ISSN 0819-2642
ISBN 0 7340 2596 3

THE UNIVERSITY OF MELBOURNE

DEPARTMENT OF ECONOMICS

RESEARCH PAPER NUMBER 940

JUNE 2005

CAUSES OF OVEREDUCATION IN THE AUSTRALIAN LABOUR MARKET

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Causes of Overeducation in the Australian Labour Market

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Abstract

Overeducation is a form of labour underutilisation which occurs when the formal education level of a worker exceeds that which is required for the job. In Australia close to 30 per cent of workers are overeducated and are underutilising their skills. Using data from the Negotiating the Life Course survey, this study determines the causes of overeducation in Australia. Four of the key theories that have been used to explain overeducation are tested: human capital, job competition, assignment and the career mobility theories. Tests show that the job competition model best explains the existence of overeducation in the Australian labour market.

Keywords: Overeducation, labour market, human capital theory, career mobility

JEL Codes: I21, J24, J62

[*] University of Melbourne. I should like to thank John Creedy, William Griffiths and the two anonymous referees for their comments and suggestions.

1. Introduction

Overeducation occurs when individuals possess more education than is strictly required for the job. It is a form of skill-related underemployment, a type of labour underutilisation that imposes costs on individuals and economies. Overeducation represents an inefficient allocation of human capital resources, and as such may negatively impact on productivity and economic growth. Moreover, as overeducation arises when the growth in the supply of skills that comes from increasing participation in education exceeds the growth in demand for skills, it implies that the level and composition of investment in education may be suboptimal.

Evidence suggests that overeducation is a pervasive feature of labour markets in industrialised economies. In the U.K., a number of studies have found that the incidence of overeducation is around 30 per cent, whilst in the U.S. some studies have estimated that up to 45 per cent of individuals are overeducated (see Groot and Maassen van den Brink, 2000). Estimates vary due to differences in the techniques used to measure overeducation, as well as the time period and country considered. Studies have also found that overeducation is associated with lower levels of job satisfaction and reduced earnings (Hersh, 1991; Tsang *et al*, 1991; Linsley, 2005).

In Australia, recent estimates have found that between 10 and 30 per cent of individuals are overeducated (Kler, 2005a; Kler, 2005b; Linsley, 2005).[1] Moreover, the incidence of overeducation was found to be higher among those who are young, have preschool aged children, work in large firms, and have fewer years of tenure (Linsley, 2005). Overeducation was also found to be higher among immigrants from a non-English speaking background, particularly for those from Asian countries who experience rates of overeducation as high as 40 per cent (Green *et al*, 2004; Linsley, 2005). Recent Australian studies have also identified a link between overeducation and time-related underemployment, such that those who are in positions in which their skills are underutilised are also likely to be underutilising their time (Linsley, 2005). Consistent with findings from overseas, overeducation has also been found to impose significant costs on individuals in Australia, reducing earnings by between 10 and 20 per cent and lowering job satisfaction (Linsley, 2005).

[1] Kler (2005b) found that the incidence of overeducation among Australian graduates, when measured using the Realised Matches approach, was 46 per cent for females and 38 per cent for males. These estimates seem unusually high, which is likely to be due to the measurement technique used and the restrictions placed on the sample.

This study examines the causes of overeducation in the Australian labour market. In doing so, it provides insights into the underlying factors determining labour market outcomes for individuals in the longer term, and the productivity potential of the Australian economy. It also helps in informing the debate on the optimal investment in education. Data from the 1997 Negotiating the Life Course survey are used to test four of the competing theories that have been put forward to explain the existence of overeducation. These are the human capital, job competition, assignment and career mobility theories.

This paper is organised as follows. The next section describes the main theories that have been used to explain overeducation, and by doing so establishes the foundations for formulating the procedures to test these theories and determine the causes of overeducation. In Section 3, the data and measurement technique are described, and descriptive statistics presented. Section 4 tests the human capital and job competition models against the assignment theory using techniques based on earnings regressions. In Section 5, tests are run to determine if the career mobility theory best explains the existence of overeducation in the Australian labour market. Section 6 concludes and identifies some of the policy implications of the findings.

2. Theoretical perspectives on overeducation

When individuals have higher levels of educational attainment than is strictly required for their jobs they are said to be overeducated. Overeducation implies an underutilisation of skills, and as such can represent an inefficient allocation of resources. Research into overeducation commonly finds that workers in jobs for which their actual education level exceeds the required level earn more than workers in the same position who possess the required level of schooling, and less than workers with the same education attainment in jobs which require that level. Overeducated individuals are also found to have significantly lower levels of job satisfaction, higher rates of turnover, and poorer mental and physical health (Tsang and Levin, 1985, p.97).

Several conventional labour market theories have been employed to explain the existence of overeducation and account for its effect on earnings. These theories differ in terms of the factors isolated as the key causes of overeducation, the

predictions about the private and social costs, and in identifying whether overeducation is temporary or permanent.

Human capital theory is based on the assumption that productivity is an increasing function of the human capital level of the worker. Human capital includes not only formal education, but also experience and on-the-job training. In this model, labour is paid the value of its marginal product, and consequently wages are determined by the workers' educational attainment, experience and training. Indeed, the human capital model implies that worker characteristics, or the supply side, determine earnings and it is only through exogenous shocks that the demand side impacts on real wages (Becker, 1964).

Overeducation arises when there is an increase in the educational attainment of workers. This causes the relative wage of high-skilled workers to fall. Producers, faced with a cheaper supply of educated labour, substitute away from low-skilled workers towards the more highly skilled. Educated workers are placed in positions previously filled by low-skilled workers. On the supply side, lower returns to education induce individuals to reduce their investment in human capital. Hence the human capital model predicts that when overeducation arises the labour market is in disequilibrium. As such, overeducation and the associated economic costs are temporary, as firms adjust their production processes and workers reduce their investment in education in response to the lower relative earnings of skilled workers.

Career mobility theory is a variation of human capital theory that identifies overeducation as an equilibrium labour market outcome. As in the human capital model, education, experience and training are assumed to be substitutes, and each of these components of human capital are positively related to productivity and earnings. Career mobility theory suggests that new entrants to the labour market with high levels of formal education accept positions for which they are apparently overeducated whilst they gain experience and occupation-specific human capital through training. Like in the human capital model, overeducation is a temporary phenomenon for individuals, who progress from being in positions for which they are overeducated to higher level occupations in which they make full use of their qualifications. However, unlike the human capital model, the career mobility theory assumes that optimising individuals choose jobs for which they are overeducated in

order to improve their future labour market prospects. The career mobility theory implies that overeducation is a standard feature of a well functioning labour market, and is factored into decisions made by individuals and firms. Consequently, there are negligible economic costs associated with overeducation.

Job competition theory offers a demand side explanation for the existence of overeducation, in contrast to the supply side approach of the human capital and career mobility theories. Central to the job competition theory is the assumption that workers compete in the labour market for high wage jobs. Competition between workers creates a job queue, in which jobs are ranked by earnings. On the demand side, competition between firms for high productivity workers creates a labour queue. In the labour queue workers are ranked by their potential training costs for the firm. As formal education and on-the-job training are assumed to be complements, training costs are lower for individuals with more education. Hence workers are ranked by education level in the labour queue, and highly educated persons are matched to high paying jobs (Thurow, 1975).[2]

Whilst the underlying structure of the labour market is similar in the job competition and human capital models, unlike the human capital approach the job competition model assumes that productivity and earnings are related to job characteristics. That is, in the job competition model, earnings are driven by demand side factors alone and a worker's education attainment has no impact on earnings. Overeducation arises when there is an increase in the educational attainment of workers. This causes a shift in the distribution of workers in the labour queue, forcing the low-skilled into low paid jobs or out of the labour market entirely. Consequently, overeducation leads to low-skilled workers being 'bumped down' into lower wage jobs or 'crowded out' of the labour market into unemployment. Furthermore, overeducation reduces the return to education as high-skilled individuals are forced to accept jobs lower in the job queue. Despite lower returns to educational investment, it is rational for individuals to invest in education as workers need to defend their position in the labour queue (Thurow, 1975, p.96). The job competition model predicts that

[2] In the general form, workers are ranked by their background characteristics, which include age, gender, ability and education, and the ranking of workers varies among jobs. Whilst this form of the model more accurately reflects the job matching process, through incorporating differences in the quality and type of educational qualifications, it leaves the basic predictions of the model unchanged (Thurow, 1975, pp.86-87).

overeducation persists, and that it creates economic costs in the form of suboptimal investments in education, allocative inefficiencies, and increased income inequalities.

The assignment model is an alternative approach that employs matching theory to incorporate both demand and supply side factors into the analysis of overeducation (Sattinger, 1993). This model rests on the assumption that worker productivity is positively related to education. However, not all similarly educated workers are equally productive in all jobs. Indeed, workers have a comparative advantage in specific jobs. The problem of overeducation arises when workers are not allocated to jobs in which they have a comparative advantage. Hence overeducation is a form of allocative inefficiency whereby skills are underutilised. This has a negative impact on productivity. Under the assignment model, overeducation persists until a more efficient allocation of individuals to jobs can arise, through improved matching processes or government policies to reduce inefficiencies.

A number of alternative theories have also been used to explain the existence of overeducation. These are the job signalling model, spatial mobility theory, and the differential overqualification theory. In the job signalling model, firms are assumed to have imperfect information about the productivity of workers. In response to this problem, individuals use education as a signal of quality. Overeducation arises when there is a signalling equilibrium under which it is optimal for individuals to invest in more education than is strictly required to perform the tasks of their jobs (Spence, 1973, p.368).[3] This implies there is a systematic overinvestment in education, which occurs either when the costs of investing in education are low, or when the expectations of individuals or firms about education levels are inflated. Whilst overeducation can arise in a signalling equilibrium, it is a Pareto inferior equilibrium in which overeducation persists.[4]

The spatial mobility theory suggests that individuals in small local labour markets with limited capacity to migrate or commute are more likely to be overeducated (Büchel and van Ham, 2003). The differential overeducation theory also suggests

[3] A signalling equilibrium occurs when a firm's expectations about the signals displayed by potential employees are confirmed (Spence, 1973, pp.360-361).
[4] Both the job competition and signalling models cannot explain undereducation, where workers have less education than is required for the job.

spatial constraints are a key cause of overeducation. In particular, this theory suggests that married women are more likely to be overeducated as their job choice is dictated by the husband's choice (Frank, 1978). As such, women can become 'tied movers' or 'tied stayers' and have higher levels of underemployment and overeducation.

This study focuses on testing the human capital, job competition, assignment and career mobility theories. The reasons for this are twofold. Firstly, testing whether overeducation is caused by job signalling requires comprehensive information on the education level needed to obtain the job, and on that needed to perform the tasks of the job. It is the difference between the education needed to obtain and perform the tasks of the job that is the signalling component of a person's education level. Data constraints prevent such analysis in this study. Secondly, this study does not test the spatial mobility and differential overeducation theories as tests were conducted in Linsley (2005). These tests showed that whilst spatial factors have some effect on the probability of overeducation for Australian women, this effect is small and not significant for married women. Hence, these theories were shown to play a limited role in explaining the existence of overeducation in Australia.

3. Measuring overeducation

This section describes the dataset and outlines the techniques available to measure overeducation. The measure of overeducation used in this study is described and basic descriptive statistics are presented.

Data and measurement

This study uses the Negotiating the Life Course (NLC) survey of 18 to 54 year old persons living in Australia. The survey was based on a random sample, with data collected by telephone interview. This paper uses the 1997 wave of data, which contains 2231 unweighted cases. The response rate for the survey was 63 per cent.[5] Self-employed persons are excluded from the analysis, which reduces the sample to 1930 observations. For each stage of the analysis, separate models are estimated for

[5] The response rate excludes interviewees who refused immediately, or when the interview was not possible.

the male and female samples, which contain 802 and 1128 observations respectively.[6]

The NLC dataset provides detailed information on individual demographic, family, work history and human capital characteristics which allows for tests of the theories used to explain overeducation. Most importantly, the NLC survey also contains information on the level of education required for a worker's job.

Studies use one of three techniques to measure overeducation: job analysis (JA), realised matches (RM) or worker self-assessment (WA). JA takes assessments made by professional job analysts on the education and training requirements for different occupations, and compares these requirements to the actual educational attainment of workers (see Rumberger, 1981; Tsang *et al*, 1991). Whilst this technique is thought to be the most theoretically sound, a number of problems arise in practice due to heterogeneity in job requirements within the same occupational title, difficulties in translating job requirements into years of schooling, and the speed with which the classifications become obsolete (Battu *et al*, 2000; Hartog, 2000).[7]

The RM technique derives the required education level from the mean or median of the observed distribution of actual educational attainment of workers in each occupation. Workers are overeducated (undereducated) if their educational attainment is more than one standard deviation above (below) the mean or median (see Groot, 1996; Mendes de Oliveira *et al*, 2000). This technique produces substantially lower estimates of the incidence of overeducation than the JA or WA methods, and has the disadvantage of producing symmetric results.[8]

WA measures overeducation by comparing the level of education workers *believe* they require to obtain or perform their job to their actual education level. WA is

[6] Econometric analysis is conducted using EViews 5. The number of observations varies across specifications estimated due to missing values.

[7] Examination of the NLC data shows that there is considerable heterogeneity in attained education levels within a given occupation class. For example, in the Manager and Administrator occupational class, 14 per cent had not completed secondary schooling, 16 per cent had completed secondary schooling, 32 per cent had vocational qualifications, and 37 per cent had a degree. This suggests that these critiques of the JA technique are well founded.

[8] When the JA and WA techniques are used the incidence of overeducation is found to be significantly higher the incidence of undereducation. Hence the symmetry imposed on the matching distribution is a major problem with the RM technique (Hartog, 2000, p.133)..

thought to be the best measure available as it is up-to-date and specific to an individual's job. As a result it has been used extensively in recent studies (Duncan and Hoffman, 1981; Sicherman, 1991; Hersh, 1991; Alba-Ramírez, 1993; Robst, 1995; Sloane *et al*, 1999). Yet problems can arise in using this technique as individuals have a propensity to inflate reported educational requirements. This can lead to the incidence of overeducation being understated (Hartog, 2000, p.132-133). However, by not accounting for differences in the quality and type of education, the WA measure can overstate the extent of overeducation.[9] Despite these caveats, this technique is thought to be most effective in measuring overeducation (Hartog, 2000, p.133).[10] Consequently, the WA technique is employed in this study.

The NLC survey asks respondents "about how much education or schooling is required to get a job like yours?" (Australian Social Sciences Data Archives, 2002, p.90). Four categories of educational attainment are listed: incomplete secondary school, complete secondary school, vocational qualifications including a post-school certificate or diploma, and degree from a university. Respondents are also asked about the highest level of education attained. Results for education attainment are divided into five categories, which are the same as for required education except for the vocational category which is divided into incomplete undergraduate or associate diploma, and post-school certificate or diploma categories. These two categories are combined in this study to enable comparison between the required and education attainment variables.

Both the required and education attainment variables contain only broad education categories. This places some limits on the analysis, and impedes identification of the intensity of overeducation among individuals with postgraduate qualifications. Moreover, the education categories are unable to capture differences in actual and required education by field of study.[11] These limitations imply that measured overeducation may capture unobservable skill differentials and differences between

[9] The WA measure has also been criticised on the grounds of subjectivity bias, cognitive dissonance, and systematic bias in how job requirements are assessed across genders (Battu *et al*, 2000).

[10] In a meta-analysis, Groot and Maassen van den Brink find that the WA technique produces estimates of the incidence of overeducation, and the returns to over and undereducation that are not significantly different at the five per cent level from the estimates using the JA technique (Groot and Maassen van den Brink, 2000, p.155).

[11] Information on the field of study of the respondent's education attainment was collected in the NLC survey. However, due to the large number of missing observations this information was not used in the analysis.

field of study and sector of employment, in addition to differences between the levels of education attained and required (Chevalier, 2003, p.509).

To construct the over and undereducation variables, the education requirements of respondents' jobs are compared with their education attainment. Overeducated workers have an education level higher than that required to obtain the job, and undereducated workers have less education than is required. Table 1 shows the proportion of employed persons with a given education attainment in positions with a given required education level. The diagonal elements are correctly matched workers, whilst those above the diagonal are overeducated and those below are undereducated.

Descriptive statistics

Overall, 27.1 per cent of employed persons are classified as overeducated and 19.2 per cent are undereducated.[12] The incidence of over and undereducation is comparable to that found in British and American studies employing the WA technique, which find the incidence of overeducation to be between 30 and 40 per cent and undereducation to be between 10 and 20 per cent (Duncan and Hoffman, 1981; Sicherman, 1991; Robst, 1995; Sloane *et al*, 1999; Dolton and Vignoles, 2000).

Table 2 shows how the incidence of overeducation varies across population subgroups. It presents estimates of the proportion of a population subgroup over or undereducated, with groups classified by age, country of birth, household characteristics, education and job characteristics. Separate estimates of are shown for the male and female samples.

For both males and females, the incidence of overeducation is decreasing, and undereducation increasing, in age and years of tenure (Graph 1 and Graph 2). From Table 2, the relationship appears to be stronger for females than for males, with the level of overeducation falling from 40 per cent for females aged 18 to 24 to 17.1 per cent for those over 45 years. The negative relationships between overeducation, and

[12] As the sample is confined to 18-54 year olds, the incidence of undereducation may suffer from a downward bias given that undereducation likely to be increasing with age outside the range of ages in the sample.

age and years of tenure provide some preliminary evidence to support the career mobility theory.

There is a strong relationship between education and the incidence of over and undereducation: individuals with secondary education have the highest rate of overeducation whilst a large proportion of those with vocational qualifications or incomplete secondary education are undereducated. This suggests that educational mismatch is not only a problem for highly educated individuals, but rather is a problem faced by workers across all levels of educational attainment.[13]

Table 2 also shows that the incidence of overeducation is higher among immigrants from an English speaking background, those who are not married, and among individuals who would prefer to work more hours either in their current or alternative workplace.

4. Human capital, job competition and assignment theories

This section focuses on understanding the causes of over and undereducation by testing the human capital and job competition theories against the assignment theory through earnings regressions.

Human capital theory proposes that worker productivity is determined by an individual's actual level of education, whilst job competition theory suggests that productivity is determined by the job characteristics alone. These two assumptions have opposing implications for the determination of earnings, such that under the human capital model earnings are determined by actual education levels, whilst under the job competition model earnings are determined by required education levels. Assignment theory, by contrast, assumes workers with the same level of human capital are not equally productive; their productivity depends on the job to which they are matched. This implies that both actual and required education levels impact on earnings. Consequently, these theories can be tested using earnings equations.

An adaptation of the Mincer wage equation is used to test whether the human capital, job competition or assignment theories best explains the existence of overeducation

[13] By definition, individuals with a degree or incomplete secondary education cannot be under or overeducated, respectively.

in the Australian labour market (Mincer, 1974). Hartog (2000) has termed this adaptation the over-required-undereducation (ORU) earnings equation, as it decomposes the return to education into the returns to over, required and undereducation.[14] The equation is given by:

$$\ln Y_i = \alpha_0 + \alpha_1 q_i^r + \alpha_2 q_i^s + \alpha_3 q_i^d + X_i'\beta + \lambda_i + U_i \qquad U_i \sim i.i.d.N(0,\sigma^2) \tag{1}$$

Where Y_i is income and X_i is a vector of other characteristics for individual *i* that includes additional components of human capital, experience and training. Here q_i^s represents surplus educational qualifications, or the education in excess of that which is required for the job, q_i^d represents deficit education. Actual education is given by:

$$q_i = q_i^r + q_i^s - q_i^d \tag{2}$$

As positive hourly wages are only observed for employed workers, a selectivity bias can arise when estimating earnings equations. Hence to account for incidental truncation in the sample, Heckman's two step selection method is used. The Mincer specification is estimated using Ordinary Least Squares (OLS).

When the ORU equation is given by Equation 1, tests for the human capital, job competition and assignment theories can be conducted by testing the following hypotheses:

Hypothesis 1 $H1$: $\alpha_1 = \alpha_2 = -\alpha_3$

Hypothesis 2 $H2$: $\alpha_2 = \alpha_3 = 0$

Hypothesis 3 $H3$: $\alpha_1 = \alpha_2 = \alpha_3 = 0$

Here α_1, α_2, and α_3 are the returns to required, over and undereducation, respectively. The first hypothesis implies that education attainment alone determines earnings, consistent with the human capital theory. As such, failure to reject H1 provides evidence that the human capital model holds. By contrast, the second hypothesis implies that only the education requirements of the job impact on earnings, as predicted by the job competition theory. Hence failure to reject H2 provides evidence to support the job competition theory. The assignment theory states that both education attainment and the job education requirements impact on earnings. Hence if H3 is rejected, the assignment model of the labour market holds.[15]

[14] The ORU earnings equation does not precisely capture the differences in comparative advantage that are central to the assignment model as it allows the level of productivity to vary over jobs and workers, but fixes the ratio between the productivities of workers with different education levels across jobs, and the ratios of productivities of different jobs across workers with the same level of education (Hartog, 2000, p.141).

[15] Rejection of H3 is equivalent to rejecting both H1 and H2, as the first and second hypotheses are both separately necessary and jointly sufficient for H3.

In order to test the human capital against the job competition and assignment theories, the education variables in the ORU earnings equation must use the same units of measurement (Sloane *et al* 1999, p.1450). The NLC survey does not decompose the educational attainment of the respondent into years of schooling; hence one approach to estimating the ORU earnings equation is to use a set of dummy variables for the required education level. Whilst this allows the private cost of overeducation to be estimated, it does not allow for tests of the competing theories as this approach does not use a uniform measure of education. Hence in order to test the human capital against the job competition and assignment models it is necessary to use an alternative approach.

The approach used here follows that developed by Hartog (1986) in which the ORU earnings equation is respecified by creating a dummy variable for each combination of actual and required education. This is given by:

$$\ln Y = \delta_0 + \delta_{jk} q_{jk} + X^{/}\beta + \lambda + U \quad U \sim i.i.d.N(0, \sigma^2) \tag{3}$$

Where q_{jk} is a dummy variable equal to one if an individual has an actual education level j and is matched to a job with required education level k. The i subscript is omitted to avoid untidiness in the notation. As actual and required education are both variables with four point scales, there are a total of 15 dummy variables in the above model. The reference category includes individuals with incomplete secondary education in jobs which require that level.

The job match variables, q_{jk}, can be inscribed on a four by four matrix in which the rows represent actual education and columns the required education level. This allows for tests of the human capital, job competition and assignment theories. Under the human capital model, earnings are the same for all individuals with a given education level. Hence if the human capital model holds, the coefficients in each of the rows will be equal, yet the coefficients will vary within a column. This is equivalent to testing H1. By contrast, under the job competition model earnings are determined by job characteristics alone. Hence if the job competition model holds, the coefficients in each column will be equal, yet will vary within a row. This is equivalent to testing H2. If the assignment model holds both job and worker characteristics determine earnings, hence the coefficients will vary within each column and each row.

Factors that can impact on productivity and earnings are controlled for by the inclusion of individual characteristic variables (male, age, age squared, marital status, number of children, preschool aged children, immigrant status, health status), the spatial mobility variable "access to vehicle", and job characteristic variables (firm size, sector of employment, supervisor/manager, permanent position, tenure). The Inverse Mills Ratio is included to control for selectivity bias arising from the participation decision.[16] The earnings equation results are presented in Table 3 and the participation equation results are in Table 4.[17] Variable definitions are included in the Appendix.

Tests of the human capital and job competition theories are conducted using a Wald test. For the combined, male and female samples, the human capital restrictions produce *F*-statistics of 2.99, 2.36 and 2.78, respectively. Hence the null hypothesis H1, that earnings are determined by actual education levels alone, is rejected at the one per cent level for all samples. The *F*-statistics under the job competition model restrictions are 1.25, 1.20 and 1.44 for the combined, male and female samples. In each case the *F*-statistic is less than the one per cent critical value. Hence the null hypothesis H2, that earnings are determined by the required education level alone, cannot be rejected. Furthermore, as H2 cannot be rejected, the assignment model of the labour market cannot hold. This suggests that the job competition model best explains the existence of overeducation in the Australian labour market.

This result has a number of important implications. Firstly, the job competition model implies that worker productivity is determined by the job rather than by education. Hence investments in education above that which is required for the job have limited productive benefit for the economy. This indicates that there may be an overinvestment in education in Australia, given that close to one third of the labour market is overeducated.

[16] The participation equation includes as explanatory variables the education attainment dummies, as well as the male, age, age squared, marital status, number of children, preschool aged children, immigrant from ESB, immigrant from NESB, owner-occupier, health, other income and "access to vehicle" variables. The owner-occupier and other income variables are not included in the wage equation, and as such these variables identify the wage equation.

[17] Table 3 shows that there is a negative, but statistically insignificant, Inverse Mills Ratio for both the male and female samples. An insignificant Inverse Mills Ratio for females is an unusual result, but it is consistent with findings in other wage regressions (Sloane *et al*, 1999; Breusch and Gray, 2003).

Secondly, the job competition model suggests that overeducation persists. Consequently, some individuals remain in positions for which their actual education level exceeds the job requirements for a large part of their working lives. This suggests that skill-related underemployment may be a permanent feature of the Australian labour market. This is an inefficient outcome, indicating a sub-optimal resource allocation.

Finally, the job competition model implies that low-skilled workers are bumped down, such that less educated workers are pushed down the labour queue into lower paying jobs, or crowded out of the labour market entirely. This process permanently consigns low-skilled workers to the secondary labour market, in which jobs are low paid and often part-time, or to unemployment. This is evidenced in the higher unemployment rates among low-skilled persons in the NLC study. Here 10.4 per cent of individuals with incomplete secondary education are unemployed, compared with only 5.7 per cent of those with vocational qualifications, and 4.7 per cent of those with a degree. The processes of bumping down and crowding out have important equity implications.

Whilst the education matrix approach provides evidence to suggest that the job competition model best explains the functioning of the Australian labour market, two caveats must be placed on these findings. Firstly, when the WA measure of overeducation is used it can be difficult to isolate the signalling component of the required education variable. In the NLC survey, respondents are asked how much education is required to *obtain* their job. Hence the required education variable captures both the education necessary to perform the job tasks and the education required by the employer as a signal of worker quality. This suggests that the supply side may affect earnings, given that in the job-signalling model employers respond to higher educational attainment of workers by increasing educational requirements. Secondly, some economists argue that overeducation does not imply an underutilisation of skills, instead it leads to an increase in the skill level of the job. Whilst this may in part be true, the negative relationship found in a number of studies between individual productivity indicators and overeducation suggests that overeducation is associated with some skill underutilisation (Hersh, 1991; Tsang, *et al* 1991; Linsley, 2005).

Despite these caveats the key implications of the job competition model hold: a proportion of current investments in education have limited productive benefit, overeducation persists, and individuals with low-skill levels are displaced by more educated workers in the Australian labour market.

5. Career mobility theory

This section tests the career mobility theory, which suggests formal education is a substitute for experience, on-the-job training and tenure. This implies new entrants in the labour market are overeducated, as despite having high levels of formal education, they possess little experience and occupational-specific human capital. However, when workers gain experience and on-the-job training they move up into exactly matched jobs.

Testing the career mobility theory involves examining the relationship between an individual's current job match and his or her work history. In this paper it is not possible to trace an individual's job match history as the NLC survey does not collect information on education requirements of previous jobs held by respondents. However, there is information on occupational change, tenure and on the promotion expectations of respondents. Through looking at the relationship between promotion expectations and job match, the impact of overeducation on labour market prospects is evaluated. And the extent to which an individual's current labour market position reflects their previous work history is determined by firstly by looking at the relationship between tenure and job match, and secondly examining the relationship between past occupational change and current job match.

Model 1 looks at the relationship between promotion expectations and the quality of the job match. Career mobility theory predicts individuals currently in positions for which they are overeducated have relatively high promotion expectations, as they expect to move up into jobs to match their education.

The dependent variable in Model 1 is a dichotomous variable equal to one if the respondent expects to be promoted to the level of their immediate supervisor either at their current workplace or at an alternative place of employment, and zero otherwise. A binary probit model is estimated with education attainment dummies, over and undereducation dummies, individual characteristics (male, age, marital

status, number of children, preschool aged children, and immigrant status), and job characteristics (firm size, sector of employment, permanent position, supervisor/manager, and tenure) included as explanatory variables.

The results from Model 1 are presented in Table 5. Not surprisingly, there is a positive relationship between holding a degree or vocational qualifications and promotion expectations. These results are statistically significant at the 5 per cent level for the combined and female samples. The size of the coefficients on degree and vocational qualifications are largest for the female sample, which suggests education level has a strong effect on a woman's perceived career prospects.

Contrary to the predictions of career mobility theory, overeducated individuals have lower promotion expectations than similarly educated workers in positions for which they are exactly matched. This finding is significant for both the combined and female samples, and for females the effect is particularly large. Indeed, the predicted probability that a 30 year old unmarried female with a degree will expect to be promoted is 0.5 for those in jobs which require a degree, but only 0.1 for those in jobs for which they are overeducated.[18] By contrast, undereducation has no discernible effect on promotion expectations.

The negative coefficient on the overeducation variable implies that workers in jobs in which their formal education is underutilised do not expect to move up the occupational ranks into positions which better match their education. The overeducated may have lower promotion expectations as they actively choose their jobs for the lower levels of responsibility and stress. However, the negative relationship found in Linsley (2005) between overeducation and the respondent's satisfaction with the level of responsibility associated with their job contradicts this hypothesis. Accordingly the negative relationship between overeducation and promotion expectations suggests that for women overeducation persists.

Model 2 examines the relationship between tenure and job match. A binary probit model is estimated in which the dependent variable is a dichotomous variable, equal

[18] This is calculated using the coefficient estimates from the female sample, assuming that the person is Australian born, working in a permanent position at a medium sized firm in the private sector, and has 5 years of tenure.

to one if the respondent has five or more years of tenure in their current position and zero otherwise. Independent variables included in this model include education attainment dummies, over and undereducation dummies, individual characteristic variables (male, age, age squared, marital status, number of children, preschool aged children, and immigrant status), and job characteristic variables (firm size, sector of employment, permanent position, and supervisor/manager). It is important to control for job characteristics in this model, given that a worker's current tenure is likely to be affected by employment conditions.

Table 6 presents the results from Model 2. Interestingly, those with secondary education are significantly more likely than all other workers to have been working for their current employer for five or more years. This result apparently reflects the recent trend towards dynamic career trajectories, where very few workers in the younger, more educated cohorts, attain jobs upon completion of their highest qualification in which they remain throughout their working lives.

As predicted by career mobility theory, workers that are overeducated are less likely to have had five or more years of tenure with their current employer. However, this relationship is only statistically significant for the combined and female samples. For males, there exists a positive and significant relationship between undereducation and tenure, which is again consistent with the career mobility theory.

Model 3 tests whether overeducated individuals are more or less likely to have previously moved to a higher level occupation. Occupations are classified at the one digit level using the Australian Standard Classification of Occupations (ASCO).[19] There are nine occupational categories: manager and administrator, professional, associate professional, tradesperson, advanced clerical or service worker, intermediate clerical or service worker, intermediate production or transport worker, elementary clerical or service worker, and labourer. The dummy variable, change to a higher level occupation, captures all respondents who changed occupations at least once prior to the 1997 survey, and this change was to a higher occupational class. This approach assumes that a higher level occupation represents a better job match.

[19] Despite the broadness of the categories, one digit occupational codes are used due to the small sample size. This means that small promotions within an individual's career are not captured by this model.

Yet this assumption is not unfounded. The ASCO evaluates the education requirements for each occupational category, and confirms that the requirements are increasing in occupational class (ABS, 1997, p.9).

Career mobility theory predicts that overeducated workers are unlikely to have previously experienced a move to a higher level occupation as they have little labour market experience and training. By contrast, undereducated workers are more likely to have climbed the occupational ranks.

Model 3 analyses how an individual's current job match is related to past occupational change. A binary probit model is estimated in which occupational change is the dependent variable. The explanatory variables used in the analysis include the over and undereducation dummy variables and a education attainment dummy variables, with incomplete secondary education as the reference category. The individual characteristic variables, gender, age, marital status, immigrant status and years of tenure are also included in this model.[20]

Table 7 presents the empirical results for Model 3. For males, being overeducated has no discernible effect on the probability an individual has changed to a higher level occupation prior to the survey, relative to similarly educated workers in exact match jobs. Yet, undereducated males are significantly more likely to have experienced upward career mobility. This finding is consistent with career mobility theory.

However, for females being overeducated significantly increases the probability that an individual has changed to a higher level occupation. This result suggests that overeducation persists for women. Indeed, women who are currently overeducated are more likely to have already experienced an improvement in their occupational class, suggesting that prior to the move these women were in positions for which their educational level greatly exceeded that required for the job.

[20] More fully specified models were estimated but the additional individual and job characteristic variables were found to be jointly insignificant. The model presented is the most parsimonious of those estimated.

The results from the three career mobility models imply that overeducated females are more likely to have experienced a change to a higher level occupation, yet despite this change remain overeducated. Moreover, overeducated females have fewer years of tenure and lower promotion expectations than similarly educated women in positions for which they are exactly matched. By contrast, overeducation has no discernible effect on the experience of past occupational change, years of tenure or promotion expectations for males. Yet there is evidence that males who have long tenures and have experienced a change to a higher level occupation in the past are more likely to be undereducated, consistent with the career mobility theory.

These results suggest that, firstly, there is no strong evidence to suggest that the career mobility theory explains overeducation, particularly among women. Secondly, overeducation appears to persist. Hence the costs of overeducation are substantial: current earnings are reduced, and by being overeducated an individual's career prospects and future earnings are likely to be diminished. This finding is in accordance with the predictions of the job competition model.

6. Conclusion

This study examined the causes of overeducation in the Australian labour market in order to gain insight into the ways in which skill-related underemployment influences individual outcomes and the Australian economy.

To understand the causes of labour market mismatch, four of the key theories used to explain overeducation were tested: the human capital, job competition, assignment and career mobility theories. Evidence suggests that the job competition model best explains the existence of overeducation in the Australian labour market. The job competition model implies that overeducation persists and leads to less skilled workers being bumped down into low-skilled, low wage positions or crowded out of the labour market entirely. This has serious equity implications. Moreover, the job competition model implies that a proportion of an individual's investment in education has limited productive benefit. This suggests that there may be an inefficient allocation of investment in education, and points to a need to rethink the nature and delivery of education in Australia. Indeed, the current shortage of tradespeople and those with vocational skills in Australia suggests that the composition of investment in education is suboptimal. Accordingly, these findings

highlight that there is a role for a reallocation of investment in education toward vocational education and training institutions that provide individuals with intermediate skills.

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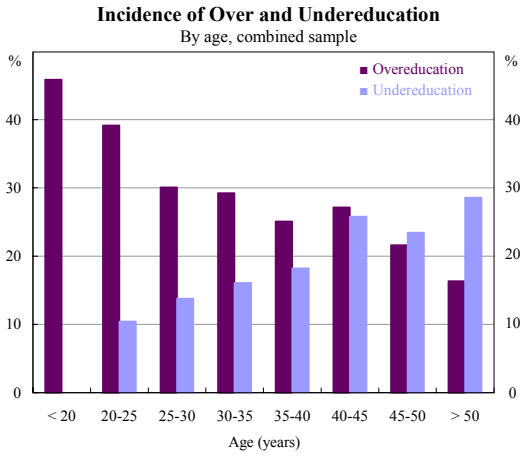
Table 1: Allocation of workers to jobs by education attainment, combined sample (%)

Education attainment	Required education				
	Degree	*Vocational*	*Secondary*	*Incomplete secondary*	*Total by education attainment*
Degree	78.72	9.12	6.69	5.47	100
Vocational	13.02	41.00	22.99	22.99	100
Secondary	11.30	14.64	39.33	34.73	100
Incomplete secondary	5.99	12.62	24.61	56.78	100
Total by required education	27.12	21.84	22.29	28.75	100

Table 2: Incidence of over and undereducation across population subgroups, as a proportion of all persons in the population subgroup (%)

	Overeducated		Undereducated	
	Male	**Female**	**Male**	**Female**
Age group (years)				
18-24	40.7	40.0	6.8	10.0
25-34	30.0	29.3	12.0	17.7
35-44	28.5	23.7	21.6	22.0
45-54	21.8	17.1	21.8	29.0
Country of birth				
Australian born	26.6	26.3	18.1	20.0
English speaking background	41.6	24.1	11.7	21.7
Non-English speaking background	29.6	19.5	16.7	34.2
Household characteristics				
Married	26.5	23.4	21.0	22.7
Unmarried	32.0	29.5	11.3	18.6
Preschool aged children in household	27.3	20.0	19.5	20.0
Education attainment				
Degree	23.9	19.0	0.0	0.0
Vocational	18.4	22.4	30.6	29.9
Secondary	35.9	33.3	25.2	26.1
Incomplete secondary	0.0	0.0	41.3	44.9
Job characteristics				
Prefer more hours	43.6	36.6	9.7	20.7
Prefer fewer hours	25.1	23.2	17.1	18.6
Tenure				
Fewer than 5 years	31.7	32.2	12.5	17.0
5 or more years	25.5	17.6	22.5	23.3
Overall	**28.7**	**25.7**	**17.1**	**21.0**

Graph 1



Graph 2

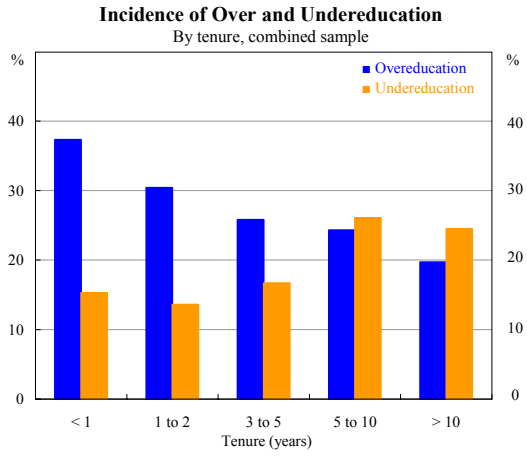


Table 3: Adapted ORU earnings equation, OLS

		Combined		Male		Female	
Variable		**Coeff.**	**Std. Err.**	**Coeff.**	**Std. Err.**	**Coeff.**	**Std. Err.**
Education							
Actual	**Required**						
Inc. secondary	Secondary	0.303***	0.092	0.106	0.115	0.495***	0.144
	Vocational	0.206	0.169	0.237**	0.117	0.089	0.316
	Degree	0.635***	0.125	0.581***	0.166	0.555***	0.148
Secondary	Inc. secondary	0.146	0.110	0.090	0.162	0.225	0.153
	Secondary	0.258***	0.095	0.024	0.142	0.466***	0.139
	Vocational	0.195	0.176	0.257**	0.119	0.167	0.282
	Degree	0.549***	0.115	0.323*	0.193	0.739***	0.147
Vocational	Inc. secondary	0.338***	0.096	0.099	0.140	0.553***	0.136
	Secondary	0.336***	0.081	0.203*	0.104	0.422***	0.127
	Vocational	0.316***	0.085	0.195*	0.111	0.449***	0.132
	Degree	0.459***	0.103	0.291**	0.124	0.631***	0.155
Degree	Inc. secondary	0.197	0.315	- 0.272	0.316	0.960	0.587
	Secondary	0.467***	0.100	0.342**	0.141	0.586***	0.167
	Vocational	0.217	0.186	- 0.183	0.387	0.494***	0.140
	Degree	0.575***	0.090	0.481***	0.111	0.653***	0.138
Male		0.179***	0.044				
Age		0.100***	0.018	0.098***	0.025	0.119***	0.026
Age squared		- 0.001***	0.000	- 0.001***	0.000	- 0.001***	0.000
Marital status		0.059	0.048	0.133*	0.076	0.002	0.062
Number of children		- 0.040**	0.019	- 0.039	0.025	- 0.045	0.029
Preschool aged children		0.094**	0.047	0.090	0.057	0.101	0.073
Immigrant from ESB		0.067	0.058	0.115	0.070	0.043	0.085
Immigrant from NESB		- 0.249***	0.095	- 0.201**	0.100	- 0.304*	0.175
Health		- 0.076**	0.033	- 0.118***	0.042	- 0.023	0.049
Access to vehicle		0.045	0.103	0.107	0.153	- 0.073	0.123
Large firm		0.159**	0.070	0.269***	0.073	0.012	0.142
Small firm		- 0.151***	0.051	- 0.021	0.084	- 0.258***	0.071
Public sector		0.045	0.042	0.120*	0.066	- 0.018	0.058
Supervisor/manager		0.089*	0.038	0.069	0.052	0.122**	0.058
Permanent		- 0.003	0.052	0.095	0.088	- 0.055	0.065
Tenure		- 0.001	0.003	0.003	0.004	- 0.010*	0.005
Constant		0.401	0.333	0.498	0.459	0.167	0.475
Inverse Mills Ratio		0.092	0.122	0.199	0.184	- 0.018	0.142
Number of observations		1219		567		652	
Adjusted R-squared		0.213		0.271		0.211	

Levels of significance: *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.10$

Dependent variable: log of gross hourly income, including wage and salary, and business income. Hours refer to the total number of hours worked by the respondent in the week prior to the survey.

Note: White's heteroscedasticity consistent standard errors are reported.

Table 4: Employment participation equation, binary probit

	Combined		Male		Female	
Variable	**Coeff.**	**Std. Err.**	**Coeff.**	**Std. Err.**	**Coeff.**	**Std. Err.**
Education attainment						
Degree	0.803***	0.108	1.643***	0.321	0.656***	0.122
Vocational	0.131	0.121	0.197	0.274	0.155	0.135
Secondary	0.041	0.088	0.141	0.165	0.070	0.110
Individual characteristics						
Male	0.500***	0.073				
Age	0.055*	0.029	0.065	0.049	0.036	0.038
Age squared	- 0.001*	0.000	- 0.001	0.001	- 0.001	0.001
Marital status	0.049	0.090	0.336*	0.173	- 0.113	0.109
Number of children	- 0.078**	0.034	0.001	0.064	- 0.129***	0.042
Preschool aged children	- 0.531***	0.098	0.187	0.220	- 0.780***	0.116
Immigrant from ESB	0.183	0.121	0.178	0.232	0.145	0.147
Immigrant from NESB	- 0.433***	0.117	- 0.407**	0.206	- 0.487***	0.153
Owner-occupier	0.134	0.091	0.213	0.165	0.096	0.115
Health status	- 0.241***	0.048	- 0.248***	0.082	- 0.238***	0.060
Other income	- 0.059***	0.010	- 0.088***	0.010	- 0.051***	0.013
Access to vehicle	0.652***	0.106	0.810***	0.184	0.507***	0.138
Constant	- 0.303	0.497	- 0.435	0.810	0.429	0.658
Number of observations	1862		769		1093	
Log likelihood	- 831.5		- 242.8		- 545.8	
Mean of dependent variable	0.743		0.832		0.681	

Levels of significance: *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.10$
Dependent variable: 1 = employed in the week prior to the interview; 0 = not employed in the week prior to the interview

Table 5: Career mobility models

Model 1: Promotion expectations, binary probit

	Combined		Male		Female	
Variable	**Coeff.**	**Std. Err.**	**Coeff.**	**Std. Err.**	**Coeff.**	**Std. Err.**
Education attainment						
Degree	0.260**	0.119	0.064	0.167	0.464***	0.173
Vocational	0.278*	0.157	0.139	0.256	0.363*	0.202
Secondary	- 0.170	0.125	- 0.110	0.183	- 0.236	0.178
Labour market mismatch						
Overeducation	- 0.189*	0.104	- 0.054	0.146	- 0.353**	0.155
Undereducation	- 0.105	0.125	- 0.003	0.195	- 0.190	0.168
Individual characteristics						
Male	0.575***	0.091				
Age	- 0.046***	0.007	- 0.045***	0.010	- 0.046***	0.010
Marital status	- 0.078	0.107	0.229	0.166	- 0.258*	0.143
Number of children	0.005	0.045	- 0.095	0.065	0.037	0.063
Preschool aged children	0.000	0.120	0.117	0.176	- 0.192	0.171
Immigrant from ESB	- 0.250*	0.136	- 0.294	0.205	- 0.151	0.182
Immigrant from NESB	0.246	0.171	- 0.086	0.217	0.627**	0.244
Job characteristics						
Large firm	- 0.118	0.154	0.052	0.205	- 0.283	0.238
Small firm	- 0.200*	0.120	- 0.030	0.172	- 0.345**	0.168
Public sector	0.032	0.118	0.217	0.172	- 0.076	0.162
Supervisor/manager	0.361***	0.094	0.285**	0.134	0.439***	0.139
Permanent	0.255**	0.113	0.524***	0.192	0.067	0.143
Tenure	- 0.036***	0.008	- 0.034***	0.010	- 0.042***	0.013
Constant	1.213***	0.259	1.389***	0.387	1.517***	0.356
Number of observations	991		455		536	
Log likelihood	- 570.7		- 269.4		- 287.4	
Mean of dependent variable	0.441		0.554		0.345	

Levels of significance: *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.10$
Dependent variable: 1 = respondent expects to get promoted to the level of their immediate supervisor, either in current or alternative workplace; 0 = respondent does not expect to get promoted to the level of their immediate supervisor

Table 6: Career mobility models

Model 2: Tenure in current job greater than 5 years, binary probit

	Combined		Male		Female	
Variable	**Coeff.**	**Std. Err.**	**Coeff.**	**Std. Err.**	**Coeff.**	**Std. Err.**
Education attainment						
Degree	- 0.038	0.104	0.013	0.152	- 0.053	0.145
Vocational	0.039	0.125	- 0.188	0.202	0.122	0.160
Secondary	0.279***	0.110	0.232	0.163	0.306***	0.153
Labour market mismatch						
Overeducation	- 0.156*	0.092	0.021	0.133	- 0.287**	0.131
Undereducation	0.120	0.107	0.284*	0.165	0.011	0.141
Individual characteristics						
Male	0.005	0.079				
Age	0.160***	0.037	0.093*	0.056	0.226***	0.051
Age squared	- 0.001***	0.000	- 0.001	0.001	- 0.002***	0.001
Marital status	0.142	0.092	0.095	0.149	0.207*	0.121
Number of children	- 0.108***	0.040	- 0.108*	0.059	- 0.133**	0.056
Preschool aged children	0.111	0.108	- 0.118	0.159	0.359**	0.152
Immigrant from ESB	- 0.355***	0.112	- 0.407**	0.173	- 0.336**	0.155
Immigrant from NESB	- 0.054	0.143	- 0.115	0.192	0.011	0.214
Job characteristics						
Large firm	0.696***	0.146	0.898***	0.189	0.533**	0.242
Small firm	0.124	0.102	0.005	0.148	0.213	0.146
Public sector	0.720***	0.103	0.792***	0.153	0.711***	0.145
Supervisor/manager	0.289***	0.081	0.293***	0.117	0.349***	0.115
Permanent	0.652***	0.101	0.954***	0.193	0.557***	0.125
Constant	- 4.851***	0.689	- 3.690***	1.020	- 6.258***	0.960
Number of observations	1330		610		720	
Log likelihood	- 745.6		- 341.6		- 390.2	
Mean of dependent variable	0.459		0.477		0.443	

Levels of significance: *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.10$

Dependent variable: 1 = respondent has worked for 5 or more years in current job or alternative workplace, 0 = respondent has worked for less than 5 years in current job.

Table 7: Career mobility models

Model 3: Change to higher level occupation, binary probit

	Combined		Male		Female	
Variable	**Coeff.**	**Std. Err.**	**Coeff.**	**Std. Err.**	**Coeff.**	**Std. Err.**
Education attainment						
Degree	- 0.297***	0.111	- 0.071	0.165	- 0.549***	0.158
Vocational	- 0.278**	0.140	- 0.003	0.218	- 0.505***	0.184
Secondary	- 0.156	0.120	0.100	0.175	- 0.389**	0.161
Labour market mismatch						
Overeducation	0.133	0.098	- 0.030	0.144	0.259*	0.135
Undereducation	0.102	0.116	0.329*	0.170	- 0.136	0.157
Individual characteristics						
Male	0.081	0.085				
Age	0.024***	0.005	0.023***	0.008	0.023***	0.007
Marital status	0.028	0.089	0.200	0.136	- 0.132	0.121
Immigrant from ESB	0.140	0.120	0.149	0.180	0.185	0.168
Immigrant from NESB	- 0.200	0.175	- 0.277	0.241	- 0.060	0.265
Job characteristics						
Tenure	- 0.039***	0.007	- 0.047***	0.010	- 0.029***	0.011
Constant	- 1.485***	0.195	- 1.558***	0.278	- 1.303***	0.261
Number of observations	1252		579		673	
Log likelihood	- 603.2		- 278.5		- 314.0	
Mean of dependent variable	0.205		0.211		0.199	

Levels of significance: *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.10$

Dependent variable: 1 = respondent has changed to a higher level occupation; 0 = respondent has either not changed occupations, or has changed to a lower level occupation

Appendix

Variable definitions	
Variable	**Definition**
Access to vehicle	Dummy = 1 if respondent has access to a motor vehicle when required, = 0 otherwise
Age	Age of respondent, years
Degree (highest)	Dummy = 1 if the respondent's highest qualification is a degree, = 0 otherwise
Vocational (highest)	Dummy = 1 if the respondent's highest qualification is a post-school certificate or diploma, = 0 otherwise
Health	Self assessed health status, = 1 excellent, = 2 good, = 3 fair, = 4 poor
Immigrant from ESB	Dummy = 1 if respondent was born in Canada, New Zealand, South Africa, United Kingdom or United States, = 0 otherwise
Immigrant from NESB	Dummy = 1 if respondent was born in an non-English speaking country, = 0 otherwise
Large firm	Dummy = 1 if the firm employs more than 300 workers, = 0 otherwise
Male	Dummy = 1 if male, = 0 if female
Marital status	Dummy = 1 if legally married, =0 otherwise
Number of children	Number or natural or adopted children of respondent
Other income	All income earned by respondent not from wages, salaries and business income, $ 000s.
Owner-occupier	Dummy = 1 if respondent owns their own home, = 0 otherwise
Permanent	Dummy = 1 if respondent works in a permanent position, = 0 if position is casual or temporary
Prefer fewer hours	Dummy = 1 if respondent would like to work fewer hours in their current or an alternative job, = 0 otherwise
Prefer more hours	Dummy = 1 if respondent would like to work more hours in their current or an alternative job, = 0 otherwise
Preschool aged children	Dummy = 1 if respondent has children younger than 5 years of age living in household, = 0 otherwise
Public sector	Dummy = 1 if respondent works in the public sector, = 0 otherwise
Secondary (highest)	Dummy = 1 if the respondent's highest qualification is secondary schooling, = 0 otherwise
Small firm	Dummy = 1 if the firm employs less than 25 workers, = 0 otherwise
Supervisor/manager	Dummy = 1 if respondent has supervisory or managerial responsibilities in current workplace, = 0 otherwise
Tenure	Number of years respondent has worked for current employer