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LABOUR MARKET OUTCOMES OF AUSTRALIAN UNIVERSITY GRADUATES FROM EQUITY GROUPS

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Make tomorrow better.

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1. Introduction

The Australian higher education sector has had a number of changes in the recent past. Notably, the Bradley (2008) Review of Australian Higher Education had recommended an increase in higher education access and completion by individuals from equity groups or backgrounds. Since the Bradley Review, there have been increases in the higher education participation of individuals from equity groups. Recently, a report by Koshy (2014) reported that the share of students from equity groups in higher education has been increasing. That report looked at trends in higher education student enrolment over 2007-2012, for individuals from six key equity groups. These are students who: (i) are from low socioeconomic status (SES); (ii) have disabilities; (iii) are Indigenous; (iv) are from regional locations; (v) are from remote locations; and (vi) have non-English speaking backgrounds (NESB). Koshy (2014) reported that the growth in higher education enrolments of individuals from these equity groups during the period, expressed as a proportion of all higher education enrolments, have all been positive. For instance, the share of low SES students had increased from 16.3 percent in 2007 to 17.3 percent in 2012.

Another development in the higher education sector lies in the uncapping of Commonwealth funded university student places under the student demand-driven system of 2012. Under the demand-driven system, higher education student enrolments have been increasing, which has led to doubts about maintaining academic standards and calls for university students places to be capped, or for a minimum Australian Tertiary Admission Rank (ATAR) for university admission to be imposed. Yet, as Norton (2013) points out, imposing minimum ATARs would impact negatively on low SES students most. At the same time, a study by Li and Dockery (2015) indicated that low SES first-year university students perform relatively better in comparison to their peers from more privileged backgrounds, while a study by Pitman, Koshy and Phillimore (2015) showed that Australia's higher education expansion has not led to any decline in educational quality and standards. The findings from these two studies thus favour higher education policies that maintain access for underprivileged individuals. Another study by Lim (2015) examined the probability of completing university degree courses for various equity groups using data from the

Longitudinal Study of Australian Youth. Some key findings from Lim's (2015) study are that students with low SES are less likely to complete their course compared to students with high SES, as are students from regional locations. Students from an Asian language background are more likely to complete their university course, compared to those from 'other' language backgrounds.

Previous studies on outcomes of Australian university students from equity groups have been limited in terms of the scope of the outcomes analysed, concentrating mainly on university academic outcomes. For example, Win and Miller (2005), Birch and Miller (2007) Mills et al. (2009) and Li and Dockery (2015) assessed first-year students' university academic outcomes from one single university each in their studies, while Lim (2015) examines university course completion rates. There are relatively few studies looking at the labour market outcomes of university graduates from equity groups. Further information on labour market outcomes for students from equity groups would be beneficial in informing higher education policy. In particular, it would inform policies to help disadvantaged groups at particular stages of their academic life.

The current study widens the evidence base in that it assesses a range of employment outcomes of disadvantaged students, and further, utilises data from multiple universities from one Australian state. Outcomes assessed include the probability of employment, qualification-job match, job quality, and earnings. Hence, the assessment of the graduates' labour market performance contributes by examining key outcomes which are primary motivating factors behind higher education access and equity policies. In addition, individuals in the key equity groups tend to belong to groups who face labour market disadvantage.

The paper is structured in the following manner. Section 2 reviews the literature on graduate labour market outcomes in Australia, with a focus on the studies on the various equity groups. Section 3 discusses the data and variables that will be used for the study, and presents descriptive statistics for selected variables. The methodological approach and estimating equations are discussed in section 4. Empirical results are presented and discussed in section 5, and structured around the various equity groups. Section 6 concludes.

2. Literature Review

Studies of the outcomes of Australian equity groups in higher education have typically focussed on the academic outcomes, such as participation, retention and academic performance at university. These studies tend to find that students from low socioeconomic status perform well academically compared to their peers, after controlling for prior academic achievement (Li and Dockery 2015; Win and Miller 2005). The policy implications of these and other studies encourage the participation of equity groups in higher education (Coates and Krause 2005).

As Edwards and Coates (2011) point out, however, it is important to monitor the outcomes of graduates from disadvantaged backgrounds. This extends to outcomes beyond graduation. Nevertheless, studies which examine the post-graduation labour market outcomes of equity groups in Australia are relatively scarce.[1] Coates and Edwards (2009) examined the short-term (one year) and longer-term (five years) labour market outcomes for Australian graduates in the key equity groups mentioned earlier. A main finding by Coates and Edwards (2009) was that graduates in equity groups have similar employment outcomes compared to the general university population. Edwards and Coates (2011) examined the employment rates of graduates, and found that there were negligible differences in the short-term employment rates between graduates from advantaged or disadvantaged backgrounds. At three and five years after graduation, however, graduates from disadvantaged backgrounds were slightly less likely to be working full-time and slightly more likely to be working part-time. Graduates from disadvantaged backgrounds were also less likely to be working in managerial or professional occupations, although this was argued to be attributable to the differences in the fields studied at university. The annual salaries of graduates from disadvantaged backgrounds were found to be comparable to their peers from more advantaged backgrounds.

[1] In particular, there appears to be a dearth of literature looking at labour market outcomes of university graduates with disabilities. Studies of the general population that examine labour market outcomes of individuals with disability, though, have found substantial labour market disadvantage. See, for example, Brazenor (2002) and Wilkins (2004).

Edwards and Coates (2011) found that the number of Indigenous people who participated in higher education was low, at less than 1 percent of their sample. Hence, the participation of Indigenous Australians in higher education was recommended to be a priority. Nevertheless, Edwards and Coates (2011) did find that Indigenous graduates fared better than non-Indigenous graduates in terms of being employed, and in terms of being more positive about the overall benefits of their degree to their employment. In a similar vein, recent research by Li (2014) found that Indigenous graduates in Australia experienced comparable employment and earnings outcomes to non-Indigenous, although it was also shown that there was an Indigenous wage gap for graduates at the bottom ten percent of the wage distribution of around 27 percent.

Studies that look at the labour market outcomes of non-English speaking background graduates in Australia have generally done so together with a focus on migrant outcomes. However, it has also been established that the language background of migrants plays a part in determining labour market outcomes. For example, Kler (2006), Green, Kler and Leeves (2007), and Li and Miller (2013) find that migrants from English-speaking countries of origin fare better than migrants from Asian countries in terms of labour market outcomes such as labour market mismatch and earnings. In the study by Li and Miller (2013), graduates from non-English speaking backgrounds were found to be more likely to be overeducated for their jobs compared to English speaking graduates, even if they had domestic residency status. These findings are congruent with other studies of the general labour market in Australia, where migrants have been found to experience disadvantage in employment outcomes, particularly migrants from non-English speaking backgrounds (see, for instance, Junankar, Paul and Yasmeen 2010).

There is a richer literature that looks at the gender wage gap for university graduates. This literature, however, does not tend to focus on graduate labour market differences by gender within Science, Technology, Engineering and Mathematics (STEM) fields. In Australia, as in other countries, women are substantially under-represented in STEM courses, particularly in physics, engineering and technology (Sikora 2015). Edwards and Coates (2011) examined gender differences for Australian university graduates, and noted that there are gender differences in the fields studied at university, and that the choice of fields studied would have substantial influence on the

future occupations and earnings of the graduates. Female graduates were found to be more highly represented in the fields of health and education, while male graduates were more likely to have studied information technology and engineering. They found that a gender wage gap (of AUD$2,000) exists for graduates one year after graduation, after controlling for factors such as field of study, occupation and industry of employment, work status and age. This gap widened at three years and five years after graduation, with the graduate gender wage gap at five years around AUD$7,800.

A separate national study of Australian university graduates by Li and Miller (2012) that looked at short-term graduate outcomes four months after graduation between 1999 and 2009 came to the same conclusion. Specifically, female graduates experience earnings disadvantages of around 4.5 percent compared to male graduates. This gender wage gap widened with age at graduation, ranging from three percent for graduates aged 25 years old, to nine and 19 percent, for those aged 40 and 65 years old, respectively. This finding lends weight to Edwards and Coates' (2011) conclusion that the gender wage gap is larger at more advanced stages of the graduates' careers. A separate finding in Li and Miller's (2012) study relates to the graduate earnings premium conferred by fields of study. A multivariate model of earnings for male and female graduates, respectively, had been estimated. The estimated earnings coefficients on fields of study were qualitatively identical and quantitatively similar. This suggests that the gender wage gap by female graduates is not driven by differences in the earnings (dis)advantage conferred by fields of study.

Finally, graduates originating from regional and remote areas were found to have lower rates of labour force participation and higher unemployment rates compared to graduates from metropolitan areas one year after graduation (Edwards and Coates 2011). Differences in the labour force participation and unemployment rates by their geographic area of origin dissipated in the longer term, however, and they have similar employment outcomes by the five year mark. Nonetheless, a reverse trend was observed for their earnings outcomes. Specifically, the earnings for graduates in full-time work were identical one year after graduation, regardless of their area of origin. At five years after graduation, however, graduates from metropolitan areas were found to have a modest earnings advantage, compared to the graduates from regional and remote areas.

3. Data

Data description

The data for this study were drawn from multiple sources. Confidentialised unit record data were obtained from four anonymous universities within one Australian state. In particular, student records for domestic students who completed a bachelor's degree (pass or honours), and who were admitted to their university study on the basis of the completion of Year 12, were obtained from these universities. These records were then linked to the Australian Graduate Survey, a survey of short-term labour market outcomes of graduates from Australian universities. The Australian Graduate Survey is an annual national census of graduates who have completed a higher degree qualification from an Australian university, and had been conducted since 1972 (Graduate Careers Australia 2015a). The present study uses the Graduate Destination Survey component of the Australian Graduate Survey, which contains information on the graduates' employment and further study characteristics at four months post-completion of their higher education. The Australian Graduate Survey is conducted in April and October every year, which reflects the typical mid- and end-year higher degree completion cycles. The study sample comprised of undergraduates who completed their bachelor's degrees between 2010 and 2014.

The Australian Graduate Survey is administered by the universities individually, although the survey instrument, code of practice and coding instructions are developed by Graduate Careers Australia, a not-for-profit organisation with expertise in graduate employment issues in Australia (Graduate Careers Australia 2015b). The response rate for the national survey has been in the 60 to 65 percent range. The survey questionnaire, contact instruments, code of practice and other relevant documentation can be accessed through the Graduate Careers Australia website.

As the Australian Graduate Survey was administered by the individual universities, it was possible for the data linkage to university student records to be done by each university. Broadly speaking, the linked dataset consists of three sorts of variables: i) personal and demographic characteristics; ii) university study characteristics and iii) labour market characteristics. The personal characteristics include gender, age, English-speaking background, disability status, Indigenous background,

socioeconomic status, residential postcode, and country of birth. The university characteristics include course Weighted Average Mark, Australian Tertiary Admission Rank, level of study, major field of study and further study status. The labour market characteristics include employment status, job-seeking status, industry of employment, earnings, hours worked per week, type of employment contract, sector of employment, employer size and self-reported importance of the university degree type to employment. The sample consists of 10,718 graduates.

Definition of equity groups

The equity groups are defined for the purposes of this study as follows. First, the residential postcodes of the graduates are linked to the Index of Relative Socioeconomic Advantage and Disadvantage within the Socio-Economic Indexes for Areas (SEIFA) Indices, produced by the Australian Bureau of Statistics (Australian Bureau of Statistics 2011a). Graduates who are in the lowest quartile of the Index of Relative Socioeconomic Advantage and Disadvantage are defined as belonging to the low socioeconomic equity group.[2]

The second equity group of graduates are those who originate from regional or remote regions in Australia. This measure was based on their original location prior to starting their degree course at university, and defined according to the Australian Standard Geographical Classification Remoteness Structure (Australian Bureau of Statistics 2011b). Graduates who resided in Inner Regional, Outer Regional, Remote and Very Remote areas, as opposed to major capital cities, were defined to be in this second equity group.

The third, fourth and fifth equity groups consists of those from non-English Speaking backgrounds (NESB), those who had a physical or mental disability, and those who identified as being Indigenous. These were all based on self-report in the university records. Finally, the last equity group of women in non-traditional study areas refers

[2] The data also included a separate measure of socioeconomic status, based on the university student administrative records, where the graduates were classified as being from low, middle and high SES backgrounds. The statistical analyses in subsequent sections were also performed incorporating a dummy variable for low SES using this measure in place of the SEIFA-based measure, and the regression estimates were qualitatively similar. As such, these estimates were not presented but are available on request.

to female graduates in the STEM fields of study, namely, Natural and Physical Sciences, Information Technology and Engineering, as defined within the Australian Standard Classification of Education (Australian Bureau of Statistics 2001).

Descriptive statistics

Table 1 (refer to appendix) presents selected descriptive statistics for the sample. Attention is first drawn to the mean proportions of equity group membership. Up to 27 percent of the graduates came from a low SES background. 14 percent of the graduates were from a regional or remote area of origin, while nine percent of the graduates were from a NESB. Female graduates who graduated from a STEM field of study represent nine percent of total graduates. The proportion of graduates who have a disability or who identified as being Indigenous were 1.6 percent and 0.3 percent, respectively. For these two latter groups, the proportions appear to be strikingly low. However, these were consistent with the higher education statistics from the Department of Education and Training (2015). Furthermore, low proportions of Indigenous graduates, at less than one percent, had been previously reported in the Review of Indigenous Higher Education (DIISRTE 2013), Li (2014) and Edwards and Coates (2011). Hence, for these two groups of graduates, the low proportions and numbers are a reflection that more needs to be done to encourage access, participation, and completion of higher education. Due to the low numbers in these two equity groups, statistical analyses were not feasible and hence further statistical analysis in this paper will only be conducted for the remaining equity groups.

Academic characteristics of the graduate sample are also presented in Table 1. The average Course Weighted Average Mark for the graduate sample was around 70 percentage points. The Course Weighted Average Mark was also looked at for the equity groups of the low SES graduates, graduates from regional and remote areas, graduates from NESB and female graduates in STEM fields. It was found that the mean Course Weighted Average Marks across these equity groups were very similar in value, and graduates in the equity groups had mean Course Weighted Average Marks of around 68 to 70 percentage points (not shown in table). Hence, the academic performances of equity groups were very similar to their peers.

About 23 percent of graduates were from a STEM field of study. The proportion of graduates in STEM fields of study was also estimated for the various equity groups. These are presented graphically, in Figures 1 to 4 in the appendix. Figure 1 shows the fields of study by SES. It can be seen that graduates from low SES were more represented in the fields of Science, Engineering, Nursing, Education and Creative Arts. Figure 2 disaggregates the fields of study for graduates from regional and remote areas, and metropolitan areas. Slightly more regional or remote graduates were observed to have studied STEM, Education and Allied Health fields.

Figure 3 shows the fields of study for NESB and English-speaking graduates. NESB graduates are more represented in the fields of Science, Engineering and Accounting, compared to their English-speaking peers. Finally, the distribution of fields of study by gender is presented in Figure 4. Females are much higher represented in the fields of Allied Health, Nursing, Education, Psychology and Creative Arts. Conversely, there are much lower proportions of females in the fields of Information Technology, Engineering and Accounting.

4. Methodology

Probit models

The employment outcomes of the graduates are examined using binary probit models. In these models, several measures of job outcomes are examined, and the probit regressions are estimated separately with a regressor for each equity group.[3] The probit model can be expressed in the following manner. Let Emp be a binary variable that takes on the value of 1 denoting an employment outcome, 0 otherwise. The probability of attaining the employment outcome is conditional on a vector $\boldsymbol{Z}$ of explanatory variables, so that $Prob(Emp = 1|\boldsymbol{Z}) = F(\beta'\boldsymbol{Z})$, and $Prob(Emp = 0|\boldsymbol{Z}) = 1 - F(B'\boldsymbol{Z})$. The expected value conditional on $\boldsymbol{Z}$ is then:

$$E(Emp|\boldsymbol{Z}) = 1[F(\beta'\boldsymbol{Z})] + 0[1 - F(B'\boldsymbol{Z})] = F(B'\boldsymbol{Z}) \quad (1)$$

[3] In an alternative specification, the three probit models were re-estimated with the dichotomous variables for equity groups entered simultaneously in the estimating equation for each model. The results from this specification were very similar to the results when the equity group variables are regressed separately, and are hence robust to the specification adopted.

The unobserved probability of attaining the employment outcome is assumed to be normally distributed, N(0,1).

The first probit model looks at the determinants of the probability of employment (full-time or part-time). In this model, the outcome variable is binary, and takes on the value of 1 where the graduate is employed in a full-time or part-time job, and 0 otherwise.

The second probit model examines a more refined measure of employment, in particular, the probability of being employed in a job where the graduate's university degree is self-reported to be 'matched' to his or her job. Specifically, the graduates were asked whether their university qualification was useful to their job, with possible responses to this question being: (i) Formal requirement; (ii) Very important; (iii) Somewhat important; (iv) Not important; and (v) Don't know. For this model, graduates with responses of 'Don't know' were excluded from the sample.[4] Hence, the outcome variable for this second probit model is defined as follows. A graduate is considered 'matched' (value = 1) if the response was that the university degree was a formal requirement or very important to their job, 0 otherwise.

The third probit model builds on the outcome variable used in the second probit model described above, and examines an alternate measure of employment termed 'job quality'. The graduates are defined as being in a job of good quality if they satisfy the two requirements of: (i) they are 'matched' to their job as described above, and (ii) if they report to be not looking for another job.[5] Hence, for this third probit model, the outcome variable 'job quality' takes on the value of 1 if the graduate reports that their university degree was a formal requirement or very important to their job and if they were not looking for another job, 0 otherwise.

[4] 139 graduates, or 3.85 percent of the sample responded 'Don't know' to this question. After excluding these responses and excluding graduates not in employment, there were 8,678 observations in the sample.

[5] Several other probit models were estimated using different measures of 'job quality' in addition to those reported in this paper. These included: (i) obtaining a full-time job; (ii) obtaining a professional or semi-professional occupation; (iii) the field of study matched the requirements of the job; (iv) the skills of the graduate matched the requirements of the job; and (v) occupational status as measured by the AUSE106 index (McMillan, Beavis and Jones 2009). In the interests of conciseness, the results from these models are not reported, although it can be noted that the conclusions to be drawn as to the performance of equity groups in the labour market are similar to those reported below. Full results from these analyses are available on request.

Earnings models

The determinants of earnings of the graduates were examined using an Ordinary Least Squares model of earnings based on the human capital specification developed by Mincer (1974). This model can be written as:

$$lnY = \alpha + \beta \boldsymbol{X} + \varepsilon \quad (2)$$

where lnY denotes the annual salary of the graduates in Australian dollars, expressed in natural logarithmic format. $\mathbf{X}$ is a vector of variables hypothesised to impact on graduate earnings, and includes dichotomous variables representing membership of the various equity groups.

Furthermore, the Blinder-Oaxaca decomposition method (Blinder 1973; Oaxaca 1973) was used to look at the earnings differentials for certain equity sub-groups. The main aim for using the Blinder-Oaxaca decomposition method was to separate the earnings differential between sub-groups into different components. The Blinder-Oaxaca decomposition can be expressed as:

$$Earnings_A - Earnings_D = \Delta \boldsymbol{V} \beta_D + \Delta \beta \boldsymbol{V}_D + \Delta \boldsymbol{V} \Delta \beta = E + C + CE \quad (3)$$

where subscripts A and D denotes the advantaged and disadvantaged groups, respectively, Δ represents the earnings difference between the groups and $\mathbf{V}$ is a matrix of regressors.

The first component of the earnings differential (E) has often been referred to as the ‘endowment’ effect, as it represents the earnings differences arising from differences in human capital characteristics between groups. The ‘endowment’ effect has also been called the ‘explained’ portion of the earnings gap. The second component of the earnings differential (C) is termed the ‘coefficient’ effect, and represents the portion of the earnings gap arising from between-group differences in how human capital was translated into earnings. This ‘coefficient’ effect represents the ‘unexplained’ portion of the earnings gap, and is often taken as a proxy for the portion of the earnings gap that can be attributed to discrimination. A third component of the earnings differential (CE) is the ‘interaction’ effect, and stands for the earnings gap arising from joint differences in the ‘endowment’ and ‘coefficients’ effects. This ‘interaction’ effect can be apportioned to either the ‘explained’ or ‘unexplained’ component of the earnings

gap, depending on the approach chosen. In the present study, the approach by Cotton (1988) will be used, where the weighted average of the 'interaction' effect will be taken and apportioned to the 'explained' and 'unexplained' portions of the earnings gap, with the weight to be used being given by the employment share of the groups examined.

Quantile regression models of earnings were also estimated for the various equity groups. This permits the assessment of earnings differences at various points along the wage distribution for the equity groups, and uncovers earnings differences which could be masked if earnings were evaluated using only a simple linear model of earnings (Buchinsky 1998). The quantile regression model can be expressed as:

$$logY = \beta_\theta \boldsymbol{X} + u_\theta, q_\theta(logY|\boldsymbol{X}) = \beta_\theta \boldsymbol{X}$$

where $\mathbf{X}$ is the vector of explanatory variables specified in equation (2) above, $q_\theta(logY|\boldsymbol{X})$ is the conditional quantile of the logarithm of earnings, conditional on the vector of explanatory variables $\mathbf{X}$ and $\theta \in (0,1)$. For this study, the quantile regression models were estimated at the 25th, 50th and 75th percentile of the earnings distribution.

5. Results

The results of the analyses of employment and earnings outcomes of graduates are presented and discussed below. The first section presents an overview of the results from the various models, while following sections discuss the results with a focus on the respective equity groups.

Overview

Tables 2 to 4 present the results from the probit models of job outcomes. Specifically, the estimated probabilities of being employed (either full-time or part-time) are presented in Table 2, while the estimated probabilities of having qualifications match to the job and of getting a good quality job are presented in Tables 3 and 4, respectively. In order to facilitate the interpretation of the estimated probabilities, marginal effects were computed and presented, in addition to the estimated probit coefficients.

A few findings of note from the probit models are highlighted here. First, graduates who had worked in the final year of their degree have mixed employment outcomes.

They are much more likely to be employed, with an increased probability of around 28 percent (Table 2). However, they are much less likely to be matched to their jobs by around 14 percent (Table 3), and less likely to have a quality job by 11 percent (Table 4). Second, graduates who were engaged in further study had adverse employment outcomes, and were 12 percent less likely to be employed, 29 percent less likely to be matched to their jobs, and 27 percent less likely to be in a quality job.[6]

Third, academic performance, as measured by the Weighted Average Mark from the graduates' university course, was a consistent predictor of job outcomes and was statistically significant in all the probit models of job outcomes. The relationship was relatively small between Weighted Average Mark and the probability of being employed (Table 2), with every one percentage point increase in the Weighted Average Mark leading to an increased 0.1 percent probability of being employed. This was larger for the probability of finding a matched job and finding a job of quality though, with the observed marginal effect to be 0.8 and 0.7 percent, respectively.

The results from the OLS model of graduate earnings are reported in Table 5. Again, the results indicate that being engaged in further study impacted adversely on earnings, while working in the final year of the degree provided a modest earnings advantage. These effects were reflected in the quantile regression model of earnings, presented in Table 6, and were consistent along the earnings distribution. Tables 7 to 10 presents the results from the Blinder-Oaxaca decomposition analyses, and these are discussed in turn in the following sections.

Low SES graduates

Graduates from low SES backgrounds were found to have comparable employment outcomes to the graduates from more privileged backgrounds. This was consistent across the three measures of job outcomes in the probit models (Tables 2 to 4). Specifically, the estimated effects of the graduate being from a low SES background on the probability of being employed, and being in a job of good quality were statistically indifferent from the graduates from more advantageous SES backgrounds.

[6] Around 28 percent of the graduates were engaged in further study after graduation, but over 80 percent of these graduates engaged in further study reported active participation in the labour force.

When the outcome of job match was evaluated, low SES graduates were found to perform marginally better. The results from the OLS model of earnings (Table 5), as well as the quantile regression of earnings (Table 6) revealed that there was no earnings disadvantage for low SES graduates.

These were positive outcomes, and indicated that low SES graduates perform just as well as their peers in the labour market after graduation. Nonetheless, it needs to be borne in mind that a selection process has taken place. One point of selection occurs at entry into university, as students with disadvantaged backgrounds face greater obstacles in participation in higher education, such as financial barriers and greater opportunity costs, and hence have reduced propensities to participate in higher education (Le and Miller 2005). Existing student selection practices by the universities were also found by Pitman (2014) to be inadequate in fostering access for equity groups. A further process of selection takes place during university study, in terms of the impact of SES on attrition and completion rates in university. Lim (2015) found that university students from low SES backgrounds had lower rates of university completion, compared to their peers from higher SES backgrounds. This suggests that the low SES graduates in the sample consisted of individuals who have accessed and completed higher education amidst substantial obstacles, and hence are likely to possess positive characteristics which have translated well into the labour market. Policies aimed at improving the outcomes of equity groups need to occur early in the pipeline.

Graduates from regional and remote areas

Lim (2015) found that the lowest likelihood of university completion was for students from regional areas. This selection bias appeared to translate into favourable labour market outcomes for those who did manage to complete their university studies. The model of employment probability indicated that graduates from regional and remote areas had equal probability of finding employment as graduates in metropolitan areas (Table 2). In addition, graduates from the regional and remote areas experienced increased probabilities in securing a job matched to their qualifications or of good quality (Tables 3 and 4). The job outcomes for regional and remote graduates are hence superior to those from metropolitan areas.

Graduates from regional and remote areas were also found to have higher earnings compared to their peers from metropolitan areas, although the positive earnings effect was only observed for male graduates in this equity group (Table 5). Quantile regression estimates revealed that this positive earnings effect was found at higher percentiles of the earnings distribution (Table 6). Hence, the earnings premium for regional and remote graduates appears to be observed only amongst those of higher ability. Once again, these findings suggest that equity policies targeted at this group need to be implemented at earlier stages prior to the commencement of higher education, as well as during university study itself, in order to boost completion rates for this group (Lim 2015).

Graduates from non-English speaking backgrounds

Another of the equity groups considered at a disadvantage in the Australian labour market is the group of graduates who come from a non-English speaking background (NESB). The hypothesis is that NESB students may have poorer English speaking ability as well as weaker networking connections in the labour market.

It was found that NESB graduates lag behind ESB graduates across key labour market outcomes. In particular, it was found that the probability of finding a job is lower for NESB graduates (Table 2). However, for graduates who were employed, no difference in terms of job match or job quality was observed between NESB and ESB graduates (Tables 3 and 4).

NESB graduates were found to earn less than ESB graduates, by around 12 percent (Table 5). When the model of earnings was estimated separately by gender, it was found that the earnings disadvantage experienced by NESB graduates was largely driven by female NESB graduates, who earned 15 percent less than female ESB graduates. A Blinder-Oaxaca decomposition by language status showed that only a quarter of the NESB earnings gap was attributable to differences in human capital endowments between NESB and ESB graduates (Table 7). The remaining 75 percent of the earnings gap was unexplained, and hence NESB graduates face a substantial amount of disadvantage in the labour market.

Quantile regressions were performed at the 25th, 50th and 75th percentile to explore the estimated impact of NESB along the earnings distribution (Table 6). At these percentiles, the only statistically significant NESB earnings gap was found at the 75th percentile, with NESB graduates at this point of the earnings distribution earning five percent less. Hence, the quantile regression model was estimated at more refined points, at every 5th percentile of the distribution.[7] This showed that the largest NESB earnings gap was found at the bottom ten percent of the earnings distribution, at around 50 percent, statistically significant at the one percent level. NESB graduates in the middle of the earnings distribution have earnings that are not statistically different from ESB graduates, and those in the top ten percent of the earnings distribution earn slightly less.

Note, however, that Lim (2015) found that students with an Asian language background, and who would hence fall within the NESB group here, were found to have the highest likelihoods of completing university. These findings are suggestive of great disadvantages experienced by NESB graduates in the labour market. Further, it has to be borne in mind that the sample consisted of individuals who had Australian citizenship or permanent residency status. Moreover, a substantial portion of the NESB graduates were born in Australia, and of those born overseas, the mean duration they have lived in Australia was reported to be more than 10 years. The gap in earnings and employment for NESB graduates, therefore, are especially stark and could be suggestive of discrimination for this group in the labour market (Junankar, Paul and Yasmeen 2012; Booth, Leigh and Vargonova 2010).

Female graduates from STEM fields of study

Occupational segregation along gender lines is important because it is seen as a contributing factor to women's labour market disadvantage, including the well-documented gender wage gap (Mandel and Semyonov 2005). The gender segregation that is apparent once people have entered the labour market has its roots in gender differences in childhood, through aspirations and the choice of subjects taken at school, and gender differences in post-school pathways through VET and

[7] The results of these refined quantile regression estimates are not reported, but are available on request.

University (Sikora 2015). The stark under-representation of females in STEM fields of study not only contributes to this segregation and the limitation of women's career options, but also impedes the efficiency of the labour market by vastly limiting the supply of capable persons into fields identified as strategically important for innovation and Australia's economic potential.

STEM fields of study were defined as including the fields of science, mathematics, information technology and engineering. Females made up 61.6 percent of the graduate sample. They are reasonably well represented in science and maths (59 percent), however, they comprised just 10 percent of IT graduates and 14 percent of engineering graduates. A better understanding of labour market outcomes for those women who do venture into these male dominated areas is clearly important for the formation of policy to encourage young women into STEM related career paths.

Overall, female and male graduates had similar labour market outcomes in terms of their propensity to be employed (Table 2); the importance of skills for their jobs (Table 3) and job quality (Table 4), though women earned lower earnings, of around 10 percent (Table 5). Taking males and females together, graduates from STEM fields of study actually displayed inferior outcomes in terms of employment probability, job matching and job quality, which is perhaps surprising given the commonly held perception of a shortage of people entering those fields. STEM graduates did have higher earnings - in the vicinity of 6 percent - but this can be attributed purely to a STEM earnings premium for males of around 9 percent. Relative to women who graduated in other fields, women who graduated in STEM fields earned around 33 percent lower salaries (Table 9). Most of this latter earnings 'penalty' seems to be attributable to differences in observable characteristics of females who undertake STEM studies and those who do not. For the wider sample, however, differences in returns to characteristics do make a substantial contribution, although the lower earnings for female STEM graduates are still driven by differences in observable characteristics (Table 10).

Although STEM graduates fared worse than non-STEM graduates in terms of the propensity to be employed, this applied similarly to male and female graduates (Table 2). That is, females with STEM qualifications were not significantly less likely than

males with STEM qualifications to be in employment. However, the disadvantage faced by women is apparent in terms of job matches (Table 3). Female graduates from STEM fields are markedly less likely than their male counterparts to report that they are in a job for which their STEM qualification was a pre-requisite or very important.

The evidence is highly suggestive of gender-based barriers or discrimination against females in the rewards to STEM-based qualifications. First, female graduates with STEM qualifications appear to be less likely than males to find a job using those skills. Second, there is the contrasting return, in terms of earnings, to having completed studies in a STEM field for males (positive) and females (negative). This may well be because jobs requiring STEM qualifications – and the higher paying jobs in particular – are male dominated and this creates barriers to entry and progression in those occupations for females.

These findings are disconcerting for efforts to increase female participation in STEM subjects. The evidence from this sample is that there are well-founded reasons for females to steer clear of those non-traditional fields. They not only fare worse than females who enter non-STEM fields, they also do markedly worse than their male classmates. Given the obvious barriers to enrolling in such fields in the first place, it is particularly worrisome that those women who successfully graduate then also appear to face discrimination in the workforce. Policies to increase the number of young women choosing to enter STEM courses will need to also address gender inequality in labour market opportunities.

6. Conclusion

This study examined the labour market outcomes of Australian graduates from disadvantaged backgrounds, utilising a dataset that linked university student records from four universities, to the Graduate Destination Survey. The study of labour market outcomes of graduates from equity groups in Australia is important, and evaluates a key outcome of equity policies aimed at closing inequality for disadvantaged groups in Australia. There are some limitations of this study which should be addressed in further research. First, the study looked at data from four Australian universities located in the same state. Future studies could attempt to obtain and use data from more universities

in order to conclusively arrive at findings more representative of the graduate labour market in Australia. Second, it is probable that individuals from disadvantaged backgrounds who successfully complete university do so in the face of substantial barriers and obstacles. Hence, the findings in this study possibly relate to those who possess greater amounts or quality of human capital endowments. Greater support in the form of policies encouraging access to and completion of higher education is required. Indeed, prior research has indicated that providing educational opportunities to the disadvantaged allows them to catch up and sustain their academic achievement (Lamb et al. 2015).

Several noteworthy findings have emerged from this study. First, the number of graduates from the equity groups of Indigenous Australians and individuals with disabilities is is well below their representation in the wider population. This highlights the need for further action to boost participation and, more importantly, completion for individuals in these two groups.

Second, the labour market outcomes for graduates from equity groups were mixed. Graduates from low SES backgrounds and regional and remote areas experienced similar or even slightly better labour market outcomes in terms of employment and earnings, when compared to graduates from more privileged SES backgrounds or metropolitan areas. This is likely to be attributable to the selection process(es) mentioned above, where graduates from these two areas of disadvantage and who possess unobservable positive human capital characteristics, are able to successfully complete their university study despite their disadvantage. Graduates from these two groups hence also experience success in the labour market. However, graduates in the equity groups of NESB and female graduates in STEM fields were found to have adverse labour market outcomes in comparison to their peers. In particular, NESB graduates were less likely to be employed and also earned less than their ESB counterparts. Females in STEM fields had similar probabilities of employment compared to the general graduate population, but were substantially less likely to be matched to their jobs, or to have jobs of quality. In addition, the earnings disadvantage experienced by females in STEM fields was substantial.

The positive labour market outcomes experienced by graduates from low SES backgrounds and from regional or remote areas indicate that the increased higher education participation rates by these groups have borne fruit and contributed to sustained success in the labour market. From this perspective, participation in higher education for these groups could be further encouraged.

Substantial labour market disadvantage for graduates from NESB and female graduates in STEM fields were found. For graduates from NESB, a substantial earnings penalty was uncovered, and which could not be explained by differences in their human capital endowments. This is suggestive of discrimination against this group. Female graduates in STEM faced barriers to securing (good) employment outcomes as well as earnings disadvantage. Further research that identifies causes of these disadvantages, as well as policies to improve the labour market outcomes of these groups, would be welcome.

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Appendices

Table 1 Descriptive Statistics for the Graduate Sample

Variable	Mean	Standard Deviation
Demographics		
Female	0.616	0.486
Age, expressed in years	23.155	3.375
Born in Australia	0.795	0.404
Equity group		
Low SES (SEIFA)	0.266	0.442
Regional or remote area of origin	0.142	0.349
NESB	0.085	0.279
Females in STEM	0.090	0.286
Indigenous	0.003	0.059
Disability	0.016	0.126
Academic characteristics		
University 1	0.428	0.495
University 2	0.155	0.362
University 3	0.141	0.348
University 4	0.276	0.447
University Course Weighted Average Mark	69.517	7.348
STEM field of Study	0.229	0.420
Further study after graduation	0.280	0.449
Worked in final year of study	0.846	0.361
Employment characteristics		
Employed full-time	0.450	0.498
Employed part-time	0.377	0.485
Employed in the public sector	0.250	0.433
Professional or semi-professional occupation	0.516	0.500
Quality job	0.350	0.477
Permanent job (> 1 year)	0.414	0.493
Large firm (> 99 employees)	0.543	0.498
Medium firm (20-99 employees)	0.167	0.373
Small firm (< 20 employees)	0.232	0.422
Likely to have changed employers since graduation	0.297	0.457
Annual salary, in Australian dollars	39,231	32,606
Observations	10,718	

Table 2 Results from the Probit Model of Employment, by Equity Group

Variables	Low SES		Regional/Remote		NESB	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Female	0.070*	0.015*	0.072*	0.015*	0.072*	0.015*
(Ref = Male)	(1.772)	(0.008)	(0.040)	(0.008)	(0.040)	(0.008)
STEM field of study	-0.143***	-0.030***	-0.141***	-0.030***	-0.138***	-0.029***
(Ref = Non-STEM)	(-2.791)	(0.011)	(0.051)	(0.011)	(0.051)	(0.011)
Weighted Average Mark	0.004*	0.001*	0.004*	0.001*	0.004*	0.001*
	(1.815)	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)
Work in last year of degree	1.313***	0.275***	1.307***	0.274***	1.304***	0.273***
(Ref = No work in final year)	(35.089)	(0.007)	(0.037)	(0.007)	(0.037)	(0.007)
Born in Australia	0.104***	0.022***	0.111***	0.023***	0.078*	0.016*
(Ref = Not born in Australia)	(2.738)	(0.008)	(0.038)	(0.008)	(0.041)	(0.009)
Further study	-0.560***	-0.117***	-0.561***	-0.118***	-0.561***	-0.118***
(Ref = No further study)	(-16.680)	(0.007)	(0.034)	(0.007)	(0.034)	(0.007)
Female*STEM	-0.118	-0.025	-0.119	-0.025	-0.120	-0.025
(Ref = Male = 0 or Non-STEM)	(-1.600)	(0.015)	(0.074)	(0.015)	(0.074)	(0.015)
Lowest Quartile of SES	0.033	0.007				
(Ref = Not lowest SES quartile)	(0.920)	(0.008)				
Regional or Remote Area			-0.040	-0.008		
(Ref = Not in regional or remote)			(0.045)	(0.009)		
NESB					-0.108*	-0.023*
(Ref = English speaking background)					(0.057)	(0.012)
Constant	-0.245		-0.239		-0.187	
	(-1.569)		(0.156)		(0.158)	
Observations	10,422		10,422		10,422	
Log likelihood	-3952		-3952		-3950	
Pseudo R-squared	0.175		0.175		0.175	

Note: Standard errors in parentheses. ***, **, and * denote significance at one, five and ten percent levels, respectively.

Table 3 Results from the Probit Model of Matched Employment, by Equity Group

Variables	Low SES		Regional/Remote		NESB	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Female	0.056*	0.021*	0.053	0.020	0.057*	0.021*
(Ref = Male)	(0.034)	(0.013)	(0.034)	(0.013)	(0.034)	(0.013)
STEM field of study	0.190***	0.070***	0.187***	0.069***	0.190***	0.070***
(Ref = Non-STEM)	(0.048)	(0.018)	(0.048)	(0.018)	(0.048)	(0.018)
Weighted Average Mark	0.020***	0.008***	0.020***	0.008***	0.021***	0.008***
	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
Work in last year of degree	-0.370***	-0.136***	-0.362***	-0.134***	-0.372***	-0.137***
(Ref = No work in final year)	(0.051)	(0.019)	(0.051)	(0.019)	(0.051)	(0.019)
Born in Australia	-0.048	-0.018	-0.059*	-0.022*	-0.025	-0.009
(Ref = Not born in Australia)	(0.035)	(0.013)	(0.036)	(0.013)	(0.038)	(0.014)
Further study	-0.776***	-0.286***	-0.775***	-0.286***	-0.777***	-0.287***
(Ref = No further study)	(0.033)	(0.011)	(0.033)	(0.011)	(0.033)	(0.011)
Female*STEM	-0.524***	-0.193***	-0.519***	-0.191***	-0.524***	-0.193***
(Ref = Male = 0 or Non-STEM)	(0.071)	(0.026)	(0.072)	(0.026)	(0.071)	(0.026)
Lowest Quartile of SES	0.066**	0.024**				
(Ref = Not lowest SES quartile)	(0.032)	(0.012)				
Regional or Remote Area			0.162***	0.060***		
(Ref = Not in regional or remote)			(0.041)	(0.015)		
NESB					0.077	0.028
(Ref = English speaking background)					(0.057)	(0.021)
Constant	-0.866***		-0.865***		-0.883***	
	(0.146)		(0.146)		(0.148)	
Observations	8,678		8,678		8,678	
Log likelihood	-5,595		-5,589		-5,596	
Pseudo R-squared	0.069		0.070		0.069	

Note: Standard errors in parentheses. ***, **, and * denote significance at one, five and ten percent levels, respectively.

Table 4 Results from the Probit Model of Employment in a Quality Job, by Equity Group

Variables	Low SES		Regional/Remote		NESB	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Female	0.047	0.017	0.044	0.016	0.047	0.017
(Ref = Male)	(0.034)	(0.013)	(0.034)	(0.013)	(0.034)	(0.013)
STEM field of study	0.217***	0.080***	0.212***	0.078***	0.215***	0.079***
(Ref = Non-STEM)	(0.048)	(0.018)	(0.048)	(0.017)	(0.048)	(0.018)
Weighted Average Mark	0.021***	0.008***	0.021***	0.008***	0.021***	0.008***
	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
Work in last year of degree	-0.294***	-0.109***	-0.285***	-0.105***	-0.293***	-0.108***
(Ref = No work in final year)	(0.049)	(0.018)	(0.049)	(0.018)	(0.049)	(0.018)
Born in Australia	0.006	0.002	0.018	0.007	0.009	0.003
(Ref = Not born in Australia)	(0.035)	(0.013)	(0.036)	(0.013)	(0.038)	(0.014)
Further study	-0.685***	-0.253***	-0.683***	-0.252***	-0.685***	-0.253***
(Ref = No further study)	(0.034)	(0.012)	(0.034)	(0.012)	(0.034)	(0.012)
Female*STEM	-0.544***	-0.201***	-0.539***	-0.199***	-0.544***	-0.201***
(Ref = Male = 0 or Non-STEM)	(0.072)	(0.026)	(0.072)	(0.026)	(0.072)	(0.026)
Lowest Quartile of SES	0.013	0.004				
(Ref = Not lowest SES quartile)	(0.032)	(0.012)				
Regional or Remote Area			0.129***	0.048***		
(Ref = Not in regional or remote)			(0.040)	(0.015)		
NESB					0.060	0.022
(Ref = English speaking background)					(0.056)	(0.021)
Constant	-1.264***		-1.272***		-1.286***	
	(0.146)		(0.146)		(0.148)	
Observations	8,678		8,678		8,678	
Log likelihood	-5,593		-5,588		-5,592	
Pseudo R-squared	0.056		0.057		0.056	

Note: Standard errors in parentheses. ***, **, and * denote significance at one, five and ten percent levels, respectively.

Table 5 Results from the OLS Model of Earnings, Graduate Sample and by Gender

Variables	Full sample	Males	Females
Female	-0.070***	-	-
(Male = 0)	(0.022)	-	-
STEM field of study	0.093***	0.074**	-0.070*
(Non-STEM = 0)	(0.031)	(0.032)	(0.041)
Weighted Average Mark	-0.003**	-0.005***	-0.001
	(0.001)	(0.002)	(0.002)
Work in last year of degree	0.066*	0.058	0.070
(No work = 0)	(0.037)	(0.052)	(0.052)
Born in Australia	0.036	0.011	0.047
(Not Australia = 0)	(0.025)	(0.035)	(0.035)
Further study	-0.258***	-0.328***	-0.217***
(No further study = 0)	(0.027)	(0.040)	(0.035)
Full-time employment	0.774***	0.788***	0.764***
(Part-time = 0)	(0.027)	(0.043)	(0.036)
Employed in Public sector	-0.016	-0.058	0.006
(Private sector = 0)	(0.024)	(0.040)	(0.031)
Professional or semi-professional occupation	0.180***	0.230***	0.142***
(Not professional or semi-professional = 0)	(0.023)	(0.037)	(0.029)
Medium employer	0.106***	0.101**	0.105***
(Small employer = 0)	(0.030)	(0.050)	(0.037)
Large employer	0.183***	0.163***	0.195***
(Small employer = 0)	(0.023)	(0.034)	(0.030)
Permanent contract	0.448***	0.432***	0.452***
(Casual or Short-term contract = 0)	(0.029)	(0.045)	(0.038)
Fixed-term contract	0.412***	0.348***	0.439***
(Casual or Short-term contract = 0)	(0.035)	(0.055)	(0.045)
Likely changed employer since graduation	0.043**	0.007	0.070***
(Not likely = 0)	(0.021)	(0.033)	(0.027)
Lowest Quartile of SES	0.004	-0.003	0.010
(Not lowest SES = 0)	(0.022)	(0.033)	(0.028)
Regional or Remote Area	0.053*	0.078*	0.040
(Not in regional or remote = 0)	(0.030)	(0.044)	(0.039)
NESB	-0.115***	-0.066	-0.148**
(English speaking background = 0)	(0.044)	(0.055)	(0.062)
Female * STEM field of study	-0.162***	-	-
(Male = 0, Non-STEM = 0)	(0.051)	-	-
Constant	9.475***	9.680***	9.250***
	(0.102)	(0.132)	(0.155)
Observations	7,829	2,951	4,878
Adjusted R-squared	0.412	0.448	0.388

Note: Standard errors in parentheses. ***, **, and * denote significance at one, five and ten percent levels, respectively.

Table 6 Results from the Quantile Regression Model of Earnings

Variables	Quantile		
	0.25	0.5	0.75
Female	-0.008	-0.037**	-0.068***
(Male = 0)	(0.021)	(0.016)	(0.016)
STEM field of study	0.159***	0.137***	0.202***
(Non-STEM = 0)	(0.029)	(0.023)	(0.023)
Weighted Average Mark	-0.001	0.000	0.000
	(0.001)	(0.001)	(0.001)
Work in last year of degree	0.023	0.019	0.014
(No work = 0)	(0.030)	(0.024)	(0.024)
Born in Australia	0.039*	0.011	0.001
(Not Australia = 0)	(0.023)	(0.018)	(0.018)
Further study	-0.216***	-0.188***	-0.176***
(No further study = 0)	(0.022)	(0.017)	(0.017)
Full-time employment	0.966***	0.774***	0.558***
(Part-time = 0)	(0.023)	(0.019)	(0.018)
Employed in Public sector	0.045**	0.038**	0.024
(Private sector = 0)	(0.021)	(0.017)	(0.017)
Professional or semi-professional occupation	0.170***	0.169***	0.158***
(Not professional or semi-professional = 0)	(0.020)	(0.016)	(0.015)
Medium employer	0.079***	0.066***	0.051**
(Small employer = 0)	(0.026)	(0.020)	(0.020)
Large employer	0.189***	0.142***	0.119***
(Small employer = 0)	(0.020)	(0.016)	(0.016)
Permanent contract	0.480***	0.323***	0.289***
(Casual or Short-term contract = 0)	(0.024)	(0.019)	(0.019)
Fixed-term contract	0.487***	0.322***	0.268***
(Casual or Short-term contract = 0)	(0.028)	(0.023)	(0.022)
Likely changed employer since graduation	0.044**	0.053***	0.064***
(Not likely = 0)	(0.019)	(0.015)	(0.015)
Lowest Quartile of SES	-0.005	-0.014	-0.015
(Not lowest SES = 0)	(0.020)	(0.016)	(0.016)
Regional or Remote Area	0.020	0.038*	0.063***
(Not in regional or remote = 0)	(0.026)	(0.021)	(0.020)
NESB	-0.025	-0.025	-0.048*
(English speaking background = 0)	(0.034)	(0.027)	(0.027)
Female * STEM field of study	-0.212***	-0.139***	-0.167***
(Male = 0, Non-STEM = 0)	(0.042)	(0.034)	(0.033)
Constant	8.947***	9.492***	9.970***
	(0.090)	(0.072)	(0.071)
Observations	7,829	7,829	7,829
Sparsity	1.692	1.167	1.330
Bwidth	0.0339	0.0489	0.0339

Note: Standard errors in parentheses. ***, **, and * denote significance at one, five and ten percent levels, respectively.

Table 7 Estimates from the Blinder-Oaxaca Decomposition, by Language Background

Item	Coefficient	Standard error
Predicted Non-NESB Earnings	10.231***	(0.012)
Predicted NESB Earnings	10.080***	(0.053)
Raw Wage Gap	0.151***	(0.055)
- due to endowments	0.138**	(0.066)
- due to coefficients	0.124***	(0.046)
- due to interaction	-0.112*	(0.059)
Unexplained	0.115	
Explained	0.037	
% Unexplained	75	
% Explained	25	
Observations	7,829	

Note: Standard errors in parentheses. ***, **, and * denote significance at one, five and ten percent levels, respectively. Unexplained and explained components are evaluated at the means for "NESB" from Table 1.

Table 8 Estimates from the Blinder-Oaxaca Decomposition, by Gender

Item	Coefficient	Standard error
Predicted Male Earnings	10.330***	(0.019)
Predicted Female Earnings	10.153***	(0.015)
Raw Wage Gap	0.176***	(0.024)
- due to endowments	0.038**	(0.018)
- due to coefficients	0.080***	(0.021)
- due to interaction	0.059***	(0.013)
Unexplained	0.116	
Explained	0.061	
% Unexplained	66	
% Explained	34	
Observations	7,829	

Note: Standard errors in parentheses. ***, **, and * denote significance at one, five and ten percent levels, respectively. Unexplained and explained components are evaluated at the means for "Female" from Table 1.

Table 9 Estimates from the Blinder-Oaxaca Decomposition for Female Graduates, by STEM

Item	Coefficient	Standard error
Predicted non-STEM Earnings	10.198***	(0.016)
Predicted STEM Earnings	9.865***	(0.048)
Raw Wage Gap	0.333***	(0.051)
due to endowments	0.246***	(0.040)
due to coefficients	0.070*	(0.041)
due to interaction	0.016	(0.026)
Unexplained	0.072	
Explained	0.260	
% Unexplained	22	
% Explained	78	
Observations	4,878	

Note: Standard errors in parentheses. ***, **, and * denote significance at one, five and ten percent levels, respectively.

Table 10 Estimates from the Blinder-Oaxaca Decomposition, for Female Graduates in STEM

Item	Coefficient	Standard error
Predicted Reference Earnings	10.252***	(0.012)
Predicted Female in STEM Earnings	9.865***	(0.048)
Raw Wage Gap	0.387***	(0.050)
due to endowments	0.276***	(0.038)
due to coefficients	0.115***	(0.039)
due to interaction	-0.003	(0.022)
Unexplained	0.115	
Explained	0.276	
% Unexplained	29	
% Explained	71	
Observations	7,829	

Note: Standard errors in parentheses. ***, **, and * denote significance at one, five and ten percent levels, respectively. The predicted reference earnings in this decomposition are for graduates who are either male or in non-STEM fields.

Figure 1 Distribution of Field of Study, by SES

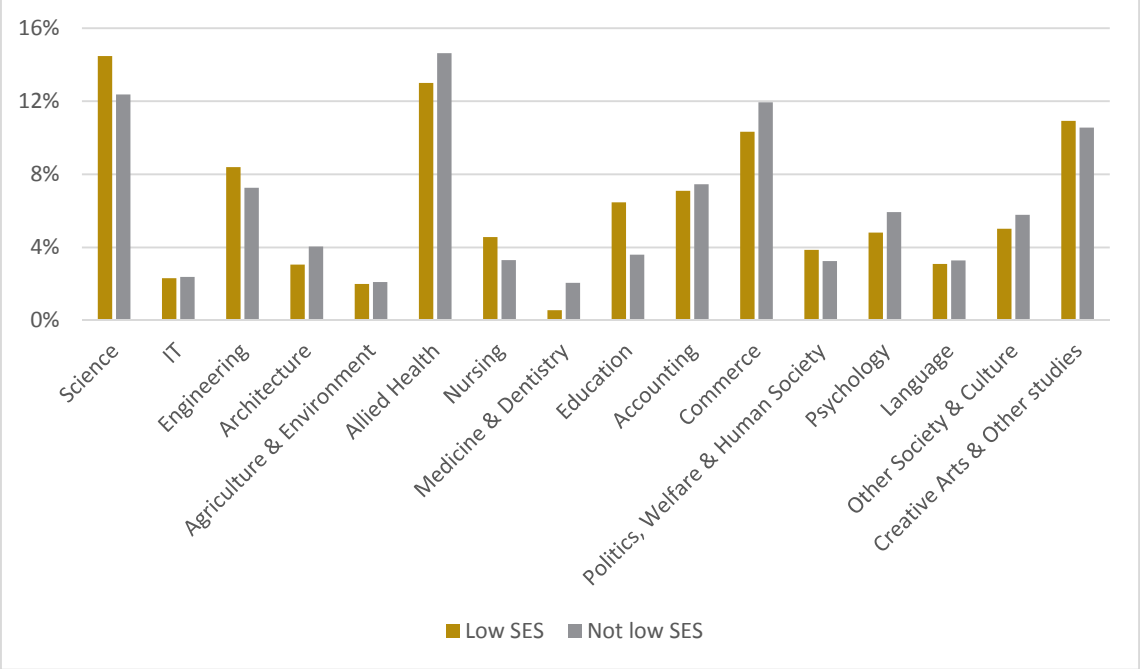

Figure 2 Distribution of Field of Study, by Geographic Origin

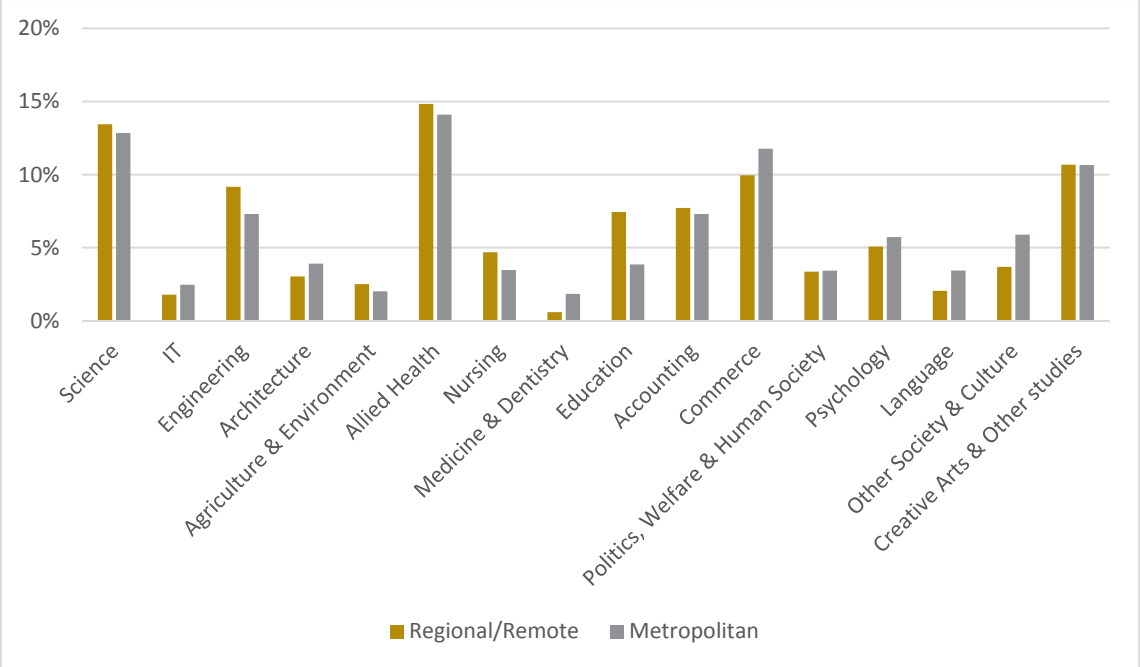

Figure 3 Distribution of Field of Study, by NESB

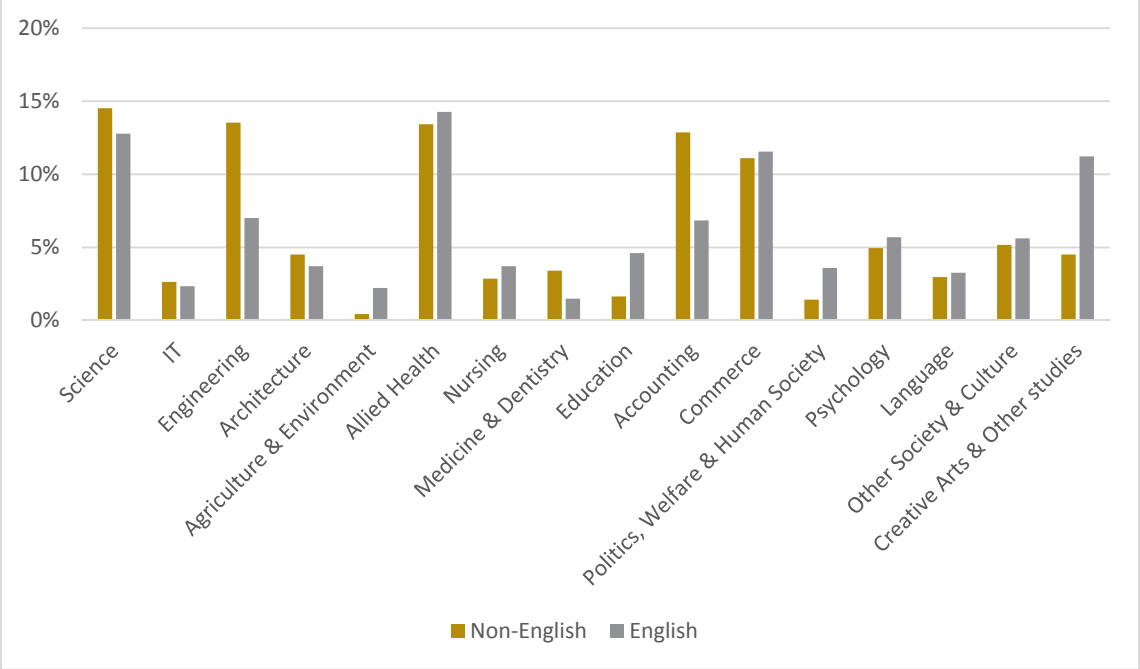

Figure 4 Distribution of Field of Study, by Gender