



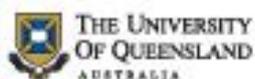
The Returns to Mature-Age Education in Australia

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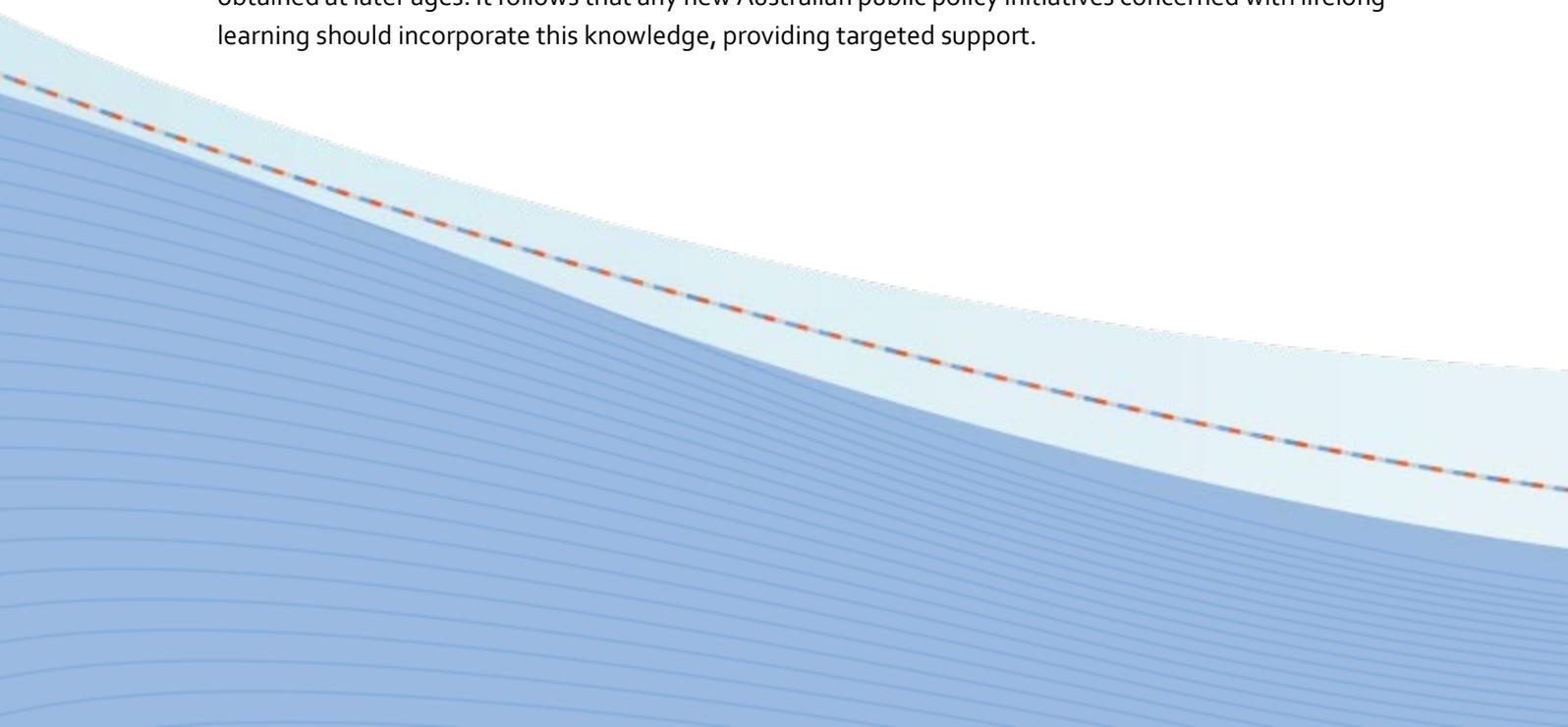


NON-TECHNICAL SUMMARY

In countries such as Australia education is becoming a lifelong endeavour, with many Australian men and women returning to education to upgrade their skills as a means to change employers, strengthen their claims for a promotion within their current employer, or move from inactivity or unemployment into paid employment. According to the Australian Bureau of Statistics, over one million people aged 25-64 years were enrolled in a formal programme of study in 2016. In 2014, Australia had the 2nd highest rate of participation in tertiary education for people aged 30-64 amongst OECD countries, and the highest for post-secondary non-tertiary education for people aged 25-64. Given this, it is important to understand whether and how returning to education at older ages relates to social and economic gains in Australia. We do so by comparing the earnings and occupational status of mature-age individuals (ages 24-63) before and after they acquire a new educational qualification using 15 years of Australian longitudinal data.

We find that mature-age educational upgrading is quite common in Australia, with about 11% of women and 8% of men attaining a new, higher-order educational qualification over the 15-year observation period. The most common transitions involve moving from less than year 12 education to having a professional qualification, from an undergraduate to a postgraduate degree, and from year 12 education to professional qualifications. On average, the attainment of a qualification between ages 24-63 is associated with wage increases of 9.4% (~AU\$3.40) amongst men and 6.5% (~AU\$2.07) amongst women, and occupational status increases of 4.6 amongst men and 4.8 units amongst women. We also find substantial differences in the returns of different educational transitions, that qualifications obtained at younger ages yield higher pay offs, and that men's but not women's wage trajectories become steeper after mature-age educational upgrading.

These findings carry significant implications for Australian education policy and practice. Australia spends comparatively little in education and its institutional support for lifelong learning has historically lagged behind. However, a recent Government review of the Australian income-support system emphasises the importance of continued skill development and the need to invest in lifelong learning. Our findings suggest that policy interventions aimed at encouraging and supporting the upskilling of the older workforce would result in improved labour market outcomes amongst mature-age learners. However, they also provide a cautionary message: different educational options are associated with highly different labour market returns and credentials obtained at younger ages matter more than those obtained at later ages. It follows that any new Australian public policy initiatives concerned with lifelong learning should incorporate this knowledge, providing targeted support.



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Abstract

Using 15 years of Australian panel data and fixed-effect panel regression models, we examine the prevalence of and labour market returns to different types of educational upgrading between ages 24-63, paying attention to differences by gender, time since attainment and age at attainment. Mature-age qualification upgrading is associated with increases in earnings and occupational status, with substantial heterogeneity across different types of educational transitions and only weak evidence of gender differences. Qualifications obtained at younger ages yield better pay offs, and time since qualification attainment is associated with faster wage progression amongst men. These findings suggest that policies aimed at upskilling the mature-age workforce would be beneficial.

Keywords: adult education; lifelong learning; occupational status; wages; Australia

1. Background

As advanced economies restructured from industrial to post-industrial, the associated contraction of the manufacturing sector, growth in the service sector and rapid technological change encouraged many adults to return to education to improve their skills and upgrade their qualifications. Additionally, socio-economic and demographic processes which have become more prevalent in recent years also served as push factors for mature-age workers to return to education, including changes in family circumstances (e.g. separation or divorce), residential relocation and retrenchment (Blanden, Buscha, Sturgis, and Urwin, 2012). As a result, adults now accept the need to acquire post-school qualifications and expect to engage in further study. In countries such as Australia education is thus becoming a lifelong endeavour, with a sizeable proportion of adults being enrolled in an educational course. Australian men and women return to education to upgrade their skills as a means to change employers, strengthen their claims for a promotion within their current employer, or move from inactivity or unemployment into paid employment (Coelli, Tabasso, and Zakirova, 2012). According to the Australian Bureau of Statistics (ABS), over one million people aged 25 to 64 years were enrolled in a formal programme of study in 2016 (ABS, 2016). In 2014, Australia had the second highest rate of participation in tertiary education among OECD countries for individuals aged 30-64, and the highest rate of participation in post-secondary non-tertiary education for individuals aged 25-64 (OECD, 2016).

Given this, it is important to understand whether and how returning to education to upgrade one's qualifications is associated with social and economic mobility, with Australia constituting an interesting case study given its large share of mature-age learners. Nevertheless, while there is growing evidence of rising rates of individuals returning to education late in life (ABS, 2016; OECD, 2016) and emerging research on the reasons behind this decision (Boudard and Rubenson, 2003; Jenkins, Vignoles, Wolf, and Galindo-Rueda, 2003; Jamieson, 2007; Ronnie, 2015), we know relatively little about how obtaining a new qualification during mature age enhances labour market outcomes. A small but growing body of international studies, most of which come from the UK, points to some gains in labour market outcomes for mature-age graduates –including better employment prospects and higher wages (see e.g. Blanden et al., 2012; Chesters, 2015; Dorsett, Lui, and Weale, 2016). In this paper, we examine how educational upgrading during mature age (defined as gaining a new, higher-order qualification between the ages of 24 and 63) is associated with changes in social and economic standing in contemporary Australia. While we acknowledge that the concept of lifelong learning is broader

than the attainment of new qualifications during mature age (e.g. it includes non-certifiable knowledge and skills) (Field, 2006), for ease of narrative in this paper we use the terms interchangeably. We use 15 years of panel data from the Household Income and Labour Dynamics in Australia (HILDA) Survey and fixed-effect panel regression models to compare the earnings and occupational status of mature-age individuals before and after they acquire a new educational qualification. We contribute to the available literature in several ways: we focus on the Australian case, we consider occupational status as an outcome of interest in addition to wages, we analyse a range of educational transitions using long-running panel data, and we explore how age at attainment and time since attainment are associated with labour market outcomes.

2. The labour market returns to mature-age education

As posed by human capital theory (Becker, 1993), education and training are important investments and enable the acquisition of skills and abilities that improve workers' productivity in the labour market. This translates into better labour market outcomes, including lower unemployment rates, better jobs and higher wages, for those with the highest qualifications. In addition, educational qualifications also serve as a marker of more general individual attributes that are sought after by employers, such as motivation, perseverance and commitment, as suggested by signalling theory (Spence, 1973). The process of hiring employees is risky for employers due to the inherent difficulty in observing ability, and educational qualifications are taken as a signal of unobserved competencies (Brown, 2001). Consistent with these theoretical propositions, a long-standing body of evidence documents important labour market returns to education (see Harmon, Oosterbeek, and Walker, 2003; Machin, 2006; Peracchi, 2006 or Dickson and Harmon, 2011).

Studies focusing more specifically on the returns to education amongst mature-age students are however scarcer, with most of the available evidence coming from the UK. In a seminal study, Jenkins et al. (2003) examined the labour market effects of lifelong learning between the ages of 33 and 42 using data from the 1991 and 2003 sweeps of the British National Child Development Study (NCDS) and first-difference models. Their findings indicated that participating in lifelong learning increases men's and women's likelihood of being employed, but not their wages. Using data from the British Household Panel Survey (BHPS) covering the period 1991-2006 and fixed-effect models, Blanden et al. (2012) found evidence of wage

increases following from adult education (at age 30 years or later). For women, the effect was found to be causal, but for men it was found to emerge due to selection into adult learning. Using also BHPS data (1991-2007) and focusing on men age 25 to 60 years, Dorsett et al. (2016) found that gaining a higher-order qualification (but not a same-level qualification) leads to wage increases, more so if qualifications are obtained at a younger age. There is also some UK evidence that, compared to younger graduates, mature-age graduates are more likely to work part-time and in non-graduate jobs (Purcell, Wilton, and Elias, 2007), less likely to work in professional or managerial occupations (Egerton, 2000), and more likely to work for the same employer pre- and post-graduation (Woodfield, 2011). The latter suggests that mature-age graduates seek to formalize their existing skills to improve their promotion prospects. The UK literature also suggests that age at graduation is a determinant of subsequent earnings, with older graduates earning less than younger graduates after graduation (Egerton, 2000; Egerton and Parry 2001; Purcell et al., 2007).

Research on the labour market returns to lifelong learning for other countries is scarcer. In the US, Taniguchi (2005) examined the wage returns to tertiary education for older college graduates, using data from the National Longitudinal Survey of Youth (NLSY79) spanning from 1979 to 2000 and fixed-effect models. Students who were 25 years or older when they graduated received significantly lower wage premiums than younger graduates, and this penalty was more marked amongst male than female graduates. In Sweden, Hällsten (2012) used matched register data for the 1981-2007 period and fixed-effect models to investigate the economic returns to higher education qualifications obtained by mature-age students (age 30 or older). He found that degrees obtained in later life help increase both employment and earnings, particularly amongst women. Results from this international literature also indicate that the labour market returns to lifelong learning are cumulative and realise with time since qualification attainment (Taniguchi, 2005; Blanden et al., 2012; Hällsten, 2012). In addition, recent research by Vono de Vilhena and colleagues (2012, 2016) concludes that mature-age education increases the chances of being employed and securing non-precarious employment in the UK, Spain, Sweden and Russia.

In Australia, there is robust evidence on the overall returns to education, which are –as in other countries– quite marked. For example, Leigh and Ryan (2005) estimated that earnings of workers in Australia increase by 8-12% with each additional year of education, while Leigh (2008) showed that the hourly wages of workers with no post-school qualifications are 13% lower than those of workers holding a diploma, 30% lower than those of workers with

undergraduate degrees, and 40% lower than those of workers with postgraduate degrees. However, unlike in other developed countries such as the US, the earnings premium to education has remained fairly stable for the past three decades (Coelli and Wilkins, 2009). Australian research on the returns to education focusing specifically on mature-age students is lacking. Findings from a report to the National Vocational Education and Training Research Program suggest that achieving a higher-order qualification during mature age is associated with increased job satisfaction and earnings and decreasing weekly work hours amongst men, and an increase in the likelihood of being employed and higher satisfaction with work opportunities amongst women (Coelli et al., 2012). Chesters and Watson (2014) found that the earnings of mature-age graduates are higher than those of younger graduates in the first two years after graduation, but differences disappeared by the third year after graduation. More recently, Chesters (2015) reported increases in occupational prestige associated with obtaining an undergraduate degree at age 25 or older (which were more pronounced amongst women), and wage increases after completing a postgraduate degree (which were larger amongst men).

As it can be inferred from this brief review, much of the literature on the returns to mature-age education has examined educational upgrading involving tertiary education, whereas other types of educational transitions have been explored less. In addition, most studies have examined earnings and/or employment, but have not considered other markers of labour market success, such as occupational status. Furthermore, only a few studies have probed into the role of time, e.g. by considering age at attainment or wage trajectories. In what pertains to the Australian context, there is particularly little research on these issues, and most of what is available relies on cross-sectional data and/or methods. This neglects more powerful approaches that exploit longitudinal data to examine within-individual changes in outcomes for mature-age graduates before and after the attainment of a new qualification. We add to the literature by estimating the impacts of different types of educational upgrading on the hourly wages and occupational status of Australian mature-age workers, exploiting the properties of a high-quality, large-scale panel dataset to estimate within-individual fixed-effect models that account for person-specific unobserved effects, and delving further into the roles of age at attainment and time elapsed. Given the rapid increase and high prevalence of mature-age education in Australia, this is an important opportunity to gain further insights into the role of late-in-life education in enabling social and economic mobility.

3. Dataset, sample and variables

We use 15 waves of panel data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. This is an annual household panel survey covering the period 2001-2015 that contains rich information from a sample of Australian individuals age 15 and older. The initial HILDA Survey sample is representative of the Australian population, with the exception of individuals living in remote areas and the institutionalized population. The data are collected using a complex, multi-stage sampling strategy and a mixture of self-complete questionnaires and computer-assisted face-to-face interviews. The different HILDA Survey waves have sample sizes ranging from 12,408-17,612, with remarkably low attrition rates (Summerfield et al. 2014). For further details on the study properties, see Watson and Wooden (2012) and Summerfield et al. (2014).

The HILDA Survey is particularly useful for our purposes for three reasons: (i) it contains rich longitudinal data on educational qualifications, occupation and earnings and other relevant contextual factors; (ii) it collects information from a large number of individuals, which enables us to identify a subpopulation of adults who obtain further qualifications that is sufficiently large to perform robust analyses; and (iii) its panel structure allows us to compare the labour market outcomes of the same individuals before and after they obtain a new qualification, and examine how these evolve over time after the receipt of such qualification. Because our focus is on the adult population, we draw a subsample of individuals with ages comprised between 24 and 63 (inclusive) without missing information on key variables.

We are interested in the impact of receiving a new qualification on two indicators of labour market performance. The first outcome is hourly wages from the current main job, adjusted to 2015 prices using the Consumer Price Index and transformed using their natural logarithm to correct for skewness. The second outcome of interest is occupational status, captured by the AUSEI-06 classification (McMillan, Beavis, and Jones, 2009). This classification is based upon the approach used to develop the International Socio-Economic Index (ISEI) and its scores range from 0 (lowest occupational status) to 100 (highest occupational status). Our analytical sample for the occupational status models comprises 44,466 observations from 7,094 women and 48,610 observations from 7,319 men. In models in which the dependent variable is the log of hourly wages sample sizes are smaller due to missing data on earnings: 35,971 observations from 6,638 women and 38,133 observations from 6,781 men.

Our key interest is on the impacts of educational transitions, which we measure in several ways. First, we construct dummy variables for the highest education level achieved at the time of interview. The different categories denote individuals whose highest level of education is a postgraduate university qualification (i.e. a graduate diploma, graduate certificate, Masters degree or doctorate), an undergraduate university qualification (i.e. a bachelors or honours degree), a professional qualification (i.e. an advanced diploma, diploma or certificate), school year 12 and lower than school year 12. Second, we construct a dummy variable to capture the attainment of a new, higher-order qualification. This takes the value 1 for all person-year observations after an individual has been observed to receive a new, higher-order qualification, and the value 0 otherwise.¹ A new qualification is considered to be a higher-order qualification if it falls into a higher educational level, i.e. postgraduate degree > undergraduate degree > professional qualification > year 12 > lower than year 12. Third, we disaggregate the latter variable and identify an exhaustive set of educational transitions based on the qualifications of ‘origin’ and ‘destination’ (e.g. from an undergraduate to a postgraduate degree, from a professional qualification to an undergraduate degree, from year 12 to an undergraduate degree, etc.).

In our regression models we control for an encompassing set of potential confounders similar to that used in previous studies in the field. Control variables include age and its square, years in paid work, weekly work hours in the current main job, marital status, number of children, state of residence, remoteness of place of residence and the regional unemployment rate. Categories, means and standard deviations for all variables can be found in Table A1 in the Appendix.

4. Estimation method

Our interest is on the impact of obtaining a new qualification during mature age on wages and occupational status in Australia. This means that, unlike studies devoted to comparing the labour market outcomes of individuals with different educational qualifications or years in the education system, our focus is on within-individual changes. Thus, as others before us, we fit fixed-effect panel regression models. These compare labour market outcomes for the same

¹ For simplicity, we exclude individuals who obtain more than one qualification over the observation period. In sensitivity analyses, we included these individuals in the regression models, considering their earnings and occupational status before they obtained the first new qualification and after they obtained the last new qualification. The pattern of results did not change.

individuals before and after they obtain a new qualification during mature age, instead of comparing across individuals with different educational levels. Let a simple model for panel data be:

$$Y_{it} = X_{it}\beta + e_{it} + u_i \quad (1)$$

where the i and t subscripts denote individual and time respectively; Y is the outcome variable of interest (i.e. logged hourly wages or occupational status); X is a vector of time-changing explanatory variables including education; β is a vector of coefficients to be estimated; e is the usual stochastic error term in regression (i.e. ‘luck’); and u represents person-specific time-constant unobserved heterogeneity. The within-group fixed-effect regression model for panel data is estimated by taking deviations from the person-specific means of the outcome and explanatory variables over time:

$$Y_{it} - \bar{Y}_i = (X_{it} - \bar{X}_i)\beta + (e_{it} - \bar{e}_i) \quad (2)$$

By doing this, fixed-effect regression effectively models changes over time in the dependent and independent variables. Effectively, in this type of regression individuals act as their own statistical controls (Allison, 2009). Because it is time-constant, the error term u drops from the above equation. Thus, by mean-differencing, fixed-effect models produce estimates of the effect of explanatory variables on the outcome variable that are “*not contaminated with spurious effects of any stable, unmeasured individual characteristics’ such as ‘cohort, socioeconomic background [...] unchanging aspects of intelligence, preferences resulting from early socialisation, life cycle plans, and unmeasured human capital’*” (England et al., 1988, 548 cited in Perales, 2013). While the impact of time-constant factors (e.g. gender, ethnicity or socio-economic background) cannot be directly retrieved in fixed-effect models, these factors are controlled for ‘by design’ (Allison, 2009). Because the predictors of labour market outcomes often differ by gender, we fit gender-specific models.

5. The returns to mature-age education in Australia

5.1 Descriptive analyses

We begin by showing the gender-specific distribution of education variables (Table 1). About a third of individuals aged 24-63 in Australia have a university degree and about one-fifth have educational qualifications lower than year 12. The typical finding in developed countries that women have surpassed men at university is also apparent in these data: in 35.7% of the women's person-year observations the level of education recorded was an undergraduate or postgraduate degree, compared to 28% for men. Women are also overrepresented amongst the very lowly educated: in 22.6% of their person-years observations their education level is less than year 12, compared to 18.9% for men. Professional qualifications are more typical amongst men (41.3%) than women (28.7%).

In our sample of individuals aged 24-63 years, more women (n=822) than men (n=562) attain a new, higher-order qualification over the 15-year observation window, with some educational transitions being more prevalent than others. The most common transitions involve attaining a professional qualification from having lower than year 12 education (n=388), a postgraduate degree whilst holding an undergraduate degree (n=370), or a professional qualification from year 12 education (n=320). In contrast, transitioning from having year 12 education to a postgraduate degree (n=40), or from having less than year 12 to year 12 education (n=6), an undergraduate degree (n=16) or postgraduate degree (n=8) is rare. The distribution of educational transitions is similar for men and women. The most visible differences are that a greater share of women than men with year 12 or less than year 12 education attain a professional qualification, and that a greater share of women than men with undergraduate degrees attain postgraduate degrees.

Table 2 shows mean hourly wages and occupational status for the 822 women and 562 men who are observed to upskill during mature age, across all of their observations before and after attaining their new qualification. When women have not yet achieved the new qualification, their mean wage is AU\$27.68 and their mean occupational status is 51.94. After attaining the new qualification, these increase by AU\$3.83 and 6.11 units, respectively. The pattern of results is similar for men. Before upskilling, men's mean wage and occupational status are AU\$32.50 and 51.03 respectively, and these increase by AU\$8.48 and 8.19 units after attainment of the new qualification. Hence, changes in earnings and occupational status before and after individuals obtain a new qualification are both substantial and seemingly stronger

amongst men. However, this evidence is hardly sufficient to be certain that these differences are due to the attainment of a new qualification. The observed changes might as well be due to individuals being older and more experienced after upskilling, to other observable factors which change together with educational transitions, or to unobserved differences between those who upskill and those who do not. More robust evidence requires multivariate models which account for these and other confounding factors, as those we discuss in the next section.

5.2 Regression models of hourly wages

Table 3 presents the results of fixed-effect panel regression models of the log of hourly wages for our sample of men and women aged 24-63 years.² In these models, a within-individual one-unit increase in the estimated coefficient on an explanatory variable is associated with a within-individual percentage change of $(e^{\beta} - 1) * 100$ in the outcome variable, *ceteris paribus*. For simplicity and following the literature, we use percentage approximations of $\beta * 100$ instead.

Columns 1 (women) and 4 (men) show the results of models in which education enters as a set of dummy variables capturing their education level. Because we fit fixed-effect models, the coefficients on these dummies implicitly relate to within-individual changes in educational level. When women's highest qualification is an undergraduate or postgraduate educational qualification their wages increase by 16.2% and 23.6% respectively, relative to when their education level is less than year 12. The wage returns to professional (4.5%) and year 12 qualifications (5.3%) amongst women are smaller, though statistically significant. Amongst men, relative to when their education level is less than year 12, wages increase by 17.6% with postgraduate degrees, by 7.7% with undergraduate degrees, and by 5% with professional qualifications. They do not change significantly with the attainment of year 12 qualifications. Results from Wald tests reveal that the coefficients on undergraduate degrees and year 12 education are larger for women than men, though differences are substantively small and only marginally significant.

While dummy variables are a typical way to specify education in wage regressions, this limits comparisons to a reference category in which not all individuals in the sample are ever observed (in this case, less than year 12 education). An alternative way to specify education is in terms of transitions. Columns 2 (women) and 5 (men) show results from models of logged hourly

² The estimated coefficients on the control variables for a selection of models are available in Table A2. These are largely consistent with previous literature and will not be discussed further.

wages in which education is specified as a dummy variable capturing the attainment of *any* new, higher-order qualification. The new variable is related to wage increases of around 6.5% for women and 9.5% for men, with the difference being marginally significant in a Wald test. However, these results may mask variation across different types of educational transitions during mature age. Columns 3 (women) and 6 (men) show the results of models in which educational transitions are further disaggregated by origin and destination, and portray a picture of heterogeneity.³ Substantial wage gains are associated with moves from undergraduate to postgraduate degrees (14.6% for men and 10% for women), from year 12 qualifications to undergraduate degrees (22.7% for men and 17.5% for women), and from professional qualifications to undergraduate degrees (10% for men and 15.3% for women). Moving from year 12 to professional qualifications has modest effects on the wages of both men (5.9%) and women (3.9%). Transitions from year 12 to professional qualifications only lead to wage gains amongst men (6.2%), whereas transitions from professional qualifications to postgraduate degrees only lead to wage gains amongst women (12%). Wald tests reveal that differences in the coefficients in the male and female equations are generally statistically insignificant. As an exception, there is some weak evidence that transitions from year 12 to professional qualifications yield greater wage returns for men than women.

5.3 Regression models of occupational status

Table 4 presents the results of fixed-effect regression models for our sample of individuals aged 24-63 years in which occupational status is the outcome variable. Here, the estimated coefficients on the explanatory variables give the raw change in occupational status associated with a within-individual one-unit increase in the explanatory variable, *ceteris paribus*. Results in columns 1 (women) and 4 (men) indicate that education is highly related to occupational status. Women work in occupations which have substantially higher status (13.4-15.3 units) when they have university qualifications relative to when their education level is less than year 12. Similarly, the occupational status returns to university education for men are between 12.9 and 13.1 units. For the most part, Wald tests reveal little evidence of gender differences in these effects.

³ Variables capturing transitions experienced by very few individuals are included in the models, but their results are not shown in the tables.

The models for the single educational transition variable in columns 2 (women) and 5 (men) indicate that the average effect of educational upgrading on occupational status is 4.8 units amongst women and 4.6 units amongst men, with the gender difference not being statistically different from zero. Results for specific educational transitions in columns 3 (women) and 6 (men) offer additional insights. Both men and women increase their occupational status with all upward educational transitions. The magnitude of the effect is larger when moving from a professional qualification to an undergraduate degree (16.7 units for men and 19.1 units for women) and from year 12 education to an undergraduate degree (14.7 units for men and 15.8 units for women). There are only two statistically significant gender differences: moving from an undergraduate to a postgraduate degree yields greater occupational status returns for women, whereas moving from less than year 12 education to a professional qualification yields greater returns for men.

5.4 Age at attainment and time since attainment

Table 5 presents the results of additional specifications that provide further insights into the relationships between mature-age education and labour market outcomes. The first additional specification (columns 1, 3, 5 and 7) includes a variable capturing the number of years elapsed since individuals received the new qualification. Its associated coefficient captures whether labour market progression ‘speeds up’ after mature-age upskilling. In contrast, the coefficient on the variable ‘attaining any new higher-order qualification’ in these models captures immediate discontinuities in labour market returns associated with upskilling. This separation enables us to determine how the increase in the wages and occupational status of mature-age individuals occurs after educational upgrading. This could happen smoothly through steeper career progression or by means of a single ‘jump’ in outcomes upon receipt of the new qualification, or a combination of both.

We only observe strong evidence in favour of steeper career progression in the model of men’s wages, where the coefficient on the variable ‘years since qualification attained’ is positive and statistically significant. Men’s wages grow faster after mature-age upskilling, at a rate of one additional percentage point per year than prior to attaining the new the qualification. For women’s wages and men’s and women’s occupational status, there is little evidence of such a process. Across all the models, the coefficient on the variable capturing the attainment of the new qualification is positive, large and statistically significant, which provides evidence of

immediate increases in wages and occupational status following from mature-age educational upgrading. These estimates are represented visually in Figure 1, which shows predicted wages and occupational status for representative men and women who upgrade their qualifications at age 40. The graph clearly depicts the model findings described earlier: attaining a new qualification is associated with a comparatively steeper increase in men's wage profiles, whereas immediate pay rises are of a comparable magnitude for men and women. For occupational status, both men and women experience substantial increases of a similar magnitude following from upskilling, but the subsequent trends are not pronounced –despite the relevant coefficient being marginally significant for women.

The second additional specification in Table 5 (columns 2, 4, 6 and 8) includes an interaction term between attaining a new qualification and the age at which this was obtained. Its associated coefficient can be used to examine whether or not mature-age individuals benefit more from qualifications attained at earlier ages. Our results yield clear evidence in favour of this proposition for both earnings and occupational status, and for both men and women. The negative coefficients on the interaction terms indicate that the older an individual is when he/she obtains a new qualification, the lower the returns to the qualification will be. Selected predictions made using these models are shown in Figure 2. These indicate hourly wage returns of AU\$1.09 for women who attain a new qualification at age 30, AU\$1.06 for women who do so at age 45 and AU\$1.03 for those who do so at age 60. For men, the analogous figures are AU\$1.12, AU\$1.05 and AU\$0.99. The predictions for occupational status show a more marked age-at-attainment gradient. These indicate a return of 6.13 units for women who attain a new qualification at age 30, 4.5 units at age 45 and 2.87 units at age 60. For men, differences in the expected occupational status returns to a new qualification are 4.68 units at age 30, 3.57 units at age 45 and 2.45 units at age 60.

6. Discussion and conclusion

Education is now more than ever a lifelong endeavour and many mature-age Australians have returned to the education system in recent times to upgrade their qualifications. The benefits of doing so for their labour market prospects are however not well understood. In this study we have examined whether and how completing a new, higher-order educational qualification between age 24 and age 63 translates into movement into higher-status occupations and/or

improved earnings in contemporary Australia. To do so, we deployed fixed-effect panel regression models using a unique long-running Australian panel survey.

Our first set of findings concerning the prevalence of mature-age educational upgrading confirms that this is quite common in Australia, with about 10% of all mature-age individuals in our sample attaining a new, higher-order educational qualification over the 15-year observation period. This is higher than the rate of 4.5% reported by Blanden et al. (2012) for the UK, which is not unexpected given Australia's status as an outlier with regards to the incidence of lifelong learning (OECD, 2016). Concerning gender, our findings suggest that a greater share of women (11.4%) than men (7.7%) attain new qualifications during mature age. The most common transitions involve moving from less than year 12 education to having a professional qualification, from having an undergraduate to a postgraduate degree, and from having year 12 education to having a professional qualification. The rates across educational transitions are similar for men and women, though women with year 12 education or below are more likely than equivalent men to obtain a professional qualification, and women with year 12 education are more likely than men with equivalent credentials to obtain an undergraduate or postgraduate degree.

A second set of findings indicates that, in Australia, changes in earnings and occupational status accompanying the attainment of higher-order educational qualifications during mature age are substantial. On average, the attainment of one such qualification between the ages of 24 and 63 is associated with wage increases of 9.4% amongst men and 6.5% amongst women. Using the sample means, this is roughly equivalent to AU\$3.40 and AU\$2.07, respectively. The effect sizes are thus moderate, accounting for about 13% of the standard deviation in hourly wages amongst men, and 7% of it amongst women. Similarly, the attainment of new qualifications during mature age is on average related to occupational status increases of 4.6 and 4.8 units amongst men and women, respectively. The effect sizes are again large, and represent about 20% of the standard deviation in occupational status. Our estimates of the wage returns to mature-age education for Australia are consistent with those provided in recent international studies using similar methodologies, including the 10% rate reported by Blanden et al. (2012) for the UK and the 12% rate reported by Hällsten (2012) for Sweden. Concerning occupational status, there are fewer comparison points, as most studies have restricted their attention to employment and earnings. We generally find that, for both men and women, the occupational status returns to mature-age education in Australia mirror its wage returns –though they are more pronounced and more often statistically significant. Chesters (2015) also finds

occupational status returns to mature-age education in Australia but, unlike in our study, these are restricted to undergraduate and postgraduate degrees. The disparities may emerge because her study uses a cross-sectional methodology and two time points situated 10 years apart (2000 and 2010), and does not consider the qualification of origin.

Our results go beyond those of some of the previous studies in disaggregating the returns to different types of educational transitions, instead of focusing on a single type (e.g. attaining a degree). In this regard, we find substantial heterogeneity in the labour market returns of different types of educational transitions undertaken during mature age (as defined by the qualifications of origin and destination). For example, amongst women, there are no wage gains associated with moving from year 12 education to a professional qualification, while moving from that same origin into an undergraduate degree results in a wage return of 17.5%. Clearly, policymakers should recognise that different upskilling options bring about different labour market returns, and these nuances should be incorporated in initiatives aimed at promoting lifelong learning in Australia. Our analyses also provide an Australian comparison point on whether and how the returns to a new qualification attained during mature age vary by the age at attainment. In this respect, we find evidence that qualifications obtained at younger ages yield higher wage and occupational status pay offs for both men and women. This is consistent with international findings indicating that delaying graduation from tertiary education results in substantial reductions in the college wage premium (Taniguchi, 2005) and that wage growth occurs faster amongst early than late graduates (Klausen, 2016). The reasons, however, are less clear. Some argue that, from a life-course perspective, graduating at a later age gives less time for the benefits of educational upgrading to accumulate (Taniguchi, 2005). Others, however, stress that many older workers do not re-enter education to enhance their employment opportunities. Instead their motivations are more often driven by other perceived benefits, such as genuine rather than instrumental interest in the field of study, personal validation and education being part of personal active-ageing strategies (Jamieson, 2007).

The results summarised above reveal how the process of educational upgrading during mature age in the Australian context is to some extent gendered. First, women are more likely than men to engage in mature-age education, perhaps due to difficulties in completing their desired qualifications at younger ages due to childbearing and childrearing responsibilities (Craig, Perales, Vidal, and Baxter, 2016) or because they tend to work in occupations and industries that require regular updating of credentials, e.g. in education, health care or childcare (Taniguchi, 2005; Blanden et al., 2012). However, we find little evidence that the wage or

occupational status gains associated with mature-age educational upgrading differ significantly by gender once confounding factors are accounted for. The lack of defined gender differences in the returns to mature-age education in our Australian analyses contrasts with findings from studies in the UK (e.g. Blanden et al., 2012) and Sweden (Hällsten, 2012), which report greater wage gains through mature-age educational upgrading for women than men. However, similar to these studies, we find that men's but not women's wage trajectories become steeper after mature-age educational attainment. Since men are less likely to engage in mature-age education, this may suggest that those men who do so strategically choose qualifications which boost their subsequent wage growth.

There are however some limitations to our research which must be acknowledged. First, our data are observational, and so we cannot establish whether the observed associations are causal. While our fixed-effect models are more robust than cross-sectional approaches by virtue of controlling for stable unmeasured aspects (such as socialization, preferences, motivation or ability), we cannot rule out the possibility that those mature-age individuals who expect their prospects to improve by gaining a new qualification 'select into' mature-age education. Hence, our estimates should not be interpreted as causal, and (pseudo)experimental approaches should be considered to test causality in the Australian context. Second, there is substantial heterogeneity in the returns to educational qualifications (particularly university qualifications) by field of study (Daly, Lewis, Corliss, and Heaslip, 2015), and this is something we cannot capture in our data. Future research may thus pay attention to how the returns to mature-age education differ not only by the level of the new qualification, but also by its field. Third, our analyses are restricted to wages and occupational status, and ignore other potential economic and social benefits of mature-age education, such as job security, life satisfaction, mental health and the maintenance of cognitive functioning amongst older adults (McMahon, 1997; Hammond, 2004; Coelli et al., 2012). Estimating how mature-age education is associated with these and other social and health outcomes is an important avenue for further research.

Despite these limitations, our findings carry significant implications for Australian education policy and practice. The value of lifelong learning is now well integrated in the government agenda in countries such as the UK (UK Government Office for Science, 2016) and the Nordic countries (Tuijnman, 2003), and ranks high in the education-related priorities of international organizations such as the OECD (OECD, 2014). Despite the large influx of mature-age students in recent years, Australia spends comparatively little in education and its institutional support for lifelong learning has historically lagged behind (Watson, 2004; McIntyre, 2012). However,

a recent Government review of the Australian income-support system emphasises the importance of continued skill development in enhancing productivity and global competitiveness, and the need to invest in lifelong learning (Australian Government Department of Social Services, 2015). Our findings that the attainment of educational qualifications during mature age results in wage and status increases for Australian workers suggest that policy interventions aimed at encouraging and supporting the upskilling of the older workforce would indeed result in improved labour market outcomes amongst mature-age learners. However, our findings also provide a cautionary message: different educational options are associated with highly different labour market returns and credentials obtained at younger ages matter more than those obtained at later ages. It follows that any new Australian public policy initiatives concerned with lifelong learning should incorporate this knowledge, providing targeted support. To conclude, the number of mature-age students in post-industrial economies is expected to keep growing in the short- and middle-term, and therefore it is imperative that we continue building a stock of knowledge on the outcomes of mature-age students, and the factors that ensure that their engagement with the education system is successful in lifting their economic and social prospects.

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Tables and figures

Table 1. Gender-specific distributions of education variables

	Women			Men		
	<i>(n_{ind}=7,094; n_{obs}=44,466)</i>			<i>(n_{ind}=7,319; n_{obs}=48,610)</i>		
	% obs.	% ind.	Events	% obs.	% ind.	Events
<u>Education level</u>						
University postgraduate degree	15.3%			12.1%		
University undergraduate degree	20.4%			15.9%		
Professional qualification	28.7%			41.3%		
Year 12 education	13.0%			11.7%		
Less than year 12 education	22.6%			18.9%		
<u>Attained any new higher-order qualification</u>		11.4%	822		7.7%	562
<u>Educational transitions</u>						
University undergraduate to University postgraduate		2.9%	207		2.2%	163
Professional to University undergraduate		0.8%	57		0.5%	38
Year 12 to Professional		2.8%	196		1.7%	124
Less than year 12 to Year 12		<0.1%	3		<0.1%	3
Professional to University postgraduate		0.4%	28		0.4%	29
Year 12 to University undergraduate		0.6%	44		0.5%	40
Less than year 12 to Professional		3.5%	249		1.9%	139
Year 12 to University postgraduate		0.4%	26		0.2%	14
Less than year 12 to University undergraduate		0.1%	9		0.1%	7
Less than year 12 to University postgraduate		<0.1%	3		0.1%	5

Notes: HILDA Survey, 2001-2015. Individuals aged 24-63 years. Obs. = person-year observations. Ind. = Individuals.

Table 2. Mean hourly wages and occupational status before and after attaining a new qualification

	Women			Men		
	Before	After	Difference	Before	After	Difference
Hourly wages	27.68	31.51	+3.83	32.50	40.98	+8.48
Occupational status	51.94	58.05	+6.11	51.03	59.22	+8.19

Notes: HILDA Survey, 2001-2015. Individuals aged 24-63 years.

Table 3. Fixed-effect panel regression models of log hourly wages

	1	Women 2	3	4	Men 5	6	Wald test (<i>p</i> -value)
<u>Education level</u> (<i>ref. less than year 12 education</i>)							
University postgraduate degree	0.236***			0.176***			
University undergraduate degree	0.162***			0.077*			(*)
Professional qualification	0.045*			0.050*			
Year 12 education	0.053*			-0.015			(*)
<u>Attained any new higher-order qualification</u>		0.065***			0.094***		(*)
<u>Educational transitions</u>							
University undergraduate to University postgraduate			0.100***			0.146***	
Professional to University undergraduate			0.153***			0.180***	
Year 12 to Professional			-0.002			0.062*	(*)
Professional to University postgraduate			0.120*			0.014	
Year 12 to University undergraduate			0.175**			0.227***	
Less than year 12 to Professional			0.039*			0.059**	
n (observations)	35,971	35,971	35,971	38,133	38,133	38,133	
n (individuals)	6,638	6,638	6,638	6,781	6,781	6,781	
R ² (within)	0.115	0.114	0.115	0.123	0.123	0.124	

Notes: HILDA Survey, 2001-2015. Individuals aged 24-63 years. Models also control for age and its square, total years in paid work, weekly work hours in the current main job, marital status, number of children, remoteness of place of residence, regional unemployment rate and state of residence. Models 3 and 6 also control for the remaining unusual educational transitions. Wald tests compare the coefficients in the models for men and women. Significance levels: (*) $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 4. Fixed-effect panel regression models of occupational status

	Women				Men		Wald test
	1	2	3	4	5	6	(p-value)
<u>Education level</u> (ref. less than year 12 education)							
University postgraduate degree	15.3***			13.1***			
University undergraduate degree	13.4***			12.9***			
Professional qualification	1.9***			3.4***			(*)
Year 12 education	-0.6			0.6			
<u>Attained any new higher-order qualification</u>		4.8***			4.6***		
<u>Educational transitions</u>							
University undergraduate to University postgraduate			4.3***			2.0*	**
Professional to University undergraduate			19.1***			16.7***	
Year 12 to Professional			3.3***			3.5***	
Professional to University postgraduate			5.1***			6.6***	
Year 12 to University undergraduate			15.8***			14.7***	
Less than year 12 to Professional			3.3***			3.6***	(*)
n (observations)	44,466	44,466	44,466	48,610	48,610	48,610	
n (individuals)	7,094	7,094	7,094	7,319	7,319	7,319	
R ² (within)	0.02	0.03	0.03	0.01	0.02	0.02	

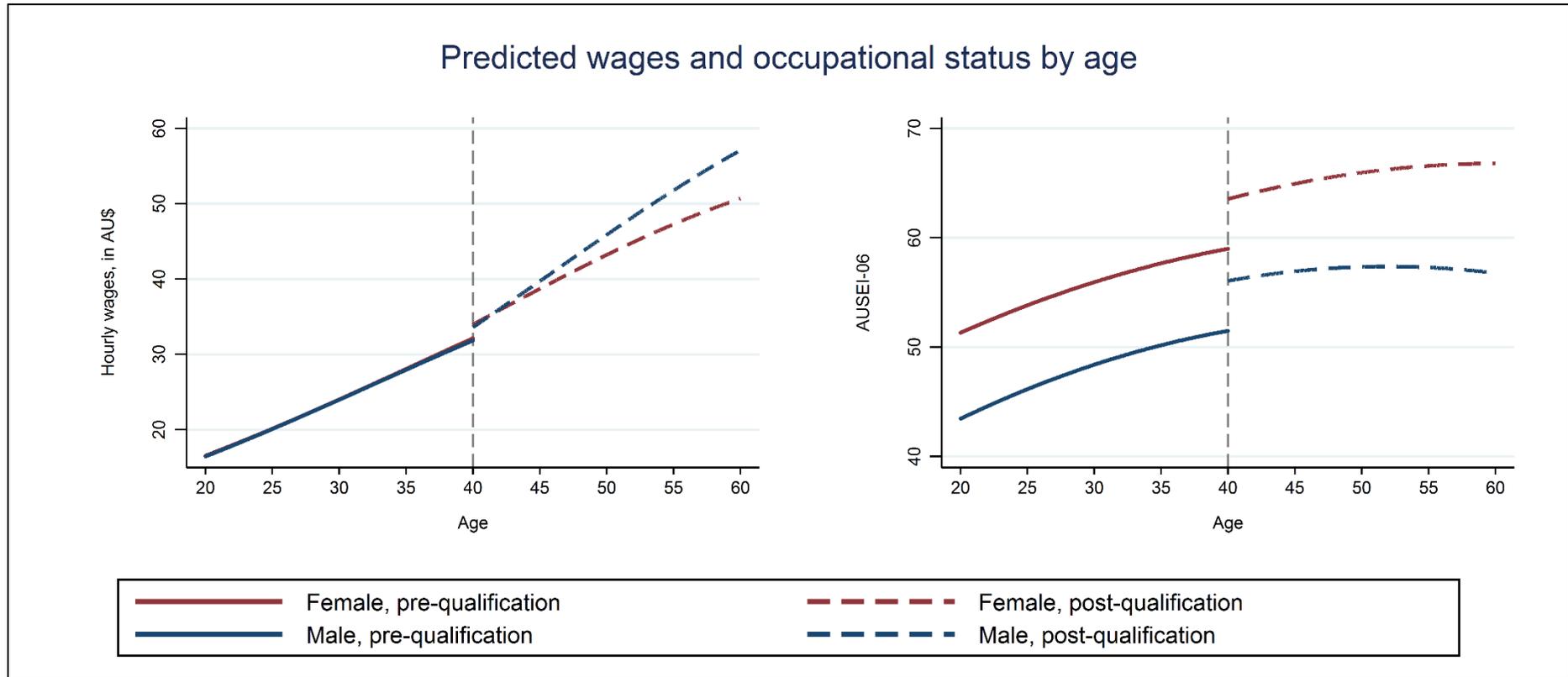
Notes: HILDA Survey, 2001-2015. Individuals aged 24-63 years. Models also control for age and its square, total years in paid work, weekly work hours in the current main job, marital status, number of children, remoteness of place of residence, regional unemployment rate and state of residence. Models 3 and 6 also control for the remaining unusual educational transitions. Wald tests compare the coefficients in the models for men and women. Significance levels: (*) $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 5. Fixed-effect panel regression models of log hourly wages and occupational status, alternative specifications

	Hourly wages				Occupational status			
	Women		Men		Women		Men	
	1	2	3	4	5	6	7	8
Attained any new higher-order qualification	0.056***	0.120*	0.054***	0.258***	4.542***	7.566***	4.573***	7.404***
Years since qualification attained	0.003		0.012***		0.094 ^(*)		0.004	
Attained any new higher-order qualification * Age attained		-0.001		-0.004**		-0.066 ^(*)		-0.074
n (observations)	35,971	35,971	38,133	38,133	44,466	44,466	48,610	48,610
n (individuals)	6,638	6,638	6,781	6,781	7,094	7,094	7,319	7,319
R ² (within)	0.114	0.114	0.124	0.123	0.024	0.024	0.014	0.014

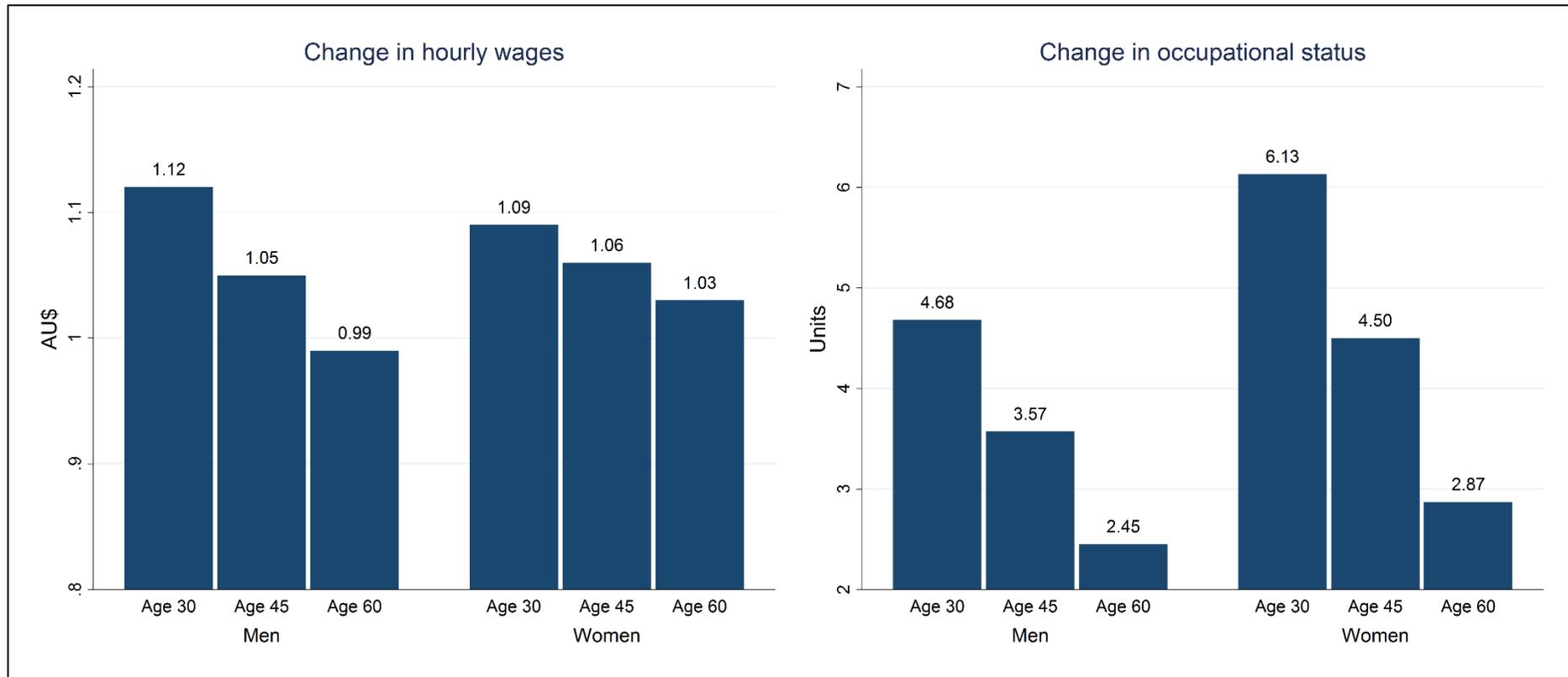
Notes: HILDA Survey, 2001-2015. Individuals aged 24-63 years. Models also control for age and its square, years in paid work, weekly work hours in the current main job, marital status, number of children, remoteness of place of residence, regional unemployment rate and state of residence. Significance levels: ^(*) $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Figure 1. Predicted hourly wages



Notes: HILDA Survey, 2001-2015. Individuals aged 24-63 years. Uses estimates from models in Columns 1, 3, 5 and 7 in Table 5. Predictions are made using hypothetical individuals who are single, live in an urban area in New South Wales in 2002 and have scores in the remaining variables that are equal to their gender-specific sample means.

Figure 2. Predicted change in hourly wages and occupational status after obtaining a new qualification



Notes: HILDA Survey, 2001-2015. Individuals aged 24-63 years. Uses estimates from models in Columns 2, 4, 6 and 8 in Table 5. Predictions are made using hypothetical individuals who are single, live in an urban area in New South Wales in 2002 and have scores in the remaining variables that are equal to their gender-specific sample means.

Appendix

Table A1. Means and standard deviations for model variables

	Women		Men	
	Mean/%	SD	Mean/%	SD
Occupational status	54.85	22.74	49.95	23.98
Hourly wages	31.82	31.40	36.22	26.94
<i>Education level</i>				
University postgraduate degree	15%		12%	
University undergraduate degree	20%		16%	
Professional qualification	29%		41%	
Year 12 education	13%		12%	
Less than year 12 education	23%		19%	
Age, in years	42.74		42.69	
Total years in paid work	20.39	10.07	23.83	11.09
Weekly work hours	32.29	14.48	44.0	13.37
<i>Marital status</i>				
Single	13%		14%	
Partnered	74%		78%	
Divorced, separated or widowed	14%		8%	
Number of children	1.71	1.35	1.68	1.41
<i>Area of residence</i>				
Urban	45%		46%	
Regional	34%		34%	
Remote or very remote	2%		2%	
Regional unemployment rate	5.2	1.04	5.2	1.04
<i>State of residence</i>				
New South Wales	30%		29%	
Victoria	26%		25%	
Queensland	21%		21%	
Southern Australia	9%		9%	
Western Australia	9%		10%	
Tasmania	3%		3%	
Northern Territory	1%		1%	
Australian Capital Territory	2%		2%	
n (observations)	44,466		48,610	
n (individuals)	7,094		7,319	

Notes: HILDA Survey, 2001-2015. Individuals aged 24-63 years. Based on the sample for models of occupational status.

Table A2. Full fixed-effect panel regression models of log hourly wages and occupational status

	Log hourly wages		Occupational status	
	Women	Men	Women	Men
<u>Education level</u> (<i>ref. less than year 12 education</i>)				
University postgraduate degree	0.236***	0.176***	15.275***	13.117***
University undergraduate degree	0.162***	0.077*	13.368***	12.915***
Professional qualification	0.045*	0.050*	1.888***	3.370***
Year 12 education	0.053*	-0.015	-0.556	0.589
Age	0.030***	0.017**	0.224(*)	-0.031
Age ²	-0.000***	-0.000***	-0.008***	-0.010***
Total years in paid work	0.028***	0.046***	0.651***	1.019***
Weekly work hours	-0.009***	-0.008***	0.085***	0.056***
Marital status (<i>ref. Single</i>)				
Partnered	0.012	0.038***	-0.944**	0.375
Divorced, separated or widowed	0.001	0.053***	-1.541**	0.459
Number of children	-0.051***	0.004	-0.527**	-0.114
Area of residence (<i>ref. Urban</i>)				
Regional	-0.049***	-0.027**	-1.706***	-0.444
Remote or very remote	0.016	-0.001	1.787*	-1.413(*)
Regional unemployment rate (%)	-0.006**	-0.008***	-0.006	-0.104(*)
State of residence (<i>ref. New South Wales</i>)				
Victoria	-0.042(*)	0.008	1.211(*)	0.150
Queensland	-0.063**	-0.029	-1.345*	-0.743
Southern Australia	-0.081*	-0.003	-3.778**	-1.534
Western Australia	-0.018	0.029	2.284*	-4.638***
Tasmania	-0.124**	-0.030	0.381	2.816*
Northern Territory	0.059	0.054	-1.367	1.928(*)
Australian Capital Territory	0.012	0.061(*)	0.754	1.026
n (observations)	35,971	38,133	4,4466	48,610
n (individuals)	6,638	6,781	7,094	7,319
R ² (within)	0.115	0.123	0.027	0.016

Notes: HILDA Survey, 2001-2015. Individuals aged 24-63 years. Significance levels: (*) $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.