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The Determinants of Earnings for Indigenous Australian Workers

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Abstract

Reducing the disadvantages faced by Indigenous Australians in relation to employment outcomes has become an important issue. There have been several studies which have focused on the factors associated with Indigenous Australians' labour force status. There is, however, only limited research on the factors which influence the earnings of Indigenous men and women. This paper enhances this literature by providing a detailed analysis on the factors which determine the earnings for Indigenous Australian workers, conditional on them being employed. The paper also estimates how Indigenous men and women's labour force participation decisions respond to changes in their potential earnings. The paper focuses on the extent to which human capital theory can explain the earnings of Indigenous Australians. It finds that the earnings of Indigenous Australians can largely be explained by their education levels and a number of demographic and job characteristics. The paper also finds that Indigenous Australians' labour force participation decisions respond positively to increases in their potential earnings. The results suggest that the human capital framework is appropriate for explaining Indigenous Australians' earnings.

Keywords: Economics of minorities, Labour force and employment, Wage level and structure

JEL Classification: J15, J21, J31

1. Introduction

It has been widely established that Indigenous Australians are disadvantaged in terms of employment and work conditions. Recent data suggests that only 51.5 per cent of Indigenous men and 41.4 per cent of Indigenous women are employed (Australian

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Bureau of Statistics, ABS, 2012). Most research on the employment outcomes of Indigenous Australians focuses on the factors associated with labour force status. There is limited research on the factors associated with the outcomes of those who are employed. Specifically, there is limited research on the factors associated with the earnings of Indigenous Australian workers.

It has been reported that the two main influences on the earnings of Indigenous Australians are their age (to proxy their labour market experience) and their education level.[1] The relationship between age and earnings for Indigenous Australians is consistent with human capital theory in terms of the earnings premiums associated with labour market experience. It has been commonly reported that there is an 'n' shaped pattern between earnings and Indigenous Australians' age (Daly and Hunter, 1999; Nepal and Brown, 2012; Daly and Liu, 1997 and Junankar and Liu, 2003). For example, Stephens (2009) suggests that the earnings for Indigenous Australians peak around the age group of 25 to 34 years for men and 35 to 44 years for women. Junankar and Liu (2003) suggest that earnings peak at age 44 for Indigenous men and age 40 for Indigenous women. These findings are of similar magnitudes to what has been reported for the total Australian population (see Preston, 2001).

It has also been suggested that Indigenous Australians' earnings are positively associated with their education level (Junankar and Liu, 2003; Daly, 1995; Hunter, 2006; Hunter and Gray, 2001; Jones, 1993 and Daly and Hunter, 1999). For instance, Daly (1995) reports that Indigenous men with certificate qualifications have earnings that are 15 per cent higher than the earnings of Indigenous men without post-school qualifications. Daly and Hunter (1999) suggest that Indigenous men and women with degrees or diplomas have earnings that are 20 and 27 per cent larger than the earnings of their counterparts without post-school education.

It appears that the relationship between education and earnings for Indigenous Australians is less pronounced than that for the total population. For example, Preston (2001) found that Australian men and women with degree level educational attainment have earnings that are 61.1 and 53.2 per cent higher than the earnings of men and women who have not completed high school. Moreover, it has been suggested that traditional economic theory, such as human capital theory, can only partially explain the earnings for Indigenous Australians and that other theories such as segmented labour market theory may be more relevant (see Stephens, 2010 for studies which examine this theory). This theory suggests that there are primary labour markets which offer many career opportunities and there are secondary labour markets which offer little opportunities. It has been suggested that Indigenous Australians are more likely to face this secondary labour market.

There are a number of limitations in the existing literature on the determinants of earnings for Indigenous Australians. First, most studies use data that is now fairly outdated. For example, Stephens (2009) used data from 2002 and Junankar and Liu (2003) used data from 1991. It is possible that the determinants of earnings for Indigenous Australians have changed. Given that the Australian Government has set

[1] The review in Stephens (2009) suggests that other demographic and household characteristics, such as health and marital status also impact Indigenous Australians' earnings, though the impact of these characteristics varies across studies.

a target of reducing the gap between the labour market outcomes of Indigenous and non-Indigenous Australians by 2018, it seems important to provide an analysis of the determinants of earnings for Indigenous Australians using recent data.[2] Moreover, given the recent improvements in the educational attainment of Indigenous Australians, it also seems important to revisit the question of whether human capital theory can now explain the earnings of Indigenous Australians.[3]

Second, most of the literature on the determinants of earnings for Indigenous Australians does not control for the potential of sample selection bias in the estimation of earnings. Most studies examine the determinants of earnings for Indigenous Australians by restricting the samples to those who work. The theory of labour supply suggests that potential biases can occur when estimating earnings without controlling for the probability of being employed (Heckman, 1979 and Killingsworth, 1983). This issue may be of importance to Indigenous Australians given their relatively lower employment rates. The study by Birch (2005b) found that there were substantial differences in the determinants of earnings when controlling for and not controlling for sample selection bias for groups of women with low employment rates.

Finally, most studies on the earnings of Indigenous Australians do not examine how improvements in earnings may potentially impact on labour force participation decisions. It is possible that Indigenous Australians have positive labour force participation elasticities with respect to potential earnings. Analysing how Indigenous Australians' labour force participation may respond to changes in their potential earnings may provide researchers and policymakers with a greater understanding of the potential options to increase labour force participation for Indigenous Australians.[4]

The purpose of this paper is to provide a detailed analysis of the earnings for Indigenous Australians who work using recent data from 2008. The paper estimates the determinants of earnings controlling for the probability that the individual works full-time, based on the two-stage procedure developed by Heckman (1979). The paper considers the determinants of earnings separately for Indigenous men and women. It is structured as follows. Section 2 discusses the data, theoretical model and estimation procedure. Section 3 presents the empirical results. A summary, including potential policy implications, is presented in section 4.

2. Data, Theoretical Model and Estimation Procedures

The data used in the empirical analyses are drawn from the 2008 National Aboriginal and Torres Strait Islander Social Survey (NATSISS) conducted by the ABS. The NATSISS contains detailed information on the socioeconomic characteristics of

[2] This target is part of the 'Closing the Gap' initiatives introduced by the Australian Government in 2008 (see Macklin, 2008)

[3] For example, the proportion of Indigenous Australians who had completed Year 12 or a skilled vocational qualification more than doubled from 16 per cent in 1994 to 37 per cent in 2008 (ABS, 2011).

[4] This paper focuses on the labour supply of Indigenous Australians and does not consider demand side factors. Gray *et al*. (2012) suggest that the employment rates of Indigenous Australians are influenced by a number of demand side factors including difficulties in finding work due to being located in areas with fewer jobs, competing with non-Indigenous Australians with higher levels of education and training, prejudices amongst employers, and having lower levels of health.

individuals who identify themselves as being of Aboriginal or Torres Strait Islander origin. The survey covers Indigenous Australians living in remote and non-remote areas of Australia and is the most recent and national survey specific to the Indigenous population (see ABS, 2009 for further details on the NATSISS). The data sample is restricted to Indigenous Australians aged 15 to 64 years and excludes individuals who were missing information on the variables considered in the analysis. The overall data sample is comprised of 3,137 men and 4,128 women.

A limitation of the 2008 NATSISS is that it does not contain information on an individual's earnings, only their personal income. To overcome this and facilitate an analysis on the factors associated with earnings, the study focuses on the weekly personal income of Indigenous Australians who are employed full-time (i.e., work 35 or more hours a week) and who report that their principal source of weekly personal income is from their employer as well as report that they do not receive Government pensions or allowances.[5] Approximately 37.3 per cent of the sample of Indigenous Australian men and 15.4 per cent of the sample of Indigenous Australian women fit these criteria.[6]

To estimate the determinants of earnings conditional on working, the paper first estimates the probability that the individual is employed on a full-time basis. It then estimates earnings taking into account the fact that the individual works. Following a model analogous to the standard labour supply theory outlined in Killingsworth (1983), the individual's decision to work full-time is based on a comparison of their potential market wage (i.e., the wage that they would earn if they worked in full-time employment), their non-wage income and reservation wage (measured by the value placed on not working full-time and proxied by variables such as children). The probability that the individual is employed full-time for the j^{th} person can be written as:

$$\Pr(j \textit{ works}) = \Pr\left(\beta_{w_0} + \beta_{w_1} A_{w_j} + \varepsilon_{w_j} > \beta_{r_0} + \beta_{r_1} V_j + \beta_{r_2} A_{r_j} + \varepsilon_{r_j}\right). \quad (1)$$

Where A_{w_j} is a vector of observable characteristics which affect the market wage (w), A_{r_j} is a vector of observable characteristics which affect the individual's reservation wage (r), V_j represents the individual's non-wage income, ε_{w_j} is the mean-zero random error term representing the unobserved characteristics which affect the individual's market wage such as motivation, and ε_{r_j} is a mean-zero error term representing the

[5] This eliminates Indigenous Australians who receive auxiliary Government payments such as the Family Tax Benefit.

[6] Most literature on the earnings of Indigenous Australians is based on personal income rather than actual wages due to data limitations (the exception being Daly and Hunter (1999) who used wage data from the 1994 NATSISS). It is noted that the measure of earnings used in this paper may capture income from sources other than wages and salaries. However by placing the described restrictions on earnings, other income transfers are somewhat eliminated. Earnings equations are also estimated on samples restricted to couple only families to eliminate potential payments of child support for lone parents. The Indigenous earnings studies by Daly (1995) and Jones (1993) also restrict their samples to full-time workers. Daly (1995) indicates that this is to provide an adequate indicator of earnings when using personal income as the measure. In addition, Preston (2001) notes that most Australian studies on the broader population which examine earnings use income as the dependent variable.

unobserved characteristics which affect the individual's reservation wage such as desire for leisure time. Equation (1) is estimated using a Probit model where the market wage and reservation wage are specified in their reduced-form and the error term becomes ε_{d_j} (where $\varepsilon_{d_j} = \varepsilon_{w_j} - \varepsilon_{r_j}$).

The estimates obtained from equation (1) are then used to construct a sample selection bias correction term, λ. Based on Heckman (1979), this is given by:

$$\lambda = f\left(\frac{-K_j}{\sigma_d}\right) \Big/ \left(1 - F\left(\frac{-K_j}{\sigma_d}\right)\right). \tag{2}$$

Where f is the standard normal density function and F is the standard normal cumulative density function.

The second stage of the analysis is to estimate the determinants of earnings for workers correcting for selection bias ($\hat{\lambda}_j$). Hence the market wage equation can be written as:

$$w_j = \beta_{w_0} + \beta_{w_1} A_{w_j} + \beta_{w_2} \hat{\lambda}_j + v_j . \tag{3}$$

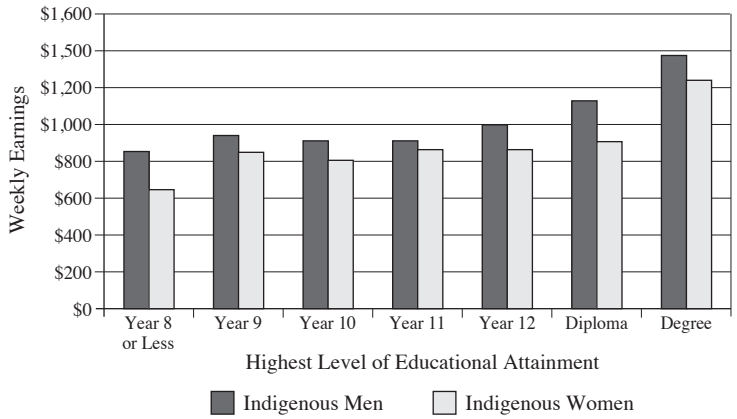
Killingsworth (1983, p.159) suggests β_{w_2} should be interpreted as an estimation of the covariance of the ratio of σ_{wd}/σ_d where σ_{wd} is the covariance between (ε_{w_j}) and the error term in the reduced-form model to estimate the probability of working full-time (ε_{d_j}). Equation (3) is estimated using Ordinary Least Squares (OLS) and market wages are measured by the log of weekly earnings.[7] The individual's earnings are modelled as a function of their education, computer usage, age, language spoken at home, disability status, marital status, locality of residence, whether they live in a household with only Indigenous persons and a number of cultural and behavioural characteristics.[8] An extended market wage model is also estimated controlling for a number of job characteristics of workers.

Overall, the mean weekly earnings for full-time workers are $1,021 for Indigenous men and $940 for Indigenous women. As shown in figure 1, consistent with human capital theory, there is considerable variation in weekly earnings by educational attainment. For Indigenous men working full-time, their weekly earnings vary by approximately 60 per cent, from $846 for those with Year 8 or lower educational attainment to $1,381 for those with degree or higher levels of educational attainment. The weekly earnings of Indigenous women working full-time vary by over 90 per cent from $645 for women with Year 8 or lower levels of education to $1,232 for those with degree or higher education levels.

[7] It is not possible to estimate the hourly earnings of full-time workers as the 2008 NATSISS only has broad hours of work categories (i.e., '35-39 hours', '41-48 hours' and '49+ hours') for those working full-time. The hours included in these categories are too wide to use the mid-points to construct a continuous variable for hours of work which would then be used to construct hourly earnings.

[8] Table A1 of the Appendix contains a description of the variables used to estimate earnings. The sample includes 12 Indigenous Australians who are participants in Community Development Employment Projects (CDEP).

Figure 1 - Mean Weekly Earnings of Indigenous Australians Working Full-Time by Educational Attainment



To estimate how Indigenous Australians' labour force participation may respond to changes in potential earnings, labour force participation elasticities are estimated.[9] These elasticities essentially show how the probability of participating in the labour market is influenced by a change in potential earnings (based on the earnings of those who are employed and working on a full-time basis). To compute the labour force participation elasticities with respect to potential earnings, the estimates obtained from the second stage of the Heckman procedure (i.e., the estimation of equation (3)) are used to form a predicted wage variable. This estimate of predicted wages is then included in a labour force participation model. The model to estimate the probability of participation in the labour market is similar to equation (1) except for the fact it estimates the labour force participation decision (in place of the estimation of the probability of working full-time) and includes an estimate of predicted wages ($\hat{w}$) in place of the vector of observable characteristics which influence market wages (i.e., in place of β_{0w_j}). In other words, the estimation of the labour force participation elasticity with respect to earnings is obtained by:

$$LFPN = \beta_0 + \beta_1 \hat{w}_j + \beta_3 V_j + \beta_4 A_{r_j} + \varepsilon_{d_j}. \quad (4)$$

Where *LFPN* is equal to one if the individual participates in the labour market and is equal to zero otherwise. Equation (4) is estimated using a Probit model. Following Birch (2005b), the estimation of the labour force participation elasticity with respect to wages is then determined by:

[9] As noted in Birch (2005a) is it also conventional for labour supply studies to estimate hours of work elasticities with respect to earnings. Hours of work elasticities have not been estimated in this paper due to the fact that they require the estimation of how predicted wages influence the number of hours worked (usually using a continuous hours of work variable, see Birch, 2005b). As noted above there is not suitable information in the NATSISS to construct a continuous hours of work variable for full-time workers.

$$LFPN \text{ elasticity} = \partial LFPN/\partial \hat{w} \cdot \hat{w}/LFPN \quad (5)$$

Where $\partial LFPN/\partial w = \phi(\hat{\beta}_1 x_1)\hat{\beta}_{\hat{w}}$ and ϕ is the standard normal density function, x_1 is the set of regressors included in the market wage equation (equation (3)), $\hat{\beta}_1$ is the associated estimated coefficients of the regressors included in the market wage equation and $\hat{\beta}_{\hat{w}}$ is the estimated coefficient of the predicted wage variable. The elasticities are evaluated at the mean labour force participation rate. A limitation of the estimation of the elasticities is that it is not possible to examine the relationship between labour force participation and hourly earnings or the relationship between hours of work and hourly earnings due to the data limitations. As such, the elasticities only establish a relationship between Indigenous Australians' labour force participation decisions and their potential earnings.

The empirical analysis estimates the determinants of earnings conditional on working, as well as the labour force participation elasticities with respect to earnings using separate samples of Indigenous men and women as well as for samples of Indigenous men and women from couple only families.

3. Empirical Results

The results from the estimation of the determinants of earnings for Indigenous men and women, conditional on them working 35 or more hours per week are presented in tables 1 and 2, respectively.[10] The dependent variable for the analyses is the logarithm of weekly earnings and each model controls for sample selection bias. Overall, the earnings model performs relatively well. The adjusted R^2s indicate that variables included in the model account for 18.0 to 23.1 per cent of the variation in earnings for Indigenous men and 27.8 to 33.8 per cent of the variation in the earnings for Indigenous women. Whilst the adjusted R^2s are smaller than what have been reported in comparable studies for the general Australian population (i.e., Preston, 2001 reports adjusted R^2s of 0.437 and 0.412 for earnings models on men and women), they are on par with those reported in other Australian studies on Indigenous earnings such as Junankar and Liu (2003) who report adjusted R^2s of 0.230 for Indigenous Australian men and 0.190 for Indigenous Australian women.

Tables 1 and 2 show that Indigenous Australians' earnings are positively associated with their levels of education. For example, the earnings of Indigenous men and women whose highest education level is the completion of high school (*Year 12*) are 23.0 and 20.1 per cent higher than the earnings of Indigenous men and women whose highest education level is less than Year 9. The earnings for those with diplomas (*Diploma*) are 28.1 and 18.8 per cent higher than the earnings of Indigenous men and women without the completion of Year 9 and Indigenous men and women with degrees (*Degrees*) have earnings that are 40.9 and 38.6 per cent higher than the earnings of their counterparts with less than Year 9 education. The strong positive relationship between education and earnings presented in tables 1 and 2 may suggest that human capital theory is relevant in explaining the earnings of Indigenous men and women.

[10] The results from the estimation of the probability of working full-time are presented in table A2 of the Appendix. The results are consistent with other studies using the 2008 NATSISS data by Kalb *et al*. (2012) and Savvas *et al*. (2011).

The impact of education on earnings found in this study is more pronounced than in other studies on Indigenous earnings using earlier data (e.g., Stephens, 2009 and Daly, 1995). It is possible that there have been improvements in the earnings of Indigenous Australians with post school qualifications in the past decade given that the results are moving closer in magnitude to the earnings premiums for educational attainment for the general Australian population (see Preston, 2001 for a review of studies). The fact that the earnings premiums associated with educational attainment for Indigenous Australians are still lower than that for the wider Australian population may indicate that many Indigenous Australians may face the 'secondary labour market' which offers fewer career opportunities. Additionally, it may also reflect discrimination in earnings for Indigenous Australian workers.

Tables 1 and 2 indicate that the earnings premiums associated with education are lower for Indigenous women than Indigenous Australian men with the gap in the earnings premium being 2.9 percentage points for those holding a Year 12 qualification, 9.3 percentage points for those holding diplomas and 2.3 percentage points for those holding degree qualifications. The gender differentials for the earnings premium associated with education are consistent with the findings reported in many earnings studies for the general population (see Preston, 2001 for a review of studies). Miller (2005, p.408) suggests that the lower earnings returns to education experienced by women can be linked to the fundamental operations of the Australian labour market which systematically disadvantages women and regardless of the type of jobs and education that women have, they receive lower earnings than men.

Consistent with most studies in the literature, tables 1 and 2 show that the earnings of Indigenous Australians vary according to their age. The earnings for Indigenous Australians peak at 47 years for men and 44 years for women. These ages are relatively on par with the Junankar and Liu (2003). They are also relatively consistent with earnings studies on the general population, based on measures of labour market experience.[11]

Indigenous Australians whose main language spoken at home is a language other than English (No English) were found to have lower earnings than those who speak English at home. For Indigenous men, speaking a language other than English at home is associated with a reduction in earnings of 13.8 per cent. For Indigenous women, the reduction in earnings is 27.5 per cent. The negative impact of speaking a language other than English at home on earnings is similar to other Australian studies that have found that immigrants who speak a language other than English at home face significant disadvantages in the labour market including lower earnings (e.g., Chiswick and Miller, 1995). It may indicate that English language skills are an important aspect in improving Indigenous Australians' earning capacity. Alternatively, these results

[11] Most studies on Indigenous Australians' labour market outcomes use age as a proxy for labour experience over the standard proxy of labour market experience commonly used in wage studies on the general population (where experience is measured as age minus years of schooling minus five). This may be due to difficulties in measuring years of schooling for Indigenous Australians given the high level of Indigenous students who repeat a year of schooling (see Anderson, 2013) and difficulties in accurately measuring years spent working due to Indigenous Australians' high movement among labour states (e.g., employed, unemployed and not in the labour market) (see Gray and Hunter, 2005).

Table 1 - Results From the Estimation of the Determinants of Weekly Earnings for Indigenous Men[a]

	Panel (i) All Indigenous Men				*Panel (ii) Indigenous Men in Couple Families*			
	Without Job Characteristics		*With Job Characteristics*		*Without Job Characteristics*		*With Job Characteristics*	
Variable	*Estimated Coefficient*	*Marginal Effect*	*Estimated Coefficient*	*Marginal Effect*	*Estimated Coefficient*	*Marginal Effect*	*Estimated Coefficient*	*Marginal Effect*
Constant	6.070 (0.239)***	NA	5.945 (0.239)***	NA	6.116 (0.237)	NA	6.088 (0.231)	NA
Education Characteristics:								
Year 9	0.167 (0.119)		0.165 (0.115)		0.111 (0.090)		0.077 (0.082)	
Year 10	0.124 (0.116)		0.125 (0.112)		0.061 (0.084)		0.046 (0.078)	
Year 11	0.150 (0.117)		0.143 (0.116)		0.024 (0.090)		0.010 (0.084)	
Year 12	0.207 (0.125)*	0.230	0.212 (0.125)*	0.236	0.112 (0.089)		0.092 (0.084)	
Diploma	0.247 (0.120)**	0.281	0.260 (0.124)**	0.296	0.167 (0.083)**	0.182	0.156 (0.079)**	0.169
Degree	0.343 (0.157)**	0.409	0.348 (0.195)*	0.410	0.334 (0.094)***	0.397	0.317 (0.093)***	0.373
Computer	0.026 (0.041)		0.013 (0.042)		0.082 (0.040)***	0.055	0.065 (0.039)*	
Demographic Characteristics:								
Age	0.029 (0.009)***		0.027 (0.008)***		0.023 (0.010)***		0.017 (0.010)*	
$Age^2/100$	-0.030 (0.010)***		-0.029 (0.010)***		-0.022 (0.010)***		-0.015 (0.010)	
No English	-0.149 (0.072)**	-0.138	-0.144 (0.068)**	-0.134	-0.208 (0.082)***	-0.188	-0.199 (0.076)***	-0.181
Disability	-0.003 (0.034)		-0.014 (0.035)		-0.015 (0.031)		-0.030 (0.030)	
Household Characteristics:								
Married	0.117 (0.045)***	0.124	0.119 (0.040)***	0.119	0.177 (0.056)***	0.193	0.166 (0.056)***	0.181
ATSI Household	0.014 (0.030)		0.200 (0.031)		-0.009 (0.037)		0.003 (0.036)	
Geography:								
Remote	0.047 (0.045)		0.037 (0.050)		0.074 (0.043)*	0.077	0.082 (0.042)*	0.084
Behavioural Characteristics:								
Homelands	-0.017 (0.029)		-0.011 (0.028)		-0.024 (0.033)		-0.004 (0.032)	
Smokes	0.021 (0.032)		0.005 (0.029)		0.004 (0.032)		-0.001 (0.030)	
Jail	-0.030 (0.051)		-0.045 (0.051)		-0.072 (0.053)		-0.086 (0.050)*	-0.082
Discriminated	0.090 (0.036)**	0.094	0.084 (0.036)**	0.087	0.092 (0.038)***	0.097	0.078 (0.035)**	0.080

Table 1 - Results From the Estimation of the Determinants of Weekly Earnings for Indigenous Men[a] (continued)

	Panel (i) All Indigenous Men				*Panel (ii) Indigenous Men in Couple Families*			
	Without Job Characteristics		*With Job Characteristics*		*Without Job Characteristics*		*With Job Characteristics*	
Variable	*Estimated Coefficient*	*Marginal Effect*	*Estimated Coefficient*	*Marginal Effect*	*Estimated Coefficient*	*Marginal Effect*	*Estimated Coefficient*	*Marginal Effect*
Job Characteristics:								
Casual	[b]		0.093 (0.040)***	0.097	[b]		0.065 (0.047)	
Overtime	[b]		0.208 (0.029)***	0.231	[b]		0.214 (0.029)***	0.238
Mutli Job	[b]		-0.079 (0.081)		[b]		0.015 (0.053	
Temporary	[b]		-0.105 (0.043)***	-0.100	[b]		-0.142 (0.051)***	-0.132
Manager	[b]		0.137 (0.064)***	0.147	[b]		0.139 (0.072)*	0.149
Professional	[b]		0.092 (0.093)		[b]		0.115 (0.063)*	0.122
Trade	[b]		0.042 (0.041)		[b]		0.031 (0.049)	
Communication	[b]		0.040 (0.051)		[b]		0.042 (0.061)	
Admin	[b]		0.100 (0.056)*	0.106	[b]		0.114 (0.062)*	0.120
Sales	[b]		0.001 (0.071)		[b]		0.044 (0.091)	
Drivers	[b]		0.113 (0.048)***	0.119	[b]		0.167 (0.047)***	0.180
Selection Correction:								
$\hat{\lambda}$	-0.250 (0.058)***	NA	-0.182 (0.059)***	NA	-0.192 (0.065)***	NA	-0.145 (0.063)**	NA
Sample Size:		1,172		1,172		852		852
F-test:		15.860		14.190		10.660		10.130
Adjusted R^2		0.180		0.231		0.222		0.305
Mean of *w*		6.806		6.806		6.854		6.854

Notes: [a] The robust standard errors are in parentheses, where the symbol *** represents statistical significance at the one per cent level, ** represents statistical significance at five per cent level and * represents statistical significance at the 10 per cent level. Marginal effects are only reported for dummy variables of statistical significance and following Halvorsen and Palmquist (1980) are determined ($\exp(\beta_0) - 1$). The marginal effects for the age variable are reported within the text.
[b] Not included in the estimating equation.

Table 2 - Results From the Estimation of the Determinants of Weekly Earnings for Indigenous Women[a]

	Panel (i) All Indigenous Women				*Panel (ii) Indigenous Women in Couple Families*			
	Without Job Characteristics		*With Job Characteristics*		*Without Job Characteristics*		*With Job Characteristics*	
Variable	*Estimated Coefficient*	*Marginal Effect*	*Estimated Coefficient*	*Marginal Effect*	*Estimated Coefficient*	*Marginal Effect*	*Estimated Coefficient*	*Marginal Effect*
Constant	5.432 (0.268)***	NA	5.412 (0.283)***	NA	5.157 (0.311)***	NA	5.199 (0.319)***	NA
Education Characteristics:								
Year 9	0.248 (0.100)**	0.281	0.227 (0.097)***	0.254	0.184 (0.134)		0.241 (0.146)*	0.273
Year 10	0.108 (0.091)		0.143 (0.089)		0.223 (0.130)*	0.250	0.259 (0.133)*	0.295
Year 11	0.133 (0.103)		0.146 (0.101)		0.267 (0.142)*	0.306	0.272 (0.145)*	0.313
Year 12	0.183 (0.101)*	0.201	0.179 (0.101)*	0.196	0.363 (0.135)***	0.437	0.357 (0.137)**	0.429
Diploma	0.173 (0.097)*	0.188	0.170 (0.097)*	0.186	0.334 (0.128)***	0.397	0.358 (0.130)***	0.431
Degree	0.326 (0.128)**	0.386	0.262 (0.133)**	0.300	0.502 (0.143)***	0.652	0.457 (0.144)***	0.580
Computer	0.178 (0.092)*	0.195	0.122 (0.101)		0.252 (0.126)**	0.286	0.182 (0.148)	
Demographic Characteristics:								
Age	0.051 (0.009)***		0.048 (0.009)***		0.050 (0.013)***		0.045 (0.012)***	
$Age^2/100$	-0.005 (0.001)***		-0.005 (0.001)***		-0.005 (0.001)***		-0.005 (0.001)***	
No English	-0.321 (0.149)***	-0.275	-0.312 (0.144)**	-0.268	-0.115 (0.110)		-0.118 (0.118)	
Disability	0.029 (0.034)		0.036 (0.033)		0.035 (0.039)		0.050 (0.038)	
Household Characteristics:								
Married	0.030 (0.045)		0.031 (0.044)		0.149 (0.073)**	0.161	0.131 (0.067)*	0.140
ATSI Household	0.044 (0.042)		0.033 (0.039)		-0.023 (0.049)		-0.024 (0.047)	
Geography:								
Remote	0.007 (0.040)		0.005 (0.040)		0.056 (0.048)		0.045 (0.048)	
Behavioural Characteristics:								
Homelands	0.032 (0.036)		0.012 (0.035)		-0.006 (0.047)		-0.025 (0.045)	
Smokes	-0.004 (0.031)		0.004 (0.031)		-0.015 (0.038)		-0.002 (0.039)	
Jail	-0.029 (0130)		-0.005 (0.105)		0.081 (0.120)		0.068 (0.108)	
Discriminated	0.073 (0.034)**	0.076	0.053 (0.034)		0.053 (0.043)		0.028 (0.044)	

Table 2 - Results From the Estimation of the Determinants of Weekly Earnings for Indigenous Women[a] (continued)

	Panel (i) All Indigenous Women				*Panel (ii) Indigenous Women in Couple Families*			
	Without Job Characteristics		*With Job Characteristics*		*Without Job Characteristics*		*With Job Characteristics*	
Variable	*Estimated Coefficient*	*Marginal Effect*	*Estimated Coefficient*	*Marginal Effect*	*Estimated Coefficient*	*Marginal Effect*	*Estimated Coefficient*	*Marginal Effect*
Job Characteristics:								
Casual	[b]		-0.011		[b]		-0.095	
			(0.068)				(0.094)	
Overtime	[b]		0.134	0.144	[b]		0.153	0.165
			(0.043)***				(0.050)***	
Mutli Job	[b]		-0.157	-0.145	[b]		-0.123	-0.116
			(0.068)***				(0.074)*	
Temporary	[b]		-0.068		[b]		-0.114	
			(0.067)				(0.074)	
Manager	[b]		0.262	0.300	[b]		0.134	
			(0.109)**				(0.147)	
Professional	[b]		0.266	0.305	[b]		0.218	0.243
			(0.089)***				(0.125)*	
Trade	[b]		-0.018		[b]		-0.075	
			(0.098)				(0.130)	
Communication	[b]		0.105		[b]		-0.030	
			(0.084)				(0.118)	
Admin	[b]		0.124		[b]		0.092	
			(0.089)				(0.120)	
Sales	[b]		0.039		[b]		-0.070	
			(0.100)				(0.142)	
Drivers	[b]		0.316	0.372	[b]		0.130	
			(0.110)***				(0.070)	
Selection Correction:								
$\hat{\lambda}$	-0.143	NA	-0.119	NA	-0.112	NA	-0.068	NA
	(0.059)**		(0.058)**		(0.067)*		(0.065)	
Sample Size:		638		638		402		402
F-test:		13.700		11.660		9.420		8.740
Adjusted R^2		0.278		0.338		0.318		0.392
Mean of *w*		6.751		6.751		6.748		6.748

Notes: [a] The robust standard errors are in parentheses, where the symbol *** represents statistical significance at the one per cent level, ** represents statistical significance at five per cent level and * represents statistical significance at the 10 per cent level. Marginal effects are only reported for dummy variables of statistical significance and following Halvorsen and Palmquist (1980) are determined ($\exp(\beta_0) - 1$). The marginal effects for the age variable are reported within the text.
[b] Not included in the estimating equation.

may suggest that Indigenous Australians who speak a language other than English at home are discriminated against in terms of earnings in the Australian labour market.

Tables 1 and 2 show that the earnings of Indigenous Australian men are positively associated with being married. Married men have earnings that are 12.4 per cent higher than the earnings of non-married men. Similar earnings premiums for marriage among Indigenous men have been reported in the studies by Junankar and Liu (2003) (premium of 14.0 per cent) and Daly and Hunter (1999) (premium of 11.1 per cent). This relationship is consistent with economic theory which suggests that married men have higher earnings due to higher levels of productivity (see Birch and Miller, 2006).

The estimation of the extended earnings model shows that a number of job characteristics have an impact on the earnings of Indigenous men and women. Indigenous Australian men who work overtime (*Overtime*) (based on working more than 40 hours per week) have earnings that are 23.1 per cent larger than the earnings of their counterparts who do not work overtime (based on those working 35 to 40 hours in a usual week). Indigenous women working overtime have earnings which are 14.4 per cent higher than those who do not. The earnings premiums associated with working overtime for the Indigenous population are of similar magnitudes to studies on the general Australian population. For example, the national study by Preston (2001) reports that Australian men and women who work more than 40 hours per week have earnings that are 21.8 and 12.4 per cent higher than those working 35 to 40 hours per week. The findings are also consistent with standard labour supply theory of a positive association between hours worked and earnings.

Indigenous men who are employed in casual or shift work (*Casual*) positions have higher earnings than those who work standard hours each week. This earnings premium is 9.7 per cent. Indigenous men who work in temporary positions (*Temporary*) have earnings which are 10.0 per cent lower than the earnings of Indigenous Australian men working in jobs which are permanent. Indigenous women working two or more jobs (*Multi job)* have earnings which are 14.5 per cent lower than the earnings of Indigenous women working only one job.

There are also differences in the earnings of Indigenous men and women employed in the highest ranked occupation and lowest ranked occupation.[12] Indigenous men and women who are employed full-time as managers (*Manager*) have 14.7 and 30.0 per cent higher earnings than the earnings of Indigenous men and women employed as labourers. This relatively distinct occupational hierarchy even after controlling for human capital endowments is a common feature in earnings studies for the general population (see Preston, 2001). However, the variation in earnings by occupation for Indigenous Australian men is far less pronounced than what has been reported for the general Australian population for males.[13] For instance, using similar controls for occupation as in this study, Rodgers (2004) and Eastough and Miller (2004) report that Australian men experience a 33 to 38 percentage point variation in earnings by occupation. Preston (2001) suggests that there is a 66 percentage point

[12] Preston (2001) argues that Australian studies on earnings typically rank managers as the highest occupation and rank labourers as the lowest occupation.
[13] The variation in earnings by occupation for Indigenous Australian women is close to what has been reported in the literature for the overall Australian population.

variation in earnings by occupation for Australian men using more detailed controls for occupation than those used in this study. The difference in the variation in earnings by occupation for Indigenous men and the wider population may be further evidence that Indigenous Australian men face a more secondary labour market.

The earnings model was also estimated on Indigenous Australians from couple families to examine the validity of the measure of earnings (as the sample of couple families would reduce other potential sources of income for full-time employees, such as child support payments to parents without partners). These results are presented in Panel (ii) of tables 1 and 2. The results from these analyses are fairly comparable to the estimates from the full sample of Indigenous men and women in terms of the signs and significance of the estimated coefficients. As such, it is possible to suggest that the measure of earnings is fairly robust, (assuming that the earnings of men and women working full-time from couple families provides a more accurate measure of earnings). There are some noticeable differences in the estimated impacts of the earnings premiums associated with human capital endowments for Indigenous Australians living in couple families and those for the wider Indigenous population. The earnings premiums from educational attainment and potential labour market experience (measured by age) are lower for Indigenous men from couple families than all Indigenous males. There is an opposite pattern for Indigenous women. These finding may reflect differences in earnings determination for the population groups. Creedy *et al*. (2001) and McKenna and McNabb (1989) report that the determinants of earnings vary by family type for the Australian population. The findings also may also highlight problems in accurately measuring earnings for Indigenous Australian workers.

Finally, a key feature of the estimation of the determinants of earnings for Indigenous Australians is that the variable to correct for sample selection bias is significant in most of the earnings equations.[14] As such, it is possible to suggest that correcting for selection bias is of importance in studies which estimate the determinants of earnings for Indigenous Australians. The negative sign of the selection bias correction term ($\hat{\lambda}$) and the size of the coefficients are relatively similar to the results produced in studies for the general Australian population (see Preston, 2001). The negative sign of the $\hat{\lambda}$ term implies that the error term in the probability of working full-time model (ε_{d_j}) is negatively correlated with the error term in the model to estimate earnings (ε_{w_j}). In other words, it implies that the unobserved factors which are negatively associated with the probability of working full-time are positively associated with earnings. For Indigenous Australians these may reflect welfare payments for not working or the age and timing of dependent children. These factors (which are not observed in the data set) may have a negative impact on decisions to work full-time but have a positive impact on the motivation of workers which results in higher earnings.[15]

[14] It is noted that results from the Heckman (1979) selection procedure should be treated cautiously as they are subject to model specification and that there is a high degree of correlation between the selection bias term and variables included in the wage model. Preston's (2001) review on studies controlling for selection bias concluded 'the problems introduced to the wage equation using the selectivity bias correction term are in fact greater than the bias associated with analysis of a non-random sample in the first place' (Preston, 2001, p.27).

[15] The estimated coefficients from earnings models estimated without controls for selection bias were generally larger than the models controlling for selection bias. These results are available from the author.

Table 3 presents the labour force participation elasticities with respect to predicted earnings. The elasticities are obtained from using a probit model to estimate the probability of participating in the labour force using the predicted earnings of full-time workers. These elasticities essentially show the relationship between Indigenous Australians' labour force participation decision and the predicted earnings from working full-time to provide some insight into the relationship between earnings and labour force participation decisions. The elasticities are evaluated at the mean labour force participation rate.

As shown in table 3, Indigenous men and women's labour force participation decisions respond favourably to increases in their potential earnings. For Indigenous men, the labour force participation elasticity with respect to weekly earnings is 0.714. This elasticity implies that a one per cent increase in the weekly earnings of men working full-time is associated with, on average, a 0.7 per cent increase in labour force participation.[16] The labour force participation elasticity with respect to weekly earnings for Indigenous women is 1.607. The elasticities for Indigenous men and women in couple families are lower than those for the wider Indigenous population, being 0.663 and 1.287, respectively. This finding is consistent with the views in Dandie and Mercante (2007) who report that married men and women's labour force participation decisions are less responsive to changes in earnings than their non-married counterparts.

Table 3 - Estimated Labour Force Participation Elasticities with Respect to the Weekly Earnings of Full-Time Workers

Sample	*Elasticity (Earnings with $\hat{\lambda}$)*	*Elasticity (Earnings without $\hat{\lambda}$)*	*Mean Labour Force Participation Rate*
All Indigenous Men	0.714	0.705	0.749
Indigenous Men in Couple Families	0.663	0.642	0.799
All Indigenous Women	1.607	1.539	0.552
Indigenous Women in Couple Families	1.287	1.251	0.599

The elasticities for men are higher than those reported in the review of labour force participation elasticities with respect to earnings for Australian men by Dandie and Mercante (2007) (ranging from 0.03 to 0.23). The elasticities for women are at the upper-end of the range of labour force participation elasticities reported in Birch (2005a). However, the reviews in Dandie and Mercante (2007) and Birch (2005a) are based on labour force participation and hourly earnings and therefore are not directly comparable with the results presented in this study which uses the predicted weekly earnings of full-time workers. In addition, the existing literature on the labour force participation elasticities with respect to earnings has not directly

[16] The elasticities were estimated using alternative predicted earnings based on the variables included in the market wage equation and did not vary considerably by specification. The results from the labour force participation model and elasticities using alternative predicted earnings are available from the author.

focused on Indigenous Australians. Birch (2005a) suggests that the elasticity estimates can be sensitive to model specification, year of the data and variables included in the estimating equations.

4. Summary

This paper has examined the determinants of earnings for Indigenous Australians using recent data. The purpose of the paper was to shed 'new light' on the determinants of earnings for Indigenous Australians and to assess whether human capital theory is relevant to earnings studies on Indigenous Australians. The paper estimated the determinants of earnings for Indigenous men and women, conditional of them being employed full-time. It also estimated how Indigenous Australians' labour force participation decisions are likely to respond to changes in their earnings.

The analysis also found that Indigenous Australians' earnings could be explained by human capital theory. The earnings of Indigenous Australians were strongly influenced by their education level, with those with higher levels of education experiencing higher earnings. The analysis of the determinants of earnings also found that Indigenous Australians' earnings were influenced by their age, marital status, language skills and some cultural and behavioural characteristics. The findings from the extended earnings model showed that a number of job characteristics including occupation had an impact on Indigenous Australians' earnings. The estimation of the labour force participation elasticities with respect to earnings found that the probability that Indigenous Australians participate in the labour force is positively associated with their potential earnings.

Many of the findings reported in this study are similar to those reported in studies for the general Australian population. There are three noticeable exceptions to this. First, the explanatory power of the earnings model used in this study is smaller than similar earnings models applied to the wider Australian populations (in terms of the adjusted R^2). Second, the earnings premiums associated with educational endowments are lower for Indigenous Australians than studies using data on the general Australian population and third, the earnings premiums associated with occupation are lower for Indigenous men than the wider population of males. These results may reflect the fact that the earnings of Indigenous Australians are still linked to segmented labour markets or that Indigenous Australians face wage discrimination. Alternatively, there may be other factors not captured in the data set which also influence Indigenous Australians earnings.

A limitation of this study is that the current data available in Australia does not contain information on all the factors that potentially influence earnings or labour supply of Indigenous Australians, including the fact that it does not contain information on actual earnings. In addition, this data set is cross-sectional so it is difficult to fully understand the causal link between some of the variables examined and labour market outcomes which could be achieved using panel data. To obtain a more detailed picture of the determinants of labour supply and earnings for Indigenous Australians, future surveys would benefit from the collection of information on individual's actual earnings from paid employment as well as more accurate measures of unearned income and job characteristics.

Nevertheless, there are a number of implications for researchers and policymakers from the findings presented in this paper. First, the analysis has shown that the earnings for Indigenous Australians vary by education level. As such, policy aimed at improving the education of Indigenous Australians, particularly post-school education should have an improvement on their earnings potential. Second, the analysis has found that controlling for the probability of working full-time when estimating earnings for Indigenous Australians via the inclusion of a sample selection bias correction term appears to be important. Future studies on the earnings of Indigenous Australians should consider the use of such controls. Finally, the analysis has shown that Indigenous Australians respond positively in terms of working to increases in their potential earnings. Therefore, policies aimed at improving the earnings of Indigenous Australians should have a positive impact on their labour force participation decisions. There may be merit in exploring ways of improving the earnings of existing Indigenous workers, via on the job training or educational attainment, as an approach of also encouraging labour force participation among the Indigenous population.

Appendix

Table A1 - Description of Variables Used to Estimate Earnings[a]

Variable Name	*Description*	*Mean*	*Std Dev*
Dependent Variable:			
w	Earnings based on the logarithm of weekly self-reported personal income for those working 35 or more hours per week, whose principal source of personal income is from their employer and who do not receive a Government pension or allowance.	6.786	0.517
Independent Variables:			
Year 9	Highest educational attainment is Year 9.	0.129	0.335
Year 10	Highest educational attainment is Year 10.	0.232	0.423
Year 11	Highest educational attainment is Year 11.	0.116	0.320
Year 12	Highest educational attainment is Year 12.	0.115	0.320
Diploma	Highest educational attainment is a certificate or diploma.	0.218	0.413
Degree	Highest educational attainment is a degree or higher degree.	0.052	0.222
Year 8	Omitted Category: Highest educational attainment is Year 8 or less.	0.138	0.345
Computer	Used a computer in the past 12 months.	0.671	0.470
No Computer	Omitted Category: Did not use a computer in the past 12 months.	0.329	0.470
Age	The individual's age.	35.019	13.321
No English	Main language spoken at home is a language other than English.	0.140	0.347
English	Omitted Category: Main language spoken at home is English.	0.860	0.347
Disability	Has disability affecting their activities.	0.510	0.500
No Disability	Omitted Category: Does not have a disability affecting their activities.	0.490	0.500
Married	Married individuals.	0.465	0.499
Not Married	Omitted Category: Not married individuals.	0.535	0.499
ATSI Household	Lives in a household with only Indigenous persons.	0.628	0.483
Mixed Household	Omitted Category: Lives in a household with Indigenous and non-Indigenous persons.	0.372	0.483

Table A1 - Description of Variables Used to Estimate Earnings[a] (continued)

Variable Name	*Description*	*Mean*	*Std Dev*
Remote	Lives in 'remote' or 'very remote' communities based on the Accessibility/Remoteness Index of Australia (ARIA), which is an index measuring the remoteness of an area on the physical road distance to the nearest urban centre. ARIA is published as a 1 kilometre grid that covers the whole of Australia and areas which score more than 5.92 are considered remote.	0.330	0.470
Non-Remote	Omitted Category: Lives in 'major cities', 'inner' and 'outer' regional areas measured by those areas with a score on the ARIA of less than 5.92.	0.670	0.470
Homelands	Recognises an area as homelands or traditional country.	0.735	0.441
No Homelands	Omitted Category: Does not recognise an area as homelands or traditional country.	0.265	0.441
Smokes	Smokes cigarettes.	0.501	0.500
No Smokes	Omitted Category: Does not smoke cigarettes.	0.499	0.500
Jail	Has been in jail.	0.097	0.297
No Jail	Omitted Category: Has not been in jail.	0.903	0.297
Casual	Job is defined as casual or shift work.	0.120	0.326
Not Casual	Omitted category: Jobs defined as full-time which refers to those working standard work hours during a standard working week.	0.880	0.326
Overtime	Works more than 40 hours per week.	0.368	0.482
Regular	Omitted category: Works 35 to 40 hours per week.	0.632	0.482
Multi Job	Works more than one job.	0.112	0.315
Not Multi Job	Omitted category: works one job.	0.888	0.315
Temporary	Employed in a temporary position or who do not know the type of job contract.	0.098	0.297
Permanent	Omitted category: Employed in a permanent position.	0.902	0.297
Manager	Employed as managers.	0.073	0.261
Professional	Employed as professionals.	0.154	0.361
Trade	Employed as technicians or trade workers.	0.155	0.362
Communication	Employed as community or personal services workers.	0.140	0.347
Admin	Employed as clerical or administrative workers.	0.148	0.355
Sales	Employed as sales workers.	0.033	0.178
Drivers	Employed as machinery operators and drivers.	0.135	0.342
Labourers	Omitted Category: Employed as labourers and those who do not adequately define their occupation.	0.162	0.369

Note: [a] The means and standard deviations are for the full sample except for the variables relating to earnings and job characteristics, which are for workers only. A description of the variables used to estimate the probability of working full-time or participating in the labour force is available from the author.

Table A2 - Results From the Estimation of the Probability of Working Full-Time for Indigenous Men and Women[a]

	All Indigenous Men	*All Indigenous Women*	*Indigenous Men in Couple Families*	*Indigenous Women in Couple Families*
Variable	*Estimated Coefficient*	*Estimated Coefficient*	*Estimated Coefficient*	*Estimated Coefficient*
Constant	-.3834	-4.177	-4.211	-4.230
	(0.299)***	(0.334)***	(0.378)***	(0.469)***
Year 9	0.129	0.017	-0.031	-0.040
	(0.111)	(0.162)	(0.141)	(0.219)
Year 10	0.250	0.336	0.201	0.395
	(0.098)**	(0.138)**	(0.124)	(0.183)**
Year 11	0.305	0.108	0.223	0.103
	(0.115)***	(0.160)	(0.142)	(0.212)
Year 12	0.463	0.616	0.385	0.737
	(0.115)***	(0.147)***	(0.142)***	(0.193)***
Diploma	0.364	0.616	0.290	0.747
	(0.101)***	(0.136)***	(0.125)**	(0.182)***
Degree	0.540	1.093	0.366	1.295
	(0.153)***	(0.155)***	(0.184)**	(0.203)***
Study	-0.180	0.051	-0.054	0.114
	(0.082)**	(0.076)	(0.106)	(0.099)
Computer	0.231	0.614	0.276	(0.015)***
	(0.067)***	(0.097)***	(0.083)***	
Demographic Characteristics:				
Age	0.086	0.087	0.113	0.100
	(0.014)***	(0.016)	(0.018)***	(0.023)***
Age^2	-0.001	-0.001	-0.001	-0.001
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
No English	-0.467	-0.299	-0399	-0.252
	(0.098)***	(0.127)**	(0.118)***	(0.171)
Disability	-0.269	-0.115	-0.297	-0.075
	(0.057)***	(0.065)*	(0.071)***	(0.083)
Exvg	0.778	0.242	0.843	0.037
	(0.130)***	(0.145)*	(0.164)***	(0.183)
Good	0.713	0.351	0.791	0.094
	(0.129)***	(0.142)**	(0.162)***	(0.180)
Fair	0.393	0.018	0.451	-0.161
	(0.139)***	(0.154)	(0.174)***	(0.196)
Household Characteristics:				
Married	0.737	-0.124	0.593	0.188
	(0.107)***	(0.130)	(0.127)***	(0.160)
1 Child	-0.009	-0.641	0.081	-0.540
	(0.079)	(0.081)***	(0.093)	(0.099)***
2 Children	0.002	-0.949	0.102	-0.859
	(0.082)	(0.933)***	(0.095)	(0.113)***
3 Children	-0.126	-1.302	-0.069	-1.310
	(0.104)	(0.141)***	(0.117)	(0.172)***
4 Children	-0.151	-1.044	-0.199	-0.846
	(0.143)	(0.159)***	(0.157)	(0.185)***
5+ Children	-0.116	-1.407	-0.150	-1.334
	(0.139)	(0.231)***	(0.154)	(0.282)***
ATSI Household	-0.158	-0.185	-0.135	-0.201
	(0.067)**	(0.078)**	(0.086)	(0.097)**

Table A2 - Results From the Estimation of the Probability of Working Full-Time for Indigenous Men and Women[a] (continued)

Variable	*All Indigenous Men* Estimated Coefficient	*All Indigenous Women* Estimated Coefficient	*Indigenous Men in Couple Families* Estimated Coefficient	*Indigenous Women in Couple Families* Estimated Coefficient
3+ Adults	-0.114	0.016	-0.149	-0.065
	(0.064)*	(0.071)	(0.080)*	(0.092)
Lone Parent	0.234	-0.201	[b]	[b]
	(0.111)***	(0.138)		
Other Fam	0.704	0.268	[b]	[b]
	(0.125)***	(0.157)*		
Geography:				
Remote	0.170	0.455	0.112	0.465
	(0.081)**	(0.088)***	(0.103)	(0.116)***
Transport Characteristics:				
1 Car	0.461	0.516	0.415	0.446
	(0.085)***	(0.106)***	(0.123)***	(0.193)***
2 Cars	0.647	0.718	0.512	0.690
	(0.095)***	(0.118)***	(0.132)***	(0.195)***
3 Cars	0.863	0.816	0.749	0.886
	(0.106)***	(0.130)***	(0.143)***	(0.206)***
Public Transport	-0.022	0.072	-0.055	0.135
	(0.068)	(0.079)	(0.083)	(0.100)
Behavioural Characteristics:				
Culture	-0.012	0.214	-0.032	0.228
	(0.061)	(0.072)***	(0.078)	(0.092)***
Homelands	-0.056	-0.026	-0.102	-0.034
	(0.066)	(0.072)	(0.084)	(0.091)
Removed	-0.149	-0.060	-0.257	-0.072
	(0.100)	(0.111)	(0.135)*	(0.151)
Alcohol Risk	-0.246	0.158	-0.421	0.145
	(0.097)**	(0.148)	(0.128)***	(0.210)
Smokes	-0.045	0.002	-0.045	0.012
	(0.057)	(0.067)	(0.071)	(0.081)
Victim	-0.020	-0.210	-0.013	-0.040
	(0.074)	(0.095)**	(0.097)	(0.134)
Jail	-0.242	-0.353	-0.157	-0.035
	(0.077)***	(0.241)	(0.098)	(0.295)
Discriminated	-0.064	0.031	-0.099	0.095
	(0.063)	(0.069)	(0.080)	(0.093)
Non-Wage Income Characteristics:				
Support	0.179	0.253	0.211	0.108
	(0.056)***	(0.065)***	(0.071)***	(0.083)
Raise Funds	0.475	0.296	0.494	0.224
	(0.058)***	(0.066)***	(0.075)***	(0.090)***
Sample Size:	3,137	4,128	1,966	2,206
Chi^2:	1066.740	11127.440	676.470	587.910
Pseudo R^2 Square:	0.257	0.317	0.251	0.281
Log Likelihood:	-1539.706	-1213.500	-1006.981	-753.365
Proportion *EMP*:	0.374	0.154	0.433	0.182

Notes: [a] The standard errors are in parentheses, where the symbol *** represents statistical significance at the one per cent level, ** represents statistical significance at five per cent level and * represents statistical significance at the 10 per cent level. [b] Not included in the estimating equation.

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Female Labour Supply in Australia and Japan: The Effects of Education and Qualifications

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Abstract

This paper compares the effects of educational attainment on women's employment status in Australia and Japan from 2005 to 2009. Our data are from the Household Income and Labour Dynamics in Australia Survey and the Japanese Panel Survey on Consumers. Using both static and dynamic models to estimate female labour supply, we find robust positive effects of education on employment in Australia, but not in Japan, where the effects of higher education on permanent employment are weaker. The results of the dynamic estimation suggest that the effect of previous employment status is more significant than that of education in Japan, unlike in Australia. This suggests that Japanese firms value previous experience more than educational attainment. Vocational education has a significant effect in Australia, but not in Japan. This result suggests that the skill acquired from education, in particular, vocational education, is not fully utilised in Japan.

Keywords: Female labour force participation, Vocational education, Longitudinal data

JEL Classification: J210, J220, J240

1. Introduction

The objective of this study is to compare female labour supply in Australia with that in Japan using longitudinal data. In particular, we focus on the relationships between education, vocational qualifications, and employment status of women in both countries. As the two countries differ in vocational training and employment systems, the comparison enables us to identify problems concerning skill formation and job creation in the Japanese labour market.

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Japan's labour market has been characterised by low employee mobility and highly organised internal labour markets, and employment practices are closely related to the seniority-based wage system. Firms provide intense on-the-job training to newly-hired employees, enabling them to develop the skills needed to perform a wide variety of jobs. There are systematic job rotations within firms, allowing employees to gradually accumulate knowledge and skills and be promoted to roles involving higher responsibility. Job training within firms is regarded as more important than training outside firms (Koike, 1991; Koike and Inoki, 2003).

However, since the early 1990s, the Japanese labour market has undergone fundamental changes amid a period of prolonged economic stagnation. The changes include increased numbers of female employees and part-time or contract employees, growing competitiveness, and the emergence of a performance-based pay system. The portion of people who spend their entire career working for a single firm is declining. As a result, the majority of working people no longer experience the traditional processes of skill formation operating within Japanese firms. Under such circumstances, providing the full range of workers with opportunities for career advancement requires establishing a system for evaluating vocational skills acquired outside firms (JILPT, 2008).

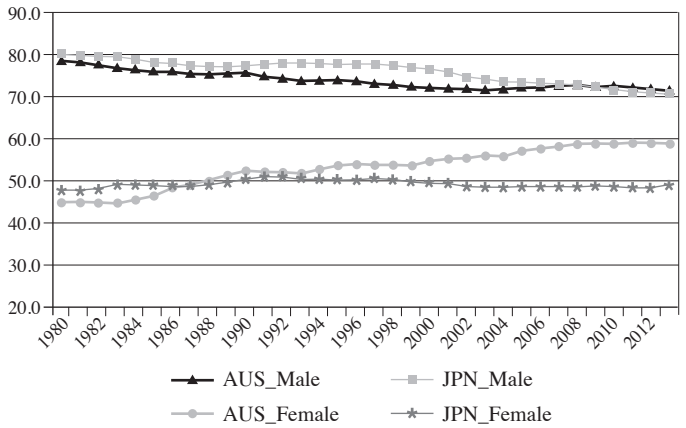
The effect of vocational skills on individuals' careers is becoming an increasingly important research question. As such, this study analyses the effects of formal vocational education on female employment in contemporary Japan. We perform an international comparison to evaluate our results objectively. Australia is considered to be a useful comparative case, as it has a well-established qualification system, including the Australian Qualifications Framework (AQF) and the Australian Apprenticeship.

The rest of the paper compares linkages between education and female labour supply in Australia and Japan. Section 2 provides an overview of female labour force participation and education in both countries. Section 3 explains the current situation of vocational education in Japan and compares it with that of Australia. Section 4 reviews the relevant literature. Section 5 explains the longitudinal data, the econometric model, and the variables used in the comparative analysis. Sections 6 and 7 interpret the estimated results and conclude the paper.

2. An overview of labour force and education in Australia and Japan

Figure 1 shows the trends in both male and female labour force participation rates in Australia and Japan since 1980. The trends in male labour force participation are largely similar between the two countries, showing consistent declines since the early 1980s. In contrast, the female labour force participation trends are markedly different. In Australia, female labour force participation increased from less than 50 per cent in 1980 to nearly 60 per cent in 2010, while in Japan, it has remained nearly constant at 50 per cent, with a slight decline in recent years.

Figure 1 - Australian and Japanese labour force participation rates for men and women



Sources: Australian Bureau of Statistics (2014); Statistics Bureau of Japan (2014).

3. Vocational education in Japan

The outline of the education system of Japan as of 2014 is as shown in figure 2. Six years of elementary schooling are followed by three years of lower secondary and three years of upper secondary education. Both elementary and lower secondary education are compulsory. Post-secondary academic education is offered by junior colleges, which provide two-year education, and universities, which provide four-year education. Junior colleges, usually female-dominated, teach both liberal arts and practical education based on liberal arts within a shorter period than do universities. Institutions for vocational education are shown by the shaded areas in figure 2. It suggests that the vocational education system is not well coordinated as multiple institutions coexist, instead of forming a hierarchy.

The vocational education system of Japan has developed in a way quite different from that of Australia. Before World War II, education in Japan was based on a 'double track' system consisting of the vocational track and the academic track, which were not linked at all. After World War II, the system was changed to a 'single track' system, where academic education had a higher status than vocational education (Goodman, Hatakenaka and Kim, 2009). A number of vocational schools were 'promoted' to universities with multiple disciplines soon after the war. The government laid much stress on the development of university education, while reducing subsidies for vocational schools. At the same time, the demand for higher academic education increased with the rise in per capita incomes. As a result, the number of junior colleges and universities went up significantly.

The post-war educational policy was closely related with the Japanese management system. The expansion of heavy industries has been accompanied by the development of internal labour markets. Japanese firms gave intensive OJTs to newly hired employees so that they would be able to perform a wide range of jobs within a firm. As the employees' average years of service were long and wage determination was left

to wage negotiations in individual firms, firms valued the experience that employees gained within the firm more than the employees' experience prior to recruitment. Firms believed that 'qualifications themselves are not significant signals of the quality of labour for white-collar employees' in Japan (Koike and Inoki, 2003, Chapter 3).

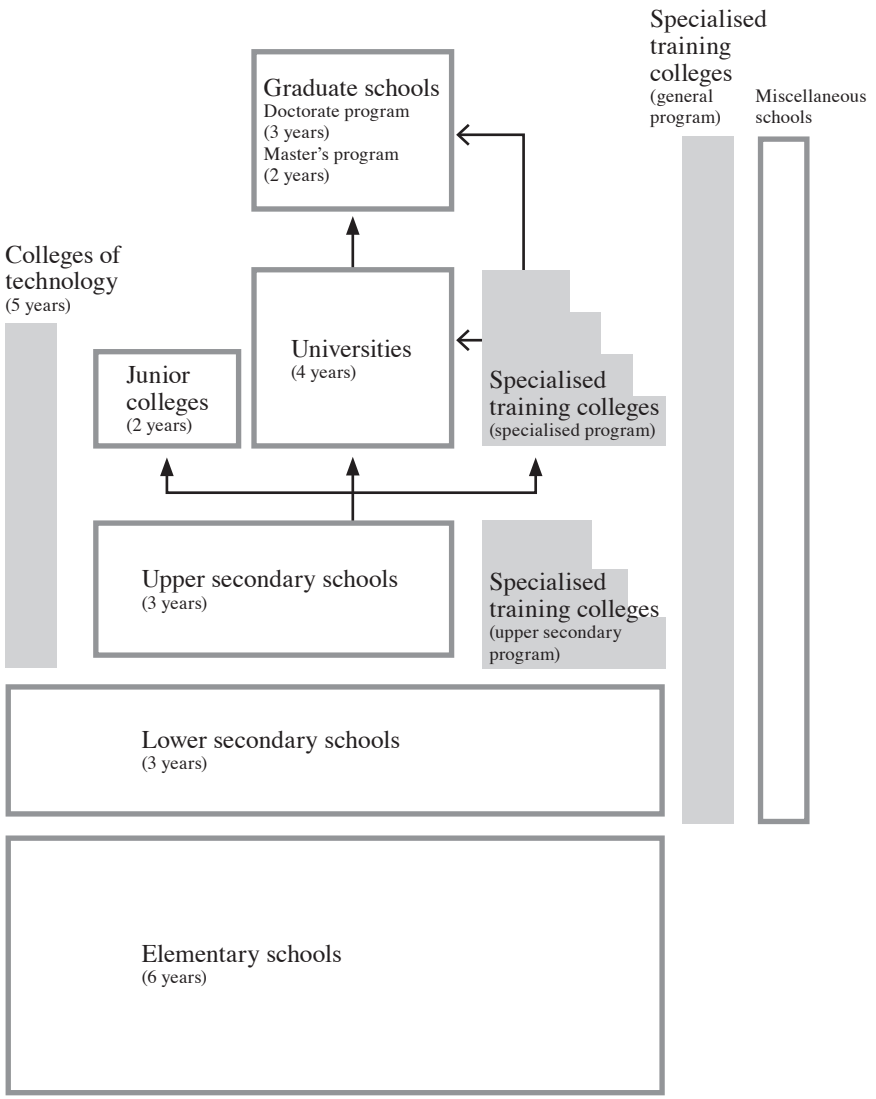
That government stressed academic education does not mean that it made light of vocational education; it established colleges of technology in 1962 to nurture engineers to meet demand from industries. These colleges have provided students who finished lower secondary education with five-year education on specialised subjects such as mechanical engineering, electrical engineering, information technology, and architecture, as well as general subjects. However, the number of colleges of technology has been much smaller than that of universities.

The 'vacuum' in vocational education led to an emergence of a number of miscellaneous vocational schools, most of which were private and not regulated by the government. In 1975, after the revision of the Basic Education Law, miscellaneous schools which fulfilled certain conditions were promoted to specialised training colleges. In addition, from 1994 onwards, students who completed courses of two years or more or 1,700 hours or more were awarded a 'Diploma', and from 2006 onwards, those finished four years of specialised courses with certain conditions were granted an 'Advanced Diploma'. The government also created a linkage between the specialised training colleges and universities. This enabled graduates of specialised training colleges to transfer to universities, subject to fulfilling certain conditions. Nowadays, specialised training colleges can be categorised into three types by programs – those associated with general programs, upper secondary programs, and specialised programs. General programs do not have any pre-requisites. On the other hand, upper secondary programs require graduation from lower secondary education, and specialised programs require graduation from upper secondary education.[1] The main areas of education include engineering, agriculture, healthcare, hygiene such as hairdressing, cooking and nutritional management, social welfare, commercial business, home economics, and culture/general education. The curriculum within specialised training colleges emphasizes practical education.[2] Some of them grant candidacy for the state examinations for professions such as nurses, physical therapists, occupational therapists, medical technologists, architects, registered surveyors, tax accountants, and so on.

The education system of Australia is quite different from that of Japan. Australia's national system, the AQF, incorporates the qualifications from each educational and training sector into a single national qualification framework with 10 qualification levels. TAFE (Technical and Further Education) colleges award AQF qualifications aligned as Certificate 1-IV, Diploma, Graduate Certificate, and Graduate Diploma qualifications. On the other hand, universities grant bachelors and honours, masters, and doctoral degrees following completion of academic education. Each qualification attests that the individual has a certain level of skill or knowledge, be it academic or vocational.

[1] In 2014, there were 3,205 specialised training colleges in Japan, among which 2,812 offered specialised courses, 438 had upper secondary courses, and 178 offered general courses.
[2] Practical education is usually offered within the colleges. Usually, this is different from OJT.

Figure 2 - The Japanese educational system



Source: Ministry of Education, Culture, Sports, Science, and Technology in Japan website for specialised training colleges. http://www.mext.go.jp/component/a_menu/education/detail/__icsFiles/afieldfile/2013/10/11/1322361_2_1.pdf

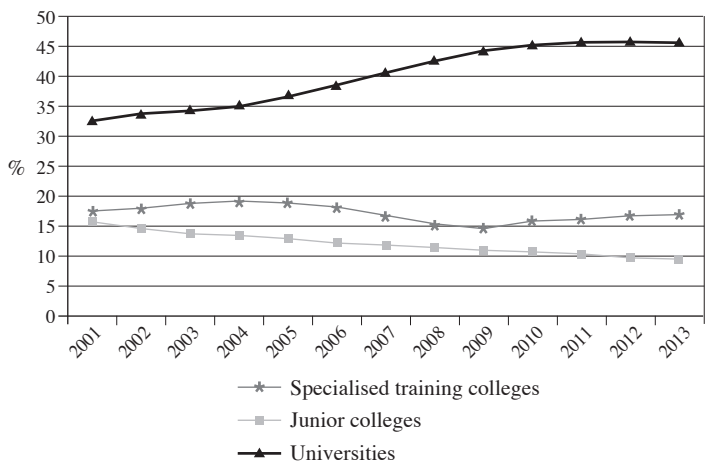
The absence of the fixed concept of a 'qualification' in Japan makes it hard to make precise comparisons with the Australian context. However, there are some similarities between the vocational education systems of Australia and Japan. For both countries, universities grant bachelor's degrees, master's degrees, and doctoral degrees. Both countries have post-secondary vocational education systems. In the following section, we compare the effects of higher education and qualifications on labour market outcomes in both countries.

Statistics on post-secondary education in Australia and Japan

Official data show that higher education enrolment rates have been increasing in both Australia and Japan. However, the data published pertaining to the indicators for education differ. The Japanese government publishes data on the ratio of newly enrolled university, junior college, or specialised training college students to total high school graduates, as shown in figure 3.1. On the other hand, the Australian government publishes data for students enrolled in higher education as a portion of the population by age range, as figure 3.2 shows. For Japan, the university enrolment rate increased from 2001 to 2009 but has remained relatively stable since 2009. The enrolment rate for junior colleges has been declining, while that for specialised training colleges has been increasing after reaching a nadir in 2009.

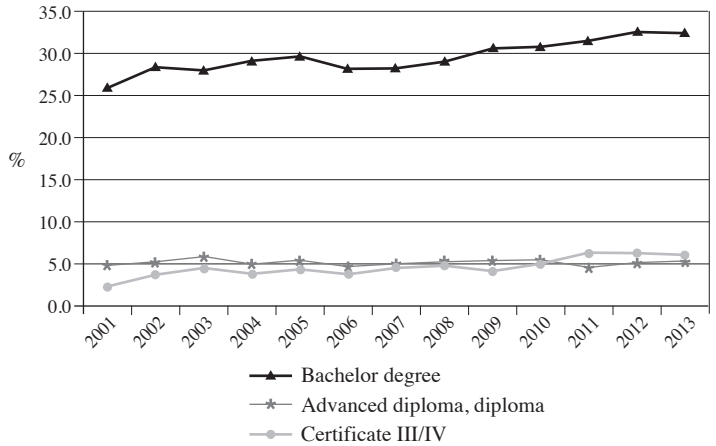
For Australia, the enrolment rate for bachelor's or higher degrees has been increasing rapidly, whereas that for advanced diplomas or diplomas has been fairly stable. The enrolment for Certificate III or IV has increased from 2.4 per cent to 6.1 per cent in the period 2001-2013 (figure 3.2)

Figure 3.1 Ratio of female students enrolled in higher education to female high school graduates, 2001-2013, Japan



Source: Ministry of Education, Culture, Sports, Science, and Technology of Japan, School Basic Survey 2001-2013.

Figure 3.2 - Enrolment in higher education for females aged 18-24, 2001-2013, Australia



Source: Australian Bureau of Statistics, Data Catalogue 4125.0 (2014).
Note: The data show females enrolled in Advanced Diplomas, Diplomas, and Certificates III and IV as a portion of all females aged 18-24.

4. Previous research

Previous research in Japan

In Japan, a number of researchers have estimated female labour supply functions, usually focusing on the effects of childbirth on employment. Research that focuses on the relationship between women's education and employment outcomes is rare. However, some researchers have estimated the effect of education on women's employment outcomes, even where this was not the primary consideration. Matsuura and Shigeno (2001) employ static estimation to find a positive relationship between education levels and employment. In contrast, Nawata and Ii (2004) conclude that higher education has a negative effect on female employment in Japan.[3] Waldfogel *et al*. (1999), analysing the impact of childcare leave, find that the effect of higher education on post-childbirth job retention of female employees is weaker in Japan than in the United States or Britain. Kohara (2010) uses a dynamic model to estimate labour supply for women whose husbands face job loss and finds that higher education has no significant impact compared to senior high school education. Okamura and Islam (2011) estimate inter-temporal participation decisions of women using linear probability models that assume state dependence and unobserved heterogeneity; they find that highly educated women are less likely than less-educated women to re-enter the labour market after childbirth.

[3] Aside from the analyses of the effects of education, some researchers, including Edwards and Pasquale (2003), point out that in Japan, higher education for women is not career oriented.

Previous research in Australia

Australia also has a rich literature on female labour supply. A number of researchers have focused on spousal incomes or women's own wages and female labour supply, as reviewed in Birch (2005), or on the effects of childcare on labour supply (Breunig *et al*., 2012; and Moschion, 2013). Recent analyses using panel data indicate that higher educational attainment, including vocational education, raises the probability of obtaining a job. Cai (2010) shows that completing more than 11 years of education has a significant positive effect on female labour supply. The results of Buddelmeyer *et al*. (2006) also indicate that degrees and diplomas have significant positive effects on female employment, even after controlling for state dependence. Mitchell and Welters (2008), using a Cox proportional hazard analysis of labour market transitions, find that the hazard rates out of casual employment and into permanent employment are higher for those with bachelor's degrees or post-bachelor's education. On the other hand, some researchers, such as Mavromaras *et al*. (2009), have recently noted the existence of overly educated and overly skilled job-seekers in Australia.

Previous comparative research on Australia and Japan

Comparisons of female labour supply between Australia and Japan are still rare. Daly, Meng, Kawaguchi, and Munford (2006) estimated the gender wage gap in four countries including Australia and Japan. They found that secondary education as well as tertiary education had significant positive effects on female wages in both Australia and Japan. Kishi (2014) found that part-time employment in Japan was different from that in Australia both in terms of the relationship with education and in terms of job duration.

5. Data

Two longitudinal datasets

We use panel data from the Household Income and Labour Dynamics in Australia (HILDA) Survey and the Japanese Panel Survey on Consumers (JPSC). HILDA Survey is a household-based panel dataset collected by the Melbourne Institute of Applied Economic and Social Research, which has been gathering information on economic and subjective well-being, labour market dynamics, and family structures since 2001 by following respondents over time.[4] The JPSC collects data on the similar topics and has been conducted by the Institute on Household Economics in Japan since 1993. The features of both the HILDA Survey and the JPSC are described in Appendix A2. There are some differences between the two longitudinal datasets; for the HILDA Survey, interviews are conducted annually, while for the JPSC, no interviews are conducted; questionnaires are sent to respondents and returned to the institute by post. The HILDA Survey covers both men and women of 15 years of age or older, while the JPSC covers only women of 24 years of age or older.

[4] Detailed information on HILDA Survey is available from http://www.melbourneinstitute.com/hilda/.

For the HILDA Survey, we use only data for women in order to maintain comparability with the JPSC. The study period is 2005-2009. For the HILDA Survey, this corresponds to waves 5-9, while for the JPSC, it corresponds to waves 13-17. We confine our analysis to respondents who fulfil the following conditions:

(1) Female respondents aged 25-40 years,
(2) Respondents who provided answers to all questions pertaining to education, qualifications, employment status, and incomes for each year from 2005 through 2009, and
(3) Respondents whose employment status is clear.

The second condition is imposed because the econometric model (explained in Subsection 5.1) requires that the panel data have no attrition and that the data cover the same number of time periods for all respondents. To meet the third condition, we exclude respondents who did not provide answers to questions regarding their employment status. We also exclude self-employed people and family members of JPSC employees. After making these exclusions, the number of observations we use in the dynamic estimation is 912 x 5 = 4,560 for the HILDA Survey and 764 x 5 = 3,820 for the JPSC. The number of observations used in the static estimations is lower still, because observations with missing values on family variables are deleted.

The effects of past employment status

We classify employment status into three types. Within the HILDA sample, we distinguish three categories of employment status: permanent (on-going) employment, casual employment, and not working. Casual employment means employment without paid leave (Fair Work Ombudsman, 2012) and is characterised by a lack of job security. For the JPSC, we also classify observations into three categories for employment status: employment on a permanent or on-going basis[5], other types of employment, and not working. Among the employment sequences, the ten most frequent patterns for the two samples are listed in Appendix B. In the HILDA Survey, 40 per cent of respondents retain the same employment status for all five consecutive years, while the corresponding proportion is over 60 per cent for the JPSC. This suggests that Japanese people change their employment status only infrequently. This indicates potentially strong state dependence of employment status, particularly in Japan.

The model

We use two kinds of models for our econometric analysis; one is static and the other is dynamic. The reason why we use the latter model is that previous research has found that female labour supply is characterised by state dependence, as detailed in Heckman (1981). That is, we assume that work experience raises the probability that a woman will work in the future, even if initial entry into the workforce is determined by a random process. In order to capture state dependence, we use a random-effects dynamic probit model; the basic framework for this model is given by Stewart (2006).

[5] In Japan, employees are classified into regular and non-regular employees in the official statistics. Regular employees roughly correspond to employees who work on a permanent or ongoing basis. On the other hand, non-regular employees do not correspond to casual employees in Australia. For this reason, we confined our analysis to the estimations of employment and employment on a permanent basis. The meaning of 'non-regular employees' is detailed in Kambayashi (2013).

Model 1

Suppose that the employment status for person i in period t is y_{it} and that the latent variable for y_{it} is y^*_{it}.

$$y_{it} = \begin{cases} 1 & \text{if } y_{it}^* \geqq 0 \\ 0 & \text{if } y_{it}^* < 0 \end{cases} \tag{1}$$

$$y^*_{it} = x'_{it} b + a_i + \varepsilon_{it}$$

In equation (1), x_{it} is a vector of exogenous explanatory variables; a_i denotes an individual specific (time-invariant) error term; ε_{it} is the error term; and

$$\varepsilon_{it} \sim N(0, \sigma_\varepsilon^2)$$

Equation (1) is estimated using both a random-effect probit model and a probit model clustered for individuals.

Model 2

$$y_{it} = \begin{cases} 1 & \text{if } y_{it}^* \geqq 0 \\ 0 & \text{if } y_{it}^* < 0 \end{cases} \tag{2}$$

$$y^*_{it} = \gamma y_{it-1} + x'_{it}\beta + \alpha_i + u_{it}$$

In equation (2), x_{it} is a vector of exogenous explanatory variables; α_i is an individual-specific (time invariant) error term; u_{it} is an error term; and

$$u_{it} \sim N(0, \sigma_u^2)$$

Equation (2) is estimated using the random-effect dynamic probit model based on the Stewart method (Stewart, 2006). This method assumes that the initial condition for the employment status is specified as in equation (3).

$$y^*_{i1} = z_{i1}'\pi + \eta_i \tag{3}$$

where Z_{i1} is a vector of exogenous instruments and η_i is an error term correlated with α_i but uncorrelated with u_{it} for $t \geqq 2$.

$$\eta_i = \theta\alpha_i + u_{i1} \tag{4}$$

Substituting equation (4) for η_i in Equation (3), we obtain equation (5).

$$y^*_{i1} = z_{i1}'\pi + \theta\alpha_i + u_{i1} \tag{5}$$

We assume that the error term follows an auto-regressive process, as shown in equation (6).

$$u_{it} = \rho u_{it-1} + \varepsilon_{it} \quad (6)$$

Equations (3) and (5) are estimated simultaneously.[6] When estimating equation (5), we use data for the year 2005. These models are estimated using variables drawn from the two datasets, as detailed in the next subsection.

Using both model 1 and model 2, we perform two kinds of estimations. In the first estimation, $y_{it} = 1$ if the respondent works on a permanent basis and $y_{it} = 0$ otherwise; in the second estimation, $y_{it} = 1$ if the respondent works on any basis, and $y_{it} = 0$ otherwise.

The variables

The variables used for the analyses of the HILDA Survey and the JPSC are as shown in table 1.

Table 1 - Variables used in the estimations

	HILDA Survey	*JPSC*
Dependent variable	1) Dummy =1 if the respondent is employed in the t^{th} period.	1) Dummy =1 if the respondent is employed in the t^{th} period.
	2) Dummy =1 if the respondent is employed on a permanent basis in the t^{th} period	2) Dummy =1 if the respondent is employed on a permanent basis in the t^{th} period
Independent variables		
Age	Respondent's age as of June30	Respondent's age as of October1
Children0_4	Number of children aged 0-4 years	Number of children aged 0-4 years
Children 5_14	Number of children aged 5-14 years	Number of children aged 5-14 years
Spousal income	Spousal income in AUD 1,000	Spousal income in JPY million
Dummy variables for education		
Reference group	Respondents whose highest education is year 12 or less, or certificates I/ II	Respondents whose highest education is secondary school or specialised training college with lower secondary programs or general programs
Postgraduate	Dummy =1 if the respondent has a postgraduate degree	Dummy =1 if the respondent has finished a postgraduate course
Bachelor	Dummy = 1 if the respondent has a bachelor's or honours degree	Dummy =1 if the respondent has a bachelor's degree
Advanced diploma/ diploma (HILDA Survey) Junior college/ college of technology (JPSC)	Dummy =1 if the respondent has a diploma or advanced diploma	Dummy = 1 if the respondent has finished a junior college or a college of technology

[6] We apply a 'random effects dynamic probit model with auto-correlated errors' (redpace) command in Stata.

Table 1 - Variables used in the estimations (continued)

	HILDA Survey	*JPSC*
Certificate III/IV (HILDA Survey) Specialised technical college (JPSC)	Dummy = 1 if the respondent has a certificate III or IV	Dummy = 1 if the respondent has finished a specialised course of specialised technical college
lag1(Employed)	Dummy =1 if the respondent is employed in the t^{th} period.	Dummy =1 if the respondent is employed in the t^{th} period.
lag1(Permanent)	Dummy =1 if the respondent is employed on a permanent basis in the t^{th} period	Dummy =1 if the respondent is employed on a permanent basis in the t^{th} period

Some explanation is required pertaining to the dummy variable for education. The variable 'postgraduate' represents postgraduate degrees for both the HILDA Survey and the JPSC. It represents a graduate certificate, a graduate diploma, a master's degree, or a doctoral degree for the HILDA Survey, while it covers only master's degrees and doctoral degrees for the JPSC, as graduate certificates and graduate diplomas are not awarded in Japan. The variable 'bachelor' pertains to a bachelor's degree or honours for the HILDA Survey and only to a bachelor's degree for the JPSC, as an honours degree is not a distinct formal qualification in Japan. The education dummies for the qualifications other than 'postgraduate' and 'bachelors' differ between the two countries. For the HILDA Survey, we use the dummy variable 'Advanced diploma/diploma' and 'Certificate III/IV'. The reference group consists of the respondents whose highest education is Certificate I/II or Year 12 or less. For the JPSC, we use the dummy variables 'Junior college/college of technology' and 'specialised training college'.[7] As explained in the previous section, there are several types of specialised training colleges in Japan. We distinguish specialised courses offered by specialised training colleges from other courses. The dummy variable 'specialised training college' is 1 if the respondent's highest education is a specialised course offered by a specialised training college. The reference group consists of respondents whose highest education is senior high school, or a general course offered by a specialised training college, or a miscellaneous school. The descriptive statistics for the explanatory variables for the HILDA Survey and the JPSC are listed in table 2.

We calculated the proportion of employment and employment on a permanent basis for each level of education or qualification, for both the HILDA Survey and the JPSC samples (table 3). This suggests that the proportion employed increases with education or qualification for the HILDA Survey but not for the JPSC. On the other hand, the proportion of those employed on a permanent basis has a positive relationship with education for both samples.

[7] In the JPSC, junior college graduates are not separated from those who graduated from colleges of technology. This makes it difficult to estimate the effect of colleges of technology.

Table 2 - Descriptive statistics

HILDA Survey			*JPSC*		
Variable	*Mean*	*Standard deviation*	*Variable*	*Mean*	*Standard deviation*
Employed	0.718	0.45	Employed	0.495	0.5
Employed (*t*-1)	0.719	0.45	Employed (*t*-1)	0.493	0.5
Permanent employment	0.485	0.5	Permanent employment	0.212	0.409
Permanent employment (*t*-1)	0.491	0.5	Permanent employment (*t*-1)	0.226	0.419
Children0_4	0.719	0.801	Children0_4	0.623	0.698
Children5_14	0.765	1.03	Children5_14	0.848	0.848
Spousal income (AUD1,000)	59.694	46.554	Spousal income (JPY1,000 thousand)	503.31	255.16
Postgraduate	0.131	0.337	Postgraduate	0.011	0.104
Bachelor	0.273	0.446	Bachelor	0.164	0.37
Advanced diploma, diploma	0.105	0.306	Junior college or college of technology	0.264	0.441
Certificate III or IV	0.11	0.312	Specialised training college	0.171	0.376
N of observations	3,247			2,359	

Note: Author's calculations based on the HILDA Survey, waves 5-9 and the JPSC, waves 13-17.

Table 3 - Labour market outcomes by education/qualifications, HILDA Survey and the JPSC

HILDA Survey	*Proportion employed (%)*	*Proportion employed on a permanent basis (%)*	*JPSC*	*Proportion employed (%)*	*Proportion employed on a permanent basis (%)*
Postgraduate	83.29	62.35	Postgraduate	57.69	53.85
Bachelor	80.59	64.79	Bachelor	48.32	33.59
Advanced diploma, diploma	76.97	52.25	Junior college or college of technology	45.10	21.03
Certificate III/IV	63.95	36.05	Specialised training college	56.82	25.56
Certificate I/II or lower (reference)	62.04	34.30	Senior high school, specialised training college (not specialised courses)	49.57	13.26

Note: Author's calculations based on the HILDA Survey, waves 5-9 and the JPSC, waves 13-17.

6. Econometric results

As explained in the previous subsection, our analyses are mainly composed of four kinds of estimations, as shown in the following table.

Model	*Type*	*Description of the type*	*Data*
Model (Static)	1	y = 1 if employed on a permanent basis; y = 0 otherwise	HILDA
			JSPC
	2	y = 1 if employed on any basis; y = 0 otherwise	HILDA
			JSPC
Model (Dynamic)	1	y = 1 if employed on a permanent basis; y = 0 otherwise	HILDA
			JSPC
	2	y = 1 if employed on any basis; y = 0 otherwise	HILDA
			JSPC

The estimated results are presented in tables 4.1 through 6.2.

Table 4.1 - Estimated results for permanent or ongoing employment, 2005-2009 (1)

Dependent variable: employed on a permanent or ongoing basis in wave *t*

	Random-effect probit estimation			*Random-effect probit estimation*	
HILDA Survey	*Marginal effects*	*z-value*	*JPSC*	*Marginal effects*	*z-value*
Age	0.0041	1.08	Age	0.0012	0.04
Children0_4	-0.2265	-16.31 ***	Children0_4	-0.0822	-6.81 ***
Children5_14	-0.1132	-7.84 ***	Children5_14	-0.0452	-3.46 ***
Spousal income	0.0002	0.89	Spousal income	-0.1311	-2.63 ***
Postgraduate	0.2470	5.41 ***	Postgraduate	0.3690	2.22 **
Bachelor	0.2586	6.94 ***	Bachelor	0.2450	4.27 ***
Advanced diploma, diploma	0.1607	3.23 ***	Junior college, college of technology	0.0979	2.15 **
Certificate III/IV	0.0068	0.15	Specialised training college	0.1318	2.41 **
N of observations	3247		N of observations	2359	
N of groups	749		N of groups	546	
Wald chi^2	336.730		Wald chi^2	84.54	
	Prob > chi2 = 0.0000			Prob > chi2 = 0.0000	

Note: Author's estimation based on the HILDA Survey, waves 5-9 and the JPSC, waves 13-17.
***, ** and* denote significance at the 1%, 5%, and 10% levels, respectively.

Table 4.2 - Estimated results for permanent or ongoing employment, 2005-2009 (2)

Dependent variable: employed on a permanent or ongoing basis in wave *t*

	Pooled probit estimation, clustered with individuals			*Pooled probit estimation, clustered with individuals*	
HILDA Survey	*Marginal effects*	*z-value*	*JPSC*	*Marginal effects*	*z-value*
Age	0.0027	0.56	Age	0.0003	0.06
Children0_4	-0.2168	-11.64 ***	Children0_4	-0.0962	-4.44 ***
Children5_14	-0.1075	-5.90 ***	Children5_14	-0.0631	-3.31 ***
Spousal income	0.0004	1.09	Spousal income	-0.2945	-3.73 ***
Postgraduate	0.2280	4.61 ***	Postgraduate	0.4065	2.51 **
Bachelor	0.2721	6.96 ***	Bachelor's degree	0.2405	4.02 ***
Advanced diploma, diploma	0.1425	2.57 **	Junior college, college of technology	0.0996	2.11 **
Certificate III/IV	-0.0049	-0.09	Specialised training college	0.1453	2.56 **
N of observations	3247		N of observations	2359	
N of groups	749		N of groups	546	
Wald chi^2	247.25		Wald chi^2	82.50	
Log pseudo-likelihood	-1927.305		Log pseudo-likelihood	-1104.57	

Note: Author's estimation based on the HILDA Survey, waves 5-9 and the JPSC, waves 13-17.
***, ** and* denote significance at the 1%, 5%, and 10% levels, respectively.

Table 5.1 - Estimated results for employment on any basis, 2005-2009 (1)

Dependent variable: employed in wave *t*

	Random-effect probit estimation			*Random-effect probit estimation*	
HILDA Survey	*Marginal effects*	*z-value*	*JPSC*	*Marginal effects*	*z-value*
Age	0.0121	3.57 ***	Age	-0.0023	-0.62
Children0_4	-0.2005	-16.44 ***	Children0_4	-0.2461	-13.97 ***
Children5_14	-0.0916	-7.81 ***	Children_514	-0.0128	-0.96
Spousal income	-0.0001	-0.44	Spousal income	-0.5820	-9.49 ***
Postgraduate	0.1474	4.81 ***	Postgraduate	0.1075	1.06
Bachelor	0.1479	5.45 ***	Bachelor	0.0775	2.32 **
Advanced diploma, diploma	0.1009	2.92 ***	Junior college or college of technology	0.0005	0.02
Certificate III/IV	0.0101	0.29	Specialised training college	0.0871	2.76 ***
N of observations	3247		N of observations	2359	
N of groups	749		N of groups	546	
Wald chi^2	318.02		Wald chi^2	303.78	

Note: Author's estimation based on the HILDA Survey, waves 5-9 and the JPSC, waves 13-17.
***, ** and* denote significance at the 1%, 5%, and 10% levels, respectively.

Table 5.2 - Estimated results for employment on any basis, 2005-2009 (2)
Dependent variable: employed on a permanent or ongoing basis in wave *t*

	Pooled probit estimation, clustered with individuals			*Pooled probit estimation, clustered with individuals*	
HILDA Survey	*Marginal effects*	*z-value*	*JPSC*	*Marginal effects*	*z-value*
Age	0.0107	2.75 ***	Age	-0.0025	-0.39
Children0_4	-0.1985	-13.49 ***	Children0_4	-0.2468	-9.33 ***
Children5_14	-0.0773	-5.84 ***	Children_514	-0.0127	-0.56
Spousal income	-0.0002	-0.67	Spousal income	-0.5768	-4.09 ***
Postgraduate	0.1579	5.32 ***	Postgraduate	0.1065	0.64
Bachelor or honours	0.1528	5.50 ***	Bachelor's degree	0.0775	1.32
Advanced diploma, diploma	0.0897	2.37 ***	Junior college or college of technology	0.0004	0.01
Certificate III/IV	-0.0059	-0.14	Specialised training college	0.0872	1.55
N of observations	3247		N of observations	2359	
N of groups	749		N of groups	546	
Wald chi^2	275.23		Wald chi^2	121.20	
log pseudo-likelihood	-1650.014		log pseudo-likelihood	-1451.8503	

Note: Author's estimation based on the HILDA Survey, waves 5-9 and the JPSC, waves 13-17.
***, ** and* denote significance at the 1%, 5%, and 10% levels, respectively.

Table 6.1 - Estimated results for permanent or ongoing employment, 2005-2009 (3)
Dependent variable: employment on a permanent or ongoing basis in wave *t*

	Random-effect dynamic probit estimation with auto-correlated errors			*Random-effect dynamic probit estimation with auto-correlated errors*	
HILDA Survey	*Estimated coefficients*	*z-value*	*JPSC*	*Estimated coefficients*	*z-value*
lag1(permanent)	0.8401	2.74 ***	lag1(permanent)	2.2230	4.99 ***
Children0_4	-0.5164	-6.19 ***	Children0_4	-0.2719	-1.82 *
Children5_14	0.0017	0.03	Children5_14	0.0731	0.77
Spousal incomes	0.0001	0.10	Spousal incomes	-0.8398	-1.85 *
Postgraduate	1.0905	4.18 ***	Postgraduate	1.4015	1.41
Bachelor or honours	1.3390	5.66 ***	Bachelor	0.9580	2.20 **
Advanced diploma, diploma	0.7852	3.08 ***	Junior college, college of technology	0.4658	1.74 *
Certificate III/IV	0.1860	0.88	Specialised training college	0.6309	1.70
Intercept	-0.7392	-3.83 ***	Intercept	-2.1401	-5.40 ***
N of observations	4560		N of observations	3820	
Log likelihood	-1264.8608		Log likelihood	-476.574	
Wald chi^2	161.95		Wald chi^2	137.76	
lambda	0.608	8.08 ***	lambda	0.5436	2.09 **
AR(1)	0.011	0.07	AR(1)	-0.1609	-1.26
theta	0.959	5.51 ***	theta	1.6829	2.01 **

Note: Author's estimation based on the HILDA Survey, waves 5-9 and the JPSC, waves 13-17.
***, ** and* denote significance at the 1%, 5%, and 10% levels, respectively.

Table 6.2 - Estimated results for employment on any employment basis, 2005-2009 (3) Dependent variable: employment in wave *t*

	Random-effect dynamic probit estimation with auto-correlated errors			*Random-effect dynamic probit estimation with auto-correlated errors*	
HILDA Survey	*Estimated coefficients*	*z-value*	*JPSC*	*Estimated coefficients*	*z-value*
employed					
lag1(employed)	0.7781	2.65 ***	lag1(employed)	1.8440	6.34 ***
Children0_4	-0.6279	-7.20 ***	Children0_4	-0.2600	-2.36 **
Children5_14	-0.0540	-0.88	Children5_14	0.1515	2.25 **
Spousal incomes	-0.0011	-1.17	Spousal incomes	-0.3882	-1.82 *
Postgraduate	0.7725	3.62 ***	Postgraduate	0.2144	0.32
Bachelor	0.7314	4.13 ***	Bachelor	0.1480	0.79
Advanced diploma, diploma	0.4238	1.97 *	Junior college, college of technology	0.0174	0.11
Certificate III/IV	0.0454	0.26	specialised training college	0.1807	0.93
Intercept	0.6366	2.18 **	Intercept	-0.7989	-3.15
N of observations	4560		N of observations	3820	
Log likelihood	-1193.756		Log likelihood	-855.1954	
Wald chi^2	174.56		Wald chi^2	148.75	
lambda	0.4743	5.97 ***	lambda	0.4155	2.29
AR(1)	-0.0222	-0.15	AR(1)	-0.1713	-1.7
theta	0.6674	4.48 ***	theta	1.2302	2.88

Note: Author's estimation based on the HILDA Survey, waves 5-9 and the JPSC, waves 13-17.
***, ** and* denote significance at the 1%, 5%, and 10% levels, respectively.

Tables 4.1 and 4.2 are obtained from the static estimation based on model1, type1. They indicate that most of the variables pertaining to education or qualifications have significant positive effects on the probability that a respondent works on a permanent or ongoing basis. For the HILDA Survey, three categories of qualifications – postgraduate degrees, bachelors or honours, and advanced diplomas or diplomas – have significant positive effects. For the JPSC, four categories of post-secondary education have significant positive effects on permanent employment. The comparison between the HILDA and JPSC results reveals that the marginal effects of the bachelor's degrees are almost the same for both samples, while those for the advanced diplomas or diplomas in the HILDA Survey are higher than those for junior college or colleges of technology in the JPSC.

Tables 5.1 and 5.2 display the estimated results for model1, type2. Table 5-1, which is based on random-effects estimation, indicates that for the HILDA Survey, the three dummy variables for qualifications – postgraduate degrees, bachelor or honours, and advanced diplomas/diplomas – have significant effects on the probability that the respondent works. On the other hand, for the JPSC, only bachelor's degrees have significant positive effects. However, the marginal effect of the bachelor's degree for the JPSC, 0.078, is lower than that for its HILDA counterpart, 0.148. Table 5.2, based on a pooled probit estimation with clusters, shows that for the JPSC, none of the variables pertaining to educational attainment have significant effects to employment.

A comparison between table 4.1 and 5.1 reveals that for both surveys, marginal effects of all dummy variables for higher education or qualifications are higher for employment on a permanent/ongoing basis than for other employment statuses. However, the differences in the marginal effects of education/qualifications dummies between the two tables are greater for the JPSC than for the HILDA survey. For example, the differences in the marginal effects of bachelor's degrees are larger for the JPSC (0.2450 in table 4.1 and 0.0775 in table 5.1) than that for the HILDA Survey (0.2586 in table 4.1 and 0.1479 in table 5.1). Similarly, the differences in the marginal effects of junior colleges or colleges of technology for the JPSC (0.0979 in table 4.1 and 0 in table 5.1) are also larger than the differences in the marginal effects of advanced diploma/diploma for the HILDA Survey (0.1607 in table 4.1 and 0.1009 in table 5.1). Similar observations are obtained from a comparison between table 4.2 and 5.2. This suggests that for the JPSCs, the return to higher education or qualification is more dependent on whether the employment is on a permanent or ongoing basis than it is for the HILDA Survey.

Tables 6.1 and 6.2 depict the dynamic estimation results based on model2, types 1 and 2, respectively. Table 6.1 demonstrates that, for the HILDA Survey, postgraduate degrees, bachelor's degrees, advanced diplomas or diplomas have significant positive effects on permanent or ongoing employment. On the other hand, for the JPSC, only bachelor's degrees significantly raise the probability of working on a permanent basis. Table 6.2 shows that, for the HILDA Survey, postgraduate degrees, bachelor's degrees, and advanced diploma/ diploma have significant positive effects on employment on any basis. For the JPSC, none of the education dummies has significant effects on employment in the dynamic estimation results.

Comparing the HILDA and JPSC results leads to several observations. Firstly, the effects of education on employment (for all types of employment status) are significant and positive in the estimations using HILDA data but not for those using JPSC data. The effects of higher education on permanent employment are observed for the JPSC but the results are not robust. Secondly, for the JPSC results, the effects of postgraduate degrees, bachelor's degrees, and junior college/colleges of technology on permanent employment are less significant statistically for the dynamic model (table 6.1) than for the static model (tables 4.1 and 5.1). This suggests that the effects of education are cancelled by the effects of the previous period's employment status. This in turn suggests that, in Japan, the previous period's employment status is more important for employment than educational attainment or qualifications in the present period. Thirdly, for the HILDA Survey, the effects of degrees or diplomas are significant in the dynamic estimation results as well as in the static results. Fourthly, the marginal effects of bachelor's degrees on employment are weaker for the JPSC than for the HILDA Survey. One possible explanation is that university education in Japan is not necessarily career-oriented, as pointed out by Edwards and Pasquale (2003). Another explanation is that the labour demand for women with bachelor's degrees is so weak in some industries (Hori, 2009; and Sano, 2009) that labour supply of women with bachelor's degrees tends to be excessive. However, the interpretation of this result needs further research.

7. Concluding remarks

We estimated female labour supply functions, paying special attention to the effects of education and qualifications on labour market and employment outcomes in Australia and Japan. We adopted a dynamic model as well as static models to obtain robust results for the two countries.

As the qualification systems for the two countries differ, it was not possible to compare the effects of education or qualifications on employment in a symmetric manner. However, we were able to find some differences between the econometric results for the two countries.

One of the major dissimilarities is that postsecondary education does not lead to a higher probability of employment (for any employment status) in the JPSC results, unlike for the HILDA results. Another important dissimilarity is that, for the JPSC, the effects of education are weaker for the dynamic estimation with lagged employment variables than for the static estimation. In contrast, for the HILDA Survey, the effects of education are not significantly different between the dynamic and static estimation results. This result could be interpreted in the following way. For the JPSC, the effects of previous employment status were so strong that they cancelled the effects of education. However, this is a hypothesis; future econometric study will be required to isolate the effects of previous employment from those of education.

The marginal effects of bachelor's degrees on permanent employment were weaker for the JPSC than for the HILDA Survey. The interpretations for this finding also need to be investigated further.

For Japan, specialised training colleges appear to have no effects on employment in the dynamic estimation results. In contrast, for Australia, qualifications such as advanced diplomas or diplomas did have an effect. This suggests that skills acquired from vocational education have not yet been fully utilized in Japan.

The need for certain types of education, skill formation, and skill evaluation varies on the basis of the labour market type. In the past, the Japanese labour market was characterised by low labour mobility and well-developed internal labour markets. For this reason, experiences acquired within firms have been weighed higher than the skills acquired outside firms. However, the labour market in Japan has been changing since the beginning of the 1990s in terms of labour mobility and diversifications in the types of employment, thus raising the importance of skills acquired outside firms. Currently, the systems of education, qualifications, and labour market institutions are undergoing reform so that human capital developed both outside and inside the firms can be fully utilized to bear returns. The Australian experiences could be useful as an example of advanced cases for this reform.

Appendices

Appendix A1 - Characteristics of the Household Income and Labour Dynamics in Australia (HILDA) Survey and the Japanese Panel Survey on Consumers (JPSC)

	HILDA Survey	*JPSC*
Starting year	2001	1993
Gender of respondents	Both men and women	Only women
Age group for the first year	14-92 years	24-34 years
Number of respondents in first wave	13,969	1,500
Interviews	Conducted annually	Not conducted
Continuity	Panel members are followed over time	Panel members are followed over time
Topping of the data	5,477 new members were added in wave 11	500 new members were added in wave 5 836 new members were added in wave 11
Information	Economic and subjective well-being, labour market dynamics, and family dynamics	Family dynamics, labour market dynamics, household incomes, savings, and expenditure

Appendix A2 - Sequence patterns for the HILDA Survey, waves 5-9

Sequence pattern	*Number of observations*	*Percentage*	*Cumulative percentage*
22222	158	17.32	17.32
00000	108	11.84	29.17
11111	91	9.98	39.14
22221	25	2.74	41.89
10000	19	2.08	43.97
01111	18	1.97	45.94
12222	16	1.75	47.70
21111	16	1.54	49.45
00111	14	1.54	50.00
10111	13	1.43	52.52
Others	433	47.48	100.00
Total	912	100.00	

Notes: Author's calculations based on the HILDA Survey, waves 5-9. 2, 1, and 0 denote employment on a permanent basis, other types of employment, and not working, respectively.

Appendix A3 - Sequence patterns for the JPSC, waves 13-17

Sequence pattern	*Number of observations*	*Percentage*	*Cumulative percentage*
22222	185	24.21	24.21
00000	162	21.20	45.42
11111	98	12.83	58.25
01111	17	2.23	60.47
00001	16	2.09	62.57
10000	15	1.96	64.53
22220	15	1.96	66.49
00011	10	1.31	67.80
11100	10	1.31	69.11
11222	10	1.31	70.42
Others	226	29.59	100.00
Total	764	100.00	

Note: Author's calculations based on the JPSC, waves 13-17. 2, 1, and 0 denote employment on a permanent basis, other types of employment, and not working, respectively.

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Earnings of Indian Male Migrants in the Australian Labour Market

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Abstract

The number of Indian students and migrants in Australia has increased considerably from the mid-2000s, partly as a result of changes in migration policy which made it much easier to gain a visa to work and settle in Australia. This paper examines the earnings of Indian migrants in the Australian labour market controlling for educational attainment and demographic variables for Australian born Indian born, and other foreign born migrants from English speaking and non-English speaking backgrounds. The results suggest that the returns to educational qualifications in the Australian labour market for Indian born male migrants are markedly lower as compared to Australians and other migrants in general. These findings are consistent with the major hypothesis of this paper that Indian males in the labour market are not utilising their post-secondary qualifications to their full extent either due to divergent motivations that treat the possession of a post-secondary qualification as a secondary consideration, or the quality of their qualifications may be perceived to be of poorer quality. Both explanations have serious implications for Australia's skilled migration policy and the labour market prospects of Indian migrants and workers in Australia.

Keywords: Indian migrants, Earnings, Migration, Returns to education

JEL classification: J24, J61

1. Introduction

The number of Indian migrants and students in Australia increased considerably from the mid-2000s partly as a result of changes made to Australian migration policy. These changes made it easier to gain residence to work and settle in Australia for those obtaining certain qualifications from Australian tertiary education institutions (Baas, 2007; Birrell and Healy, 2010; McCann, 2010). This paper attempts to open a dialogue on the issue of the labour market outcomes of Indian migrants and former international students. This cohort has received considerable media attention in recent years although not all of this discussion has been productive or indeed academic. A common refrain that runs through the discussion of this issue is that when it comes

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to recent Indian migrants, Australia's immigration policy has done a less than perfect job at vetting these applicants, resulting in relatively poor labour market outcomes for Indian migrants in terms of earnings and employability. Australia might be expected to present greater labour market opportunities for Indians as compared to their home country. The extent to which Indians in the Australian labour market have capitalised on these opportunities, especially relative to Australian-born, remains to be tested.

This paper concentrates on one important labour market outcome, namely weekly earnings, and analyses the differences in earnings outcomes of Indian male migrants in Australia compared to Australian-born labour market participants and migrants from a non-Indian backgrounds.

This research is motivated by the relatively recent phenomenon of a rapid increase in the number of Indians coming to Australia, especially former students who chose Australia as an international study destination and subsequently as a migration destination. As Rafi and Lewis (2013) illustrate, this trend persisted until 2009 after which student numbers from India started to taper off. A combination of factors such as the global financial crisis (GFC), a strengthening Australian dollar and ethnic violence against Indians in Melbourne has been thought responsible for this decline in new student arrivals (Rafi and Lewis, 2013). Previous research by Rafi and Lewis (2013) also highlighted that the recent behaviour of Indian students in Australia, their course preferences and the mix of higher education and vocational education have been governed by recent changes in immigration policies.

Theory suggests that the desire of Indians to secure quality qualifications and access market opportunities in Australia is driven by an expected increase in lifetime income (Maxwell, 1988; Bradford, 2013). The Indian economy is characterised by large scale informal employment, heterogeneous and stagnant wage and productivity growth between sectors, and increasing income inequality (Kijima, 2006; Glinskaya and Lokshin, 2007; Kumar and Mishra, 2008; Majumdar, 2010; Sidhu, 2010). Furthermore, supply constraints in the Indian tertiary sector, in terms of lack of suitable staff and unavailability of vacancies at premier tertiary institutions as outlined by Jain *et al*. (2006) and Aggarwal (2008), mean that Indians are increasingly looking beyond their borders for educational and employment opportunities. Thus, Australia can be seen as one of the possible destinations that Indians consider to pursue higher education and by extension better economic opportunities in the labour market. The attraction of Australia as a migration destination is also amplified due to Australia's skilled migration program awarding extra points for applicants that possess Australian qualifications.

This paper begins with a brief overview of recent movements of Indian students to Australia, followed by a summary of the theoretical framework and research methodology, followed by the presentation and discussion of empirical results, and concluding by suggestions for the direction for future research.

2. Indian Students in Australia

The number of Indian students in Australia grew significantly during the 2000s. The number of students in higher education rose steadily (more than doubling) up to 2009, with most of these students choosing to pursue postgraduate courses in information technology (IT) and commerce (Rafi and Lewis, 2013). Post 2006 the popularity of vocational courses such as hairdressing and cookery spiked dramatically with

Indian students enrolling in vocational (VET) courses rather than university degrees in commerce or IT. These VET courses became the most cost effective and assured pathway to permanent residency (McCann, 2010). This explains the surge in Indians applying for subclass 572 VET study visas. The total number of subclass 572 VET visas granted increased dramatically from 12,612 in 2007/08 to 36,774 in 2008/09 while subclass 573 higher education visas started to decline around the same time (Rafi and Lewis, 2013). However, due to quality concerns regarding the provision of VET services in Victoria, and the realisation that the VET sector was being utilised as a migration loophole, the link between vocational training and migration was promptly de-emphasised (Rafi and Lewis, 2013).

As highlighted by Rafi and Lewis (2013) Indian students have proven to be keen followers of Australian migration policies, making choices that result in the highest probability of securing permanent residence in Australia. While anecdotal, there is, however, the general perception that Indian students who chose to stay in Australia after the completion of their studies do not end up fully utilising their university and tertiary qualifications and are engaged in relatively low skilled jobs.

While Indian students who choose to study in Australia are clearly motivated by superior labour market outcomes than would be expected in India, the superior outcomes may not necessarily result from the possession of an Australian qualification. That is to say, for an Indian student, an Australian qualification may not be the primary factor that nets a higher rate of return to education; instead an Australian qualification may be the mechanism which facilitates migration which provides the superior economic outcomes relative to the Indian labour market. It may be the prospect and likelihood of Australian migration that is attractive to Indians considering studying in Australia, not the qualification itself. This hypothesis is tested in this paper by modelling the earnings of Indian males in the Australian labour market relative to Australian-born males and other male migrants.

3. Theoretical Framework

This section discusses recent literature on the labour market outcomes of migrants to Australia and the returns to their skills and qualifications.

A recent report by the OECD (2007) concluded that overall the labour market integration of skilled migrants in Australia was favourable compared to other migrant destinations. This was attributed mainly to Australia's point based selection criteria for skilled immigrants which, generally, means migrants to Australia are highly educated (OECD, 2007). Furthermore migrants originating from non-OECD countries were found to be more qualified than migrants from OECD countries. However, immigrants from non-OECD countries faced a higher initial unemployment gap relative to immigrants from OECD countries. The report stated that immigrants from non-OECD countries experienced an unemployment rate of 26 per cent in the first two years post arrival. This is compounded by higher levels of distress driven employment for non OECD immigrants, 39.1 per cent of whom were engaged in low to medium skilled jobs for which they were over qualified (OECD, 2007), the report argued that the high incidence of over qualification for non-OECD migrants results in lower returns to qualifications for these migrants.

Messinis (2008) found evidence of over qualification in the Australian labour market. The findings of Messinis (2008) suggested that ethnic background, ancestry, natural ability and parental occupation status were important determinants of over qualification.

With regards to qualifications, using data from the Household Income and Labour Dynamics Australia (HILDA) survey the OECD reported that immigrants with Australian qualifications fared better in terms of employment prospects when compared to similar migrants (in terms of age, gender, education level, experience) who did not possess Australian qualifications (OECD, 2007, p.35).

Parasnis, Fausten and Cheo (2008) further tested the labour market assimilation and outcomes for migrants, especially former international students in Australia. The authors stated that the literature on immigrant assimilation suggested that immigrants are disadvantaged in the labour market relative to Australian-born. According to Parasnis, Fausten and Cheo (2008) the policy of allocating extra points to migration applicants with Australian qualifications has been justified on the basis that possessing Australian qualifications would reduce the labour market disparity between migrants and Australian-born workers. Parasnis, Fausten and Cheo (2008) utilised a probability model to estimate the impact of Australian qualifications on the labour market outcomes of migrants. Utilising Census data from 2001 the authors estimated the labour market outcomes for migrants with Australian qualifications and migrants without Australian qualifications. Both cohorts were compared against Australian born workers. Their findings contradict those of the OECD (2007) in that possession of Australian qualifications were found to not exert a significant influence on labour force participation and employment and that other factors such as labour market experience, marital status, disability and birthplace were better determinants of labour force participation and employment.

Miller and Neo (2003) analysed the labour market adjustment of immigrants in the Australian and US labour markets by analysing expected earnings and employment outcomes. Utilising augmented Mincer wage equations and a binary logit model of employment, the findings of the authors suggested that high degrees of labour market inflexibility in Australia resulted in relatively modest and slower convergence of the labour market outcomes of immigrants in Australia as compared to the USA.

Chiswick and Miller (2008) used unit record data (one per cent sample) from the 2001 Census to estimate an augmented earnings function (which included information on occupation) for adult men from different labour market cohorts including immigrants. The results showed that limited international transferability of human capital skills was responsible for new immigrants taking up low skilled jobs when they first entered the Australian labour market (Chiswick and Miller, 2008, p.45). In the present context, it is expected that this phenomenon would be less severe, as the higher incidence of Australian qualifications possessed by recent Indian migrants would assist them in transferring their skills more readily to the Australian labour market. However, as the findings of Parasnis, Fausten and Cheo (2008) illustrate, this is not a guaranteed outcome.

The framework for this study draws on the work of Chiswick and Miller (Miller and Neo, 2003; Chiswick, Yew Liang and Miller, 2005; Chiswick, Le and Miller, 2008; Chiswick and Miller, 2008); and Parasnis, Fausten and Cheo (2008).

Using this framework, we analyse the impact of educational attainment and other demographic variables on the earnings outcomes of Indian immigrants.

4. Methodology

This study largely follows the specification of Miller and Neo (2003). Weekly gross income (WIP) for each individual i is used as a proxy for weekly earnings[1] and is related to a number of educational and demographic variables

$$WIP_i = Y12_i + CER_i + DIP_i + UG_i + PG_i + EXP_i + EXP_i^2 + SMS_i + DR5 + u_i$$

where *Y*12, *CER*, *DIP*, *UG*, *PG*, are highest educational attainment dummies for each individual *i*, namely, year 12, certificate, diploma, undergraduate degree and postgraduate qualifications, respectively. It should be noted that by implication, an observation that possesses an undergraduate or postgraduate qualification also possess a Y12 or equivalent qualification, however, the Y12 dummy is only equal to 1 if that is the highest qualification possessed by an observation.

EXP denotes the years of labour market experience of each individual, calculated using the Mincer proxy (age of an individual minus their years of training minus the age at which they started school, usually at five years of age). To allow for the possibility of diminishing returns to experience a quadratic term EXP^2 is also included.

SMS is a dummy variable that denotes social marital status (de-facto or civil). To incorporate the possible effect of duration of residence on earnings a duration of residence variable, *DR5*, is also included. This dummy variable is equal to 1 if a migrant has resided in Australia for five years or longer and zero otherwise. Finally *u* denotes the random error term.

Migrants (excluding Indian born males) are split into two separate cohorts, foreign born English speaking background (ESB) males and foreign born non-English speaking background (NESB) males. It should be noted that Indian born observations are not included in either of the two foreign born cohorts. As such the weekly income model is estimated for Australian born, foreign born ESB and NESB and Indian born male cohorts separately.

An ordered logistic regression model, estimated through maximum likelihood is used for empirical testing of the weekly earnings specification. The estimation technique utilised for the earnings model is governed by the nature of the data. The data used for this research is from the Census five per cent sample. The information on the dependent variable WIP, weekly gross personal income is reported by the ABS as an ordered categorical variable in the confidential unit record file (CURF) that is ranked according to increasing ranges of weekly gross income (ABS, 2013).

[1] The ABS defines weekly income of person as gross income before tax, superannuation, health insurance, or other deductions are made. Gross income includes family payments, additional family payments, pensions, unemployment benefits, student allowances, maintenance (child support), superannuation, wages, salary, overtime, dividends, rents received, interest received, business or farm income (less operating expenses) and workers' compensation received. Given the age profile of the sample and their hours worked per week, this research uses weekly income of persons as a proxy for weekly earnings based on the assumption that the majority of gross weekly income is attributed to earnings from salary and wages.

The earnings sample excludes all males who do not report their weekly income or are not employed. To control for the number of hours worked the earnings model only includes males who were engaged in full time employment (working more than 34 hours a week).

In the presence of a variable that has discrete outcomes the use of OLS is inadvisable due to the fact that the predicted probabilities of the outcomes are not constrained between zero and one (Katchova, 2013). Therefore in this case the use of the ordered logit model is more appropriate. Greene (2007) and Katchova (2013) provide an overview of the ordered logit model which is summarised below.

Let Y_i^* denote a latent unobservable variable for the *ith* observation which can be represented in terms of a vector of independent predictors X_i and a random error term u_i so that:

$$Y_i^* = X'_i\beta + u_i$$

Where β denotes a vector of parameters.

For J possible outcomes the probability distribution can be compartmentalised into J–1 thresholds denoted by α:

$$Y_i = j \text{ if } \alpha_{j-1} < Y_i^* \leq \alpha_j$$

The probability of observation i choosing outcome j is given by:

$$P_{ij} = P(\alpha_{j-1} < Y_i^* \leq \alpha_j)$$
$$P_{ij} = cdf_{Yi*}(\alpha_j) - cdf_{Yi*}(\alpha_{j-1})$$
$$P_{ij} = F(\alpha_j - X'_i\beta) - F(\alpha_{j-1} - X'_i\beta)$$

Where F denotes a cumulative distribution function of the logistic distribution which can be generally represented as:

$$F(z) = \frac{e^z}{1 + e^z}$$

As such the predicted probability of an observation i selecting outcome j can be computed as the difference between the two cumulative distribution functions:

$$P_{ij} = \frac{e^{(\alpha_j - X'_i\beta)}}{1 + e^{(\alpha_j - X'_i\beta)}} - \frac{e^{(\alpha_{j-1} - X'_i\beta)}}{1 + e^{(\alpha_{j-1} - X'_i\beta)}}$$

Unlike the OLS model, where the parameter estimates given by β represent the marginal effects of the independent variables on the dependent variable, in the case of the ordered logit model the parameter estimates are not the same as the marginal effects and must be calculated separately. For an increase in a particular independent regressor X_r, the marginal effect of X_r on the probability of selecting outcome j for observation i is given by the partial derivative:

$$\frac{\partial p_{ij}}{\partial x_{ri}} = \{F'(\alpha_{j-1} - X'_i\beta) - F'(\alpha_{j-1} - X'_i\beta)\}\beta_r$$

The marginal effects are calculated at the means for each independent variable (X_r) and for J outcomes the sum of the marginal effects over all the categories of the independent variable is equal to zero. This is due to the fact that if some outcomes are more likely to occur, by implication other outcomes are less likely to occur.

5. Data Sources and Summary Statistics

This study utilises cross sectional confidential unit record data from the five per cent sample confidentialised unit record data files (CURFs) from the Census (ABS, 2009; ABS, 2013). These CURFs contain information on a wide range of demographics variables, such as age, ethnic background, employment status, weekly gross income (which in this research is used as a proxy for weekly earnings), level of post-secondary qualifications and year of arrival in Australia.

Separate sub samples for Australian born, foreign born ESB, foreign born NESB and Indian males were constructed using information contained in the Census variable 'Country of Birth of Person' (BPLP). All observations that did not report their weekly income or were not engaged in full time employment were dropped from the respective samples[2].

This paper only considers the earnings outcomes of full-time males. Females are excluded since their earnings are subject to issues such as gaps in their professional working careers due to issues such as maternity leave and childcare, and potential gender biases in earnings and employability for certain occupation streams such as trades related occupations. In the context of Indian migrants, especially for young, single migrants, females are also likely to be underrepresented in the Australian labour market due to cultural differences and the reluctance of Indian families to allow unmarried females to travel unattended. In the sample data for 2006 and 2011 there is an over representation of unmarried Indian born males in the 18-30 year old age cohort, as such this study concentrates on male earnings with the aim of addressing gender biases in earnings in future research. Only full-time workers (those that work more than 34 hours a week) are considered, so that the returns to education are not obscured by differences in hours worked, particularly by part-time work. Selected summary statistics from the data are reported in this section for the sake of illustration and to assist in later analysis.

Table 1 provides summary statistics on hours of work per week, as an indication of labour market engagement. As table 1 shows, there is considerable similarity between the cohorts. However, the Indian born cohort has a much lower percentage of individuals who work sixty hours or more in a week.

[2] Estimation was carried out using STATA scripts uploaded to the ABS Remote Access Data Laboratory (RADL).

Table 1 - Sample distribution of the number of weekly hours worked

	Australian	*ESB*	*NESB*	*Indian*
		2006		
25th Percentile	40	40	38	38
Median	42	43	40	40
75th Percentile	50	50	50	45
Mode	40	40	40	40
Work 60 hours or more	15	14	11	7.5
		2011		
25th Percentile	40	40	38	38
Median	42	42	40	40
75th Percentile	50	50	48	42
Mode	40	40	40	40
Work 60 hours or more	15	14.00	10.30	5

Table 2 - Tertiary qualifications – percentage of sample cohort

	Australian	*ESB*	*NESB*	*Indian*
		2006		
PG	3	6	8.7	28.53
GD	1.64	1.7	1.28	2.74
UG	13.78	16.17	22.3	30.98
DIP	7.57	8.8	9.5	8.65
CER	31.65	30.67	19.58	12.01
		2011		
PG	3.58	6.84	11.37	29.6
GD	1.77	2.1	1.64	3.5
UG	15	18.07	25.39	30.26
DIP	8.26	10	9.72	12.97
CER	33.43	29.47	18.57	9.72

Table 2 reports the tertiary qualifications possessed by the sample cohorts. Indian born males in the sample had a much higher incidence of higher education qualifications with nearly 63 per cent of the cohort possessing a university qualification in 2006 and 2011. Generally table 2 illustrates that certificate qualifications (vocational qualifications) were more prevalent within the Australian and foreign born English speaking background (ESB) cohorts, whereas university degrees had a higher representation in the foreign born non- English background (NESB) and Indian cohorts.

Table 3 - Median weekly income of sample cohorts

	Australian	*ESB*	*NESB*	*Indian*
		2006		
Median Group	$800-$999	$1,000-$1,299	$800-$999	$1,000-$1,299
Estimated Median	$926	$1,081	$893	$1,028
Income relative to AUS	1	1.17	0.96	1.11
		2011		
Median Group	$1,000-$1,249	$1,250-$1,499	$1,000-$1,249	$1,000-$1,249
Estimated Median	$1,171	$1,345	$1,109	$1,114
Income relative to AUS	1	1.15	0.95	0.95

Table 3 reports the median and relative incomes of the male cohorts from the earnings sample, in 2006 and 2011. The sample summary statistics identify foreign born ESB males as possessing the highest weekly median income followed by Indian born males. As shown by the ratio of the incomes of the foreign born (ESB and NESB) and Indian born male cohorts relative to the incomes of Australian born males, Indian born males in the earnings sample experienced a decline in their median income relative to Australian males between 2006 and 2011. This effect results from the relatively greater increase in the incomes of Australian born males relative to Indian born males over the five year period.

Table 4 reports the age distribution of the 2006 and 2011 sample cohorts. At the median, it can be seen that the two foreign born cohorts are older than both the Australian and Indian cohorts. It should also be noted that the Indian born cohort is markedly younger in 2011 compared to 2006, with the age difference at the median between Australian and Indian born males widening from two years in 2006 to seven years in 2011. The widening of this gap between Australian males and Indian born males highlights the increasing influx of younger Indian migrants, especially former international students discussed in Rafi and Lewis (2013).

Table 4 - Age distribution of sample cohorts

	Australian	*ESB*	*NESB*	*Indian*
		2006		
25th Percentile	29	36	34	30
Median	39	44	44	37
75th Percentile	49	53	52	46
90th Percentile	56	59	59	56
		2011		
25th Percentile	30	35	33	29
Median	40	45	43	33
75th Percentile	50	53	52	41
90th Percentile	58	60	59	52

6. Empirical Results

It is well known that in a maximum likelihood ordered logit regression, the coefficients are of little operational interest (Katchova, 2013). However, the sign on a coefficient (and its statistical significance) is instructive, as it states the likelihood of an observation falling in a higher (positive coefficient) or lower (negative coefficient) category. Given the less than straight forward interpretation of the coefficient estimates it is more intuitive to represent the coefficients in terms of proportional odds ratios which are equal to the probability of being in a higher income category relative to the probability of being in a lower income category. The interpretation of the marginal effects of the independent variables on each of the categories of the dependent variable is straightforward and can be stated as, all else being equal, a one unit increase in a continuous variable (or a discrete dummy variable being equal to 1) increases (positive coefficient) or decreases (negative coefficient) the probability of a particular outcome occurring by a given percentage amount.

Table 5 reports the log odds ratios for Australian born, other foreign and Indian born males for 2006 and 2011. In general, the possession of post-secondary qualifications makes a positive contribution (increases the likelihood) of all male cohorts of being in a higher income category. The exception here is the possession of certificate (vocational qualifications) by Indian born males, which has an odds ratio of less than one as well as being statistically non-significant. This lends some support to the tentative argument that investment in and possession of vocational qualifications by Indians in 2006 was not a significant contributor to their earnings capacity. To further pursue this argument the rapid increase in VET enrolments from India is a post 2006 phenomena so it remains to be seen whether Indian migrants have gotten any use out of their vocational qualifications.

As expected Australian born males enjoy the greatest benefits from tertiary education, although based on the evidence of the odds ratios there appear to be very little gains from pursuing a certificate or diploma qualification relative to year 12. This result is very much in line with previous research that for many the returns to a TAFE certificate are negative or zero. In particular previous research suggests that there are no significant earnings returns to Certificate I/II qualifications and there are no significant annual earnings returns to Certificate III/IV qualifications for those who have finished Year 12 (Leigh, 2008; Lewis, 2008).

Table 5 - Weekly Income: Log Odds Ratios[3]

WIP	*Australian*		*ESB*		*NESB*		*Indian*	
				2006				
Y12	1.973	***	1.581	***	1.353	***	2.078	***
CER	1.516	***	1.308	***	1.480	***	0.980	
DIP	2.685	***	2.427	***	2.070	***	1.377	**
UG	5.524	***	5.285	***	4.440	***	2.356	***
PG	11.140	***	9.910	***	7.933	***	4.273	***
EXP	1.188	***	1.151	***	1.091	***	1.140	***
EXP2	0.997	***	0.998	***	0.999	***	0.998	***
SMS	1.635	***	1.464	***	1.298	***	1.420	***
DR5	na		0.958		1.150	***	1.522	***
	n	134376	n	19608	n	25857	n	2082
	Pseudo R^2	8.34	Pseudo R^2	6.30	Pseudo R^2	4.60	Pseudo R^2	5.30
				2011				
Y12	1.849	***	1.506	***	1.460	***	1.671	***
CER	1.544	***	1.258	***	1.528	***	0.818	***
DIP	2.676	***	2.233	***	1.947	***	1.026	
UG	5.372	***	4.612	***	4.305	***	2.625	***
PG	10.151	***	8.866	***	6.683	***	3.685	***
EXP	1.173	***	1.156	***	1.101	***	1.154	***
EXP2	0.997	***	0.998	***	0.998	***	0.998	***
SMS	1.559	***	1.315	***	1.270	***	1.161	***
DR5	na		0.970		1.212	***	1.701	***
	n	141651	n	22541	n	32338	n	4425
	Pseudo R^2	7.87	Pseudo R^2	6.23	Pseudo R^2	4.76	Pseudo R^2	5.53

The dependent variable in this case is weekly income of person (WIP) which is an ordered categorical variable used as a proxy for weekly earnings. *** Significant at 1% , ** Significant at 5% , * Significant at 10%.

For Australian males the major gains to earnings accrue from the completion of an undergraduate or postgraduate qualification which increases the likelihood of being in a higher income category by 5.5 times and 11 times respectively in 2006. As illustrated in table 2, despite having the highest relative proportion of tertiary qualification of all the male cohorts, the earnings premiums associated with university qualifications for Indian born males are visibly lower compared to both Australian and other foreign born males for both undergraduate and post graduate qualifications. It is also clear from the results in table 5 that ESB male migrants fare better than NESB male migrants, suggesting that language and cultural background remain important in explaining labour market outcomes such as earnings. The low premiums to tertiary education for Indian born males are likely compounded by the over concentration of Indian graduates in a very narrow band of disciplines thus increasing the likelihood of a supply glut and raising quality concerns.

[3] Table 5 through 8 present abridged results from the maximum likelihood ordered logistic regression model.

Previous research (Rafi and Lewis, 2013) determined that Indian graduates were highly concentrated in two narrow fields, the disciplines of Management and Commerce (which includes accounting courses) and Information Technology The reason for this overconcentration is hardly surprising, given the availability of extra points towards permanent migration for graduates in accounting and IT. This overconcentration is one reason for the revamping of the skilled occupation list (SOL) as the inclusion of these fields of study was no longer warranted.

The impact of labour market experience on earnings is remarkably consistent and similar for all cohorts. One would have expected that after controlling for educational attainment Australian born workers, and workers in general, with more market experience would have an advantage in the labour market. However, this does not appear to be the case. Miller and Neo (2003) reached a similar conclusion stating that Australia's strict labour and wage laws govern earnings rather than experience as compared to other developed markets such as the US labour market.

In terms of the effect of duration of residence, the results indicate that foreign born NESB males and Indian born males enjoy modest benefits from more years of residency in Australia, with the benefits being larger for Indian born males. However, the variable is not significant for foreign born ESB male migrants suggesting that duration of residence has no impact on their earnings. The benefit granted by duration of residence increases modestly for Indian born males between 2006 and 2011, suggesting that more established and settled Indian males enjoy an advantage over recently arrived Indian males.

Finally, it is interesting to note that men in all four cohorts benefit from being married with Australian and Indian born males benefitting the most from being married. The observation that married individuals, especially married men, tend to earn more than their unmarried counterparts is well established in the literature (e.g. Antonovics and Town, 2005); Ahituv and Lerman, 2007; and Watson and McLanahan, 2011), and there are two main hypotheses put forward to explain this[4]. The first interpretation offered in the literature is that the added financial responsibility of marriage and spousal support increases the willingness of men to work harder both in terms of effort and number of hours worked, hence increasing their earnings. Furthermore marriage can also provide benefits ranging from greater emotional support, a more settled social life, and a source of supplementary income so that marriage and the need to work harder complement each other's effect. The recent work of Antonovics and Town (2005); Ahituv and Lerman (2007) and Watson and McLanahan (2011) explore these two themes. Notably Watson and McLanahan (2011) found empirical support for the first hypothesis, whereas Antonovics and Town (2005) and Ahituv and Lerman (2007) found evidence in support of the second hypothesis. In the case of Indian males it is likely that there are applicable elements of both theories.

[4] This phenomenon could be due to the fact that men who work harder and are more productive tend to earn more and as such make for more viable and suitable candidates for marriage. This suggests an issue with endogeneity caused by inverse causality. We assume exogeneity in our model, as such the coefficient on the marriage variable needs to be treated with caution as the positive effect of marriage on earnings is likely to be overestimated due to the endogeneity problem.

The results for 2011 also illustrate that there has been a slight deterioration in the contribution of post-secondary education on earnings (especially at the post graduate level, with this being most visible for foreign born males) for all cohorts. However the pattern of the results is similar to the earlier discussion of the 2006 results. It is interesting to note that the differences observed for Indian born males compared to other foreign born males in 2006 are even more distinct in 2011. These results suggest that the possession of post-secondary vocational qualifications provides very limited gains in terms of increasing the likelihood of being in a higher income category. As depicted by the odds ratios on CER and DIP for Indian born males, on the evidence of the results, Indian born males gain very little from their vocational qualifications, lending further support to the tentative argument established by the 2006 empirical results.

Tables 6 and 7 report selected marginal effects (percentage probabilities) of the independent variables on the various outcome categories of the dependent variable (weekly income of males). The marginal effects are calculated at the means for each explanatory variable (X_i) and for J outcomes the sum of the marginal effects over all the categories of the independent variable is equal to zero. This is due to the fact that if some outcomes are more likely to occur, by implication other outcomes are less likely to occur. The marginal effects suggest that the possession of post-secondary qualifications increases the probability of being in a higher income bracket for all cohorts.

Between 2006 and 2011 the contribution of higher education degrees towards higher income categories also increased. However, for Indian born males these probabilities are markedly lower as compared to Australian born and other foreign born males. In terms of the gap between Indian born males and Australian and foreign born males there is little to no improvement in this regard between 2006 and 2011.

Table 6 and 7 also reaffirm the earlier findings that possession of certification and diploma qualifications by Indians does not make a positive and sizeable contribution towards their likelihood of being in a higher weekly income category. These findings suggest one of several possible scenarios. First, Indians engaged in the Australian labour market are not putting their tertiary qualifications to optimal use. A rather more serious implication is that the qualifications possessed by Indians are of little use to the Australian labour market. This could be due to the lower quality tertiary programs taken by Indians (in India or in Australia), or their gravitation towards and concentration in a very narrow spectrum of disciplines such as IT and accounting, creating a supply glut. This second interpretation is consistent with the earlier hypothesis that Indians were motivated by the ease with which particular Australian qualification facilitated permanent migration, rather than the employment prospects and earnings potential. The availability of extra points towards immigration awarded for certain professions acted as a very strong signal to recent arrival Indian students who chose to pursue these vocations (Rafi and Lewis, 2013).

Table 6 - Weekly Income: Selected Marginal Effects (per cent) 2006

	$1-$149	*$150-$249*	*$250-$399*	*$600-$799*	*$1,000-$1,299*	*$1,600-$1,999*	*$2,000 or more*
				Australian Born			
Y12	-0.19	-0.55	-1.79	-6.41	4.67	3.20	3.93
CER	-0.11	-0.31	-1.03	-4.05	2.73	2.04	2.53
DIP	-0.19	-0.55	-1.83	-9.52	3.36	5.72	8.15
UG	-0.29	-0.84	-2.81	-15.16	2.11	10.14	17.04
PG	-0.27	-0.80	-2.70	-17.71	-6.48	12.61	34.28
EXP	-0.05	-0.14	-0.45	-1.66	1.23	0.81	0.97
EXP2	0.00	0.00	0.01	0.03	-0.02	-0.01	-0.02
SMS	-0.15	-0.42	-1.38	-4.56	3.65	2.20	2.64
				Foreign Born ESB			
Y12	-0.09	-0.22	-0.72	-4.49	0.98	2.64	4.64
CER	-0.05	-0.12	-0.39	-2.60	0.37	1.59	2.88
DIP	-0.13	-0.29	-0.99	-7.66	-1.64	5.31	11.97
UG	-0.21	-0.49	-1.66	-12.92	-5.36	8.77	25.60
PG	-0.21	-0.48	-1.63	-14.16	-12.12	7.62	42.94
EXP	-0.03	-0.06	-0.22	-1.38	0.27	0.82	1.44
EXP2	0.00	0.00	0.00	0.02	0.00	-0.01	-0.02
SMS	-0.0008	-0.19	-0.64	-3.78	1.06	2.16	3.68
DR5	0.01	0.02	0.07	0.42	-0.08	-0.25	-0.45
				Foreign Born NESB			
Y12	-0.13	-0.27	-0.92	-2.40	2.05	1.40	1.89
CER	-0.14	-0.30	-1.03	-3.42	2.27	2.00	2.85
DIP	-0.23	-0.47	-1.66	-6.55	3.20	4.01	6.15
UG	-0.44	-0.92	-3.21	-12.69	4.53	8.31	14.26
PG	-0.43	-0.90	-3.19	-16.32	-1.08	11.23	27.43
EXP	-0.04	-0.07	-0.25	-0.72	0.57	0.42	0.57
EXP2	0.00	0.00	0.00	0.01	-0.01	-0.01	-0.01
SMS	-0.11	-0.23	-0.80	-2.07	1.78	1.20	1.62
DR5	-0.06	-0.12	-0.42	-1.12	0.95	0.65	0.88
				Indian Born			
Y12	-0.29	-0.57	-1.76	-6.97	3.91	4.00	5.10
CER	0.01	0.01	0.04	0.20	-0.07	-0.13	-0.17
DIP	-0.08	-0.17	-0.53	-3.14	0.63	2.08	3.05
UG	-0.22	-0.45	-1.41	-8.20	1.36	5.54	8.46
PG	-0.35	-0.69	-2.18	-13.03	0.16	9.29	16.33
EXP	-0.04	-0.08	-0.24	-1.31	0.43	0.81	1.12
EXP2	0.00	0.00	0.00	0.02	-0.01	-0.01	-0.02
SMS	-0.11	-0.23	-0.71	-3.49	1.41	2.10	2.81
DR5	-0.13	-0.27	-0.83	-4.17	1.56	2.55	3.46

Table 7 - Weekly Income: Selected Marginal effects (per cent) 2011

	$1-$199	*$200-$299*	*$300-$399*	*$600-$799*	*$1,000-$1,249*	*$1,500-$1,999*	*$2,000 or more*
				Australian Born			
Y12	-0.18	-0.40	-0.82	-5.53	-0.84	5.85	6.76
CER	-0.11	-0.26	-0.53	-3.78	-0.95	4.16	5.09
DIP	-0.19	-0.44	-0.91	-7.16	-4.56	8.34	14.59
UG	-0.30	-0.67	-1.39	-11.04	-8.47	11.39	27.64
PG	-0.28	-0.64	-1.32	-11.40	-13.58	6.03	45.81
EXP	-0.04	-0.10	-0.21	-1.44	-0.25	1.54	1.77
EXP2	0.00	0.00	0.00	0.02	0.00	-0.03	-0.03
SMS	-0.13	-0.30	-0.62	-4.07	-0.44	4.24	4.72
				Foreign Born ESB			
Y12	-0.11	-0.15	-0.26	-2.99	-2.04	3.22	6.57
CER	-0.05	-0.07	-0.13	-1.57	-1.28	1.70	3.88
DIP	-0.15	-0.20	-0.37	-4.59	-5.26	4.19	15.61
UG	-0.26	-0.35	-0.64	-7.91	-9.78	5.05	31.29
PG	-0.26	-0.35	-0.64	-8.37	-13.41	-1.59	48.29
EXP	-0.04	-0.05	-0.09	-1.03	-0.78	1.12	2.40
EXP2	0.00	0.00	0.00	0.02	0.01	-0.02	-0.04
SMS	-0.07	-0.10	-0.18	-2.01	-1.35	2.18	4.36
DR5	0.01	0.01	0.02	0.22	0.17	-0.24	-0.51
				Foreign Born NESB			
Y12	-0.16	-0.25	-0.51	-3.89	0.31	3.18	4.12
CER	-0.14	-0.22	-0.47	-4.09	-0.46	3.57	5.42
DIP	-0.20	-0.31	-0.66	-6.07	-1.44	5.43	9.35
UG	-0.43	-0.67	-1.40	-12.53	-3.69	10.57	21.83
PG	-0.41	-0.64	-1.35	-13.55	-8.09	9.46	34.34
EXP	-0.04	-0.06	-0.12	-0.97	0.00	0.82	1.12
EXP2	0.00	0.00	0.00	0.02	0.00	-0.01	-0.02
SMS	-0.10	-0.15	-0.31	-2.44	0.12	2.02	2.66
DR5	-0.08	-0.12	-0.25	-1.97	0.11	1.63	2.13
				Indian Born			
Y12	-0.27	-0.26	-0.65	-5.65	0.89	4.52	4.59
CER	0.09	0.09	0.23	2.16	-0.13	-1.84	-1.98
DIP	-0.01	-0.01	-0.03	-0.27	0.00	0.24	0.27
UG	-0.35	-0.34	-0.87	-9.19	-1.60	8.63	11.75
PG	-0.46	-0.44	-1.13	-11.91	-2.79	11.16	16.84
EXP	-0.06	-0.06	-0.15	-1.50	-0.01	1.33	1.50
EXP2	0.00	0.00	0.00	0.02	0.00	-0.02	-0.02
SMS	-0.07	-0.06	-0.16	-1.57	0.03	1.37	1.52
DR5	-0.23	-0.22	-0.56	-5.51	-0.02	4.86	5.56

Also, it can be argued that characteristics, such as English language skills, Australian citizenship status, differences in attitudes towards work and the presence of labour market discrimination are also important in determining labour market outcomes such as earnings. The results presented in tables 5, 6 and 7 lend support to the argument that language background plays an important role in determining earnings with foreign born ESB males enjoying a clear lead over foreign born NESB and Indian males[5].

Table 8 - Goodness of Fit

	Sample Frequency (per cent)				*Means of Predicted Probabilities (per cent)*			
				2006				
WIP	*AUS*	*FB ESB*	*FB NESB*	*IND*	*AUS*	*FB ESB*	*FB NESB*	*IND*
Negative or Nil Income	0.8	0.57	1.03	0.63	0.78	0.58	1.03	0.62
$1-$149	0.54	0.30	0.55	0.43	0.51	0.31	0.55	0.43
$150-$249	1.51	0.69	1.13	0.86	1.43	0.70	1.14	0.86
$250-$399	4.41	2.25	3.91	2.65	4.31	2.29	3.99	2.69
$400-$599	14.09	9.51	15.81	10.50	14.11	9.58	16.13	10.81
$600-$799	18.44	15.82	19.28	16.72	18.41	15.88	19.56	17.2
$800-$999	16.04	15.58	16.27	15.48	16.09	15.56	16.26	15.66
$1,000-$1,299	17.33	18.82	16.37	18.66	17.39	18.77	16.08	18.44
$1,300-$1,599	10.57	12.62	9.90	12.88	10.56	12.62	9.67	12.49
$1,600-$1,999	6.75	8.60	6.67	9.18	6.79	8.57	6.55	8.89
$2,000 or more	9.51	15.24	9.08	12.00	9.61	15.15	9.04	11.91
				2011				
WIP	*AUS*	*FB ESB*	*FB NESB*	*IND*	*AUS*	*FB ESB*	*FB NESB*	*IND*
Negative or Nil Income	0.84	0.64	1.14	0.79	0.82	0.64	1.14	0.79
$1-$199	0.52	0.37	0.53	0.62	0.50	0.38	0.53	0.63
$200-$299	1.15	0.50	0.81	0.60	1.10	0.51	0.82	0.61
$300-$399	2.21	0.90	1.69	1.51	2.15	0.91	1.71	1.54
$400-$599	6.41	3.80	7.05	6.23	6.44	3.83	7.16	6.44
$600-$799	13.31	10.14	15.69	15.58	13.39	10.17	16.04	16.16
$800-$999	14.56	13.01	15.55	16.34	14.54	13.07	15.8	16.56
$1,000-$1,249	15.97	15.46	15.57	16.00	15.97	15.49	15.56	15.86
$1,250-$1,499	12.09	13.14	11.54	12.34	12.15	13.07	11.31	12.07
$1,500-$1,999	15.68	17.72	14.23	15.17	15.70	17.62	13.87	14.71
$2,000 or more	17.25	24.32	16.19	14.81	17.24	24.31	16.06	14.62

[5] Regarding the issue of citizenship, auxiliary regressions estimated by the authors did not identify citizenship status as a statistically significant explanatory variable for Indian born males. However these issues and others will be revisited in future research to improve the analysis and discussion.

The reliability of the model predictions can be tested by comparing the means of the predicted probabilities against the sample frequency for each category of the dependent variable. Each observation in the sample has a predicted probability of being in each of the eleven income categories. The means of these predicted probabilities are compared to the sample frequencies in table 8. As can be seen, the model predictions are very close to the sample frequency, and on the whole the model performs well in terms of fitting the data.

6. Conclusion

This paper reported estimates of the earnings outcomes of Indian male migrants in the Australian labour market. Focusing on full time employed Indian males in the Australian economy, this paper empirically analysed the effect of educational attainment on the weekly earnings of Indian males relative to other foreign born (ESB and NESB) and Australian males. The empirical results suggest that for most levels of education, the probabilities of Indian males being in a higher income category are lower in comparison to other foreign born males and Australian born males. These findings are consistent with the hypothesis that Indian males in the labour market are not utilising their tertiary qualifications either due to divergent motivations that treat the possession of a tertiary qualification as a secondary consideration, or rather worryingly, their qualifications may be perceived as poorer quality by Australian employers.

Appendix

The ABS does not report weekly income as a continuous variable for the unit record data in the CURFs. The income categories were also revised by the ABS between the 2006 and 2011 Censuses. The income categories reported by the ABS in the CURFs and utilised for this paper are reported below.

2006 *Negative or Nil Income*	*2011* *Negative or Nil Income*
$1-$149	$1-$199
$150-$249	$200-$299
$250-$399	$300-$399
$400-$599	$400-$599
$600-$799	$600-$799
$800-$999	$800-$999
$1,000-$1,299	$1,000-$1,249
$1,300-$1,599	$1,250-$1,499
$1,600-$1,999	$1,500-$1,999
$2,000 or more	$2,000 or more

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