Industrial Relations
A JOURNAL OF ECONOMY AND SOCIETY

RETIREMENT REFORMS: OCCUPATIONAL STRAIN AND HEALTH

Journal:	*Industrial Relations*
Manuscript ID	IREL-OA-08-18-0086.R1
Wiley - Manuscript type:	Original Article
Keywords:	Delayed retirement, Health effects, Occupational strain, Income
Abstract:	A concurrent increase in the demand for State age pension and healthcare has led to reforms in delaying retirement. We employ 13 waves of longitudinal data to examine the mental and physical health effects of Australian men and women at "early" and "traditional" retirement. We use before and after Propensity Score Matching (PSM) estimates between treatment and control groups of retired and not retired individuals aged 60 and 65 years. The results indicate a negative health effect according to occupational strain for both genders but a positive mental health effect for retirees with access to self funded retirement.

1. INTRODUCTION

Retirement reforms, population ageing and increased life expectancy combined with low fertility rates in developed economies are critical issues that impact workforce planning and labour dynamics. Nowhere is the aging population more acutely observed than in the assessment of individual retirement decisions. Such decisions are integrally bound to legislative agreements relating to the labour force, and the retirement income expectations that individuals have. Retirement decisions are also affected by other individual characteristics, however Roberts, Rice and Jones (2010) found health to be a key determinant of early retirement. While Rohwedder & Willis (2010) noted that the choice of early retirement had negatively correlated with an individual's mental health as cognitive ability declined. Conversely, Coe and Lindeboom's study (2008) found that retirement timing had no impact on the physical and psychological health outcomes of men. However, they acknowledged that early retirement might have a positive, although temporary, impact on the self-reported health of individuals. Calvo, et.al (2013) similarly found that employees who retire early experience a number of poor health outcomes relating to self-reported physical and emotional health, whereas those that choose to continue employment beyond the expected retirement age are generally not associated with subjective health penalties. Although these studies have some consistencies in their findings, there are also differing estimates on the health effects with retirement subject to demographics, context and measurement bias. Notably, self-reported health measures carry endogeneity and measurement error concerns, however Roberts et al (2010) maintain that studies which employed subjective and objective measures yielded similar results when predicting retirement behaviours. They further argue that since behaviours are being examined, an

individual's subjective assessment of their health is more relevant rather than their objective health status. Disney, Emmerson & Wakefield (2006) make a similar claim but suggest using proxies for health shocks that affect retirement behaviour, as a way to address reporting bias. We follow similar approaches with self-reports and examine health utilisation rates as proxy measures, as well as using the matching of retired and non-retired individuals to overcome bias and a test of double robustness (Athey et al, 2017).

While most of these studies examined the association of retirement on physical and or mental health there has been less investigation into the effects of retirement decisions by gender, at different age categories and health utilisation rates that underlie the relationship between retirement and health. In this study we investigate the effects of retirement on health for males and females in two sub populations, at age 60 considered as early retirement and at age 65 considered as traditional retirement using Australian data. Although Australia has no mandatory retirement age, policy reforms define age eligibility criteria for access to publicly provided pension income at 65 and concessional tax treatment at age 65 for access to employer based superannuation funds. As the majority of retirement decisions relate to the age criteria for these retirement income access policies, most Australians retire at either 60 (referred to early retirees) or 65 given that until July 2017 this was the age at which the public pension provision became available. We are specifically interested in whether retirement differentially affects health in "early" retirees and "traditional" retirees.

We initially investigate the health effects on both genders and sub-populations, using Ordinary Least Square (OLS) regressions, subsequently testing for measurement bias from

self assessed health and for potential endogeneity using a propensity score matching (PSM) approach. An average treatment effects (ATE) strategy is employed to examine the mental and physical health characteristics of the treatment group comprising of retirees at ages 60 and 65 and a control group comprising of non-retired at ages 60 and 65. Generally we find mental health to have differential response rates across the subpopulations following the retirement decision. Generally however, no improvement in mental health was seen in this population either on early retirement or post retirement at the traditional age of 65.

The paper is structured as follows: section 2 gives some background to the Australian context and the retirement literature; section 3 outlines methods used in the analysis; section 4 presents the results; section 5 examines the robustness checks, section 6 discusses the findings and policy implications and concludes with section 7.

2. Background

The Australian retirement income support system consists of three primary components: the publicly funded means-tested Age Pension; income from funds generated through compulsory superannuation contributions under the Superannuation Guarantee (SG); and, income generated through non-compulsory savings, such as voluntary superannuation, assets and private savings (Human Services (DHS), 2019; Australian Tax Office, 2011). Pension eligibility age for women has gradually increased from 60 years in 1995, reaching 65 years in 2014, the same eligibility age of males. From 2017, the eligibility age increased from 65 years by six months every two years until it reaches 67 years of age in 2023 (DHS, 2019). In addition to the Australian Age Pension; the Australian Service Pension is only available to war veterans aged 60 years or older. The Disability Support Pension is available to people

with a medical impairment and is the same rate of payment ($843, 60) and subjected to the same income and asset tests as the age pension (DHS, 2019). For those individuals choosing early retirement, they are subjected to an asset test that includes the availability of personal superannuation funds. The Newstart Allowance is available to individuals aged 60 and over on low income or not in employment but subject to an income and asset test and at a lower rate ($601.10) than the age pension (DHS, 2019).

Approximately 53% of working Australians expect their main source of income at retirement to be (employer based) superannuation funds and/or the public age pension (ABS, 2016 b). Eligibility for superannuation access starts at retirement age 55 years and above however, to encourage labour force participation rate (Treasury, 2004), a policy provision was introduced in 2005 that allowed individuals over 55 to continue working and accessing their superannuation savings through a non-commutable income stream. In 2006, the budget further changed the provisions of superannuation access to a retirement age of 60 with a concessional tax treatment (ABS, 2016 b; Barret & Kecmanovic, 2013).

2.1. **Retirement Decisions**

Similar to international findings that intention to retire starts long before the retirement date, Australian workers are generally unwilling to change their retirement intentions (Phillipson, 2004). Walter, et. al (2008) note that older workers may change their retirement plans in response to Government policies but remain relatively unresponsive to specific policy incentives. For individuals younger than 62 years of age, employment offers the opportunity to enhance their subjective health, whereas for those aged over 62 years their health tends to decline with continued employment (Calvo, et. al, 2013). Physiological and

psychological health, along with a desire for improved lifestyle choices, can be determining factors in the choice of early or extended retirement (Blakeley & Ribeiro, 2008). In addition, job accommodations can influence the duration of employment for individuals with disabilities. For instance, Burkhauser, et al (1995) found that where work adjustments were made to accommodate disabilities, there was a significant reduction in decisions to cease employment. Nonetheless not all accommodations have similar effects on employment duration, certain accommodations such as flexible work arrangements and workplace modifications showed prolonged periods of employment (Campolieti, 2005). Furthermore, the requirement for job accommodations usually tends to follow from legislation such as the Australian Disability Discrimination Act (DDA, 1992), which obliges employers to make 'reasonable workplace adjustments'.

Poor health appears to have a greater influence on retirement behaviour than economic circumstances (Anderson & Burkhauser, 1985; Dwyer & Mitchell, 1999). Sejbaek, et.al (2012) note that physically strenuous work, such as heavy lifting or prolonged periods of standing can be early predictors of health-related retirement. While Eibich (2014) noted that occupational strain had significantly impacted health at retirement, van den Berg, et al's study (2010) found no significant association between physical demands and retirement timing. Biological, chronological, social and cognitive ageing (Nilsson, 2016) are associated with extending working life. Although the influence of chronic disease and health shocks are noted (Disney et al, 2006) as causative factors towards retirement timing, there is no firm consensus on this impact. Eibich's (2015) study noted a positive and highly significant association in physical activity with health improvement at retirement.

Caroli, et al (2016) note that the number of doctor visits increases upon retirement, and more so for workers retiring from jobs that involved working in excess of 48 hours per week. National and international health statistics indicate an increase in health utilisation for ages 65 and over (ABS, 2016c). The Australian health summary for 2014-2015 (ABS, 2016c) indicates the average number of visits to the doctor was between 4 to 11 times in the past 12 months, there were 31% of outpatient services for people aged 65 and over, and the average length of overnight hospital stay (combined private and public hospitals) was 5.4 days in the past 12 months.

The Australian eligibility criteria and the data available from the Household, Income and Labour Dynamics in Australia (HILDA) survey allow examination of "early" and "traditional" retirees, of importance given the age criteria associated with public pension (60) and superannuation (65) availability, as well as providing the capability to match retirement populations as the retirement age is not compulsorily enforced.

3. Data and Methods

We analyse 13 waves of panel data from the Household, Income and Labour Dynamics in Australia (HILDA) survey, which is conducted annually since 2001 with an average response rate of 66% and an annual participation rate of approximately 17000 Australians (Richardson, 2013). We use data from 2003 to 2015 since waves 3 to 15 contained questions that specifically referred to health characteristics. The sample is an unbalanced panel consisting of 15 182 pooled observations, and 4708 retirees aged 60 but less than 65 and aged 65 between the years 2003 and 2015. These individuals are re-interviewed annually and the changes to their personal circumstances as they age, are tracked.

Retirement is categorised as those who no longer participate in part or full time paid work. The HILDA data also directly elicits information on whether individuals are retired and contains information on employed individuals who are above the retirement eligibility age.

3.1. **Measurements**

We are particularly interested in the impact of retirement on an individual's health. Physical and mental health is reported in the short form (SF 36 items) self-questionnaire section of the HILDA survey. It is a commonly adopted measure and is validated as a clinical tool for individual care planning (Ware & Gandek, 1998). Mental health comprises of social functioning, role-emotional, vitality, and mental health measures. Physical health comprises of physical functioning, role physical, bodily pain and general health measures. It is suggested that the subjective well-being measures should be treated as ordinal (Frey & Stutzer, 2002). We use the HILDA weights to examine the variable of interest, with 100 being excellent health and 0 being poor. A concern of self-reported health relates to it being subjective. When forecasting retirement timing, Jones, et al (2010), Roberts, et al (2010) and Disney et al (2006) note that in instances where direct measurement error tests were conducted, the results were similar for objective and subjective health measures. They conclude that the influence of health shocks on retirement and retirement behaviours were of greater relevance. Nevertheless, for comparability of health states we examine the self-reported data with observable data (AIHW, 2017) as an implicit placebo test, comprising of the number of visits to the doctor, number of hospital admissions and the length of hospital stay in the past 12 months. A further concern is that occupational strain impacts health and retirement decisions (Wang, et al, 2009, Eibich, 2014). The Australian Standard Classification Occupations (ASCO) provides a framework for occupations based on skills level and skill specialisation (ABS, ASCO), 1997). We use the major occupational groupings: managers,

administrators and professionals; tradespersons and related workers; advanced and intermediate clerical workers and service workers; intermediate production and transport workers; elementary clerical, sales and service workers; and labourers as control variables.

In the absence of experimental data, matching estimators may be used to elicit causal inference (Abadie & Imbens, 2011). We use propensity score matching (PSM) to compare the treated group and the non treated or control group (average treatment effects on the treated [ATET]). The treated group, i.e. retired and the vector of observable characteristics (X) are measured at the point in which the individual initially appears in the data as in a parallel group design (Berry et al, 2006). We use a fixed effects approach to control for individual time–invariant characteristics. The observed factors are statistically controlled through matching. It is assumed that there will be gender differences on retirement age decisions and health consequences. Using fixed effects, ATET and control groups with similar characteristics, suggests that heterogeneity is limited.

Health and retirement many have reverse causal effects such as a higher prevalence of a chronic health condition triggering early retirement (AIHW, 2009). Initial OLS regressions are conducted prior to PSM to determine if there are significant variances in the results that would suggest bias. PSM mimics (or equalises) the treated observation(s) *i* with the control observations(s) *j* by controlling for a summary of treatment characteristics. As the outcome variable was binary in nature (with retired =1 and 0 otherwise), we use probit regression model to estimate propensity scores. An assumption of PSM is that the treatment does not indirectly affect the control observations (there are no general equilibrium effects) (Rosenbaum & Rubin, 1983) and the potential outcomes are independent of the treatment,

conditional on the treatment characteristics ($\sum x$). A further assumption of PSM is that for each treated observation, there is a matched control observation with similar x (covariates), as follows:

(1) $0 < prob\ (D = 1/ x_i) < 1$

where D_i denotes a dummy variable, D_i =1 if the individual $_i$ received the treatment (retirement). We match the propensity score of the treated *i* with similar or closest propensity scores to the control observation *(j)*, by matching on a vector of covariates: age (aged 60 but less than 65, and age 65), gender, retired =1, and geographic location using a matching algorithm referred to as caliper bound. PSM method allows for matching on a vector of characteristics rather than individual characteristics. We match the sample of those who retired (treated) with the sample of those who did not retire (control) but who had a propensity score that is closest to the treated, using nearest neighbour matching. A match is deleted if it lies outside the range of common support (Huber, et al, 2015), however if the non-retired exceeds the caliper threshold, it is added back to the pool for further matching with a likely treated group.

Matching needs to satisfy two criteria: first is the common support range where sufficient matches are needed after obsolete observations that lie outside the common support range are discarded. Second is the quality of match, where the main variables or characteristics (i.e. the vector of covariates are critical) are balanced between the treated and control observations to ensure that they are comparable (Huber, et al, 2015; Imbens & Rubin, 2015). We use a non-parametric approach (Huber, et al, 2015). For match quality and endogeneity concerns, we deleting observations that included a set of individual sick characteristics, i.e. individuals who identified as having chronic health conditions; long term health condition or

disability; any condition that restricts physical activity or physical work; and a nervous or emotional condition which requires treatment - Equation (1). This done to match for comparability before treatment. Next we matched for individual characteristics but dropped those predictors that did match such as income. The final predictors included age (60 but less than 65; or 65), gender, education, geographic location (urban/rural), marital status and superannuation. In this study we find sufficient matches between the treated and control observations (Tables 2 and 3). We restrict matching to the common support range of propensity scores and exclude treated individuals with scores higher than the maximum non-treated score and similarly exclude the non-treated with scores lower than the minimum treatment group (Huber, et al, 2015). Consistent with this specification, we run t-tests of differences between the treated and control observations with similar health characteristics and find the balancing propensity is satisfied, with region of common support as follows:

Male part A (Before): region of common support [.39444346, .99985169]

Male part B (After): region of common support [.03045031, .6352186]

Female part A (Before): region of common support [.43970871, .88851767]

Female part B (After): region of common support [.01494899, .09509333]

Insert Table 1: Descriptive Summary

4. RESULTS

Table 1 illustrates the mean scores for individuals who retired and did not retire at ages 60 or 65. The SF 36 mental health score gap between the retirees and non-retirees is relatively smaller, suggesting a similar level of mental health for both groups. The SF 36 physical functioning weight for retirees at age 60 is slightly lower than employed individuals at the same age. The differences between retired and non-retired individuals with superannuation

funds were similar. More people continued to remain in employment in the occupational categories of managers, professionals and administrators.

4.1. Mental and Physical Health: and After PSM Estimates

4.1.1. Before PSM

Initial OLS regressions are undertaken on male and female retirees at ages 60 and 65, without controlling for differences in health characteristics as it is assumed that health and retirement are related and comparison to the PSM results will highlight bias (see Appendix 1 and 2).

(2)

$$\text{Ln}\,(H_{it}) = \alpha + \beta R_{it} + y\sum x_{it} + \mu_{it} + \varepsilon_{it}$$

LnH_{it} denotes the health outcome measure and is specified in logarithms given skew in the raw data; R_{it} is the main variable of interest. R_{it} is a dummy variable, which takes the value of 1 if the individual is retired at age 60 or 65, otherwise it takes value of 0. The results are strongly positive for women with an improvement in mental health and a decline in physical health at retirement. A similar significant result is found for men's physical health with a decrease of 3% and a moderate improvement in mental health. However, these estimates may be biased, as they do not consider individuals who might have retired as a result of long term, chronic or serious health conditions. Consequently matching is undertaken to eliminate such observations and ensure estimations are undertaken on individuals with similar health characteristics.

4.1.2. After PSM

An after PSM for females and males with similar health characteristics in the treated and control groups was conducted (reported in Tables 2 and 3).

(3)

$$\ln(H_{i,t}) = \alpha_i + \lambda_t + \beta \times Retirement_{it} + \theta \times \ln(X_{it}) + \varepsilon_{it}$$

Ln (H_{it}) denotes the health outcome measure; α_i are individual fixed effects. The $\lambda_t s$ are year fixed effects, controlling for any common changes in year t. X_{it} is vector of other covariates that include years of work experience, marital status, geographic locations (i.e.: remote, urban and regional) and $\varepsilon_{it}\, is$ error term.

Insert Table 2: ATE (After PSM) Female

Insert Table 3: ATE (After PSM) Male

For women who retired at age 65 there is a moderate increase in mental health. However, there are strongly positive associations with occupational strain indicating a 10% increase in the mental health for female labourers retiring at age 60 and a 5.6% mental health increase with retirement at age 65. Women retiring from service work type jobs had an 11% improvement in physical health at age 65. Geographic location negatively impacts mental health with a decline for women living in remote locations.

For men who retired at age 60 or 65 there are no significant effects on mental or physical health, which is similar to Coe and Lindeboom's findings (2008). There is an increase of in the physical health for retirees aged 65 and living in urban areas. Interestingly health effects by occupational categories were statistically significant for strenuous job types, with mental health improving for men retiring from clerical and labour job types. The physical health for retirees in both sub populations in the machine operation occupations improved. Interestingly, mental health increased for male retirees with access to superannuation funds at both age groups (note: not all 65 year old retirees have superannuation).

In comparison to the before PSM estimates, the after PSM results have large variances and indicate no significant improvement in mental health for males and no decline in the physical health of men and women at age 60 and age 65. These results suggest that the matching technique eliminated observations with unmatched long term, chronic and/or serious mental and physical health characteristics.

4.2. **Robustness Tests**

Athey et al (2017, 3) and Funk et al (2011) suggest the use of 'doubly robust' estimators for non-randomised observations by combining two approaches to estimate the causal effect of a treatment (retirement) on an outcome, where either the propensity score or the outcome regression/model is correctly specified. It is used to identify the best estimators by adjusting the associations between potential outcomes and the covariates. In addition to a before and after PSM comparability test for bias and to ensure similarity in health states between the treatment and control groups, we undertake two tests for robustness: comparability of health utilisation and a placebo test for propensity score matching individuals who planned to retire and retired and individuals who planned to retire but did not retire as planned, at ages 60 and 65.

4.2.1. Health Utilisation

It is assumed that retirees will consume more healthcare (Manski, et al, 2013). Hence, an implicit placebo test analyses the health consumption patterns between the treated and control groups at age 60 or 65 (Table 4) and comprises of the number of visits to the doctor, number of hospital admissions and the length of hospital stay in the past 12 months. We examine two waves of reported data in the HILDA survey conducted in 2009 and 2013 on healthcare consumption between the treated and control groups and find similar health utilisation rates between the groups. There are no major differences in doctor's visits

between the sub populations; likewise the usage patterns for both control groups at age 60 and 65 are similar. On average retired individuals have 3 additional visits per year in comparison to non-retired individuals. The average length of hospital stay for retired individuals is 2 days in the past 12 months, while for the control group it is 1 day. The average number of hospital admissions for the sub populations of retirees and non-retired, is below 1, suggesting that retirees at age 60 or 65 have similar long-term health characteristics to employed individuals at the same age.

These results indicate that the treatment and control groups are fairly similar in terms of their health state and the only key difference between the two groups was the treatment. This limits bias since the treatment group does not indicate extreme or persistent patterns of health consumption (proxy measures of chronic, serious and long term poor health) and falls below the national average observable data.

Insert Table 4: Health Utilisation (Combined Male and Female)

4.3. **Placebo test**

A placebo test investigated a treatment group comprising of individuals who planned to retire and retired as planned at age 60 or 65 and a control group comprising of individuals who planned to retire but did not retire at the planned time, at age 60 or 65. These individuals entered the survey prior to retirement and whilst in employment. Their responses would precede unanticipated retirement and random health shocks. I use PSM and ATE, in the following model:

(4)

$$\ln(H_{i,t}) = \alpha_i + \lambda_t + \beta \times Retirement_{it} + \theta \times \ln(X_{it}) + \varepsilon_{it}$$

Retirement$_{it}$ is a dummy variable which takes the value of 1 if the individual planned to retire at age 60 or 65 and retired at the planned time, otherwise it takes value of 0; The PSM technique is used to test for the balancing condition between the treated and control observations with similar health characteristics and find the balancing propensity is satisfied.

The number of pooled observations for females is 8456 and the results (Appendix 3) are similar to the retired sub populations at age 60 or 65. The results are not statistically significant for women retiring at ages 60 or 65. Their estimates are similar to the initial PSM model and the estimates of health consequences from occupational strain are also similar.

Men who planned to retire at age 60 and retired at the planned age had a moderate decline in mental health of 8%, while men who retired at planned age 65 had an increase of 4% in mental health. The results for men's physical health were not statistically significant. The association of men retiring at age 60 and 65 with access to superannuation funds was positive for mental health improvement. These results suggest that the health states of individuals who retired (Tables 2 and 3) and those who planned to retire and accordingly retired (Appendix 3 and 4) are similar in most respects except for men there are differences in mental health with planned retirement. The robustness tests indicate similar health characteristics between the treated and control groups and suggests limited bias.

5. DISCUSSION AND POLICY IMPLICATIONS

We considered the effects of retirement on individual health, using Australian data from the HILDA survey that allowed us to consider "early" and "traditional" retirees and to match across a retired and non-retired population. We addressed sample bias between the two

main variables by undertaking PSM and ATE with a treatment and a control group. We also compared their health utilisation rates and showed that the health characteristics of the sub populations in this study are similar.

Women's mental health had moderate positive estimates for retirement at age 65. There are no statistically significant physical health consequences for women retiring early at age 60, or at age 65 and no statistically significant mental and physical health consequences for men retiring early at age 60, or at age 65. These results suggest that the retiring age being 60 or 65 had no major health effects for men or women.

However, there were strong significant positive or negative effects with covariates that included occupational strain; access to superannuation funds and geographic location at retirement. Occupational strain has strong significant mental and physical health effects for men and women and is either positive or negative dependent on job type and strenuousness particularly for service work, technical and labourer job types. These findings provide an insight into understanding retirement and labour dynamics that suggest a need for workforce planning and flexible work arrangements dependent on occupational strain and labour intensive job types. Importantly, policy decisions for delaying retirement should consider the occupational impact on health.

There were strong positive mental health effects for male retirees' with access to superannuation for both sub populations. The results shed light on the financial implications of retirement, particularly support for superannuation savings and associated health effects.

Geographic location in retirement has strong significant effects on health status, with urban location having strong positive effects for men while residing in remote locations had strong negative effects for women retiring early. This could be for a number of reasons, including access and proximity to resources.

The reported data for health utilisation falls within the range of the observable data for 2014-2015 (AIHW, 2017), which denotes a national average of 4-11 doctors' visits for the past 12 months. The average length of hospital stay is below the national average, which is an average of 2.8 days in the past 12 months. These results indicate that the treatment and control group are similar in their healthcare utilisation. It is also worthwhile considering that retirement duration and prolongation might lead to greater utilisation of healthcare as compared to the treatment and control groups in this study.

A key limitation of this study is that we did not examine the effects of delayed retirement post the age of 65, which could impact health utilisation and engaging in physical activity. However, since the Australian government has extended the retirement age to 67 effective from July 2017 to 2023, further studies could examine the effects of delayed retirement using the reforms; furthermore the reforms could be applied as instruments to address endogeneity concerns.

6. CONCLUSION

We complement the study of the impact of labour reforms by exploring age retirement decisions by gender and sub populations (age 60 and 65) and by examining the effectiveness of PSM combined with comparative observable health utilisation data. The two points of

retirement are critical since at age 60 there is a policy incentive via a concessional tax treatment to retire for individuals with income access to superannuation funds and at age 65 there is access to State pension funds (pre July 2017 when this data was collected). The mental and physical health estimates for men and women vary according to occupational categories and strain, access to superannuation funds and geographic location.

7. REFERENCES

Abadie, A. & Imbens, G. W. (2011). Bias-Corrected Matching Estimators for Average Treatment Effects. *Journal of Business & Economic Statistics*, 29(1), 1-11.

Anderson, K. H., & Burkauser, R. V. (1985). The Retirement-Health Nexus: A New Measure of an Old Puzzle. *Journal of Human Resources,* 20(3), 315-330.

Athey S., Imbens G., Pham T., Wager S. (2017) "Estimating Average Treatment Effects: Supplementary Analyses and Remaining Challenges," Amercan Economic Review 107: 278-281.

Australian Bureau of Statistics. (1977). *Australian Standard Classification* (ASCO) Second Edition. *ABS Catalogue No. 1220.0* Canberra, ACT: ABS.

Australian Bureau of Statistics. (2016a). *Australian Demographic Statistics, Jun 2016, ABS Catalogue No. 3101.0.* Canberra, ACT: ABS.

Australian Bureau of Statistics. (2016b). *Retirement and Retirement intentions, Australia, July 2014 to June 2015, ABS Catalogue No. 6238.0.* Canberra, ACT: ABS.

Australian Bureau of Statistics. (2016c). *Patient Experiences in Australia: Summary of Findings, 2015-16, ABS Catalogue No. 4839.0.* Canberra, ACT: ABS.

Australian Institute of Health and Welfare. (2017). *Admitted patient care 2015-16: Australian*

hospital statistics. National Health Performance Authority, Canberra.

Australian Tax Office. (2011). *Tax concessions and super for seniors.* Canberra, ACT: ATO.

Barrett, G. F. & Kecmanovic, M. (2013). Changes in Subjective Well-Being with Retirement: Assessing Savings Adequacy. *Applied Economics*, 45(35), 4883-4893.

Berry, C C., Moore, P. & Dimsdale, J. E. (2006). Assessing the trade-offs between crossover and parallel group designs in sleep research, Journal of Sleep Research, 15(4), 348-357.

Blakeley, J. & Ribeiro, V. (2008). Are Nurses Prepared for Retirement? *Journal of Nursing Management*, *16*(6), 744-752.

Burkhauser, R. V., Butler, J.S. & Yang W. K. (1995) "The Importance of Employer Accommodation on the Job Duration of Workers with Disabilities: A Hazard Model Approach." *Labour Economics* 2, 109–30.

Calvo, E., Sarkisian, N. & Tamborini, C. R. (2013). Causal Effects of Retirement Timing on Subjective Physical and Emotional Health. *Journal of Gerontology Series B: Psychological sciences and Social Sciences, 68*(1), 73-84.

Caroli, E., Lucifora, C. & Vigani, D. (2016). *Is there a retirement-health care utilization puzzle? Evidence from SHARE data in Europe* (Document No. 1609). Paris, France: Center for Economic Research and its Applications.

Coe, N. B., & Lindeboom, M. (2008). *Does Retirement Kill You? Evidence From Early Retirement Windows* (Discussion paper No. 3817). Bonn, Germany: Institute of Labor Economics.

Campolieti, M. (2005), How Accommodations Effect the Duration of Post-Injury Employment Spells, *Journal of Labor Research,* 26, 121-135.

Department of Human Services: Australian Government (2019), Canberra, https://www.humanservices.gov.au/individuals/services/centrelink/age-pension.

Disney, R., Emmerson, C. & Wakefield, M. (2006). Ill Health and Retirement in Britain: A panel data-based Analysis, *Journal of Health Economics*, 25, 621-649.

Disability Discrimination Act (1992), No 135 of 1992, Federal Registrar of Legislation, Australian Government.

Dwyer, D. S. & Mitchell, O. S. (1999). Health Problems as Determinants of Retirement: Are Self-Rated Measures Endogenous? *Journal of Health Economics*, *18*(2), 173-193.

Eibich, P. (2015). Understanding the Effect of Retirement on Health: Mechanisms and Heterogeneity. *Journal of Health Economics*, 43, 1-12.

Frey, B. & Stutzer, A. (2002). What Can Economists Learn From Happiness Research? *Journal Of Economic Literature*, 40(2), 402-435.

Funk, M.J., Westreich, D., Wiesen, C., Stürmer, T., Brookhart, M.A. & Davidian, M. (2011) Doubly Robust Estimation of Causal Effects, *American Journal of Epidemiology*, 173 (7), 761–767.

Godfrey, A., Lord, S., Galna, B., Mathers, J. C., Burn, D. J. & Rochester, L. (2014). The association between retirement and age on physical activity in older adults. *Age and Ageing*, 43(3), 386-393.

Grossman, M. (1972). On the concept of Health Capital and the Demand for Health. *Journal of Political Economy*, 80(2), 223-255.

HILDA. (2004). *Living in Australia, HILDA Survey Annual Report.* Melbourne Institute of Applied Economic and Social Research, University of Melbourne, Victoria.

Huber, M., Lechner, M. & Steinmayr, A. (2015). Radius Matching on the Propensity Score with Bias Adjustment: Tuning Parameters and Finite Sample Behaviour. *Empirical Economics,* 49(1), 1-31.

Jones, A.M., Rice, N. & Roberts, J. (2010). Sick of work or too sick to work? Evidence on self-

reported health shocks and early retirement from the BHPS. *Economic Modelling*, 27, 866-880.

Kensbock, J.M., Boehm, S.A., & Bourovi, K (2017). Is There a Downside of Job Accommodations? An Employee Perspective on Individual Change Processes *Front Psychol.* (8) 1536.

Laverty, A.A. & Flint, E. (2014). Retirement and Physical Activity. *Journal of Epidemiology and Community Health*, 68(8), 701.

Lee, S. (2015). An exploration of antecedents of positive affect among the elderly: A cross-sectional study. *European Journal of Public Health, 26*(1), 187-191.

Lumsdaine, R., Stock, J., & Wise, D. (1996). Why are Retirement Rates so High at Age 65. In D. Wise (Ed.), *Advances in the Economics of Aging.* Chicago, IL: University of Chicago Press.

Manski, R. J., Moeller, J. F., Chen, H., Schimmel, J., Clair, P. A. S., & Pepper, J. V. (2013). Patterns of older American's health care utilization over time. *American Journal of Public Health, 103*(7), 1314-1324.

Nilsson, K. (2016). Conceptualisation of Ageing in Relation to Factors of Importance for Extending Working Life. *Scandinavian Journal of Public Health, 44*(5), 490-505.

Imbens, G. & Rubin, D. (2015). *Causal Inference for Statistics, Social and Biomedical Sciences.* Cambridge University Press: Cambridge.

Phillipson, C. (2004). Work and retirement transitions: Changing sociological and social policy contexts. *Social Policy and Society, 3*(2), 155-162.

Preston, A. & Austen, S. (2001). Women, superannuation and the SGC. *Australian Bulletin of Labour*, 27(4), 272-295.

Richardson, S. (2013). A Reflection on the Household, Income and Labour Dynamics in Australia Survey. *Australian Economic Review, 46*(2), 216-222.

Roberts, J., Rice, N., & Jones, A.M. (2010) Early Retirement Among Men In Britain and Germany: How Important is Health? *The Geneva Papers*, 35, 644-667.

Rohwedder, S., & Willis, R. J. (2010). Mental Retirement. *Journal of Economic Perspective, 24*(1), 119-138.

Rosenbaum, P.R. & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70, 41-55.

Sari, N. (2009). Physical Inactivity and Its Impact on Healthcare Utilization. *Health Economics, 18*(8), 885-901.

Sejbaek, C. S ; Nexo, M. A. & Borg, V. (2013) Work-Related Factors And Early Retirement Intention: A Study Of The Danish Eldercare Sector. *The European Journal of Public Health*, 2013, Vol. 23(4), pp.611-616

Treasury. (2010). *Intergenerational Report: Aging Pressures and Spending.* Canberra, ACT: Commonwealth Department of Treasury.

Treasury. (2004). *A more flexible and adaptable retirement income system.* Canberra, ACT: Commonwealth Department of Treasury.

van den Berg, T. I. J., Elders, L. A. M., & Burdorf, A. (2010). Influence of Health and Work on Early Retirement. *Journal of Occupational and Environmental Medicine, 52*(6), 576-583.

Walter, M., Jackson, N., & Felmingham, B. (2008). Keeping Australia's Older Workers in the Labour Force. A Policy Perspective. *Australian Journal of Social Issues, 43*(2), 291-309.

Wang, J., Schmitz, N., Dewa, C. & Stansfeld, S.(2009). Changes in Perceived Job Strain and The Risk of Major Depression: Results from a Population-Based Longitudinal Study. *American Journal of Epidemiology*, 169, (9), 1085–1091.

Ware, J. E., & Gandek, B. (1998). Overview of the SF-36 Health Survey and the International Quality of Life Assessment (IGOLA) Project. *Journal of Clinical Epidemiology, 51*(11), 903-912.

Table 1: Descriptive Summary

**Job category according to the Australian Standard Classification Occupations: 1*

	Age 60				Age 65			
	Retired		Non retired		Retired		Non retired	
	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd
SF-36 physical functioning - transformed	63.17	32.80	72.55	31.28	64.44	31.46	70.71	30.50
SF-36 mental health - transformed	66.92	27.08	71.02	27.12	70.01	26.59	73.16	26.19
How often participate in physical activity	2.70	3.07	2.82	3.32	2.88	3.22	2.98	3.21
Married	0.68	0.47	0.65	0.48	0.65	0.48	0.68	0.47
Male	0.39	0.49	0.50	0.50	0.42	0.49	0.52	0.50
Female	0.61	0.49	0.50	0.50	0.58	0.49	0.48	0.50
Remote location	0.01	0.09	0.02	0.14	0.01	0.11	0.02	0.14
Urban location	0.58	0.49	0.61	0.49	0.60	0.49	0.61	0.49
Regional location	0.41	0.49	0.37	0.48	0.39	0.49	0.38	0.48
*Job category- Managers and Professionals	0.00	0.00	0.60	0.49	0.00	0.00	0.46	0.50
*Job category - Machinery operator, Drivers	0.00	0.00	0.06	0.25	0.00	0.00	0.04	0.19
*Job category - Labourers	0.00	0.00	0.07	0.26	0.00	0.00	0.07	0.25
Qualification- Bach_and above	0.16	0.36	0.23	0.42	0.14	0.35	0.22	0.41
Has super_n	0.26	0.44	0.13	0.34	0.38	0.49	0.30	0.46
Observations	584		1929		1011		1184	

(Managers, Professionals, Clerical, Sales); 2 (Technicians, Services, Machinery operators and Drivers); 3 (Labourers)

Table 2: Average Treatment Effect (After PSM) Female

	Age 60		Age 65	
	Mental_Health	Physical_Health	Mental_Health	Physical_Health
Retirement	0.0201	-0.0026	0.0127^{+}	-0.0013
	(1.1)	(-0.1)	(1.7)	(-0.1)
Experience	0.0006	-0.0027*	-0.0007	-0.0002
	(0.7)	(-2.0)	(-1.3)	(-0.2)
Married	-0.0527*	-0.0431	0.0102	0.0023
	(-2.0)	(-1.0)	(0.7)	(0.1)
Remote	-0.3302**	-0.2370	-0.0478	-0.1457
	(-2.8)	(-1.4)	(-0.2)	(-0.4)
Urban	0.0366	0.0807	-0.0462	-0.0964
	(1.0)	(1.4)	(-0.2)	(-0.3)
Managers	0.0609^{+}	0.0441	0.0105	0.0101
	(1.8)	(0.9)	(0.5)	(0.2)
Professionals	-0.0458	0.0744	0.0174	-0.0079
	(-1.5)	(1.6)	(0.9)	(-0.2)
Technicians	0.0845^{+}	-0.0209	0.0051	-0.0454
	(1.7)	(-0.3)	(0.1)	(-0.5)
Service_Work	0.0351	0.0818^{+}	0.0377^{+}	0.1074**
	(1.2)	(1.8)	(1.8)	(2.7)
Clerical	-0.0001	0.0430	0.0182	-0.0525
	(-0.0)	(1.2)	(1.1)	(-1.6)
Sales	0.0275	0.0712	0.0387	-0.1072^{+}
	(0.7)	(1.1)	(1.3)	(-1.7)
Operators	0.1419*	0.2014^{+}	0.0448	-0.0982
	(2.0)	(1.9)	(0.8)	(-0.9)
Labourers	0.0970**	0.0833	0.0563*	0.0714
	(2.9)	(1.6)	(2.5)	(1.6)
#Above_bach	-0.1574	-0.4300*	0	0
	(-1.3)	(-2.0)		
Has_supera_n	0.0030	0.0224	0.0104	0.0077
	(0.2)	(0.8)	(1.4)	(0.5)
Regional			-0.0271	-0.1313
			(-0.1)	(-0.4)
Constant	4.0739**	4.7228**	4.2884**	4.9029**
	(30.1)	(21.6)	(19.3)	(12.3)
Time FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
N	3470	2532	8730	6410
R^2	0.663072	0.537969	0.646467	0.497554
Individual FE	Yes	Yes	Yes	Yes
F	3.2658	3.0881	1.3655	5.4211

t statistics in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

#Above_bach refers to qualifications above a Bachelor Degree

Table 3: Average Treatment Effect (After PSM) Male

	Age 60		Age 65	
	Mental_Health	Physical_Health	Mental_Health	Physical_Health
Retirement	0.0126	-0.0198	0.0134	0.0172
	(0.6)	(-0.4)	(1.6)	(0.9)
Experience	-0.0010	-0.0012	0.0001	-0.0001
	(-1.2)	(-0.8)	(0.1)	(-0.2)
Married	0.0702*	0.0313	0.0337+	0.0157
	(2.5)	(0.5)	(1.8)	(0.4)
Remote	0.1102	0.0709	-0.0183	0.0169
	(0.7)	(0.2)	(-0.4)	(0.2)
Urban	-0.0116	0.0848	0.0107	0.0894**
	(-0.3)	(1.1)	(0.7)	(2.6)
Managers	-0.0157	0.0300	0.0121	0.0052
	(-0.5)	(0.6)	(0.7)	(0.1)
Professionals	0.0173	0.0014	0.0250	-0.0328
	(0.6)	(0.0)	(1.4)	(-0.9)
Technicians	0.0512	0.0670	0.0146	-0.0042
	(1.6)	(1.1)	(0.7)	(-0.1)
Service_Work	0.0261	0.0250	0.0220	-0.0099
	(0.5)	(0.3)	(0.7)	(-0.2)
Clerical	0.0715*	-0.0020	0.0278	0.0464
	(2.1)	(-0.0)	(1.2)	(1.1)
Sales	0.0436	-0.1297	0.0004	0.0400
	(0.6)	(-0.9)	(0.0)	(0.6)
Operators	0.0158	0.1686*	0.0381+	0.0899*
	(0.5)	(2.5)	(1.8)	(2.1)
Labourers	0.0579+	0.0755	0.0462*	-0.0125
	(1.8)	(1.2)	(2.5)	(-0.3)
#Above_bach	-0.0792	-0.0204	-0.0172	0.1607
	(-0.4)	(-0.1)	(-0.3)	(1.3)
Has_super_n	0.0376*	0.0014	0.0250**	0.0138
	(2.1)	(0.0)	(3.2)	(0.8)
Constant	4.0098**	4.3007**	4.3372**	5.0153**
	(26.8)	(13.8)	(48.7)	(25.8)
Time FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
N	2034	1470	6452	4680
R^2	0.758846	0.571978	0.688456	0.492259
Individual FE	Yes	Yes	Yes	Yes
F	1.8140	2.0342	2.5732	4.5530

t statistics in parentheses
*+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$*
#Above_bach refers to qualifications above a Bachelor Degree

Table 4: Health Utilization (Combined Males and Females)

	Age 60				Age 65			
	Retired		Non Retired		Retired		Non Retired	
	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd
Number of doctor visits (including 0)	7.08	7.61	4.12	5.26	7.09	7.87	4.13	4.03
Number of hospital admissions (including 0)	0.37	1.17	0.19	0.66	0.38	1.05	0.15	0.44
Number of nights in hospital (including 0)	2.42	12.57	1.35	6.96	2.47	14.06	0.77	4.00
Observations	122		292		249		142	

Appendix 1: Before PSM – Retired Females

	(1)	(2)
	Mental_Health	Physical_Health
Retirement	0.0105**	-0.0416**
	(3.1)	(-7.2)
Experience	-0.0000	0.0001
	(-0.3)	(0.5)
Married	0.0226**	-0.0036
	(6.1)	(-0.6)
Remote	0.1909+	-0.0782
	(1.7)	(-0.5)
Urban	0.1861+	-0.0700
	(1.7)	(-0.4)
Regional	0.2000+	-0.0693
	(1.8)	(-0.4)
Managers	0.0148**	0.0174*
	(3.1)	(2.4)
Professionals	0.0198**	0.0055
	(4.9)	(0.9)
Technicians	0.0208**	0.0132
	(2.9)	(1.3)
Service_Work	0.0194**	0.0057
	(4.9)	(1.0)
Clerical	0.0132**	0.0117*
	(3.4)	(2.1)
Sales	0.0069+	0.0064
	(1.7)	(1.1)
Operators	0.0316**	0.0208
	(2.6)	(1.2)
Labourers	0.0295**	0.0131+
	(5.6)	(1.7)
#Above_bach	0.0101	-0.0151
	(1.5)	(-1.5)
Has_super_n	0.0086+	0.0087
	(1.8)	(1.2)
Constant	3.1150+	3.2525
	(1.9)	(1.5)
Time FE	Yes	Yes
State FE	Yes	Yes
N	89785	76163
R^2	0.612314	0.454791
Individual FE	yes	yes
F	18.9836	34.6577

t statistics in parentheses

*+ p < 0.10, * p < 0.05, ** p < 0.01*

#Above_bach refers to qualifications above a Bachelor Degree

Appendix 2 : Before PSM – Retired Males

	(1)	(2)
	Mental_Health	Physical_Health
Retirement	0.0088*	-0.0260**
	(2.5)	(-4.2)
Experience	0.0001	0.0002
	(0.8)	(1.0)
Married	0.0130**	0.0082
	(3.6)	(1.5)
Remote	0.2346	0.0527**
	(1.1)	(2.9)
Urban	0.2241	0.0084
	(1.0)	(1.1)
Regional	0.2235	0
	(1.0)	(0)
Managers	0.0210**	0.0166**
	(5.1)	(2.7)
Professionals	0.0184**	0.0178**
	(4.4)	(2.8)
Technicians	0.0320**	0.0180**
	(8.2)	(3.0)
Service_Work	0.0254**	0.0125
	(4.6)	(1.5)
Clerical	0.0302**	0.0238**
	(6.2)	(3.3)
Sales	0.0098*	0.0192**
	(2.0)	(2.6)
Operators	0.0291**	0.0353**
	(6.3)	(5.0)
Labourers	0.0269**	0.0079
	(7.0)	(1.4)
#Above_bach	-0.0143+	0.0149
	(-1.9)	(1.3)
Has_super_n	0.0173**	0.0003
	(4.3)	(0.1)
Constant	5.2362**	-2.5739
	(3.9)	(-0.6)
Time FE	Yes	Yes
State FE	Yes	Yes
N	78790	69161
R^2	0.630550	0.464874
Individual FE	Yes	Yes
F	15.6359	25.9549

*t statistics in parentheses - + p < 0.10, * p < 0.05, ** p < 0.01*
#Above_bach refers to qualifications above a Bachelor Degree

Appendix 3: Placebo Test (Plan to Retire and Retired as Planned) - Female

	Age 60		Age 65	
	Mental_Health	Physical_Health	Mental_Health	Physical_Health
Retirement	0.0488	0.0381	0.0039	0.0201
	(1.0)	(0.5)	(0.1)	(0.4)
Experience	0.0003	-0.0028*	-0.0007	-0.0001
	(0.3)	(-2.1)	(-1.4)	(-0.1)
Married	-0.0725**	-0.0514	0.0014	0.0026
	(-2.7)	(-1.2)	(0.1)	(0.1)
Remote	-0.2891*	-0.2461	-0.0483	-0.1450
	(-2.4)	(-1.5)	(-0.2)	(-0.4)
Urban	0.0409	0.0831	-0.0431	-0.0958
	(1.1)	(1.4)	(-0.2)	(-0.3)
Managers	0.0619+	0.0477	0.0084	0.0121
	(1.8)	(1.0)	(0.4)	(0.3)
Professionals	-0.0420	0.0661	0.0178	-0.0002
	(-1.3)	(1.4)	(0.9)	(-0.0)
Technicians	0.1005+	-0.0151	0.0028	-0.0429
	(2.0)	(-0.2)	(0.1)	(-0.5)
Service_Work	0.0540+	0.0679	0.0342+	0.1104**
	(1.9)	(1.5)	(1.7)	(2.8)
Clerical	-0.0021	0.0475	0.0168	-0.0497
	(-0.1)	(1.3)	(1.0)	(-1.5)
Sales	0.0118	0.0750	0.0368	-0.1043+
	(0.3)	(1.1)	(1.3)	(-1.7)
Operators	0.1496*	0.2003+	0.0408	-0.0949
	(2.2)	(1.9)	(0.8)	(-0.9)
Labourers	0.1027**	0.0852	0.0422+	0.0681
	(3.1)	(1.6)	(1.9)	(1.5)
#Above_bach	-0.0092	-0.4419*		
	(-0.1)	(-2.1)		
Has_super_n	0.0015	0.0270	0.0120+	0.0086
	(0.1)	(0.9)	(1.7)	(0.6)
Regional			-0.0262	-0.1301
			(-0.1)	(-0.4)
Constant	4.1726**	4.7878**	4.2816**	4.8904**
	(33.6)	(23.6)	(20.0)	(12.6)
Time FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
N	3377	2499	8456	6297
R^2	0.631486	0.522579	0.628603	0.492576
Individual FE	yes	Yes	Yes	Yes
F	2.8761	2.8620	1.3186	5.3589

t statistics in parentheses
*+ p < 0.10, * p < 0.05, ** p < 0.01*
#Above_bach refers to qualifications above a Bachelor Degree

Appendix 4: Placebo Test (Plan to Retire and Retired as Planned) - Male

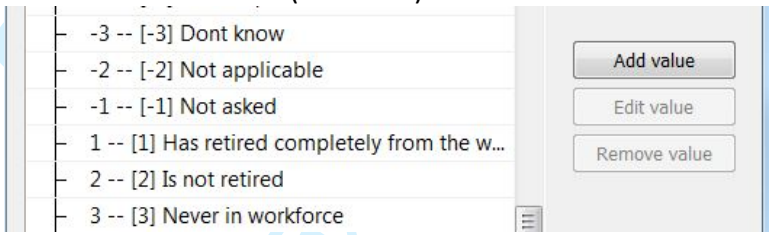
	Age 60		Age 65	
	Mental_Health	Physical_Health	Mental_Health	Physical_Health
Retirement	-0.0838*	0.0132	0.0394*	-0.0404
	(-2.1)	(0.2)	(2.5)	(-1.1)
Experience	-0.0011	-0.0010	0.0002	-0.0001
	(-1.3)	(-0.6)	(0.5)	(-0.1)
Married	0.0592*	-0.0317	0.0533**	0.0095
	(2.0)	(-0.6)	(2.9)	(0.2)
Remote	0.1436	0.0571	-0.0218	0.0117
	(0.9)	(0.2)	(-0.5)	(0.1)
Urban	-0.0098	0.1420+	-0.0020	0.0894**
	(-0.3)	(1.9)	(-0.1)	(2.6)
Managers	-0.0261	0.0393	0.0120	0.0090
	(-0.9)	(0.7)	(0.7)	(0.3)
Professionals	0.0078	0.0210	0.0269+	-0.0299
	(0.3)	(0.4)	(1.6)	(-0.9)
Technicians	0.0402	0.0653	0.0156	-0.0084
	(1.2)	(1.1)	(0.8)	(-0.2)
Service_Work	0.0192	0.0367	0.0232	-0.0082
	(0.4)	(0.4)	(0.8)	(-0.1)
Clerical	0.0558	0.0128	0.0284	0.0486
	(1.6)	(0.2)	(1.3)	(1.1)
Sales	-0.0230	-0.0684	0.0059	0.0317
	(-0.3)	(-0.5)	(0.2)	(0.5)
Operators	0.0008	0.1221+	0.0460*	0.0908*
	(0.0)	(1.7)	(2.4)	(2.1)
Labourers	0.1185**	0.0231	0.0358*	-0.0195
	(3.5)	(0.4)	(2.1)	(-0.5)
#Above_bach	-0.0911	0.0372	-0.0192	0.1553
	(-0.5)	(0.1)	(-0.3)	(1.3)
Has_super_n	0.0375*	-0.0129	0.0255**	0.0170
	(2.0)	(-0.4)	(3.5)	(1.0)
Constant	3.9304**	4.2919**	4.2999**	4.7553**
	(26.0)	(14.5)	(54.9)	(25.9)
Time FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
N	1734	1336	6289	4616
R^2	0.707056	0.552828	0.705818	0.487235
Individual FE	Yes	Yes	Yes	Yes
F	2.4627	1.7376	2.7482	4.4068

t statistics in parentheses
*+ p < 0.10, * p < 0.05, ** p < 0.01*
#Above_bach refers to qualifications above a Bachelor Degree

REVIEWERS' COMMENTS AND RESPONSE

	REVIEWER'S COMMENTS	RESPONSE	LOCATION
1.	Prefer the terms before and after to pre and post, as I was reading your abstract I almost thought you might using difference-in-difference matching, so it might reduce confusion on the part of some readers	Amended "Pre and Post' to "Before and After'	Pages: 1, 10; 12; 25; 26
2.	Minor comment: ATET in parentheses, looks better at the end of the sentence.	Amended	Page 7
3.	Minor comment: Revise to potential outcomes	Amended	Page 8
4.	Additional References Athey S., Imbens G., Pham T., Wager S. (2017) "Estimating Average Treatment Effects: Supplementary Analyses and Remaining Challenges," Amercan Economic Review 107: 278-281. Burkhauser, Richard V., J.S. Butler, and Yang Woo Kim (1995) "The Importance of Employer Accommodation on the Job Duration of Workers with	Included additional references: Kensbock, et al (2017) and Burkhauser et al (1995) Campolieti (2005), Imbens & Rubin (2015).	Pages 5, 9

	Disabilities: A Hazard Model Approach." Labour Economics 2: 109–30. Campolieti, Michele (2005), "How Accommodations Effect the Duration of Post-Injury Employment Spells", Journal of Labor Research 26: 121-135. Imbens, Guido and Donald Rubin (2015). Causal Inference for Statistics, Social and Biomedical Sciences. Cambridge University Press: Cambridge.		
5.	No one would opt for early retirement if they had a disability that would qualify them for disability benefits because the disability pension would pay them more a retirement pension. I'm not sure this an issue in Australia	Addressed under institutional context – background. Disability pension rates of payment and the Age pension payments are the same and both are subjected to an income and asset test. Reference to Department of human Services (2019) is also updated.	Pages 4, 5
6.	What sort of legislation there is for accommodations, e.g., specific legislation such as the ADA in the U.S. or provisions in Human Rights Statutes as in Canada, in Australia.	This is a helpful suggestion. The literature by Burkhauser et al 1995 notes a higher retention rate of workers where job accommodations were made. The Australian Disability Discrimination Act 1992 obliges employers to make 'reasonable workplace adjustments' and supports funding assistance to employers. This has been added to the literature.	Pages 5; 8
7.	Doubly Robust: Include some citations to these papers in your	Discussion and reference to Athey et al (2017) and Funk et al (2011) are included.	Pages 2, 12

	paper to provide more justification for this sort of approach because I don't think a lot of readers are really familiar with these sorts of strategies.		
8.	How is the control group defined?	Addressed. Valid values for those individuals who completely retired (rtcomp) are defined in value label (RTCOMP) as below:  We use all observations both male and female and then find out rtcomp=2 to identify who are not retired and never shown as completely retired at the point in which the individual is initially observed in the data. Male = 2224 observations Female = 2484 observations	Page 8
8.	Clarity: . Is it individuals who never retire in the panel, or can someone be in the control group and then retire later on in the panel? Crossover	A parallel design rather than a crossover design is used (Berry, et al 2006). The treated group, ie retired and the vector of observable characteristics are measured at the point in which the individual initially appears in the data. We include those individuals who move from x = 0 to x =1 (retired). Corresponding to the matching a difference-in-difference strategy is	Page 8 (Berry et al 2006) parallel design

		used to estimate the effect of the treatment.	
9.	Discussion of covariate balance - balance in the data	This is discussed under the methods section. We use a caliper matching method for balance. We find a sufficient amount of treated and non treated observations (Imbens & Rubin (2015, p337). We use a non-parametric approach. For match quality and endogeneity concerns, we matched by removing observations that included a vector of sick characteristics, i.e. observations that identified as having chronic health conditions; long term health condition or disability; any condition that restricts physical activity or physical work; and a nervous or emotional condition which requires treatment - Equation (1). This done to match for comparability before treatment. We then matched for individual characteristics but dropped those predictors that did match such as income. The final predictors included age (60 but less than 65 or age 65), gender, education, geographic location (urban/rural), marital status and superannuation - Equation 3. Consistent with this specification, we run t-tests of differences between the treated and control observations with similar health characteristics and find the balancing propensity is satisfied. The age groups 60 and 65 are main points for retirements in Australia due to accessing superannuation and the tax thresholds (page 2), however the treated and control samples included age 60 but less than 65 and at age 65. We did not include ages beyond 65 as age 65 is the usual age of retirement, prior to the 2017 policy reforms. In this study we find sufficient matches between the treated and control observations (Tables 2 and 3).	Pages 2, 4, 6, 9,10

(This is section for further information:

MALE PART A (Before treatment)
Test of balancing property of the propensity score
****
The balancing property is satisfied

This table shows the inferior bound, the number of treated
and the number of controls for each block

Inferior of pscore	Retirement 0	1	Total
.2	0	1	1
.4	218	251	469
.6	187	385	572
.8	2	19	21
Total	407	656	1,063

Note: the common support option has been selected

MALE PART B (After treatment)
Test of balancing property of the propensity score
****

The balancing property is satisfied

This table shows the inferior bound, the number of treated and the number of controls for each block

Inferior of block of pscore	Retirement 0	1	Total
.0304503	154	5	159
.05	388	35	423
.1	307	48	355
.2	14	7	21
.4	2	0	2
.6	0	2	2
Total	865	97	962

the common support option has been selected

FEMALE PART A (Before)

Test of balancing property of the propensity score

****

The balancing property is satisfied

This table shows the inferior bound, the number of treated and the number of controls for each block

		Inferior | of block | Retirement of pscore | 0 1 | Total ----------+----------+---------- .4 | 140 118| 258 .5 | 191 257 | 448 .6 | 275 561 | 836 .8 | 2 3 | 5 ----------+----------+---------- Total | 608 939 | 1,547 the common support option has been selected --- **FEMALE PART B (After)** Test of balancing property of the propensity score ********** The balancing property is satisfied This table shows the inferior bound, the number of treated and the number of controls for each block Inferior | of block | Retirement of pscore | 0 1 | Total ----------+----------+---------- .014949 | 883 29 | 912 .05 | 522 39 | 561 ----------+----------+---------- Total | 1,405 68 | 1,473	

10.	Range of common support: Overlap problems are generally dealt with by trimming the data in some way to ensure that there is better overlap. If overlap does not hold that causes a bias in the estimates.	Huber et al (2015) and Imbens & Rubin (2015) suggest using a trimming procedure and the conventional common support where propensity scores for the treated which are larger than the propensity scores for the control, are removed. After trimming we find the region of common support as follows: **MALE PART A (Before)** The region of common support is [.39444346, .99985169] **MALE PART B (After)** The region of common support is [.03045031, .6352186] **FEMALE PART A (Before)** The region of common support is [.43970871, .88851767] **FEMALE PART B (after)** The region of common support is [.01494899, .09509333]	Pages 9, 10