreased by 9.9 percentage points from 1966 to 1985 and then increased 9.1 percentage points from 1985 to 2002 (Borland 2003). The change in labour force participation trends is primarily a result of two factors. First, women's participation in the labour force has increased, and second, the decline in labour force participation for men across all age groups has stabilised.

Australian Bureau of Statistics (ABS) projections, extrapolated from recent trends, suggest the labour force participation rates of older men will remain stable for the next decade, while the participation rates of women will continue to rise, consistent with the experience of the last 25 years (Borland 2003). However, there is likely to be a reduction in the overall labour force participation rate of the economy. This is because the proportion of older people in the population continues to rise and employment rates among older people are lower than the population as a whole (Bacon 1997; OECD 2005). Furthermore, the number of hours worked by employed individuals affects participation and older workers have much higher rates of part-time employment than other age groups (Bacon 1997).

In combination these trends could have challenging economic and fiscal consequences, possibly dampening economic growth, reducing the tax base and increasing demand for many government services (Productivity Commission 2005). Equally important, changing retirement trends could have a significant impact on the welfare of older members of society.

2.2 Incidence and determinants of transitional retirement

Retirement decisions are affected by many factors including broad labour market influences and factors specifically affecting older individuals. For example, the increase in the number of older women in the Australian workforce from 1979 to 1999 was due to factors in the labour market affecting women across all age groups. In contrast, for males the largest drop in participation was for the 50-59 age group suggesting changes were due to factors particularly affecting older men (OECD 2005).

However, since the late 1990s participation rates have increased for both men and women in Australia and many other developed economies. Clark and Quinn (2002) suggested the rebound in retirement age in the United States, particularly for men, was due to a combination of the demise of mandatory retirement, changes to social security laws which restrict eligibility and the level of provision, and improvements in health and life expectancy. The introduction of mandatory superannuation in Australia in 1992 is also an important local factor, affecting the form and amount of private savings.

While these influences have a similar effect on the retirement decisions of a cohort of older workers, evidence from recent cohorts suggests there is no single common path out of the labour force but rather a variety of retirement transitions. Gustman and Stienmeier (1984), Ruhm (1990) and Clark and Quinn (2002) found that older workers in the United States often move to part-time employment, start their own business, take a job in a new field which is generally less demanding, or experience unemployment before fully retiring from the labour force. There is limited research of this type from Australia. However, like the United States, older Australian workers experience heterogeneous levels of labour force participation (Bacon 1997).

This paper focuses on the partial retirement of men and women in Australia. Partial retirement is defined by an individual remaining in the labour force but significantly reducing work effort from a previous job, based on the definition used by Kim and DeVaney (2005, p. 372). Many studies focused on the incidence of partial retirement of males (Honig and Hanoch 1985; Blau 1994; Quinn 1997). However, women move to part-time employment later in life at a higher rate than men (Bacon 1997; Clark and Quinn 2002). This may underreport the incidence of partial retirement in the total population.

The prevalence and determinants of different retirement transitions vary significantly in past research. Studies using the Retirement History Study (RHS) data from the 1970s reported various rates of partial retirement depending on the methodology used. Blau (1994) found that of older men who left full-time employment, 13 per cent moved to part-time employment. In contrast, Ruhm (1990) found over half of household heads partially retired, using a self-assessed definition of partial retirement.

The Health and Retirement Study (HRS) data from the 1990s produced a similar mixture of results. Using the first three waves of the HRS data (1992 to 1996) Quinn (1997) found over 40 per cent of men who left career employment moved to a bridging job. Kim and DeVaney (2005) defined partial retirement using a combination of self-assessed and objective measures and found 32 per cent of respondents who initially worked full-time moved to partial retirement. Rust (1990) found a lower incidence of partial retirement using two definitions. Using annual work hours, 22 per cent of males moved to partial retirement and using weekly work hours the figure fell to 8 per cent.

While the incidence of partial retirement varies in the literature, the influences affecting retirement decisions are more consistent. Net worth and income levels influenced labour market decisions at any age. For older workers, the propensity to retire generally increased with financial resources. Kim and DeVaney (2005) found household assets raised the likelihood of full retirement, while household debt had the opposite effect. However, these variables did not have a statistically significant effect on partial retirement. Using Australian data, Norris and Bradbury (2001)¹ concluded household net worth was not significant in determining labour force participation for older workers, although home ownership, which can act as a proxy for net worth, did tend to encourage retirement. These studies found net worth variables typically had a low level of significance because of the imprecise reporting of sensitive financial information.

Earnings had a clearer effect on retirement transitions. Mitchell and Fields (1984) found earnings was the most important factor in determining the timing of retirement. Kim and Devaney (2005) found high wage rates encouraged workers to remain in the labour force because an increase in the opportunity cost of leisure produced an incentive to remain working. Non-wage income and eligibility for government pensions was also found to affect retirement choices, although the latter was difficult to measure empirically. Cahill et al. (2005) found a more complicated relationship between earnings and partial retirement. They concluded partial retirement was most common among people at the top and bottom of the wage distribution, encouraged by a desire for quality of life and economic necessity respectively.

Demographic characteristics had considerable influence on retirement decisions in many studies. Foremost, the likelihood of retirement increased with age, primarily due to lifestyle choices. Health also had a substantial effect. Borland and Warren's (2005) probit analysis of retirement transitions, using the first three waves of the HILDA Survey, found age and having a long-term health condition were the main personal characteristics influencing whether an older worker was employed full-time. ABS data showed that deteriorating health was the most common reason cited by people over 50 for moving to retirement (OECD 2005). Likewise, overseas research concluded poor health was positively related with earlier retirement transitions (Cahill et al. 2005; Kim and DeVaney 2005).

Demographic factors with a positive impact on participation include having a working partner, particularly for women (Norris and Bradbury 2001); and educational attainment (Kim and DeVaney 2005; OECD 2005). Education can serve as a proxy for human capital, which is associated with higher wages, job enjoyment and employment that involves a lower risk of injury (Productivity Commission 2005). Norris and Bradbury (2001) found education had a greater effect on the participation of women compared to men.

Employment characteristics also impact retirement paths. Studies have shown self-employment increased the likelihood of partial retirement relative to full retirement (Borland 2003; Cahill et al. 2005). In addition there is some evidence that workers moved to self-employment when shifting to partial retirement (Quinn 1997). Borland and Warren (2005) found holding a permanent job in a regular shift and working in the public sector induced workers to remain in full-time employment over partial retirement. Non-wage working conditions, such as job satisfaction and safety, were also found to be a factor in retirement decisions (OECD 2005).

These studies show that many factors affect retirement decisions. Borland and Warren (2005) explain that characteristics affecting retirement paths cannot easily be interpreted as structural variables in a theoretical model, but rather act as proxies for supply and demand influences. Consequently determinants in this paper are interpreted in the same way.

3 Data selection and estimation

This section describes the data sample and analyses the labour force participation rates of the sample. It also details the estimation method.

3.1 Data and sample selection

To examine the incidence and determinants of partial retirement in Australia this paper uses the HILDA Survey, a household-based panel survey representative of the Australian population. The first wave of the Survey, collected in 2001, included 7682

households and 19 910 individuals. Adults in each household were interviewed about a broad range of social and economic information. Interviews were subsequently repeated each year, with the fourth wave collected in 2004. This paper used data from the Household Questionnaire and the Person Questionnaire from the first and fourth waves. This included information on health, net worth, education and other personal characteristics. This confidentialised data was released in January 2006.

Partial retirement represents a range of labour force activities, including a reduction in wages, a reduction in working hours and moving to a bridging job, often in a less demanding position or field. Due to the complexity of defining this activity a proxy is used to represent partial retirement.

Honig and Hanoch's (1985) examination of partial retirement found that self-reported partial retirement was most strongly associated with a reduction in work hours per week, when compared with other measures such as a reduction in wages or annual work hours. In this paper, individuals who experienced a reduction in weekly work hours, moving from full-time employment in 2001 to part-time employment (less than 30 hours a week) in 2004, are categorised as partially retired. Evidence from Rust (1990) suggests this definition provides a conservative estimate of partial retirement relative to using annual hours worked.

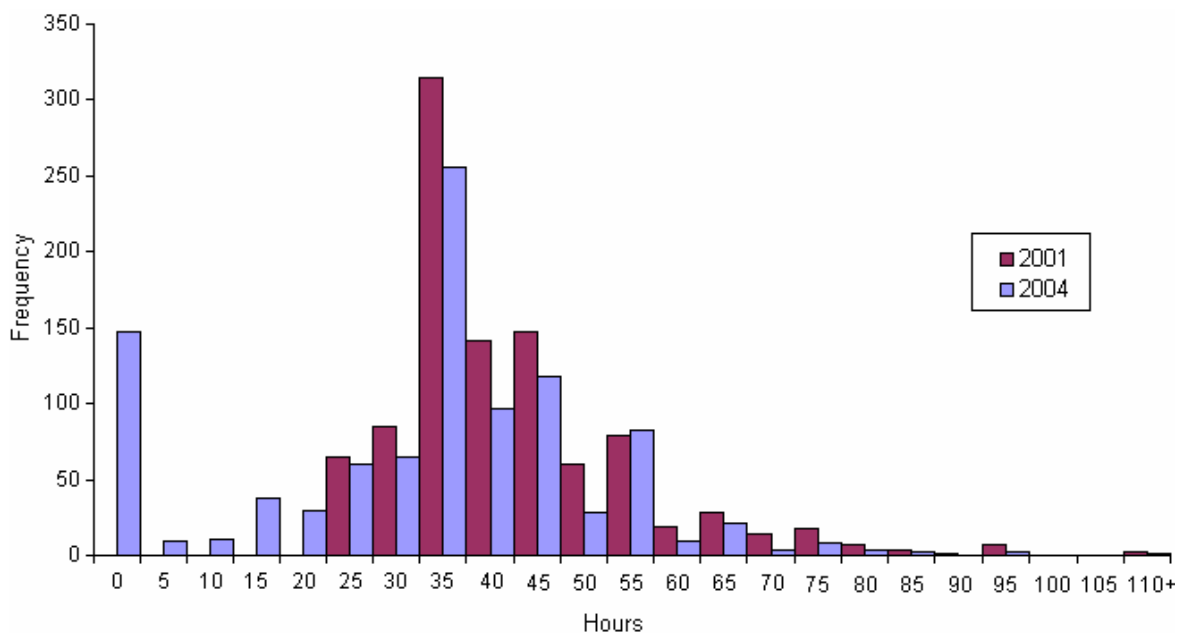
Some studies have found the percentage of the workforce engaged in part-time employment remained relatively stable for adults aged between 30 and 55 years but increased sharply after 55 years (OECD 2005; Productivity Commission 2005). Therefore, to capture the significant movement to part-time employment 'older workers' are defined as individuals aged 50 years and over in the first wave of the data. To focus on workers who were yet to begin a retirement transition the sample is limited to individuals working full-time in 2001 (30 hours a week or more in paid employment).²³ These sample restrictions exclude individuals not in the labour force, part-time workers and people who were unemployed in the first wave of data. These groups are removed to concentrate analysis on individuals initially engaged in full-time employment to capture 'typical' older workers yet to start a retirement transition.⁴

Additional restrictions are placed on the sample, excluding individuals who did not provide information on the number of hours worked per week, or provided inconsistent information.⁵. Another 40 individuals who were unemployed or not in the labour force but not retired in the fourth wave are excluded. While including these individuals might provide useful information on the demand for older workers and the role of unemployment in retirement transitions, their small number produces insignificant results. The final sample contained 992 individuals, 630 males and 362 females.

3.2 Sample statistics

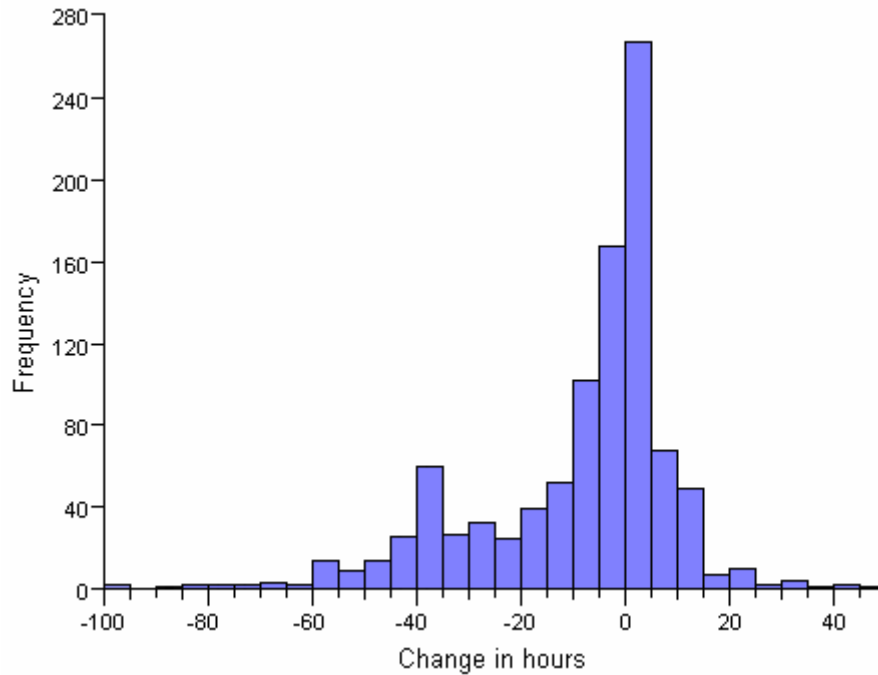
From 2001 to 2004 the mean number of hours worked per week fell from 47 in 2001 to 36 in 2004, indicating a reduction in the labour force attachment of older workers over time (Figure 1). By 2004, 138 respondents (14 per cent) had fully retired (defined by respondents reporting they were no longer attached to the labour force). One hundred and ten individuals partially retired, representing 44 per cent of individuals who left full-time employment.

Figure 1 Hours worked (weekly)



The mean decrease in hours worked between 2001 and 2004 was 10.3 (Figure 2). However, the most frequent experience was of no change. A significant group of individuals reduced their work hours by around 40, representing those who moved directly to retirement. Conversely, a small number of individuals experienced an increase in working hours over the three years.

Figure 2 Change in hours worked per week between 2001 and 2004



Seventy-five per cent of the sample, 744 individuals, remained in full-time employment in 2004. This large group did not begin a retirement transition primarily because of the short duration of the HILDA data. This paper examines only the first four waves of data, limiting the number of individuals observed moving to a retirement transition.

3.3 Estimation method

A multinomial logit (MNL) model is used to examine the determinants affecting the probability an individual followed a particular retirement path. The dependent variable, *retirement path*, is a discrete variable that takes three unordered and independent outcomes. Similar models were used to examine retirement trends by Kim and DeVaney (2005) and Cahill et al. (2005).⁶ The probability an individual *remained working full-time* ($j=0$), *moved to partial retirement* ($j=1$) or *fully retired* ($j=2$)

conditional on their set of personal characteristics x_i is given by the conditional probability model in equation 4.1.

$$P(y_i = j | x_i) = \frac{\exp(x'_i \beta_j)}{1 + \sum_{r=1}^2 \exp(x'_i \beta_r)} \quad j = 0,1,2, \quad (4.1)$$

This function is normalised by setting, *remained working full-time*, as the reference category so $\beta_0 \equiv 0$. The corresponding log-likelihood function used to estimate the model is shown in equation 4.2.

$$\log L_i = \sum_{i=1}^n \left[d_{i0} \log \frac{1}{1 + \sum_{r=1}^2 \exp(x'_i \beta_r)} + d_{i1} \log \frac{\exp(x'_i \beta_1)}{1 + \sum_{r=1}^2 \exp(x'_i \beta_r)} + d_{i2} \log \frac{\exp(x'_i \beta_2)}{1 + \sum_{r=1}^2 \exp(x'_i \beta_r)} \right] \quad (4.2)$$

d_{ij} is a dummy variable equal to one when individual i follows the j th retirement path. The model's results illustrate how personal characteristics affect the probability of undertaking a particular retirement path. To determine the correct specification of the model a likelihood ratio test is used to jointly test the significance of explanatory variables.⁷

4 Determinants of partial retirement

This section discusses the explanatory variables used and examines the determinants of partial retirement using a MNL model for the total sample and for men and women separately. In addition, selective predictions of the change in retirement pathways are presented for men and women over time.

4.1 Explanatory variables

The final model includes net worth and income variables, employment information, health status and the demographic characteristics, age, relationship status, number of resident children and highest level of education obtained (Table 1). The dependent variable, *retirement path*, is from the 2004 survey and all but one of the explanatory variables are taken from the 2001 survey.⁸ This allows the variables to be used for inference and prediction on the future retirement decisions of older workers.

Descriptive statistics of the explanatory variables and a discussion of some additional explanatory variables that were tested but ultimately excluded from the model are contained in the Appendix.

Table 1 **Variables in preferred model**

<i>Variables</i>	<i>Measurement</i>
Dependent variables	
Retirement status	
<i>Moved to partial retirement</i>	1 if respondent moved to partial retirement, 0 otherwise
<i>Fully retired</i> <i>(Remained working full-time)</i>	1 if respondent fully retired, 0 otherwise
Explanatory variables	
Wealth and income	
<i>Wage income</i>	Continuous variable, included in quadratic form ⁹
<i>Household non-wage income</i>	Continuous variable
<i>Government pension income</i>	Continuous variable
<i>Mortgage status</i>	
<i>-Loan is paid off</i>	1 if respondent has paid off loan, 0 otherwise
<i>-Loan is not paid off</i> <i>(Never had a home loan)</i>	1 if respondent has not paid off loan, 0 otherwise
<i>Financial satisfaction</i>	
<i>-High</i>	1 if respondent rated their financial satisfaction 8 or above out of 10, 0 otherwise
<i>-Medium</i> <i>(Low)</i>	1 if respondent rated their financial satisfaction between 5-7 out of 10, 0 otherwise
Health status	
<i>-Excellent/Very good</i>	1 if respondent rated their physical health as very good or excellent, 0 otherwise
<i>-Good</i> <i>(Fair/Poor)</i>	1 if respondent rated their physical health as good, 0 otherwise
Employment information	
<i>Own business</i>	1 if respondent worked in their own business/farm/silent partner/ trust beneficiary, 0 otherwise
<i>Enjoys job</i>	1 if respondent agreed with question about job enjoyment, 0 otherwise ¹⁰
<i>Occupation</i>	
<i>-Clerical</i>	1 if respondent is a clerical, sales or service worker, 0 otherwise
<i>-Professional</i> <i>(Other)</i>	1 if respondent is a manager, administrator, professional or associate professional, 0 otherwise
<i>Tenure with current employer</i>	Continuous variable
Demographic characteristics	
<i>Age (yrs)</i>	Continuous variable, included in quadratic form
<i>Female</i>	1 if female, 0 if male
<i>Relationship status</i>	
<i>-Working spouse</i>	1 if respondent has a working spouse, 0 otherwise
<i>-Non-working spouse</i> <i>(Does not have a spouse)</i>	1 if respondent has a non-working spouse, 0 otherwise
<i>Residential children</i>	Continuous variable, number of children living with respondent at least 50 per cent of the time
<i>Highest level of education</i>	
<i>-More than Bachelors degree</i>	1 if respondent received post-Bachelors qualifications, 0 otherwise
<i>-Bachelors degree</i>	1 if respondent completed a Bachelors degree, 0 otherwise
<i>-Tertiary education other than Bachelors degree</i>	1 if respondent completed tertiary qualifications other than a Bachelors degree, 0 otherwise
<i>-Year 12</i> <i>(Year 11 and below)</i>	1 if respondent completed year 12, 0 otherwise

4.2 Marginal effects of the MNL analysis

The econometric model described in subsection 3.3 was applied to the sample of 992 individuals from the HILDA Survey. The marginal effects from the MNL model are shown in Table 2.¹¹

Table 2 Marginal effects for retirement transitions of total sample (N=992)

<i>Variables</i>	<i>Partial retirement (N=110)</i>		<i>Full retirement (N=138)</i>	
	<i>Mean</i>	<i>S.E.</i>	<i>Mean</i>	<i>S.E.</i>
Wage income (\$'000)**	-0.0010	0.0011	-0.0052	0.0171
Household non-wage income (\$'000)**	0.0003	0.0003	0.0013	0.0043
Government pension income (\$'000)	0.0075	0.0075	0.0170	0.0171
Mortgage status*				
<i>Loan is paid off</i>	0.0478	0.0481	0.1228	0.3998
<i>Loan is not paid off</i>	-0.0622	0.0625	0.1672	0.5444
<i>(Never had a home loan)</i>				
Financial satisfaction**				
<i>High</i>	0.0337	0.0339	0.0407	0.1326
<i>Medium</i>	0.0349	0.0350	-0.2186	0.7117
<i>(Low)</i>				
Health status**				
<i>Excellent/Very good</i>	-0.1355	0.1362	-0.2264	0.7370
<i>Good</i>	-0.0500	0.0502	-0.1025	0.3338
<i>(Fair/Poor)</i>				
Own business**	0.0213	0.0214	-0.3851	1.2537
Enjoys job**	-0.0925	0.0930	-0.2159	0.7028
Occupation*				
<i>Cleric</i>	-0.1201	0.1207	-0.1933	0.6293
<i>Professional</i>	-0.0551	0.0553	-0.0815	0.2655
<i>(Other)</i>				
Tenure with employer (yrs)	0.0023	0.0023	0.1228	0.3998
Age** (yrs)	0.0094	1.1714	0.0337	6.6044
Female**	0.1329	0.1336	0.0837	0.2724
Relationship status**				
<i>Working spouse</i>	-0.0483	0.0486	-0.1579	0.5141
<i>Non-working spouse</i>	0.0143	0.0144	0.3871	1.2603
<i>(Does not have a spouse)</i>				
Residential children**	-0.0311	0.0313	-0.2391	0.7784
Highest level of education**				
<i>More than Bachelors degree</i>	0.1336	0.1343	-0.1348	0.4388
<i>Bachelors degree</i>	0.0585	0.0588	0.3395	1.1055
<i>Tertiary education other than</i>				
<i>Bachelors degree</i>	-0.0251	0.0252	0.0144	0.0470
<i>Year 12</i>	0.0555	0.0558	-0.1083	0.3527
<i>(Year 11 and below)</i>				

**Significant at 5% level

*Significant at 10% level

Most explanatory variables had a similar directional impact on partial and full retirement, although the magnitude of the effect was greater for full retirement. For example, as age increased so did the probability of reducing labour force engagement. However, with each additional year of age an individual was four times more likely to move directly to full retirement than partial retirement. Similarly, as wage income

increased the probability of moving to partial retirement decreased, but decreased even more for full retirement. For each additional \$1000 in wage income the chance of full retirement was five times less likely than partial retirement.

4.3 Marginal analysis by gender

This study included 630 men and 362 women indicating men are nearly twice as likely to be working full-time later in life than women. The retirement trends of men and women were examined separately by running two independent MNL models. Some variables had a similar impact on the retirement trends of men and women and were consistent with the results for the total sample. These were age, wage income and job satisfaction, although the latter two were not significant for women at the 10 per cent level. Other variables had different effects on each group. The marginal effects from the MNL models for men and women are contained in Table 3.

Using a separate model for each gender the effect of educational attainment becomes more apparent. For women, education decreases the likelihood of moving out of full-time employment. If a woman does leave full-time work the probability she partially retires increases with education. For men a high educational attainment increases the likelihood of full retirement. Men with post-graduate education are 40 per cent more likely to partially retire and 85 per cent more likely to fully retire than remain in full-time work, compared with men who did not finish high school. However, of all the educational levels men with a moderate educational attainment are most likely to partially retire, relative to men who did not finish high school. These conflicting results are similar to the finding of Norris and Bradbury (2001) that education had a strong positive effect on the probability an older woman remained working and a weaker effect on older men.

Income sources also affect men and women differently. Only household income is statistically significant for women. This may reflect the cohort of women in the sample, born prior to the 1950s, who were more reliant on their spouses financially. As household income increases so does the likelihood a woman moves to a retirement transition, in particular to full retirement. In contrast, for men household income discourages the movement out of full-time employment, although this variable is not

significant at the 10 per cent level. Increases in wage income, possibly the main income source for most males, reduces the likelihood of undergoing a retirement transition. Government pension income is also significant for men, although this has a similar effect on the likelihood of partial and full retirement.

Holding a mortgage discourages partial retirement for men, although surprisingly encourages full retirement relative to working full-time. Mortgage status and having dependent children do not have a significant effect on women. For men the number of dependent children has a strong negative affect on the likelihood of full retirement and a smaller negative affect on partial retirement.

Surprisingly, for women good health is positively correlated with full retirement, contrary to expectations. This may be because women's retirement transitions are highly dependent on household characteristics and not solely their own labour force attributes. For women, a working spouse polarises the likelihood of retirement behaviour compared to being single. Women with a working spouse are most likely to be in full-time employment and then full retirement. Women with a non-working spouse are most likely to fully retire, and least likely to remain in full-time work. Likewise for men, having a non-working partner mostly encourages full retirement, and then encourages remaining in full-time work.

Employment characteristics also vary across the sexes. Self-employment increases the likelihood of men being partially retired but decreases the probability for women. It has a negative effect on full retirement for both groups. Job tenure is insignificant for women while for men the longer they are in their job the greater the probability they reduce their labour force attachment.

4.4 Retirement predictions

Results from the MNL model were used to predict some illustrative examples of retirement transitions for older workers. An 'average' male and female worker was constructed using the mean value of each continuous variable and the mode of each discrete variable. Table 4 contains the average characteristics used in prediction.

Table 3 Marginal effects for retirement transitions

<i>Variables</i>	<i>Men (N=630)</i>				<i>Women (N=362)</i>				
	<i>Partial retirement</i>		<i>Full retirement</i>		<i>Partial retirement</i>		<i>Full retirement</i>		
	<i>Mean</i>	<i>S.E.</i>	<i>Mean</i>	<i>S.E.</i>	<i>Mean</i>	<i>S.E.</i>	<i>Mean</i>	<i>S.E.</i>	
Wage income (\$'000)**	-0.0012	0.0026	-0.0071	0.0401	Wage income (\$'000)	-0.0078	0.0328	-0.0210	0.1901
Household non-wage income (\$'000)	-0.0006	0.0013	-0.0005	0.0029	Household non-wage income (\$'000)**	0.0014	0.0044	0.0047	0.0371
Government pension income (\$'000)**	0.0313	0.0684	0.0431	0.0943	Government pension income (\$'000)	-0.047	0.1516	-0.0622	0.2006
Mortgage status*					Mortgage status**				
<i>Loan is paid off</i>	-0.0030	0.0066	0.4834	2.8243	<i>Loan is paid off</i>	0.1748	0.5637	-0.3202	2.5248
<i>Loan is not paid off</i>	-0.1474	0.3226	0.4218	2.4645	<i>Loan is not paid off</i>	0.0814	0.2626	0.1349	1.0636
<i>(Never had a home loan)</i>					<i>(Never had a home loan)</i>				
Financial satisfaction					Financial satisfaction**				
<i>High</i>	0.0357	0.0780	0.3302	1.9291	<i>High</i>	0.0326	0.1052	-0.4250	3.3504
<i>Medium</i>	0.0094	0.0205	-0.0715	0.4179	<i>Medium</i>	0.1138	0.3671	-1.0688	8.4269
<i>(Low)</i>					<i>(Low)</i>				
Health status**					Health status**				
<i>Excellent/Very good</i>	-0.2590	0.5665	-1.1083	6.4757	<i>Excellent/Very good</i>	-0.0536	0.1729	0.8276	6.5248
<i>Good</i>	-0.2221	0.4860	-0.8541	4.9906	<i>Good</i>	0.19	0.6126	1.3517	10.6569
<i>(Fair/Poor)</i>					<i>(Fair/Poor)</i>				
Own business*	0.0267	0.0584	-0.6000	3.5058	Own business**	-0.0822	0.2652	-1.1789	9.2946
Enjoys job**	-0.1341	0.2934	-0.5098	2.9787	Enjoys job	-0.1121	0.3614	-0.3912	3.0847
Occupation*					Occupation*				
<i>Cleric</i>	-0.2207	0.4829	-0.1671	0.9766	<i>Cleric</i>	-0.3759	1.2122	-0.5256	4.1443
<i>Professional</i>	-0.0341	0.0746	-0.5563	3.2502	<i>Professional</i>	-0.2198	0.7087	0.4543	3.5815
<i>(Other)</i>					<i>(Other)</i>				
Tenure with employer (yrs)**	0.0070	0.0154	0.0149	0.0870	Tenure with employer (yrs)	-0.0064	0.0208	-0.0002	0.0018
Age (yrs)**	0.0075	3.5475	0.0416	17.3461	Age (yrs)**	0.0248	9.1952	0.0775	0.0601
Relationship status**					Relationship status**				
<i>Working spouse</i>	-0.1172	0.2565	-0.4967	2.9021	<i>Working spouse</i>	-0.0212	0.0685	-0.1791	1.4121
<i>Non-working spouse</i>	-0.0247	0.0541	0.7106	4.1518	<i>Non-working spouse</i>	0.0689	0.2221	0.8604	6.7841
<i>(Does not have a spouse)</i>					<i>(Does not have a spouse)</i>				
Residential children**	-0.0782	0.1711	-0.6865	4.0113	Residential children**	-0.0199	0.0640	-0.3321	2.6183
Highest level of education**					Highest level of education**				
<i>More than Bachelors degree</i>	0.3919	0.8577	0.8578	5.0118	<i>More than Bachelors degree</i>	-0.1491	0.4810	-1.8579	14.6480
<i>Bachelors degree</i>	0.3200	0.7005	1.5303	8.9413	<i>Bachelors degree</i>	-0.1887	0.6085	-0.2566	2.0230
<i>Tertiary education other than</i>					<i>Tertiary education other than</i>				
<i>Bachelors degree</i>	0.0971	0.2127	0.0390	0.2279	<i>Bachelors degree</i>	-0.1664	0.5366	-0.0496	0.3913
<i>Year 12</i>	0.1817	0.3978	0.1770	1.0343	<i>Year 12</i>	-0.0337	0.1088	-0.6169	4.8634
<i>(Year 11 and below)</i>					<i>(Year 11 and below)</i>				

**Significant at 5% level

*Significant at 10% level

Table 4 Characteristics of the average older worker

<i>Variables</i>	<i>Man</i>	<i>Woman</i>
Wage income (\$)	44895.43	31935.46
Household non-wage income (\$)	41302.85	50858.02
Government pension income (\$)	520.08	383.38
Mortgage status	Loan is paid off	Loan is paid off
Financial satisfaction	Medium	Medium
Health status	Excellent/Very good	Excellent/Very good
Own business	No	No
Enjoys job	Yes	Yes
Occupation	Professional	Professional
Tenure with employer (yrs)	15.8	12.2
Age (yrs)	56.1	54.1
Relationship status	Working spouse	Working spouse
Residential children	0	0
Highest level of education	Tertiary education other than Bachelors degree	Year 11 and below

To examine the change in retirement pathways for an ‘average’ worker over time all variables were held constant except for age and tenure, and these increased by one unit each year. This assumes a worker remained in the same job throughout the prediction period. The probability of leaving full-time employment and undertaking a particular retirement transition was modelled for a worker aged 55 to 70 years. Figure 3 and Figure 4 represent the retirement transitions of an ‘average’ working man and woman respectively. These examples provide a useful illustration of retirement choices over time. However, the predictions are selective to the assumption that all other factors remain constant.

For men the probability of moving to partial retirement remains relatively constant over time, peaking at nine per cent around 61 years of age. The probability of remaining in full-time employment decreased with age, falling below 50 per cent at 65 years. Conversely, the probability of fully retiring increased with age. For women the probability of remaining in full-time employment followed a similar trend, steeply decreasing with age, falling below 50 per cent at 66 years. However, the probability of partial retirement was higher than full retirement across the 15-year period. The probability of both forms of retirement increased over time reaching 33 per cent for partial retirement and 29 per cent for full retirement when an ‘average’ woman was 70 years of age.

Figure 3 Retirement pathway of an average working man

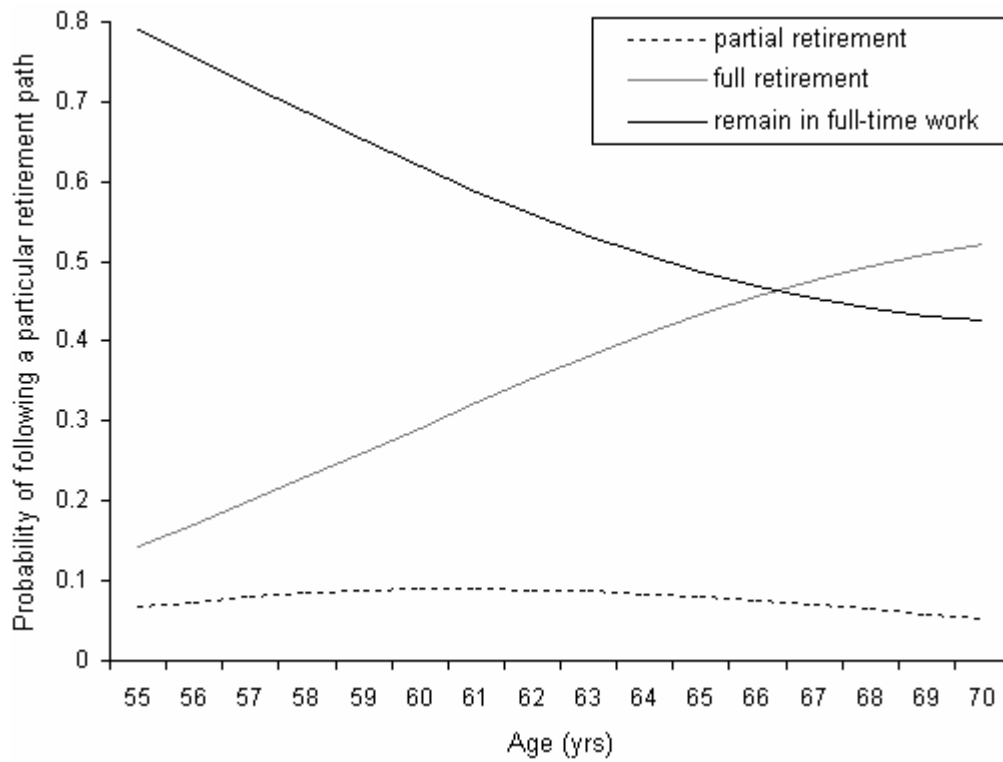
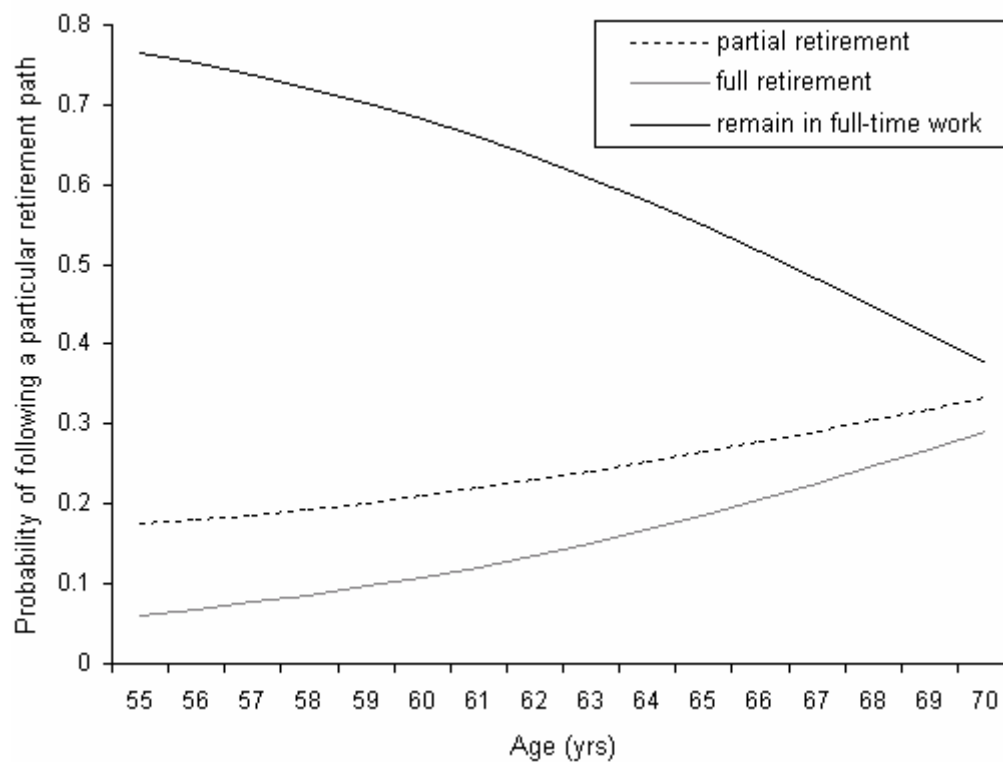


Figure 4 Retirement pathway of an average working woman



5 Sensitivity analysis

This section assesses the robustness of the results by changing definitions used in the analysis. It examines characteristics common to partial retirement other than a reduction in work hours and tests the sensitivity of the results to changes in the assumptions used in the main model.

5.1 Alternate definitions of partial retirement

This paper primarily examines one aspect of partial retirement — a reduction in working hours. However, partial retirement can include changes in other labour force characteristics including changing jobs and occupations, moving to self-employment, and experiencing unemployment or other periods out of the workforce. A preliminary examination of the importance of alternate aspects of partial retirement is conducted for the sample described above.

Individuals who experience partial retirement are much more likely to change jobs than those who remain working full-time. Of the 110 individuals who partially retired, 40 per cent changed jobs compared with 20 per cent who remained working full-time. These results are calculated by examining the tenure of employment in the job held in 2004. When tenure is less than four years the individual is deemed to have changed jobs. A similar method is used to examine a change in occupation. Shifting occupations is less frequent than changing jobs for both groups, but partial retirees are almost three times more likely to shift occupations than full-time workers, with 30 per cent compared to 12 per cent. These results imply that changing jobs and occupations is a significant part of retirement transitions, supporting earlier research by Quinn (1997) and Ruhm (1990).

Movements in and out of employment are much more common among the partially retired. The number of individuals who reported no paid employment in 2002 or 2003, but were working in 2004, is 1.9 per cent for full-time employees compared to 17 per cent of individuals who partially retired. This result highlights the increased volatility in labour force attachment of people in partial retirement and the non-linearity of retirement transitions.

Lastly, the movement of individuals into and out of self-employment is found to be similar for full-time and partially retired workers. In both groups the number of individuals running their own business remained roughly constant between 2001 and 2004. In each group the number of people who moved into self-employment roughly equalled the number who moved out and into salary jobs. This is contrary to the findings of Quinn (1997) who found moving into self-employment was a significant part of partial retirement. However, as discussed earlier, individuals who were self-employed in 2001 were more likely than wage earners to move to partial retirement by 2004.

5.2 Result sensitivity

To test the robustness of the findings in this paper a number of assumptions are modified. The main model defined 'older workers' as 50 years of age and over. Two further definitions of 'older workers' are examined, individuals 45 years of age and over, and individuals 55 years of age and over. The samples include 1601 and 470 observations respectively. The former category produced similar results to the main model. There are no directional changes to the marginal effects, but the effect of government pension income became significant at the 10 per cent level and mortgage status and occupation became insignificant. In contrast, the latter definition produces many directional changes and the significance of some variables alter considerably. This suggests that broadening the definition of 'older worker' produces similar results, but restricting it to individuals 55 years of age and over captures different retirement characteristics. The incidence of partial retirement also changes according to the choice of age. The younger the sample, the higher is the percentage of individuals who experience partial retirement after leaving full-time employment.

The definition of full-time employment was also changed, from 30 hours or more to 35 hours or more per week. This reduced the sample to 889 observations. There were minimal changes to the marginal effects, affecting only the signs of the educational dummies and the significance of the occupational dummies. This definition of full-time employment reduced the incidence of partial retirement.

Lastly, the method of determining partial retirement was varied. The main model examined the number of hours worked in 2004 and categorised respondents as having

remained working full-time (30 hours or more), having moved to partial retirement (less than 30 hours) and fully retired (respondents who reported they were not attached to the labour force).

First, individuals who worked less than 30 hours per week in waves 2 or 3 but fully retired by wave 4, were reclassified from fully retired to partially retired. This increased the proportion of individuals who left full-time employment that experienced partial retirement to 53 per cent.

Second, partial retirement was redefined to include individuals who worked less than 30 hours per work in 2004 as well as individuals who experienced a reduction in working hours of 20 or more between 2001 and 2004. Using this definition 53 per cent of individuals who left full-time employment experienced partial retirement. The alternate definitions of partial retirement also affected the significance and directional effect of many of the variables.

These results show the incidence and determinants of partial retirement are reliant on the choice of definitions, although all definitions indicate that partial retirement is a considerable aspect of retirement transitions. Variation in the incidence of partial retirement is summarised in Table 5.

Table 5 **Variation in the incidence of partial retirement**

<i>Assumptions</i>	<i>Percentage of individuals who have left full-time employment that experienced partial retirement</i>
Main model	44.4
Men	37.8
Women	54.0
Older workers	
45 years and over	48.7
55 years and over	38.7
Full-time employment	
35 hours or more	38.7
Partial retirement	
Experienced partial retirement in waves 2, 3 or 4	52.8
Including individuals who reduced working hours by 20 or more	53.1

6 Conclusions

This paper examined the incidence and determinants of partial and full retirement in the Australia labour market, using data from the first four waves of the HILDA Survey. While partial retirement can comprise many different employment characteristics in this paper it was primarily defined as a reduction in work hours to less than 30 hours per week.

Partial retirement was found to be a phase common to many older workers prior to leaving the labour force. Of those who left full-time employment within the three years examined, 54 per cent of women and 38 per cent of men shifted to partial retirement. The exact incidence of partial retirement was sensitive to the assumptions used in the analysis, but overall it appears to be an important phase for many workers prior to fully retiring. The incidence of partial retirement found in this paper lies in the upper range of results from previous research.

The determinants of different retirement transitions were examined using a MNL model. Significant factors for both men and women were health, age, self-employment, relationship status and education. Most of these determinants had the same directional effect on partial and full retirement, but the magnitude of the effect on full retirement was generally greater. Some exceptions were higher financial satisfaction for women and self-employment for men. These factors encouraged partial retirement and discouraged full retirement.

Overall the retirement trends of men and women were distinct. Many more women experienced partial retirement and the effect of several determinants of retirement paths varied between the sexes. For women, wage income was statistically insignificant whereas household income was and positively influenced the likelihood of partial and full retirement. Likewise good health increased the likelihood a woman fully retired, although there was a mixed effect on partial retirement. This is contrary to the general theory that poor health is positively related with earlier retirement transitions (Cahill et al. 2005; Kim and DeVaney 2005). One interpretation of these results is that women's retirement decisions are less dependent on their capacity to remain productive in the labour force and more dependent on the labour supply decisions of their household.

For men, the ability to provide financially for their household appeared to be a key factor in retirement decisions. Higher wage income discouraged moving to partial and full retirement, while government pension income and household income had the opposite effect and the latter was insignificant. This implies that a man's wage income was the main income source affecting retirement decisions. Lastly, the better a man's health the more likely he was to remain working full-time, and to a lesser extent part-time.

These differences highlight that older workers are not a homogenous group when determining retirement transitions. It also indicates that retirement decisions are not only an individual choice but are influenced by household characteristics. Consequently, changes to incentives encouraging older workers to remain in the workforce are likely to have varied

Aspects of partial retirement, other than a reduction in working hours, were briefly examined including moving to a new job and occupation, time out of paid employment and moving to self-employment. The first three characteristics were correlated with partial retirement as defined in the main model. However, the movement into and out of self-employment was the same for people who partially retired and remained working full-time.

As the HILDA Survey matures the clarity and significance of the results will improve and provide further research opportunities. Nevertheless, using the current data, this paper provided useful insights into the incidence and determinants of partial retirement for older Australian workers.

¹ They used data from the 1996-97 Survey of Income and Housing Costs to conduct a binary logit model to describe the impact of characteristics on the probability of employment for older workers.

² This restriction might inadvertently capture individuals who felt they were partially retired while meeting the definition of working full-time. To overcome this problem studies using the RHS and HRS data examined the self-reported retirement status. However, Borland (2005) criticised using self-reported status alone, arguing it is a less reliable indicator than labour force data. Used in combination with more objective variables it might be useful to improve the quality of the results but it is not included in the HILDA Survey, except in the third wave as part of the special Retirement Module, and is not used in this study.

³ Alternative definitions are also tested and the findings are discussed in section 5.2 *Result sensitivity*. Older workers are redefined as 55 years of age or older and 45 years of age or older. Full-time work is redefined as working 35 hours a week or more.

⁴ Norris and Bradbury (2001) found unemployment was an important phase of retirement transitions for many workers between leaving full-time employment and retiring from the workforce. As a result, excluding unemployed individuals may ignore a significant phase of the retirement transition. However, in this study this restriction reduced the sample by less than 5 per cent suggesting it affected a relatively small group

⁵ Individuals are deemed to have provided inconsistent information when the hours worked in all jobs is less than the hours worked in their main job.

⁶ The MNL model is an appropriate model to use if the Independence of Irrelevant Alternatives (IIA) assumption holds. That requires the odds ratio between any two choices to be independent of other available choices (Winkelmann and Boes, 2005). While some studies assume this holds, Honig and Hanoch (1985) suggest the IIA assumption is not valid. They found the critical retirement choice was between remaining in the labour force, and conditional on this decision between part-time or full-time employment. Under this assumption, the MNL model is misspecified and an appropriate model is the Nested Logit model. In the present study two tests were used to test the IIA assumption. The Hausman and McFadden (1984) test was unsuccessful because the inverse of the difference between the covariance matrices was nearly singular. The Small and Hsiao (1985) exact test produced inconclusive results, with some evidence supporting the IIA assumption and some against at the 5 per cent level of significance.

⁷ The variables were tested for significance in the model as a whole. This ignores the differing effects of variables on partial and full retirement.

⁸ The exception is the variable *relationship status*, which was taken from 2004 because of its dynamic nature.

⁹ Cahill et al. (2005) found bridging jobs were more common for individuals at the extremes of the wage distribution so *wage income* is included in quadratic form.

¹⁰ An individual was recorded as enjoying their job if they rated the accuracy of the statement 'I would enjoy having a job even if I didn't need the money' as 4 or above out of 7.

¹¹ The marginal effects of the explanatory variables were calculated using the average marginal probability effect. The sample marginal probability effects for each variable were then averaged across all individuals.

Appendix

Descriptive statistics of the explanatory variables are detailed in Table 6. The mean wage income for full-time employees was 7.1 per cent (\$2829) greater than for individuals who partially retired. This in turn was 29.1 per cent (\$8854) greater than for individuals who retired. Non-wage income and government pension income, which are more independent of labour force participation, appear to have the opposite relationship and were highest for individuals with the least attachment to the labour force later in life.

Individuals with their own business were most likely to move to partial retirement and least likely to retire. This may indicate owning a business allows flexibility facilitating partial retirement. Clerical workers were most likely to remain working full-time, while professionals were most likely to partially retire. The longer an individual worked with their employer the more likely they were to reduce their labour force engagement.

Age was highest for those who were full retirement and lowest for full-time workers. The number of children living at home had the opposite effect. Individuals who remained working full-time had better health than those who partially or fully retired. Females were substantially more likely to partially retire than males. An individual with a spouse had a

labour force status positively correlated with their partners, moving to retirement if they have a non-working spouse and remaining in the labour force if they have a working spouse. Individuals with no spouse most frequently move to partial retirement.

Table 6 Descriptive statistics of explanatory variables

	<i>Remained working full-time</i>		<i>Moved to partial retirement</i>		<i>Fully retired</i>	
	<i>Mean</i>	<i>%</i>	<i>Mean</i>	<i>%</i>	<i>Mean</i>	<i>%</i>
Wage income (\$'000)	42.11		39.28		30.42	
Household non-wage income (\$'000)	43.94		46.13		48.31	
Government pension income (\$'000)	0.42		0.48		0.75	
Mortgage status						
<i>Loan is paid off</i>		30.78		45.45		41.30
<i>Loan is not paid off</i>		35.35		18.18		24.64
<i>Never had a home loan</i>		33.87		36.36		34.06
Financial satisfaction						
<i>High</i>		40.59		41.82		55.07
<i>Medium</i>		46.24		46.36		31.16
<i>Low</i>		13.17		11.82		13.77
Health status						
<i>Excellent/Very good</i>		61.96		49.09		49.28
<i>Good</i>		29.70		36.36		34.78
<i>Fair/Poor</i>		8.34		14.55		15.94
Own business						
<i>Does not have own business</i>		62.50		55.45		67.39
Enjoys job						
<i>Does not enjoy job</i>		17.88		25.45		25.36
Occupation						
<i>Cleric</i>		21.10		14.55		14.49
<i>Professional</i>		56.18		60.00		52.90
<i>Other</i>		22.72		25.45		32.71
Tenure with employer (yrs)	13.68		16.23		17.57	
Age (yrs)	54.86		56.45		59.08	
Gender						
<i>Female</i>		35.22		49.09		33.33
<i>Male</i>		64.78		50.91		66.67
Relationship status						
<i>Working spouse</i>		52.69		43.64		25.36
<i>Non-working spouse</i>		18.41		22.72		51.45
<i>Does not have a spouse</i>		30.00		34.64		23.29
Residential children	0.60		0.43		0.22	
Highest level of education						
<i>More than Bachelors degree</i>		13.44		19.09		6.52
<i>Bachelors degree</i>		10.89		10.00		10.87
<i>Tertiary education other Than Bachelors degree</i>		33.87		26.36		33.33
<i>Year 12</i>		8.33		9.09		5.80
<i>Year 11 and below</i>		33.47		35.46		43.48

Individuals who remained working full-time were evenly split between the mortgage categories, while individuals who partially and fully retired were more likely to have paid

off their mortgage. The partially retired and full-time workers had similar distributions of financial satisfaction.

Education had an indistinct relationship with retirement paths. While individuals with more than a Bachelors degree most frequently moved to partial retirement, individuals with only a Bachelors degree were evenly split between the three outcomes. Individuals who did not complete high school most frequently fully retired, while those who completed year 12 were least likely to move to full retirement.

Some other explanatory variables were tested for inclusion in the model but were ultimately excluded (Table 7). They contained missing values or little variation within the sample and were statistically insignificant. These included job attributes, such as union membership, casual employment, the difficulty and complexity of the job, and the level of skills and abilities used in the job. The net worth variables *total household assets*, *total household debt* and *superannuation* were also excluded. They contained low response rates, common for variables with sensitive personal information. Instead the variables *financial satisfaction* and *mortgage status* were included in the final model as proxies for household assets and debt.

The variable *number of long-term health conditions* was found to be significant when *health status* was excluded from the model, but with both included they were individually insignificant. This suggests there was multicollinearity between the variables. *Health status* was more significant and provided a greater breadth of health information so it alone was included in the model. However, *health status* is a subjective health measure and consequently may over-estimate negative health effects. Cai and Kalb (2005) suggested health can be used to justify labour force status, whereby individuals who work part-time or who are out of the labour force use poor health to validate their low level of participation. Accordingly, health may have a smaller impact than the results suggest.

Other tested variables excluded from the final model were holding *private health insurance*, *country of birth* and *living in a major city*.

Table 7 Excluded variables	
<i>Variables</i>	<i>Measurement</i>
Wealth*	
<i>Total household assets</i>	Continuous variable
<i>Total household debt</i>	Continuous variable
<i>Total household superannuation</i>	Continuous variable
Employment information	
<i>Union</i>	1 if respondent is a member of a union, 0 otherwise
<i>Casual</i>	1 if respondent is a casual employee, 0 otherwise
<i>Uses skills and abilities in job</i>	1 if respondent rated statement about use of skills and ability in their job as 5 or above out of 7, 0 otherwise
<i>Job is difficult and complex</i>	1 if respondent rated statement about how difficult and complex their job is as 5 or above out of 7, 0 otherwise
Demographic characteristics	
<i>Country of birth</i>	
- <i>English speaking country</i>	1 if respondent was born in an English speaking country other than Australia, 0 otherwise
- <i>Non-English speaking country (Australia)</i>	1 if respondent was born in non-English speaking country, 0 otherwise
<i>Live in major city</i>	1 if respondent lives in a major city, 0 otherwise
Other	
<i>Private health insurance**</i>	1 if respondent hold private health insurance, 0 otherwise
<i>Number of long-term health conditions</i>	Continuous variable

* These variables were taken from wave 2 of the HILDA survey that contained a special wealth module.

** This variable was taken from wave 4 of the HILDA Survey that is the only wave containing information on private health insurance.

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