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ABSTRACT

Where Are the Returns to Lifelong Learning?*

We investigate the labour market determinants and outcomes of adult participation in formal education (lifelong learning) in Australia, a country with high levels of adult education. Employing longitudinal data and fixed effects methods allows identification of effects on outcomes free of ability bias. Different trends in outcomes across groups are also allowed for. The impacts of adult education differ by gender and level of study, with small or zero labour market returns in many cases. Wage rates only increase for males undertaking university studies. For men, vocational education and training (VET) lead to higher job satisfaction and fewer weekly hours. For women, VET is linked to higher levels of satisfaction with employment opportunities and higher employment probabilities.

JEL Classification: J24, J28, I23, I28

Keywords: adult education, lifelong learning, vocational studies, returns to education

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1. Introduction

Technological change and increasing globalisation have led policy-makers and employers to place more emphasis on the importance of the continual skill formation of the workforce (also referred to as ‘lifelong learning’).¹ Adult participation in formal education and training forms a central component of such skill formation.² Participation is also important in engaging adults more fully and productively in the labour market, and in building social inclusion. Globally, adult education has grown over time, with 6% of individuals aged 30 to 39 in OECD member (developed) countries enrolled in formal education in 2011 (OECD, 2013), up from 4.5% in 1996 (OECD, 1998).

The motives for undertaking further education as an adult may be quite different from the motives for studying at more conventional (younger) ages. Older individuals already have varied work experiences, many have family responsibilities, and they may have developed a wider variety of interests. The outcomes of adult education may also vary across individuals, given the potentially wider range of motives for such study. Understanding the motives for and outcomes of adult education is thus of considerable importance, yet the existing evidence base is significantly narrower than for education at conventional ages.

In this paper, we investigate both the individual precursors of adult entry into formal education, and the labour market outcomes associated with such education. We focus on Australia in our analysis, a country characterized by high rates of adult participation in formal education and training. Australia had the highest education enrolment rate of individuals aged 40 and over among all OECD countries in 2011 at 4.9%, over three times the OECD average (see Table 1). For individuals aged 30 to 39, Australia’s participation rate ranked third highest, and over twice the OECD average.

In our investigation of the precursors or “determinants” of adult education participation we consider a large number of individual demographic, education and labour market characteristics. Previous Australian studies of the precursors of participation (Roussell, 2002; Ryan and Sinning, 2009)³ found that participation rises with education qualifications already held and with the skill requirements of the occupation of employment, while it falls

¹ OECD (2003), Jenkins (2006).

² We focus on formal education and training in this investigation, i.e. study that can lead to the acquisition of a formal education qualification such as a degree, diploma or certificate. Non-formal training and learning both within and outside the workplace is also an important component of such continual skill formation.

³ These studies investigate participation in education and training using a wider definition not limited to formal education as in the present paper.

with age. We expand on these studies by investigating the role of several additional labour market factors that precede the education and training spell. Our results indicate that the decision to enrol in education as adults is related to relatively poor labour market outcomes for males, while for females it is more closely related to marriage dissolution and unemployment.

Table 1: Percentage of individuals enrolled in formal education by age group, 2011

Age group	15 to 19	20 to 29	30 to 39	40 and over
Australia	84	33	13	4.9
United Kingdom	78	19	6	1.7
United States	80	27	7	1.5
OECD average	84	28	6	1.5

Source: Organisation for Economic Cooperation and Development (2013)

Prior studies on the outcomes of adult education have often been confined to investigating wage and employment outcomes alone. These studies often found that the effects of adult education on earnings and employment were smaller than returns at more conventional ages, were close to zero for many groups (older individuals in particular) and positive returns were typically found only for specific subgroups. Examples for Australia are Karmel and Woods (2004) and Lee and Coelli (2010). International example studies include Blundell et al. (2000), Jenkins et al (2003) and Silles (2007) for the UK; Albrecht et al. (2005) and Stenberg and Westerlund (2008) for Sweden; Light (1995) and Jacobson et al. (2005) for the US. We contribute to this literature by investigating the effects of adult education on a wider range of labour market outcomes: earnings, employment status, work hours, job satisfaction and satisfaction with work opportunities.

By investigating a wider range of outcomes, we can uncover potential effects of adult education that previous studies may have missed, in particular with respect to job satisfaction and satisfaction with job opportunities. Our results indicate that for males, vocational education and training (VET) is related to higher job satisfaction yet fewer weekly hours of work, while Bachelor or above study is related to higher hourly wage rates. For females, VET study is related to improvements in the probability of being employed and higher satisfaction with employment opportunities.

The main challenge we face in estimating the effect of education on labour market outcomes is ability bias. The most able individuals often obtain higher levels of education and are also likely to be more productive workers, thus more likely to be employed and to earn more. Any observed correlation between education and labour market outcomes may

thus not represent a causal effect of education. We deal with this issue by using longitudinal data on individuals from the Household, Income and Labour Dynamics in Australia (HILDA) Survey and by estimating models that include individual fixed effects. This estimation strategy will deal with any differences in unobserved ability that are constant over time.

This estimation strategy has been employed in several recent studies of the impacts of adult education on labour market outcomes.⁴ For example, Blundell et al. (2000), Jenkins et al. (2003) and Silles (2007) employed data from the British National Child Development Study (NCDS), a long panel of individuals born in March 1958 and surveyed at several ages (7, 11, 16, 23, 33, 42, 46 and 50), while Blanden et al. (2010) employed data from the British Household Panel Study (BHPS). Zhang and Palameta (2006) employed the Canadian Survey of Labour and Income Dynamics (SLID). Jepsen et al. (2014) based their US analysis on administrative data from Kentucky while Jacobsen et al. (2005) used administrative data on recently displaced workers from the US state of Washington.⁵

In this study, we control for a rich set of individual characteristics in our fixed effects estimates. For example, we include interactions of age with initial education levels to allow individual lifecycle earnings profiles to differ by education level. In some estimates, we also allow for different time trends in outcomes across individuals who participate and do not participate in adult education.⁶ Individuals choosing to participate may have experienced lower earnings growth prior to participation.

The outline for the paper is as follows. In the next section, we describe the data and present some descriptive statistics. We present our empirical methodology and main empirical results in section 3 and 4 respectively. In Section 5, we conclude and briefly discuss potential policy implications.

⁴ Headey and Warren (2008), employing the first five waves of the HILDA Survey, found median earnings gains for men two years after adult participation, but smaller gains for women. We expand considerably on this study by investigating additional labour market outcomes over a longer time period, and allow for differential time trends across participants and non-participants. Li et al. (2015) also employ HILDA data in their study of underemployment and labour market trajectories of mature age Australian workers.

⁵ Griliches (1980), Marcus (1984), Light (1995) and Leigh and Gill (1997) study the effect of delaying entry to university using US panel surveys of young adults. The first two studies found that delayed entry did not adversely affect returns to education. Light (1995) found that those who delay earn a lower wage upon completion, but the gap closes over the next four years. Note that these studies only considered education delayed until individuals were in their mid to late 20s, and only estimated returns until they were in their early 30s.

⁶ This is similar in spirit to the inclusion by Jacobsen et al. (2005) and Huff Stevens et al. (2015) of individual time trends in some of their estimates.

2. Data and participation rates

The HILDA Survey is a nationally representative longitudinal survey of Australian households. In the initial wave of the Survey in 2001, around 7,700 households responded, with information provided for approximately 19,900 individuals aged 15 and older. Respondents are surveyed each year, with detailed information on labour market outcomes, education enrolment and receipt of qualifications collected. For more information about the HILDA Survey, see Watson and Wooden (2010).

In this study, we use data from the 2001 to 2011 waves of the HILDA Survey. To minimise issues related to missing information on enrolment or receipt of qualification, our estimation sample only includes adults (aged 25 to 54 in 2001) who responded in all eleven survey waves. In addition, the estimation sample only includes individuals ‘at risk’ in 2001 of undertaking a *new* enrolment in formal education, i.e. individuals already studying in 2001 were excluded. This exclusion restriction is important, as the labour market outcomes of individuals already studying in 2001 would be affected by such study. It results in the loss of 554 observations out of the 5,721 who responded in all eleven waves.⁷

Table 2 provides basic information on the patterns of engagement in adult education in our sample, broken down by gender and age group. These enrolment rates denote any reported enrolment in study towards a formal qualification at any time from 2002 to 2011. Note that these rates are much higher than those reported in Table 1, as they encompass any enrolment over a ten-year period.⁸

Engagement in education as an adult is quite common in Australia, with females more likely to enrol than males. As expected, relatively younger adults are more likely to engage than older adults, given that the benefits of further education can accrue over more working years if completed earlier. None-the-less, nearly 20% of adults aged 45 to 54 in 2001 enrolled in education over the following 10 year period. Note that for both genders and all age groups, certificate level study is the most prevalent level of education.⁹

Table 3 provides information on the qualification levels of individual that are held prior to engagement in education as adults. These measures are provided separately by the level of

⁷ We deal with this non-random sample selection in our estimates using re-weighting techniques. We provide details in the next section.

⁸ To aid comparisons, “current” enrolment rates by age group and gender using responders to the HILDA Survey in 2011 are provided in Appendix Table A1.

⁹ See Table A3 in Appendix A for a description of the different educational levels in Australia.

education qualification being sought. A large proportion of adults enrol in study towards a qualification at a lower level than the highest qualification level that they already hold.

Table 2: Enrolment rates (%) in formal education, at any time 2002- 2011, HILDA

Age group in 2001	25 – 34	35 - 44	45 - 54
Males			
Any study	47.6	32.6	17.7
<i>Of which:</i>			
Certificate	41.1	43.0	52.0
Diploma	15.4	15.2	12.8
Degree or above	41.1	39.5	32.8
Level not specified	2.4	2.3	2.4
Observations	616	786	706
Females			
Any study	51.9	41.7	22.7
<i>Of which:</i>			
Certificate	41.3	45.9	53.9
Diploma	14.3	14.5	13.8
Degree or above	43.1	37.3	29.1
Level not specified	1.3	2.3	3.2
Observations	728	947	838

Notes: HILDA data, percentages constructed using longitudinal weights, individuals not studying in 2001 and responding in all 11 waves from 2001 to 2011.

Of all males pursuing a Certificate III or IV as an adult, 11% already held a diploma, while 9% already held a bachelor degree or higher. In addition, 59% already held a Certificate III or IV. Some of these individuals may be attempting to improve their qualification level from III to IV, while others may be attempting to obtain a qualification that provides skills closer to those required for the development of their preferred career. Of all males pursuing a diploma, 32% already held a diploma, while 21% already held a degree or higher.

For females, there is a similar amount of adult engagement in education at levels that are at the same level or even below the highest education qualification already held. The only noticeable difference between males and females in Table 3 is the higher proportion of males studying for certificates that already hold a Certificate III or IV, and a higher proportion of females studying for certificates that only have 10 or 11 years of high school, or only hold a Certificate I or II.¹⁰

¹⁰ Certificates I and II are generally considered to be a lower level of education attainment than completion of year 12 of high school in Australia.

Table 3: Initial qualification levels of adult students (aged 25 to 54) by level sought

	Level of qualification sought				
	Certificate I or II	Certificate III or IV	Diploma	Bachelor	Postgraduate degree
Highest qualification already held					
Males					
Below year 10	0	2	0	0	0
Year 10-11 or Cert I/II	18	11	9	6	1
Completed year 12	8	8	11	19	2
Certificate III / IV	40	59	27	17	3
Diploma	10	11	32	18	5
Degree or above	24	9	21	40	89
TOTAL	100	100	100	100	100
Observations	89	205	100	72	189
Females					
Below year 10	4	3	2	2	0
Year 10-11 or Cert I/II	29	15	11	6	2
Completed year 12	16	11	17	11	1
Certificate III / IV	24	48	16	20	2
Diploma	10	11	39	18	5
Degree or above	17	12	15	43	90
TOTAL	100	100	100	100	100
Observations	136	301	137	122	243

Notes: HILDA data, percentages constructed using longitudinal weights, initial education measured in year prior to new education spell.

In our analysis we investigate the effect of mature age education on a wide range of labour market outcomes. Table 4 provides summary statistics for these outcomes using responses for 2001, before any of the individuals in our sample began their education spell.¹¹ Among males, prospective Bachelor or above students were more likely to be employed, enjoyed higher hourly wage rates and worked slightly fewer hours. These future Bachelor or above students also reported higher levels of job satisfaction and satisfaction with employment opportunities. Note that both of these satisfaction scores are recorded on a discrete scale from zero to ten, with zero being the lowest possible level. In contrast, future male VET students have lower 2001 values for all outcomes relative to both future Bachelor or above students and to males who did not engage with formal education between 2002 and 2011.

The patterns of 2001 outcomes among females by education level sought are less consistent. Future female Bachelor or above students reported the highest hourly wage

¹¹ Average values for the explanatory variables are presented in the Appendix Tables A4 and A5.

rates and the highest employment rate, but also the highest level of weekly hours of work. Females who did not engage in education reported the highest levels of job satisfaction, but their satisfaction with employment opportunities is below that of future Bachelor or above students. Future VET students reported the fewest weekly hours of work, lowest hourly wage and lowest satisfaction with job opportunities, but their level of job satisfaction was higher than that of future Bachelor or above students.

Note that differences in labour market outcomes by future study status may be due to differences in other individual attributes such as age and education qualifications already held. Such differences will be allowed for in the estimates to follow.

Table 4: Labour market outcomes in 2001, by education level sought.

	All	Did Not Study	Bachelor or above	VET
Males				
Respondent is employed	0.885 (0.319)	0.881 (0.324)	0.922 (0.270)	0.889 (0.315)
Hourly wage rate	22.799 (18.275)	23.158 (20.117)	25.827 (13.822)	20.328 (10.953)
Weekly hours of work	44.83 (12.32)	44.64 (11.98)	43.33 (12.75)	46.04 (13.31)
Job satisfaction	7.535 (1.824)	7.557 (1.777)	7.764 (1.607)	7.373 (2.050)
Satisfaction with job opportunities	6.855 (2.596)	6.847 (2.595)	7.304 (2.272)	6.725 (2.693)
Females				
Respondent is employed	0.703 (0.457)	0.688 (0.464)	0.807 (0.396)	0.712 (0.453)
Hourly wage rate	19.515 (13.458)	19.365 (12.003)	23.828 (25.882)	18.097 (8.285)
Weekly hours of work	31.65 (14.83)	31.64 (14.97)	34.71 (13.47)	30.45 (14.81)
Job satisfaction	7.708 (1.995)	7.745 (2.043)	7.600 (1.841)	7.645 (1.918)
Satisfaction with job opportunities	6.747 (2.699)	6.754 (2.752)	7.450 (2.070)	6.465 (2.714)

Notes: HILDA data for 2001. Standard deviations are provided in parentheses.

3. Estimation Methodology

We begin by analysing the precursors of participation in formal education as adults. We do so by estimating reduced form Probit models that relate enrolment to a large set of individual characteristics: initial labour market outcomes, prior education level, socio-

economic measures and demographics. For each respondent, the dependent variable I_i takes the value 1 if individual i enrolled in education at any time from 2002 to 2011 and equals 0 if individual i never engaged in education during this period. All independent variables included in these models were measured at their 2001 values.

Note that for these estimates, we exclude from the estimation sample those individuals that are already studying in 2001. This exclusion was undertaken in order to ensure that the initial labour market outcomes we include in our estimated models are not a function of currently being a student. The 2001 labour force outcomes (earnings, employment status) of current students may be a direct outcome of studying. Current students may not be working or only working in a casual part-time job in order to study.

This exclusion results in a sample that is less educated and older than the general population, as younger and more educated individuals were more likely to be studying in 2001. We employ a standard inverse probability re-weighting technique to construct appropriate weights for use during estimation (Hogan and Lancaster, 2004). By doing so, we can at least ensure that the subsample of individuals we employ during estimation is representative of the underlying population.¹² These weights were constructed by estimating Probit models (separately by gender) for the dependent dichotomous variable of studying in 2001 as a function of standard demographic characteristics (age, highest qualification already held, immigrant status, parental occupational status and residence). We then adjust the longitudinal weights constructed by the HILDA Survey team by dividing them by one minus the predicted probability of studying in 2001 constructed from these Probit model estimates.

Our main objective is to estimate the causal effect of adult education on individual labour market outcomes. The main estimation issue we must deal with is the potential effect of unobserved ability bias. Those individuals who choose to invest in education may be more able or motivated than others, thus they may have better labour market outcomes due to their higher ability or motivation rather than due purely to the education they undertake. In the large literature attempting to estimate the causal labour market effects of education more generally, researchers have tended to employ either instrumental variable techniques (using a variable that influences the education level of individuals but has no direct impact

¹² Note that standard techniques for dealing with potential sample selection bias such as the Heckman (1979) technique are not readily employed here. The same variables that determine selection into the sample (not studying in 2001) are precisely the same as those that determine the outcome of interest (studying from 2002 to 2011). Thus no valid instrument is available.

on labour market outcomes) or have compared the outcomes of twins with different education levels but arguably the same inherent ability. These studies primarily employ cross-sectional data on individuals.¹³

Such instrumental variable or twin comparison techniques will not be employed here. Instead, we follow recent studies specifically investigating the labour market effects of adult education (Blundell et al., 2000; Jenkins et al., 2003; Albrecht et al., 2005; Headey and Warren, 2005; Jacobson et al., 2005; Zhang and Palameta, 2006; Silles, 2007; Stenberg and Westerlund, 2008; Blanden et al., 2010; Jepsen et al., 2014; Huff Stevens et al., 2015) by exploiting the longitudinal nature of the HILDA Survey data. We essentially compare the changes in labour market outcomes from before to after a spell of adult engagement in education with changes for similar individuals who do not engage in education over the same period. The labour market effects of any time-constant unobserved ability differences between those who do and do not engage in education as adults are removed by focusing on within-individual changes in outcomes.

Our estimates of the effect of adult education on labour market outcomes are based on panel regressions with individual fixed effects. To begin, we estimate the model described in Equation 1. Each labour market outcome Y_{it} for individual i in year t is regressed on a subset of individual demographic characteristics that change over time Z_{it} ,¹⁴ indicators of the number of years prior to, during and after an education spell I_{ji} ; individual fixed effects δ_i ; and year indicators τ_t . The error term ϑ_{it} is assumed to be orthogonal to all regressors.

$$Y_{it} = Z'_{it} \gamma + \sum_{j=-5}^6 \alpha_j I_{ji} + \delta_i + \tau_t + \vartheta_{it} \quad (1)$$

The set of indicators I_{ji} are defined as follows. Indicator I_{-4i} equals 1 if the time period for individual i is 4 years before a new education spell, zero otherwise. Indicators for the negative values of $j = -3$ and -2 are defined similarly. Variable I_{-5i} denotes 5 or more years prior to a new education spell. We exclude an indicator denoting the period immediately prior to an education spell. Indicator I_{0i} represents the year or years during which an individual is actually studying. Indicator I_{1i} equals 1 if the relevant time period is the first

¹³ See Card (1999) for a discussion of the main estimation issues.

¹⁴ Only coefficients of variables that change over time (marital status, state of residence, disability status and age) are identified once individual fixed effects are included. We also include interactions of age and age squared with initial education level indicators to allow lifecycle profiles to differ by education level. For estimates of log hourly wages, we also include a quartic in years of work experience.

year after an education spell has ended, zero otherwise. Indicators for the positive values of $j = 2$ to 5 are defined similarly. Variable I_{6i} denotes 6 or more years after the education spell.

The estimated coefficients α_j on these indicators reveal how each outcome changes from before to after an education spell relative to the outcomes of similar individuals who do not undertake further education. We will thus be able to observe if outcomes dip just before an education spell - a phenomenon often referred to as “Ashenfelter’s Dip”, from Ashenfelter (1978) - and if outcomes jump up quickly or improve only slowly after an education spell is completed. Note that information on individuals who do not engage in education during the period is used to pin down the estimated coefficients of the time indicators and of the observed time-varying characteristics included in Z_{it} .

While the HILDA Survey contains a considerable amount of detail on individuals that are useful in our investigation, sample sizes are not large, and only a sub-set of individuals engage in education as adults. Thus the standard errors on our estimates of the α_j coefficients turn out to be wider than we would like. Therefore, we also estimate less flexible models in an attempt to construct more precise estimates that impose restrictions on the values that the α_j coefficients can take.

Specifically, we estimate the following equation:

$$Y_{it} = Z'_{it} \gamma + \alpha_{et} \cdot tr \cdot I_{ei} + \alpha_0 I_{0i} + \alpha_a I_{ai} + \alpha_{at} \cdot tr \cdot I_{ai} + \delta_i + \tau_t + \vartheta_{it} \quad (2)$$

In this specification, tr denotes a simple linear time trend, while I_{ei} equals one for all individuals who participate in education during the estimation period, zero otherwise. Indicator I_{ai} denotes periods after an education spell has been completed by individual i . This specification has the advantage of identifying whether individuals who participate in education have a lower or higher trend in outcomes prior to the education spell. The estimated effect of education on outcomes – measured by the coefficients α_a and α_{at} – is now relative to the continuation of any pre-education trend in outcomes among those who participate relative to those that do not. We will thus be able to identify whether adult education arrests any relative decline in outcomes among those individuals who participate in further education. Note that by allowing for different trends in outcomes among those who study is similar in spirit to the inclusion of individual specific time trends in the related studies of Jacobson et al. (2005) and Huff Stevens et al. (2015).

4. Estimation Results

4.1 Participation in adult education

Tables 5 and 6 report marginal effects from our Probit estimates of enrolment in education at any time during the 2002-2011 period for males and females respectively. In each table, we report results for three samples: (1) all individuals in the selected sample; (2) employees in 2001 only, as only they have initial employee earnings data; and (3) for all employed individuals in 2001, as only they have initial job satisfaction measures. Note that all estimation samples are restricted to individuals aged 25 to 54 in 2001 in order to focus on individuals who remain of standard working age for the entire estimation period.

Consistent with Table 2, the estimates in Tables 5 and 6 highlight a clear negative relation between age and enrolling in education. There is also a strong positive relationship between the highest qualifications already held and enrolment for males in particular. For females, a strong relationship also exists, but it is less monotonic across prior qualification levels.

Parental occupational status is not related to education participation as adults in these estimates.¹⁵ This is in stark contrast to the findings of studies of university-level enrolment at more conventional (younger) ages. Parental socio-economic background is strongly positively related to post-secondary study in Australia among youth leaving high school (see Coelli, 2011). The lack of any such relationship among mature age students suggests that access to education as adults is more equitable than for youth, as adults may have their own resources with which to fund further study. Yet given the strong relationship between prior qualification levels and adult participation, it does not appear that mature age education is resulting in less advantaged individuals “catching up”.

The roles of marital status and family composition in enrolment outcomes differ for males and females. For males, participation is unrelated to both marital status and the number of dependent children. For females, however, separated and divorced women are much more likely to participate, by 15 to 22 percentage points. There is some evidence that the number of dependent children is positively related to engagement for females.

¹⁵These occupational quartiles were constructed using the AUSEI06 occupational status scale based on the occupation of the parent when the individual was aged 14. See McMillan et al. (2009) for further details of how the occupational status scale was constructed.

Table 5: Marginal effects on engaging in education, 2002-2011 – males

	All Individuals		Employees Only		All Employed	
	Coeff.	<i>t-stat.</i>	Coeff.	<i>t-stat.</i>	Coeff.	<i>t-stat.</i>
<i>Reference category: age 25-29</i>						
Age 30 – 34	-0.039	-0.87	-0.018	-0.32	-0.052	-1.16
Age 35 – 39	-0.094	-2.36	-0.104	-2.10	-0.109	-2.70
Age 40 – 44	-0.087	-2.03	-0.087	-1.62	-0.119	-2.91
Age 45 – 49	-0.164	-4.58	-0.172	-3.85	-0.167	-4.45
Age 50 – 54	-0.224	-6.60	-0.224	-5.15	-0.218	-6.12
<i>Reference category: below Year 11*</i>						
Post-graduate degree	0.226	3.58	0.142	1.83	0.274	4.53
Bachelor	0.263	5.24	0.188	3.14	0.252	4.67
Advanced diploma / diploma	0.151	2.86	0.100	1.53	0.183	3.04
Certificate III / IV	0.197	5.14	0.139	2.91	0.168	3.99
Certificate I / II or cert. undefined	0.187	1.48	0.268	1.99	0.130	0.93
Year 12	0.144	2.73	0.113	1.79	0.132	2.39
<i>Reference category: non-immigrant</i>						
Immigrant, English speaking	-0.002	-0.05	-0.034	-0.67	-0.011	-0.26
Immigrant, non-English speaking	0.020	0.43	0.006	0.10	0.050	0.97
<i>Reference category: father job status – fourth quartile</i>						
Father job status - first quartile	0.029	0.74	0.027	0.56	0.041	0.95
Father job status - second quartile	0.025	0.61	0.025	0.48	0.053	1.26
Father job status - third quartile	0.026	0.71	0.040	0.88	0.023	0.60
<i>Reference category: mother job status – fourth quartile</i>						
Mother job status - first quartile	-0.035	-0.93	-0.047	-1.00	-0.061	-1.56
Mother job status - second quartile	-0.011	-0.31	-0.007	-0.14	0.007	0.18
Mother job status - third quartile	-0.041	-1.25	-0.057	-1.35	-0.034	-0.97
<i>Reference category: married or de facto</i>						
Separated or widowed	0.076	1.00	0.145	1.48	0.127	1.48
Divorced	0.071	1.12	0.076	0.95	0.048	0.71
Never married	0.028	0.66	0.029	0.55	0.058	1.23
Number of dependent children	-0.010	-0.89	-0.018	-1.21	-0.004	-0.36
Health limits work	0.060	1.29	-0.004	-0.07	-0.012	-0.23
Health prevents work	-0.283	-22.6				
<i>Reference category: employed full-time</i>						
Employed part-time	0.048	0.93				
Unemployed, wants full-time	0.091	1.29				
Unemployed, wants part-time	-0.043	-0.34				
Not in labour force, marginal	-0.081	-1.03				
Not in labour force	-0.048	-0.65				
Receive disability pension or support	-0.067	-0.97				
Disposable income (annual \$1000s)	-0.001	-1.77			-0.001	-1.76
Log wage residual			-0.097	-2.54		
Working hours			0.001	0.59	0.001	0.95
Self-employed					-0.059	-1.84
<i>Reference category: skills used in job – do not agree</i>						
Skills used in job - strongly agree					-0.026	-0.58
Skills used in job - agree					-0.038	-0.80
<i>Reference category: job satisfaction - low</i>						

Job satisfaction - very high			-0.110	-2.17
Job satisfaction - high			-0.114	-2.17
Job satisfaction - medium			-0.088	-1.69
<i>Observations</i>	<i>1854</i>	<i>1228</i>		<i>1549</i>

Notes: HILDA Data for males aged 25-54 in 2001. Probit regressions include state indicators and indicators of city and regional residence. Coefficients estimated using adjusted weights. Average marginal effects are reported. The t-statistics are based on heteroskedasticity-robust White standard errors.

* Reference category for education levels also includes a small number of individuals with an undefined initial education level.

The roles of other characteristics in enrolment outcomes also differ by gender. For example, males who report that their health prevents work and report receiving disability support pensions are less likely to participate in education than healthier males, while we do not detect such differences among women. Disposable income only appears to be related to enrolment among males, with the probability of enrolment 1.6 percentage points lower among males with an additional \$10,000 of annual disposable income.

Interestingly, there is little relationship between initial (2001) employment status and participation. Thus difficulties in finding work do not appear to be a motivating factor. The only exception is females who are not in the labour force: they are significantly less likely to participate in adult education than those employed full-time.

By focusing on the subsample of individuals who were employees in 2001 (the second model in Tables 5 and 6), we are able to analyse the relation between initial employee wages and enrolment. To this end, we construct a measure of wage residuals by regressing the log of hourly wage rates on work experience and its square, indicators of highest education level, interactions of work experience and education level, the proportion of time since leaving full-time education not working, immigrant status, marital status, number of children, disability status and residence. Thus these residuals reflect whether the individual is earning a wage that is above or below what we would expect given the observed productive characteristics of the individual.

For male employees, there is a negative relationship between these log wage residuals and enrolment, implying that poorly paid males are more likely to study. This may reflect individual dissatisfaction with the current employment situation and the desire to improve employment prospects through additional education. Note, however, that there is no such negative relationship for females.

Table 6: Marginal effects on engaging in education, 2002-2011 – females

	All Individuals		Employees Only		All Employed	
	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
<i>Reference category: age 25-29</i>						
Age 30 – 34	-0.038	-0.89	0.003	0.05	-0.011	-0.20
Age 35 – 39	-0.085	-2.08	-0.030	-0.51	-0.041	-0.75
Age 40 – 44	-0.106	-2.64	-0.029	-0.50	-0.084	-1.60
Age 45 – 49	-0.166	-4.43	-0.067	-1.19	-0.095	-1.86
Age 50 – 54	-0.254	-7.64	-0.210	-4.20	-0.210	-4.66
<i>Reference category: below Year 11*</i>						
Post-graduate degree	0.030	0.62	0.030	0.51	0.098	1.76
Bachelor	0.121	2.91	0.161	3.11	0.164	3.31
Advanced diploma / diploma	0.031	0.71	0.061	1.07	0.095	1.76
Certificate III / IV	0.068	1.55	0.099	1.57	0.059	1.04
Certificate I / II or cert. undefined	0.156	1.94	0.201	1.70	0.223	2.16
Year 12	0.069	1.85	0.091	1.78	0.088	1.89
<i>Reference category: non-immigrant</i>						
Immigrant, English speaking	-0.025	-0.66	-0.065	-1.38	-0.030	-0.67
Immigrant, non-English speaking	-0.062	-1.66	-0.127	-2.53	-0.124	-2.69
<i>Reference category: father job status – fourth quartile</i>						
Father job status - first quartile	-0.003	-0.09	0.011	0.22	0.056	1.17
Father job status - second quartile	-0.016	-0.46	-0.067	-1.60	-0.010	-0.24
Father job status - third quartile	0.012	0.37	0.018	0.44	0.063	1.56
<i>Reference category: mother job status – fourth quartile</i>						
Mother job status - first quartile	-0.062	-1.82	-0.055	-1.20	-0.046	-1.09
Mother job status - second quartile	-0.053	-1.50	-0.069	-1.46	-0.056	-1.26
Mother job status - third quartile	-0.014	-0.44	-0.010	-0.24	-0.035	-0.97
<i>Reference category: married or de facto</i>						
Separated or widowed	0.139	2.57	0.178	2.55	0.180	2.63
Divorced	0.220	4.31	0.184	2.78	0.196	3.32
Never married	0.034	0.78	0.018	0.32	0.062	1.15
Number of dependent children	0.021	1.90	0.004	0.27	0.021	1.43
Health limits work	0.046	1.21	0.033	0.57	0.036	0.70
Health prevents work	0.186	0.55				
<i>Reference category: employed full-time</i>						
Employed part-time	-0.022	-0.73				
Unemployed, wants full-time	0.081	0.81				
Unemployed, wants part-time	0.158	1.28				
Not in labour force, marginal	0.002	0.05				
Not in labour force	-0.104	-2.75				
Receive disability pension or support	-0.127	-1.93				
Disposable income (annual \$1000s)	-0.001	-1.00			-0.001	-0.73
Log wage residual			0.017	0.45		
Working hours			0.000	0.20	0.001	0.67
Self-employed					-0.028	-0.65
<i>Reference category: skills used in job – do not agree</i>						
Skills used in job - strongly agree					-0.018	-0.39
Skills used in job - agree					0.019	0.38
<i>Reference category: job satisfaction - low</i>						

Job satisfaction - very high		-0.033	-0.51
Job satisfaction - high		-0.048	-0.78
Job satisfaction - medium		-0.037	-0.55
<i>Observations</i>	2233	1283	1448

Notes: HILDA Data for females aged 25-54 in 2001. Probit regressions include state indicators and indicators of city and regional residence. Coefficients estimated using adjusted weights. Average marginal effects are reported. The *t*-statistics are based on heteroskedasticity-robust White standard errors.

* Reference category for education levels also includes a small number of individuals with an undefined initial education level.

Now we focus on the estimates for all individuals that were employed in 2001 (third column of Tables 5 and 6). While the initial self-reported skill use in the job is not significantly related to enrolment for either gender, the level of initial job satisfaction is significantly negatively related to enrolment for males. Males reporting satisfaction levels at any level above low (the base category) have much lower probabilities of studying (from 12 to 18 percentage points). For females we also find a negative relation between job satisfaction and enrolment, but the estimates are not statistically significant.

To summarize, the results presented in Tables 5 and 6 suggest that the motives for enrolling in education as adults may differ for males and females. Men appear more likely to participate to improve their employment conditions (wage rates and job satisfaction). Marital status and family size play an important role in determining female participation.

4.2 *The outcomes of education*

Figures 1A to 1E present our main results of the effect of education on labour market outcomes based on estimates of Equation 1.¹⁶ Estimates are provided separately by gender and by two levels of education: certificate or diploma (VET) and Bachelor degree or above. The dots in these figures represent our estimates of the α_j coefficients from Equation 1, while the vertical lines represent 95% confidence intervals for those estimates. These coefficients are estimated while controlling for those individual characteristics that may change over time (e.g. age interacted with education level, marital status, geography), plus individual fixed effects and time indicators. These estimated effects include all individuals who enrolled in education, including those who did not actually complete the course and receive a formal qualification.¹⁷

¹⁶ Complete sets of estimated results are available from the authors.

¹⁷ In these estimates, we exclude a small number of individuals that had more than one education spell during the period. This sample selection was made in an attempt to estimate the effects of

By controlling for individual fixed effects, we are removing the effects of any non-time varying unobservable characteristics that may drive self-selection into education. As a result, however, we are only able to estimate changes in outcomes “within” those individuals who study, relative to those who did not. Thus the estimates in Figure 1 are unable to tell us whether these labour market outcomes are on average higher or lower among those who studied versus those who did not. The estimates of Tables 5 and 6 did provide some information regarding some of these outcomes prior to study.

Figures 1A to 1C present our estimates for the standard labour market outcomes investigated in the previous literature: probability of employment (1A), hourly wage rates (1B) and weekly work hours (1C). In most instances, the precision of our estimates are not particularly high, thus it is difficult to draw strong conclusions from them. Overall, the figures do not reveal significant improvements in these outcomes following study. This is mostly consistent with prior research, which generally struggled to find consistently strong labour market returns to adult education.

There are, however, a few results worth highlighting. The probability of employment for males undertaking Bachelor or above study improves only four or more years post-study. Note that most Bachelor and above study undertaken at mature ages is more likely to be at the post-graduate level. Among males who undertook VET study, there is some evidence of an “Ashenfelter’s dip”, as employment decreases just prior to study, then gradually improves over time. Among females who enrol in VET, employment is on an upward trend prior to study, with employment flattening post-study at higher levels.

Among males that engage in VET, we detect modest declines in wage rates pre-study, wages then jump up during study, and then remain at this higher level. Among females, there is an upward trend in wage rates prior to Bachelor or above study, but no increase afterwards.¹⁸ Among males, weekly hours of work are generally lower post-study,

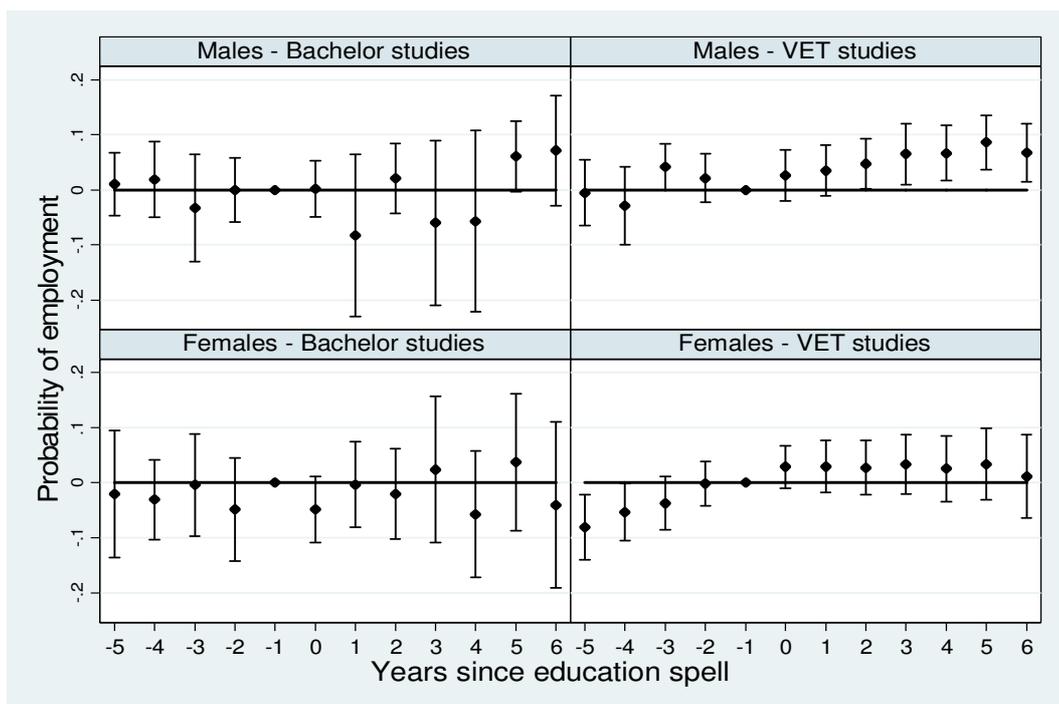
education as precisely as possible. Note that including these multiple education spell individuals did not materially change the estimates, but did lower their precision slightly.

¹⁸ Note that the estimates for hourly wage rates include the subset of individuals who had positive labour market earnings (zero earnings observations were treated as missing during those specific periods only). The estimates on employment probabilities suggested that employment changes were not large pre to post education. Thus such a restriction should not result in sample selection bias that is particularly troubling. Note also that the inclusion of individual fixed effects should ensure any selection bias is small.

particularly post VET study.¹⁹ Among females, hours decline just prior and during study, but no other trends are observed.

Looking across Figures 1A to 1C, the overall labour market effects of mature age education are modest at best, and positive effects are generally confined to males studying at the VET level. Now we turn to investigating the effect of mature age education on individual outcomes that prior studies – concentrating on wage and employment effects – may have missed. We look at the effect of such education on individual job satisfaction (Figure 1D) and satisfaction with work opportunities (Figure 1E).

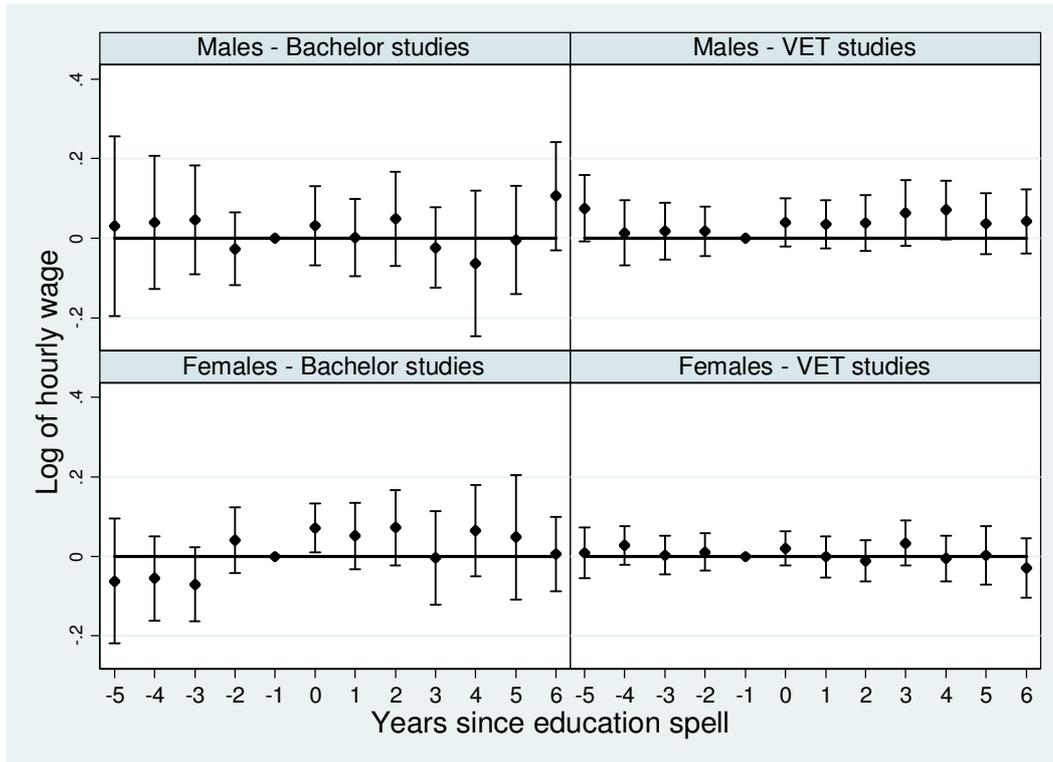
Figure 1A: Conditional employment probabilities, individual years



Notes: Dots represent estimated coefficients on indicators of years before and after an education spell, estimated using Equation 1. Vertical lines are 95% confidence intervals on the estimates, constructed using standard errors constructed after allowing clustering at the individual level.

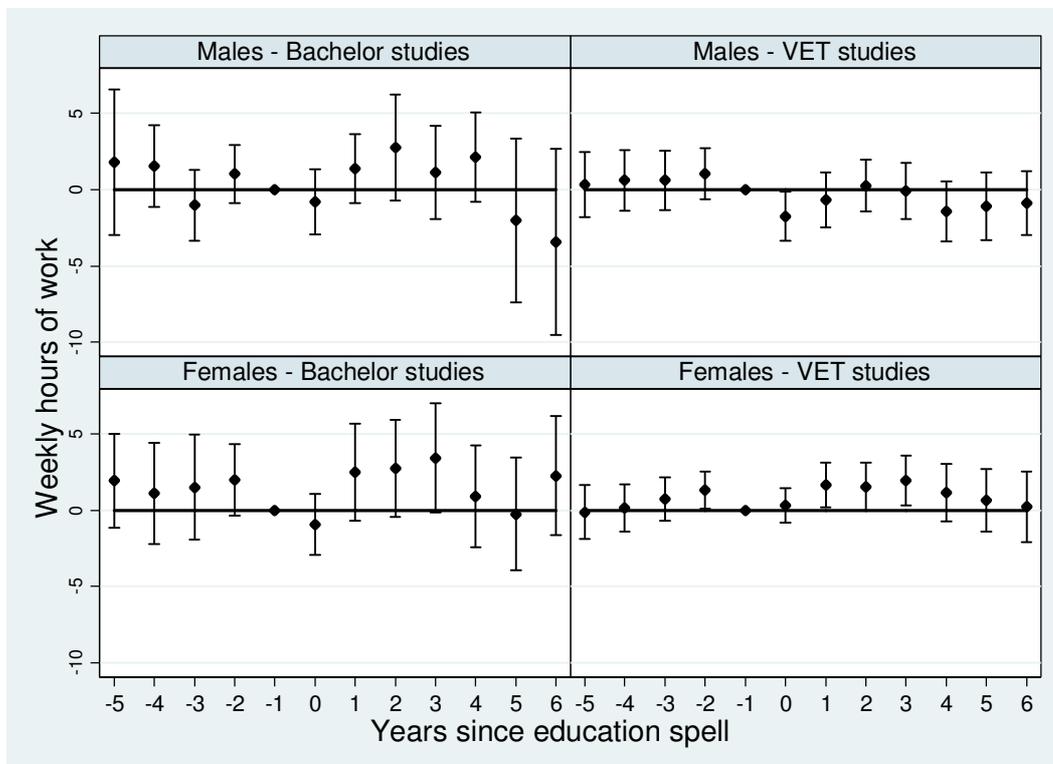
¹⁹ Note that these estimates only include individuals with positive work hours during a particular time period, i.e. individuals are included during those periods that they are employed (an unbalanced panel).

Figure 1B: Conditional log hourly wage rates, individual years



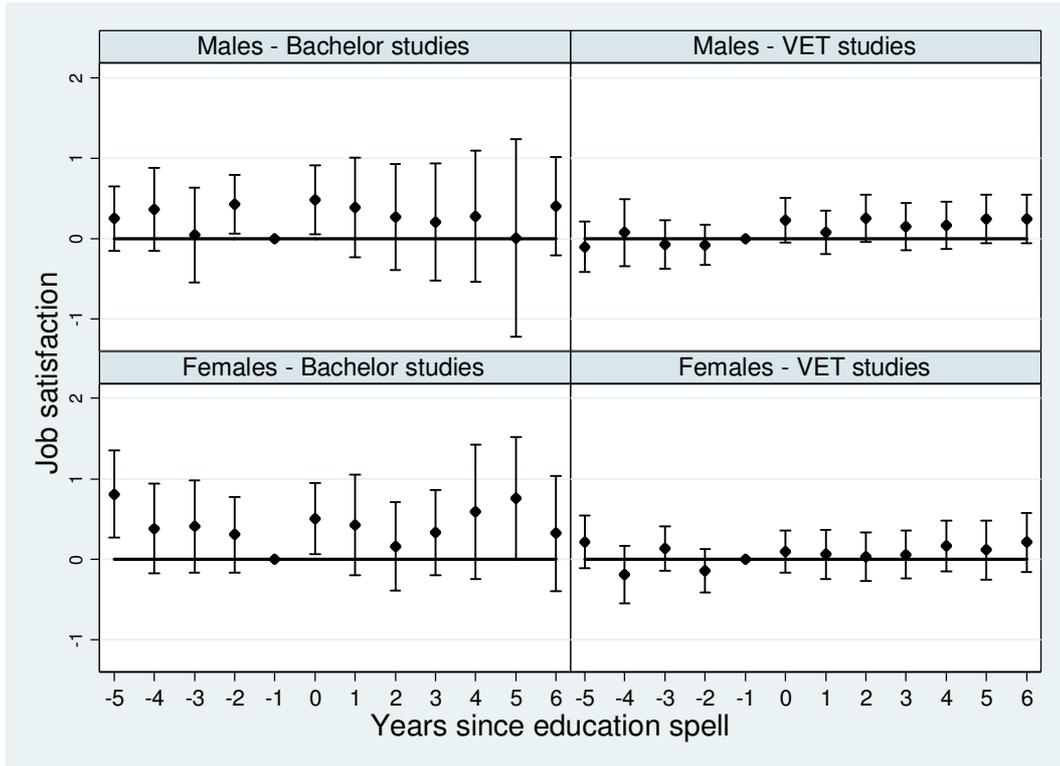
Notes: as per Figure 1A.

Figure 1C: Conditional weekly hours of work, individual years



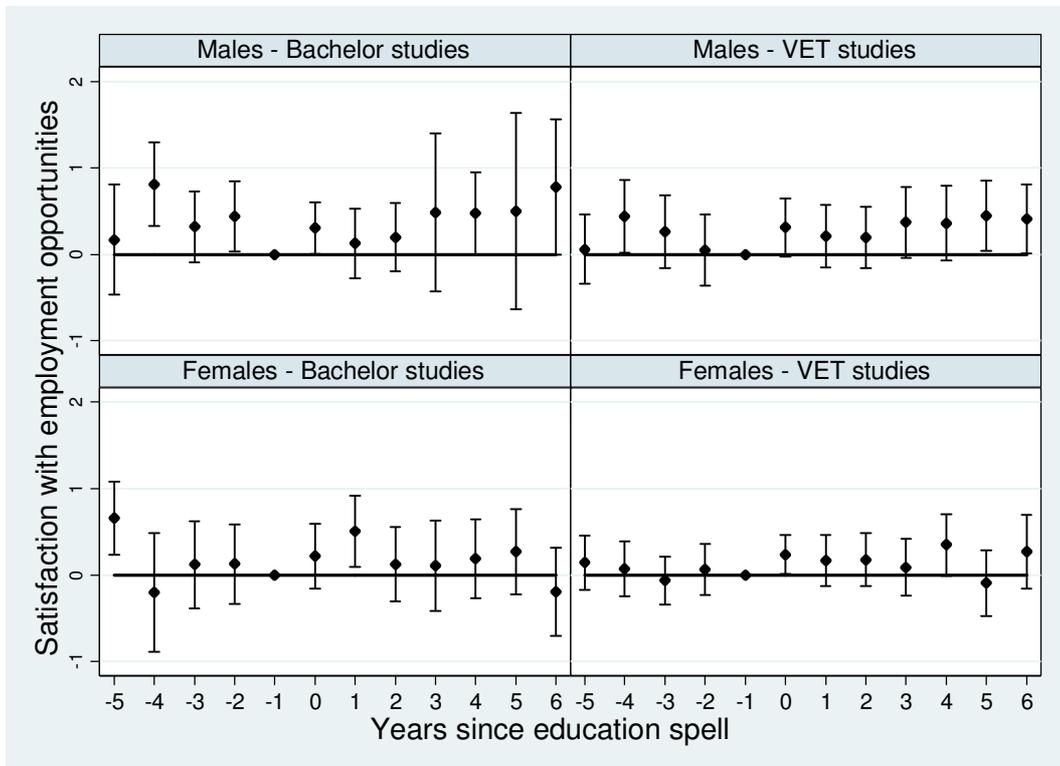
Notes: as per Figure 1A.

Figure 1D: Conditional job satisfaction, individual years



Notes: as per Figure 1A.

Figure 1E: Conditional satisfaction with employment opportunities, individual years



Notes: as per Figure 1A.

Regarding job satisfaction,²⁰ our estimates differ by gender and level of education. Among males, job satisfaction is marginally lower in the year prior to Bachelor or above study, but no other trend is evident. Job satisfaction is higher during and post VET study among males relative to years prior to such study. Among females, job satisfaction is generally declining prior to study at either level, and rises during and post-study.

In contrast, estimates of the effect of enrolment on satisfaction with employment opportunities (Figure 1E) are reasonably consistent across genders and level of study. Such satisfaction is declining pre-study, but increases during and after such study.²¹

In an effort to improve the precision of our estimates, we now impose the structure of Equation 2. These estimates allow us to focus on whether mature age education can arrest any declining trends in labour market outcomes among those who study. Rather than report the coefficient estimates directly, we again use diagrams (Figures 2A to 2E) to provide a visual display of the key findings. These figures were constructed by: (a) normalising each outcome to equal zero in the year prior to an education spell (for comparability to Figures 1A to 1E), and (b) assuming VET study lasts for one year and Bachelor or above study lasts for two years. These study lengths were the median lengths observed in the data. We also display the results of statistical tests of whether outcomes differ significantly post education from a continuation of the trend observed prior to an education spell.²²

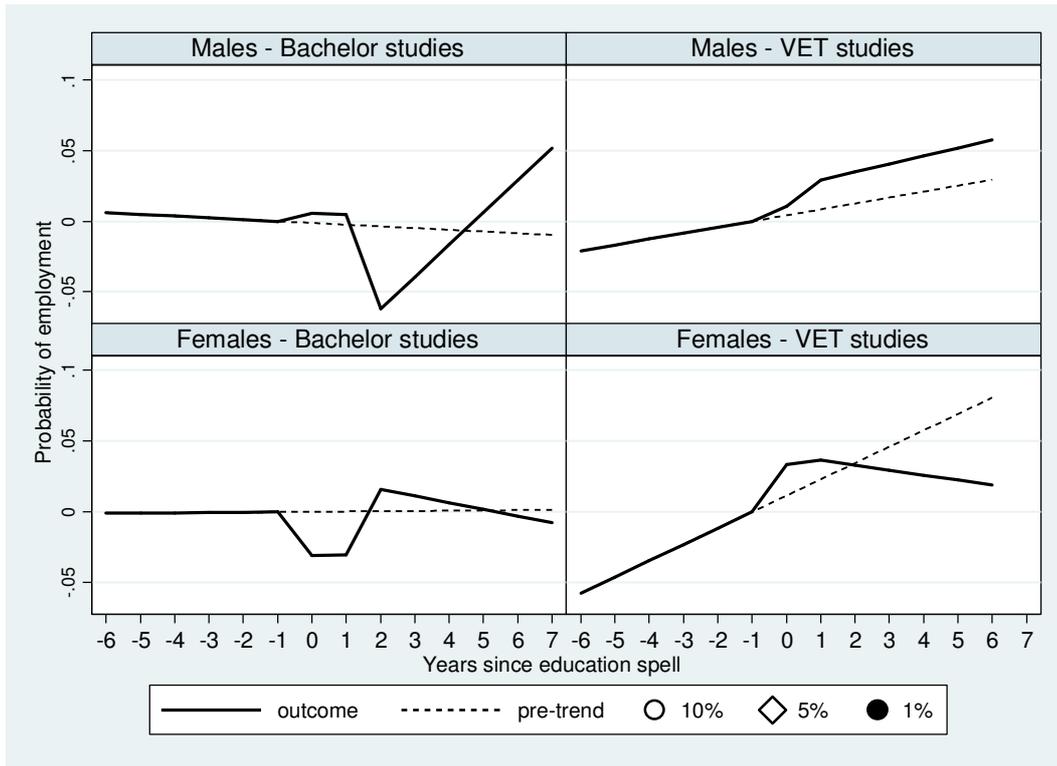
In Figure 2A, estimates of the trend in employment probabilities post Bachelor or higher study are quite noisy among both males and females, with no evidence of improving outcomes post-study. There is some evidence of employment increasing post VET study among males, but these probabilities were already on an upward trend prior to such study. Among females who study at the VET level, the strong upward trend in employment pre-study is not maintained post-study. A naïve comparison of employment probabilities before and after VET study among females reveals higher employment probabilities post-study, but this improvement was already occurring prior to any education.

²⁰ Job satisfaction is only measured for employed individuals. We set it to missing among individuals who are not working in any particular period. It is measured on a scale from zero (totally dissatisfied) to ten (totally satisfied). For simplicity, we model job satisfaction using standard linear regression.

²¹ Satisfaction with employment opportunities is measured for all individuals irrespective of whether they are currently employed. It is also measured on a scale from zero (totally dissatisfied) to ten (totally satisfied). Again, we model this variable using linear regression for simplicity.

²² These tests were generated using the full estimated variance-covariance matrix (again allowing for errors clustered at the individual level) and standard Delta Method calculations.

Figure 2A: **Conditional employment probabilities, predicted trends**



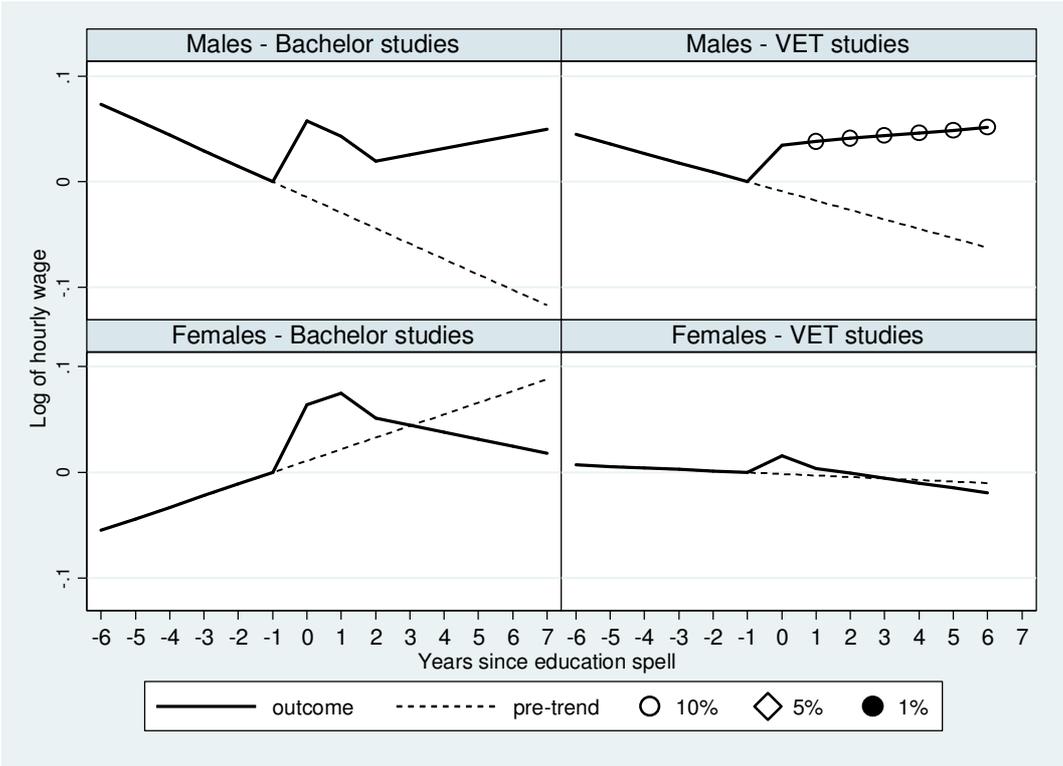
Notes: Predicted outcomes using estimates of Equation 2. Tests of differences in predicted outcomes from continuation of pre-study trend based on variance-covariance matrix constructed while allowing for clustering at the individual student level.

The benefits from mature age education appear more evident (at least for male workers) when we focus on the second standard measure of labour market outcomes, the hourly wage rate (Figure 2B). Downward trends in wage rates pre-study appear to reverse post-study among males, with the difference relative to the pre-study trend being statistically significant for VET study. The higher precision of estimates for VET study is not surprising, as the majority of adult education is at the VET level. Among females, the strong upward trend in wage rates pre Bachelor or above level study is not continued post-study, and there is no significant trend in outcomes pre or post VET.

There are no significant effects of study on weekly work hours evident in Figure 2C, apart from higher hours in the two years immediately after the end of Bachelor or above study for males.

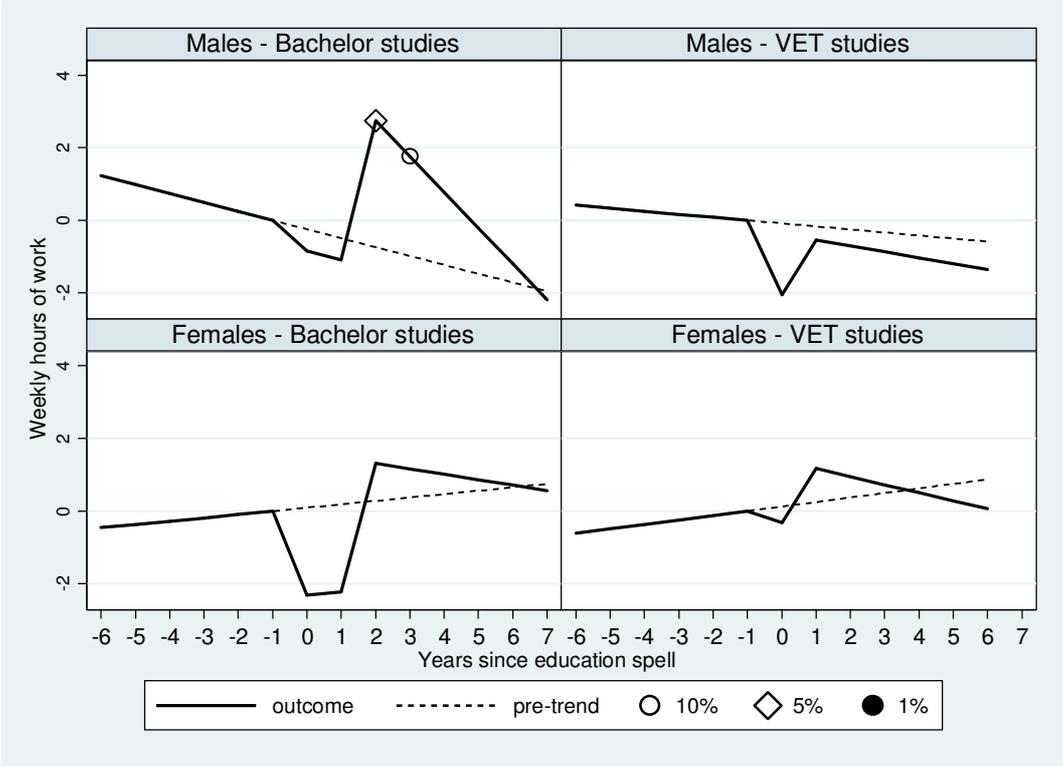
Overall, imposing some structure on the estimates (in Figures 2A to 2C) did not reveal much more in terms of positive returns to adult education. We now turn again to looking at the potential effect of such study on job satisfaction and satisfaction with work opportunities.

Figure 2B: Conditional log hourly wage rates, predicted trends



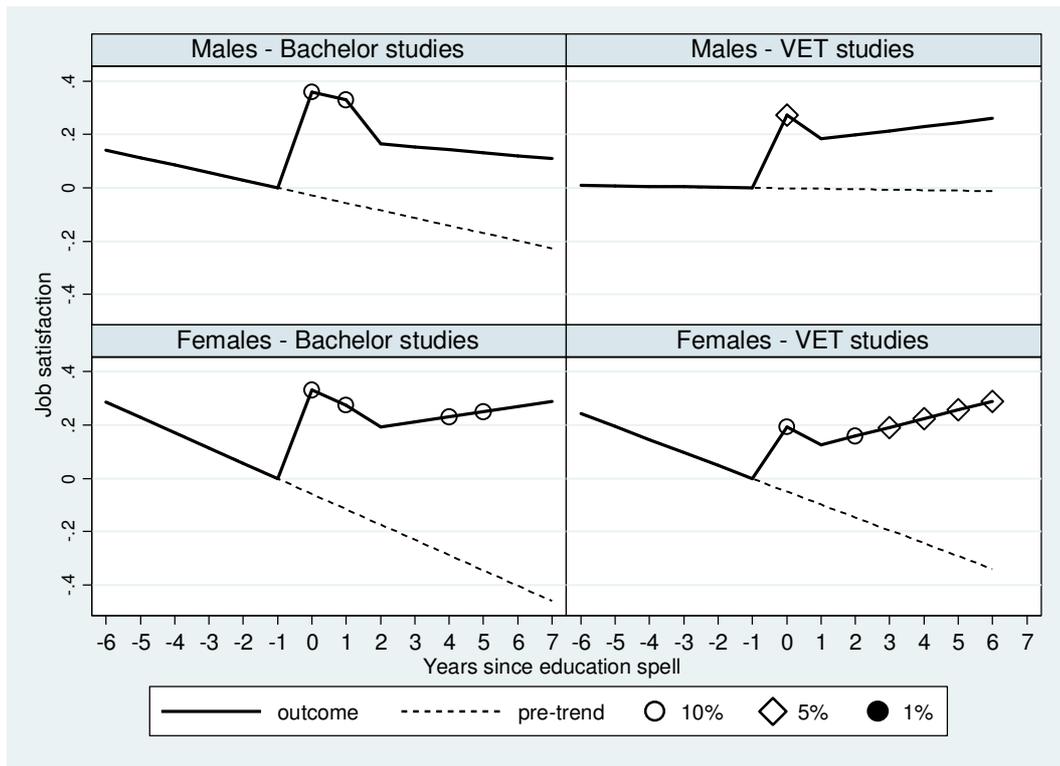
Notes: as per Figure 2A.

Figure 2C: Conditional weekly hours of work, predicted trends



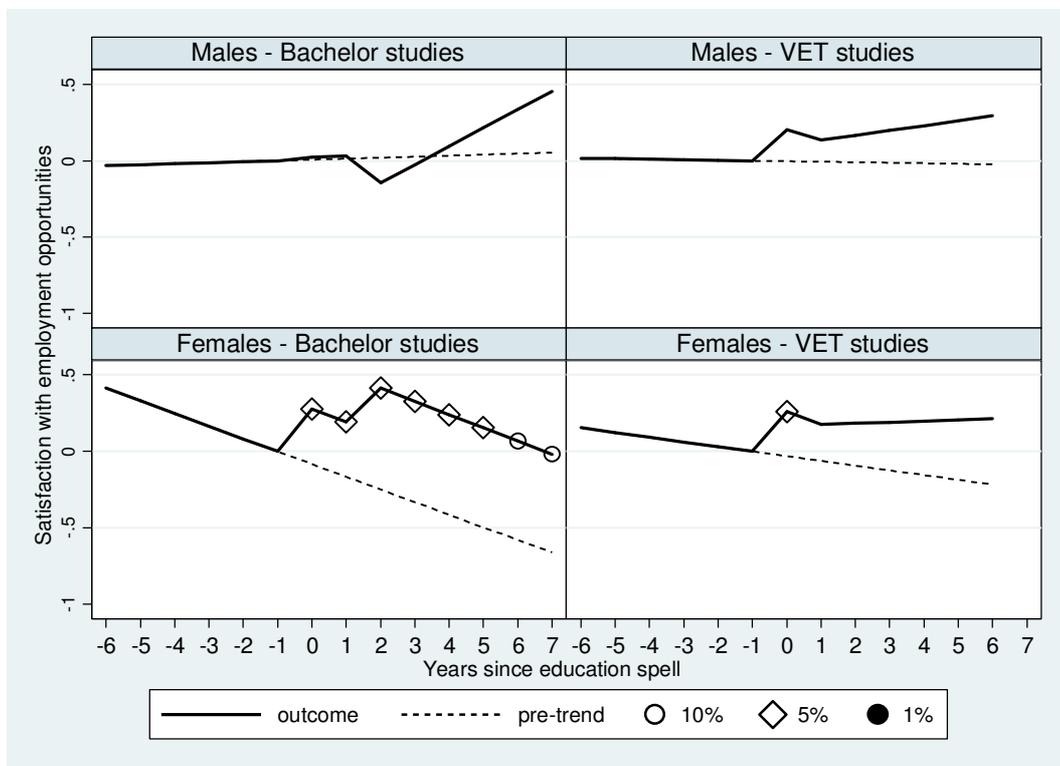
Notes: as per Figure 2A.

Figure 2D: Conditional job satisfaction, predicted trends



Notes: as per Figure 2A.

Figure 2E: Conditional satisfaction with employment opportunities, predicted trends



Notes: as per Figure 2A.

Once we impose some structure on the estimates, we find consistent positive effects of study on job satisfaction, particularly among females (Figure 2D). In most cases, studying appears to arrest a downward trend in job satisfaction. Similarly, we find mature age education arresting downward trends in satisfaction with employment opportunities among females (particularly Bachelor or above study), but less so among males (Figure 2E). Consistent with the “unrestricted” estimates based on equation 1, the main “returns” to mature age education, among females in particular, arise in terms of their satisfaction with their job or with their employment opportunities, rather than in direct measures of labour market “success” such as employment, hours of work or wage rates.

4.3 Outcomes for sub-groups

The estimates in Figures 1 and 2 represent the average effect among all individuals who undertake study. Thus we are pooling individuals that may have quite heterogeneous responses to education. We now repeat the analysis based on Equation 2 for a number of sample splits representing some of the more likely sources of heterogeneity in estimated effects. These sample splits are:

1. Those who complete their qualification versus those who do not (“completers” comprise 58% of all who study).
2. Younger adults (25 to 39 in 2001; this group comprises around 45% of our sample) versus older adults (40 to 54).
3. Those who study for a qualification at a level that is higher than the highest qualification currently held versus those that study at the same or lower level (“up-skillers” comprise 54% of all who study).

Rather than present separate sets of figures for all these sub-groups, we provide a summary of our findings for each sample split in Appendix Tables A6 to A8.²³

There is no evidence in Table A6 that individuals who complete qualifications have any more positive labour market responses to studying than those that studied but did not complete in terms of employment, weekly hours or wage rates. This finding may be due to the preponderance of non-completion among those studying at the VET level (more than 70% of non-completers in our sample were enrolled in a VET qualification). As VET

²³ All the underlying estimates are available from the authors upon request.

courses are typically administered in modules, many workers may opt out of study after completing those specific modules they deemed to be sufficient for their labour market requirements (McVicar and Tabasso, 2015). Adults that complete a Bachelor degree or higher did have larger increases in job satisfaction than those that studied but did not complete. There was little difference in the effects on job satisfaction between completers and non-completers of VET study. Regarding satisfaction with employment opportunities, female non-completers actually had more positive responses to studying than completers, while male Bachelor or above completers were the only male group to have a positive response.

We also found no evidence (Table A7) that younger adults had any more positive labour market responses to studying than older adults in terms of the standard measures (employment, hours, wage rates). This is in contrast to findings for the UK, where younger adults gained more from studying (Blanden et al., 2010). Interestingly, regarding job satisfaction and satisfaction with employment opportunities, older men and younger women gained more from Bachelor or above studies.

Finally, we found no evidence of adults who studied at a level higher than the highest qualification currently held (“up-skillers”) gained more than others in terms of the standard measures of employment, hours, and wage rates (Table A8). Male wage rates post Bachelor or above study did rise among “up-skillers”, but the effect was not statistically significant. Regarding job satisfaction and satisfaction with employment opportunities, the evidence on the subsamples of “up-skillers” and “not up-skillers” is quite mixed. Female “up-skillers” at the Bachelor or above level did gain more than those who studied at similar or lower levels, but the opposite was the case among males. Females studying at the VET level who were not “up-skillers” also had satisfaction gains, but “up-skillers” did not.

5. Discussion and concluding remarks

Engaging in education as an adult is an increasingly important component of the education and labour market landscape. Large proportions of working age adults undertake further education at non-conventional ages. This paper provides new insights into this phenomenon, particularly in understanding who is undertaking further education, and on what its labour market effects are. We focus our analysis on Australia, a country characterised by a high level of mature age education.

To begin, we found that a significant proportion of adult education is undertaken at the vocational level in Australia, and that individuals undertaking this level of education may already hold qualifications at this same level or at even higher levels. The decision to enrol in further education is also related to poorer labour market outcomes for males (low income and wages, low job satisfaction), while for females it is more closely related to marriage dissolution and unemployment.

Regarding the outcomes of adult education, in line with much of the related literature, we found very little consistent evidence that such education leads to significant improvements in the standard labour market outcomes of employment, hours of work or wage rates. There was some evidence of a downward trend in wage rates being arrested by education among males, and some evidence of employment probabilities rising among females undertaking vocational study (albeit the trend increase was already occurring pre-study). At least over the time frame we were able to investigate in this paper, engaging in formal education at more mature ages appears to be less beneficial than it is for individuals engaging at more conventional (younger) ages.

There was, however, more consistent evidence of mature age education improving levels of job satisfaction and satisfaction with employment opportunities, particularly among females. This suggests that reasons for studying at more mature ages may be quite heterogeneous across the population. It may not be the case that such individuals are only interested in increasing monetary returns. These findings are particularly relevant as most of the literature on adult education focuses on standard labour market outcomes and neglects other dimensions, such as those that we investigated in this paper.

While the HILDA Survey has a wealth of information on individuals, information on the reasons why individuals choose to study is not collected. However, the Australian Bureau of Statistics (ABS) has collected such information in their Surveys of Education and Training (SET). Percentages of individuals by their main reason for studying are presented in Appendix Table A9, broken down by gender and age group. Among the young (aged below 25), the dominant reason for study is to get a job, as we might expect. But this is much less likely to be the main reason for studying among more mature students. Note that even among mature students, females are more likely than males to respond that the main reason for studying is to get a job. This is consistent with our finding from the HILDA Survey that engagement in education is more likely to be related to marriage dissolution and unemployment among females.

Among mature students, the main reasons for studying are quite varied (Appendix Table A9). For many, it was a requirement of their job or it was undertaken to obtain skills for their current job. This finding accords with the notion that to just keep up with changes in how work is undertaken – perhaps in response to technological change – updating work skills is essential. For some, it was to get a different job or promotion, and this was more likely among males than females. Others were studying in order to change careers or for their personal interest and enjoyment.

The findings in this study pose important and challenging questions for policymakers contemplating the funding of mature age study. Much of this study does not take the form of gaining higher qualification levels. Much of it also does not appear to be related to obtaining higher paid employment. Some females do appear to use VET to re-enter the workforce. Thus such investment can be beneficial for the individual and potentially for society more generally, in terms of higher output, higher tax revenues and potentially lower income support expenditures.

The advantages adult males receive from VET, however, do not appear to be directly monetary, as wage rates and employment probabilities did not increase. Gains for males were generally limited to higher job satisfaction and satisfaction with employment opportunities. The payoff for society more generally from such study is thus less clear. Given this, government subsidisation of such study is more difficult to rationalise, particularly for the large number of individuals that have already attained higher level qualifications. That being said, there may exist cases where education at more mature ages may still be beneficial for individuals and desirable for society, in particular in response to job losses in industries in decline. Without such re-training and up-skilling, labour market outcomes for such individuals may actually have deteriorated.

Appendix A

Table A1: Current enrolment in formal education and training, 2011 HILDA

Age group	25 - 34	35 - 44	45 - 54	55 - 64
<i>Males</i>				
Any non-school study	20.86	10.47	7.09	4.18
Level				
Graduate and post-graduate	5.36	3.09	1.23	1.18
Bachelor degree	4.18	0.94	1.08	0.30
Diploma, associate degree	3.59	1.53	0.99	0.51
Certificate III/IV	6.75	4.14	2.93	1.95
Certificate I/II	0.79	0.59	0.75	0.16
Other or unknown level	0.19	0.18	0.11	0.07
Proportion full-time study	0.28	0.12	0.10	0.10
Number of observations	1,003	1,036	1,104	861
<i>Females</i>				
Any non-school study	23.26	17.27	12.51	5.48
Level				
Graduate and post-graduate	6.07	3.37	2.89	1.13
Bachelor degree	5.35	3.60	0.84	0.77
Diploma, associate degree	3.95	2.36	1.92	0.66
Certificate III/IV	6.82	7.45	5.67	2.41
Certificate I/II	0.77	0.38	1.19	0.52
Other or unknown level	0.30	0.11	0.00	0.00
Proportion full-time study	0.29	0.28	0.20	0.06
Number of observations	1,079	1,157	1,223	992

Source: HILDA data, weighted statistics.

Table A2: Number of individuals that enrolled and completed courses, HILDA.

	Enrolled in Bachelor or above	Completed Bachelor or above	Completion rate	Enrolled in VET	Completed VET	Completion rate
Males	117	63	0.54	341	214	0.63
Females	162	81	0.50	455	266	0.58
Total	279	144	0.52	796	480	0.60

Source: HILDA. Enrolment was any time during the years 2002-2009. Completion was any time during the years 2002-2011.

Table A3: Details of Australian education levels

Education level	ISCED code	Level description*
Certificate Level I / II	2C	These Certificates I qualify individuals with basic functional knowledge and skills to undertake routine work, further learning and community involvement. The volume of learning is typically 0.5 – 1 year. Examples: commercial kitchen basic skills, volunteering, pre-apprenticeship plumbing.
Certificate Level III / IV	3C / 4B	These Certificates qualify individuals who apply a broad range of specialised knowledge and skills in varied contexts to undertake skilled work and as a pathway for further learning. The volume of learning 0.5 – 2 years. There may be variations between short duration specialist qualifications that build on knowledge and skills already acquired and longer duration qualifications that are designed as entry level requirements for work. Up to 4 years may be required to achieve the learning outcomes through a program of training and employment (apprenticeship). Examples: registered/licensed plumber, teacher's aide.
Diploma and Advanced Diploma	5B	Diplomas qualify individuals who apply integrated technical and theoretical concepts and/or specialised knowledge in a broad range of contexts to undertake advanced skilled or paraprofessional work and as a pathway for further learning. The volume of learning is typically 1 – 2 years. Examples: enrolled nurse, draftsman, aircraft maintenance, early childhood educator.
Bachelor Degree	5A	The Bachelor Degree qualifies individuals who apply a broad and coherent body of knowledge in a range of contexts to undertake professional work and as a pathway for further learning. The volume of learning is typically 3 – 4 years. Examples: accountant, engineer, registered nurse.
Postgraduate Degrees	5A and 6	These Degrees qualify individuals who apply an advanced and substantial body of knowledge in a range of contexts for research and scholarship, as a pathway for further learning and to develop new knowledge. The volume of learning is typically 1-2 years for Master Degrees and 3-4 years for Doctoral Degrees.

* Source: see Australian Qualifications Framework January 2013, Australian Qualifications Framework Council, <http://www.aqf.edu.au/wp-content/uploads/2013/05/AQF-2nd-Edition-January-2013.pdf>

Table A4: Average values of explanatory variables in 2001, by level sought – Males

	All Individuals	Individuals Who Did Not Study	Bachelor Students	VET Students
	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)
Age	40.966 (8.411)	41.941 (8.216)	37.035 (7.902)	38.607 (8.474)
Number of children	1.115 (1.252)	1.107 (1.251)	1.000 (1.132)	1.185 (1.292)
Married or de facto	0.772	0.780	0.722	0.757
Separated or divorced	0.083	0.089	0.061	0.067
Widowed	0.002	0.002	0.000	0.000
Never married	0.144	0.129	0.217	0.176
Respondent has a disability	0.126	0.130	0.078	0.126
Urban area	0.636	0.628	0.757	0.625
Rural area	0.236	0.236	0.217	0.243
New South Wales	0.282	0.279	0.278	0.296
Victoria	0.257	0.254	0.296	0.255
Queensland	0.207	0.203	0.191	0.226
Southern Australia	0.101	0.100	0.113	0.103
Western Australia	0.100	0.109	0.070	0.076
Tasmania	0.028	0.028	0.026	0.026
Northern Territory	0.009	0.009	0.000	0.009
Australian Capital Territory	0.017	0.019	0.026	0.009
Year 12, 11 or below	0.366	0.394	0.165	0.326
VET Certificate	0.299	0.300	0.017	0.390
Diploma or Bachelor	0.237	0.215	0.522	0.223
Postgraduate	0.099	0.091	0.296	0.062
<i>Number of observations</i>	<i>1,742</i>	<i>1,286</i>	<i>115</i>	<i>341</i>

Notes: HILDA data for 2001. Standard deviations are provided in parentheses.

Table A5: Average values of explanatory variables in 2001, by level sought – Females

	All Individuals	Individuals Who Did Not Study	Bachelor Students	VET Students
	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)
Age	40.872 (8.470)	41.964 (8.424)	35.944 (7.405)	39.374 (8.119)
Number of children	1.286 (1.246)	1.244 (1.232)	1.211 (1.334)	1.440 (1.245)
Married or de facto	0.765	0.784	0.720	0.725
Separated or divorced	0.117	0.107	0.106	0.150
Widowed	0.013	0.014	0.012	0.011
Never married	0.104	0.094	0.161	0.115
Respondent has a disability	0.130	0.136	0.106	0.119
Urban area	0.635	0.632	0.727	0.611
Rural area	0.237	0.238	0.211	0.246
New South Wales	0.292	0.283	0.342	0.299
Victoria	0.248	0.243	0.280	0.251
Queensland	0.209	0.214	0.186	0.204
Southern Australia	0.097	0.097	0.087	0.101
Western Australia	0.096	0.104	0.043	0.092
Tasmania	0.031	0.030	0.037	0.029
Northern Territory	0.010	0.011	0.006	0.007
Australian Capital Territory	0.018	0.018	0.019	0.018
Year 12, 11 or below	0.539	0.573	0.143	0.580
VET Certificate	0.109	0.108	0.068	0.125
Diploma or Bachelor	0.244	0.218	0.509	0.229
Postgraduate	0.108	0.101	0.280	0.066
<i>Number of observations</i>	<i>1,964</i>	<i>1,349</i>	<i>161</i>	<i>454</i>

Notes: HILDA data for 2001. Standard deviations are provided in parentheses.

Table A6: Completers versus non-completers

	Obtaining a new qualification		Ended study without qualification	
	Pre-study trend	Education effect	Pre-study trend	Education effect
Male employment				
Bachelor or higher	negative	positive	zero	zero
VET	positive	zero	positive	zero
Female employment				
Bachelor or higher	positive	negative	negative	positive
VET	positive	negative	positive	zero
Male log hourly wage				
Bachelor or higher	zero	zero	negative	positive
VET	negative	positive	positive	zero
Female log hourly wage				
Bachelor or higher	positive	negative	zero	positive*
VET	zero	zero	zero	zero
Male weekly hours of work				
Bachelor or higher	positive	zero	negative	zero
VET	negative	zero	zero	zero
Female weekly hours of work				
Bachelor or higher	positive	zero	zero	zero
VET	positive	zero	positive	negative
Male job satisfaction				
Bachelor or higher	negative	positive*	zero	zero
VET	positive	zero	negative	positive
Female job satisfaction				
Bachelor or higher	negative	positive**	negative	positive*
VET	negative	positive	negative	positive*
Male satisfaction with employment opportunities				
Bachelor or higher	negative	positive**	positive	zero
VET	zero	zero	positive	zero
Female satisfaction with employment opportunities				
Bachelor or higher	negative	zero	negative	positive*
VET	zero	zero	negative	positive*

Notes: Summary of effects based on estimates of Equation 2. Statistically significant effects of education at the 10% (*), 5% (**) and 1% (***) levels, for at least two periods post-study.

Table A7: Younger versus older adults

	Younger (aged 25 to 39 in 2001)		Older (aged 40 to 54 in 2001)	
	Pre-study trend	Education effect	Pre-study trend	Education effect
Male employment				
Bachelor or higher	zero	zero	negative	zero
VET	zero	zero	positive	zero
Female employment				
Bachelor or higher	positive	negative	negative	positive**
VET	positive	negative	positive	zero
Male log hourly wage				
Bachelor or higher	zero	zero	negative	positive
VET	negative	zero	zero	zero
Female log hourly wage				
Bachelor or higher	positive	zero	negative	positive**
VET	Zero	zero	zero	zero
Male weekly hours of work				
Bachelor or higher	negative	positive**	positive	zero
VET	zero	zero	negative	zero
Female weekly hours of work				
Bachelor or higher	zero	zero	positive	zero
VET	positive	zero	positive	zero
Male job satisfaction				
Bachelor or higher	zero	zero	negative	positive***
VET	positive	zero	positive	zero
Female job satisfaction				
Bachelor or higher	negative	positive***	negative	zero
VET	negative	positive*	negative	positive
Male satisfaction with employment opportunities				
Bachelor or higher	positive	zero	negative	positive*
VET	zero	positive	positive	positive
Female satisfaction with employment opportunities				
Bachelor or higher	negative	positive***	negative	negative
VET	positive	zero	negative	positive

Notes: Summary of effects based on estimates of Equation 2. Statistically significant effects of education at the 10% (*), 5% (**) and 1% (***) levels, for at least two periods post-study.

Table A8: Up-skillers versus no up-skilling

	Obtaining higher education level		Lower or same education level	
	Pre-study trend	Education effect	Pre-study trend	Education effect
Male employment				
Bachelor or higher	positive	zero	negative	positive
VET	positive	zero	positive	zero
Female employment				
Bachelor or higher	positive	negative	negative	positive
VET	positive	negative	positive	zero
Male log hourly wage				
Bachelor or higher	negative	positive	positive	negative
VET	negative	positive	negative	positive
Female log hourly wage				
Bachelor or higher	positive	negative	negative	zero
VET	zero	zero	zero	zero
Male weekly hours of work				
Bachelor or higher	positive	negative	negative	positive***
VET	zero	negative	negative	zero
Female weekly hours of work				
Bachelor or higher	positive	zero	negative	zero
VET	positive	zero	positive	negative
Male job satisfaction				
Bachelor or higher	negative	positive*	zero	positive
VET	negative	positive	positive	zero
Female job satisfaction				
Bachelor or higher	negative	positive**	positive	zero
VET	negative	positive	negative	positive**
Male satisfaction with employment opportunities				
Bachelor or higher	zero	positive	zero	positive
VET	negative	positive	positive	zero
Female satisfaction with employment opportunities				
Bachelor or higher	negative	positive**	positive	negative
VET	zero	zero	negative	positive

Notes: Summary of effects based on estimates of Equation 2. Statistically significant effects of education at the 10% (*), 5% (**) and 1% (***) levels, for at least two periods post-study.

Table A9: Main reason for studying for a formal qualification in previous 12 months

Age group	15-24	25-39	40-54	55+
Males				
To get into another course of study	4.4	1.0	1.1	--
To get a job	44.3	11.0	5.9	4.5
To get a different job or promotion	5.2	19.8	14.1	9.9
Was a requirement of job	13.2	15.3	14.6	18.0
Wanted extra skills for job	6.1	20.8	27.3	19.8
To start own business	3.5	2.8	2.3	--
To develop existing business	0.2	1.6	4.8	1.8
To try for a different career	3.5	9.9	7.1	8.1
To improve general educational skills	5.6	6.5	7.5	4.5
To get skills for community/voluntary work	0.4	1.2	2.1	9.0
To increase confidence/self-esteem	0.4	0.5	1.8	0.9
For personal interest/enjoyment	11.2	8.3	9.8	19.8
Other reason	2.1	1.4	1.6	3.6
	100	100	100	100
Females				
To get into another course of study	5.0	2.7	1.1	2.2
To get a job	43.7	14.2	9.6	10.1
To get a different job or promotion	6.2	17.2	11.7	8.0
Was a requirement of job	6.1	10.9	12.6	12.3
Wanted extra skills for job	5.9	19.3	26.6	17.4
To start own business	2.2	2.5	3.0	3.6
To develop existing business	0.5	1.3	2.1	0.7
To try for a different career	4.3	11.1	9.3	5.1
To improve general educational skills	8.8	6.6	6.4	8.7
To get skills for community/voluntary work	0.9	1.5	3.0	3.6
To increase confidence/self-esteem	0.8	0.8	1.8	2.9
For personal interest/enjoyment	13.2	10.6	10.4	21.0
Other reason	2.4	1.5	2.4	4.4
	100	100	100	100

Notes: Constructed from the Survey of Education and Training, 2009 Confidentialised Unit Record File (CURF) provided by the Australian Bureau of Statistics. Excludes students from overseas who are present in Australia purely for study.

References

- Albrecht, J, van den Berg, GJ & Vroman, S 2005, 'The Knowledge Lift: The Swedish Adult Education Program That Aimed to Eliminate Low Worker Skill Levels', IZA Discussion Papers 1503, Institute for the Study of Labor (IZA).
- Ashenfelter, O 1978, 'Estimating the impact of training programs on earnings', *Review of Economics and Statistics*, vol. 6, no. 1, pp. 47-57.
- Blundell, R, Dearden, L, Goodman, A & Reed, H 2000, 'The Returns to Higher Education in Britain: Evidence from a British Cohort', *The Economic Journal*, vol. 110, no. 461, pp. F82-F99.
- Blanden, J, Buscha, F, Sturgis, P & Urwin, P, 2010, 'Measuring the Returns to Lifelong Learning', Centre for the Economics of Education Discussion Paper CEE DP 110, London School of Economics.
- Card, D 1999, 'The Causal Effect of Education on Earnings,' in O. Ashenfelter and D. Card (eds) *Handbook of Labor Economics*, Vol. 3, Ch. 30, pp. 1801-1863, Elsevier (North-Holland).
- Coelli, M, 2011, 'The forgotten second quartile: parental income and post-secondary education enrolment in Australia', Department of Economics Working Paper no. 1107, University of Melbourne.
- Coelli, M, Tabasso, D & Zakirova, R 2012, 'Studying beyond age 25: who does it and what do they gain', A National Vocational Education and Training Research and Evaluation Program Research Report, National Centre for Vocational Education Research (NCVER), Adelaide.
- Griliches, Z 1980, 'Schooling interruption, work while in school and the returns from schooling' *The Scandinavian Journal of Economics*, vol. 82, no. 2, pp. 291-303.
- Headey, B & Warren, D 2008 'Adult education and job training, 2001-2005: Who does it? Does it improve future earnings?' in *Families, Incomes and Jobs, Volume 3: A Statistical Report on Waves 1 to 5 of the HILDA Survey*, Melbourne Institute of Applied Economic and Social Research, The University of Melbourne, Melbourne.
- Heckman, J 1979 'Sample selection bias as a specification error', *Econometrica*, vol. 47, no. 1, pp. 153-161.

- Hogan, WJ and Lancaster, T 2004 'Instrumental variables and inverse probability weighting for causal inference from longitudinal observational studies', *Statistical Methods in Medical Research*, vol. 13, pp. 17-48.
- Huff Stevens, A, Kurlaender, M & Grosz, M 2015 'Career technical education and labor market outcomes: Evidence from California community colleges', NBER Working Paper No. 21137, April.
- Jacobson, L, LaLonde, R & Sullivan, DG 2005 'Estimating the returns to community college schooling for displaced workers', *Journal of Econometrics*, vol. 125, no.1-2, pp. 271-304.
- Jenkins, A 2006 'Women, lifelong learning and transitions into employment', *Work, employment and society*, vol. 20, no. 2, pp.309-328.
- Jenkins, A, Vignoles, A, Wolf A & Galindo-Rueda, F 2003, 'The determinants and labour market effects of lifelong learning', *Applied Economics*, vol. 35, no.16, pp.1711-1721.
- Jepsen, C, Troske, K & Coomes, P 2014 'The labor-market returns to community college degrees, diplomas, and certificates,' *Journal of Labor Economics*, vol. 32, no. 1, pp. 95-121.
- Karmel, T & Woods, D 2004, 'Lifelong learning and older workers', Report, National Centre for Vocational Education Research (NCVER), Adelaide.
- Lee, WS & Coelli M 2010, 'Analysis of private returns to vocational education and training', A National Vocational Education and Training Research and Evaluation Program Report, National Centre for Vocational Education Research (NCVER), Adelaide.
- Leigh, DE & Gill, AM 1997, 'Labor market returns to community colleges: Evidence for returning adults', *Journal of Human Resources*, vol. 32, no. 2, pp. 334-353.
- Li, J, Duncan, A and Miranti, R 2015, 'Underemployment among Mature-Age Workers in Australia', *Economic Record*, DOI: 10.1111/1475-4932.12219
- Light, A 1995. 'Hazard model estimates of the decision to reenroll in school', *Labour Economics*, vol. 2, no. 4, pp. 381-406.
- McVicar, D & Tabasso, D 2015, 'The impact of disadvantage on VET completion and employment gaps', *forthcoming*, NCVER, Adelaide.
- Marcus, RD 1984, 'Measuring the rate of return to interrupted schooling', *Journal of Educational Statistics*, vol. 9, no. 4, pp. 295-310.

- Organisation for Economic Cooperation and Development (OECD) 1998, *Education at a Glance 1998: OECD Indicators*, OECD Publishing.
- Organisation for Economic Cooperation and Development (OECD) 2003, *Beyond Rhetoric: Adult Learning Policies and Practices*, OECD Publishing.
< http://www.oecd-ilibrary.org/education/beyond-rhetoric_9789264199446-en>.
- Organisation for Economic Cooperation and Development (OECD) 2013, *Education at a Glance 2013: OECD Indicators*, OECD Publishing.
<<http://dx.doi.org/10.1787/eag-2013-en>>.
- Roussel, S 2002, 'Factors influencing participation in post-secondary education and training in Australia: 1989–1997', *Australian Journal of Labour Economics*, vol.5 no.1, pp.77-100.
- Ryan, C & Sinning, M 2009, 'Job requirements and lifelong learning for older workers', NCVER, Adelaide.
- Silles, M 2007, 'Adult education and earnings: evidence from Britain', *Bulletin of Economic Research*, vol.59, no.4, pp.313-326.
- Stenberg, A & Westerlund, O 2008, 'Does comprehensive education work for the long-term unemployed?' *Labour Economics*, vol.15, no.1, pp.54-67.
- Watson, N & Wooden, M 2010, 'The HILDA Survey: progress and future developments', *Australian Economic Review*, vol. 43, pp. 326-336.
- Zhang, X & Palameta B 2006, 'Participation in adult schooling and its earnings impact in Canada', Analytical Studies Branch Research Paper Series No. 276, Statistics Canada, Ottawa.