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Employment and study outcomes after graduation: An Australian higher education equity perspective

Ian W. Li and David R. Carroll

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Ian W. Li, School of Population and Global Health, The University of Western Australia

David R. Carroll, School of Population and Global Health, The University of Western Australia

Abstract

Higher education policy in Australia has contributed to positive outcomes for equity groups, in terms of facilitating access, participation and completion of university. It is unknown, however, whether graduates from disadvantaged backgrounds have equitable outcomes in terms of participation in employment and/or further study after the completion of their undergraduate degree. This study looks at post-degree employment and study outcomes for graduates in Australia. The findings from this study are encouraging as participation in further study, including postgraduate courses, were found to be equitable. However, graduates from low socioeconomic backgrounds, who were Aboriginal or Torres Strait Islanders, or who were from non-English speaking backgrounds were found to be disadvantaged in the labour market, and policy action to address this is needed.

*Address for correspondence: Ian W. Li, School of Population and Global Health, The University of Western Australia, M431, 35 Stirling Hwy, Crawley, WA 6009. Email: ian.li@uwa.edu.au, Telephone: +61 8 6488 1295, Fax: +61 8 6488 1188.

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Executive Summary

Higher education policy in Australia has contributed to positive outcomes for equity groups, in terms of facilitating access, participation and completion of university. At the same time, prior research has indicated that labour market outcomes are comparable for graduates from equity groups to their non-equity counterparts. It is unknown, however, whether graduates from disadvantaged backgrounds have equitable outcomes in terms of participation in further study after the completion of their undergraduate degree. Given that research findings indicate superior earnings and positive labour market outcomes for postgraduates, it is of policy interest to examine post-study pathways for disadvantaged individuals, in comparison with their relatively privileged peers.

This study uses data from the 2016 Australian Graduate Outcomes Survey, linked to student administrative records from 19 participating Australian universities, to examine post-degree study and employment outcomes. In particular, the study looks at how equity group membership, undergraduate degree characteristics, and undergraduate academic performance influences post-degree study and employment outcomes.

The results from the multivariate analyses indicate that graduates from a low socioeconomic status (SES) background, or with disability, or from a non-English speaking background (NESB) were less likely to be in employment post-degree, relative to their respective counterparts. The estimated reduced propensity of employment for these groups were rather sizable, and were up to 16 per cent less for NESB graduates. However, in terms of further study post-degree, graduates from all equity groups, with the exception of graduates from regional and remote areas, were around two to five per cent more likely to be in further study after their undergraduate degrees were completed, relative to graduates from non-disadvantaged backgrounds. In addition, academic ability, as proxied by Weighted Average Marks, and undergraduate degree field of study areas were found to be influential on the graduates' propensity to be in further study or employment.

Furthermore, graduates from the equity groups of low SES background, disability and NESB were found to be disadvantaged in labour market outcomes. For example, they were less likely to be in full-time employment, more likely to be mismatched in their jobs if there were employed, and earned less. In particular, graduates from NESB backgrounds were the most disadvantaged in these labour market outcomes.

Despite poor labour market outcomes for the stated equity groups, the findings from this study are encouraging for post-graduate study for students from disadvantaged backgrounds. From the perspective of higher education participation, participation in further study, including postgraduate courses, appear to be accessible for individuals from equity backgrounds. Therefore, more needs to be done from the perspective of ensuring equitable employment outcomes, especially for students from equity backgrounds as they enter employment after post-graduate study.

Introduction and Background

Higher educational attainment has increased globally, with data from the Organisation of Economic Cooperation and Development (OECD) showing that the proportion of 25- to 34-year-olds who have attained a tertiary education degree increased from 26 per cent in 2000 to 43 per cent in 2016 (OECD 2017). The trend in increased educational attainment is likely driven by the positive benefits conferred by education. For instance, higher education has been linked to superior economic outcomes, such as the likelihood of employment and higher salaries, as well as health outcomes, such as better mental health and longer life expectancy (Hout 2012).

In Australia, a trend of expansion in higher education has also been observed. Between 2001 and 2016, for example, domestic enrolments in undergraduate degree courses have grown by 52 per cent (Department of Education and Training 2016). Additionally, the growth in postgraduate degree course enrolments over the same period is stronger, with enrolments in 2016 being 65 per cent higher than enrolments in 2001. Norton and Cakitaki (2016) note that postgraduate coursework enrolments have doubled over the last 30 years, specifically, expressed as a share of total enrolments, they have increased from 11 to 22 per cent between 1984 and 2014.

Notwithstanding the growth in higher education attainment in Australia and globally, significant challenges remain. The underrepresentation of disadvantaged groups in Australian higher education has been well documented (Koshy 2014), though progress has been made towards addressing this, particularly since the Review of Australian Higher Education in 2008 (the Bradley Review; Bradley, Noonan, Nugent & Scales 2008). While advances have been made over the past decade on the access, participation and outcomes for disadvantaged groups, members of these disadvantaged groups are still underrepresented in university study (Gale 2012; Koshy 2014). It is essential that disadvantaged individuals are afforded the same opportunities in higher education as their non-disadvantaged counterparts, to provide them with access to the superior socioeconomic outcomes conferred by education.

Graduates have considerably higher earnings, compared to individuals without a degree. Recent Australian estimates using 2006 Australian Census data, for instance, show that male and female bachelor degree graduates earn around $1.1 million and $800,000 more, respectively, over a lifetime compared to males and females with only a Year 12 education (Norton 2012). In addition, two Australian studies looking at graduate labour market outcomes have found that bachelor degree graduates from low socioeconomic status (SES) backgrounds perform comparably to their non-disadvantaged peers in the short-term after degree completion (Coates and Edwards 2009; Li et al. 2017). Specifically, Li et al. (2017) examined several employment outcomes, such as the probability of employment, job quality and earnings, and found for each of these employment outcomes, graduates from low SES backgrounds performed comparably to graduates from higher socioeconomic backgrounds. Hence, research findings suggest that engaging in higher education levels the playing field for individuals from disadvantaged backgrounds.

While research examining labour market outcomes of disadvantaged graduates provides a favourable view of higher education as an equaliser of socioeconomic outcomes, attention needs to be paid to the fact that the production of graduates is a lengthy process. Disadvantaged individuals face barriers and challenges in higher education, particularly with regard to participation and access (Gale and Parker 2013; Chowdry et al. 2012). Unfavourable finances have been identified as an impediment to disadvantaged groups in accessing higher education, both in terms of direct costs such as tuition fees (Gale and Tranter 2011) and opportunity costs associated with foregone earnings from reduced participation in the labour market (Daly et al. 2015). Furthermore, problematic finances and

health issues have been identified as reasons that place disadvantaged students at risk of dropout from university study (Li and Carroll 2017).

Gale and Parker (2013, p. 67) state that the representation of disadvantaged groups of Australians in postgraduate university study is an area that has received little attention from researchers and policymakers alike. From an equity perspective, the reasons that more focus should be paid to postgraduate study participation and outcomes for disadvantaged individuals are: postgraduate study leads to improved labour market outcomes; the financial burden for postgraduate study can be prohibitive for students from disadvantaged backgrounds; and a low proportion of the population with postgraduate degrees could put pressure on Australia's long-term prosperity.

First, postgraduate study has been shown to result in stronger labour market outcomes, including employment and earnings (Borland 2002; Graduate Careers Australia 2016; Leigh 2008; Li and Miller 2015). Consequently, if students from disadvantaged backgrounds do not experience equitable access to postgraduate study, then higher education equity policy should be changed to reflect this inequity (Wakeling and Kyriacou 2010). In addition, a higher proportion of the population have a bachelor degree. Therefore, a postgraduate degree has been argued to provide job applicants with a competitive edge (Tomlinson 2008; Wakeling 2009). Furthermore, postgraduate qualifications provide a firmer foundation for entry into professional and/or managerial occupations (Harvey and Andrewartha 2013).

Second, the financial support for tuition fees for postgraduate study through Commonwealth government study loans is often inadequate; that is, the tuition fee amounts are higher than the available loan limits (Gale and Parker 2013). This is true at both the undergraduate and postgraduate levels; however, the financial burden is likely to be even more pertinent for disadvantaged individuals considering postgraduate study. Furthermore, given that the opportunity cost of participation in study is a substantial driver of costs and financial stress (Daly et al. 2015), this cost is likely to impose a significant barrier in the consideration of a lengthier period spent outside of employment in the pursuit of postgraduate study.

Third, Wakeling and Kyriacou (2010) and Harvey and Andrewartha (2013) argue that neglecting equity in postgraduate education could have ramifications on the economy and society. There are multiple reasons for this, including a narrowing of the socioeconomic diversity of research and innovation due to a postgraduate student base that is not diversified, as well as a narrow university teaching cohort that is not representative of the wider population. The argument with regards to the latter point by Harvey and Andrewartha (2013) could also be applied to political leaders and policymakers. In other words, neglecting equity in postgraduate education could result in a narrower pool of candidates at the decision-making level, in the country and broader society.

The primary objective of this study is to contribute to the evidence base around post-degree pathways of undergraduates from equity groups. The pathways considered include both postgraduate study and employment. The specific research questions under this objective are:

1. What are the post-graduation pathways for equity and non-equity graduates from undergraduate degrees?
   a. Do post-degree study rates differ between equity and non-equity graduates?
   b. Do post-degree employment rates differ between equity and non-equity graduates?
2. Do postgraduate study areas and degree types (e.g. coursework, higher degree research) differ between equity and non-equity graduates?
3. To what extent do academic characteristics, such as the undergraduate field of study and undergraduate academic performance, impact on subsequent postgraduate study?

a. How do these factors contribute to differential rates of postgraduate study between equity and non-equity graduates?
4. Do graduates from equity and non-equity backgrounds enjoy comparable post-completion outcomes, in terms of employment rates, occupational quality and earnings?

Data

Graduate Outcomes Survey

The main data source for this study is the 2016 collection of the Graduate Outcomes Survey (GOS)[1], a national survey of recent higher education graduates who studied onshore at one of Australia's 40 Table A (public) and Table B (private) universities. The GOS is administered by the Social Research Centre (SRC) on behalf of the Commonwealth Department of Education and Training, and takes the form of an online survey conducted approximately six months after course completion. The 2016 GOS consisted of three separate collection rounds (November 2015; and February and May 2016) to account for most Australian universities having more than one major graduation rounds each year. Respondents are asked a host of questions relating to their activities at the time of the survey, with an emphasis on their labour market outcomes and participation in further study. The response rate was 39.7 per cent, with the respondent pool generally mirroring the survey population on most characteristics (Social Research Centre 2016)[2]. Restricting the sample to Australian domestic undergraduates—the group of interest in this study—results in a working sample of 50,383 respondents.

Weighted Average Marks

Due to the nexus between academic performance at university and post-completion outcomes[3], data on graduates' Weighted Average Marks (WAM)[4] were required for subsequent analyses. The GOS data file does not contain WAMs, nor are they held within the Commonwealth Higher Education Statistics Collection. As such, data on students' marks must be obtained from universities directly.[5] Data requests were sent to the Deputy Vice-Chancellors (Academic), or equivalent, of all 39 Universities Australia-member institutions for which GOS data were available, with 19 universities ultimately agreeing to provide data (see Appendix A for a list of these institutions). Students' final WAMs in the degree on which they were surveyed were linked to their GOS response using their unique survey ID.

Because different universities use different grading schemes, WAMs by institution were standardised (i.e. converted to z-scores)[6] separately. Therefore, individual graduates' WAMs are measured in standard deviations relative to the institutional mean, where the mean is equal to zero. A WAM of 0.5, for example, indicates that a graduates' WAM is 0.5 standard deviations above the institutional mean for 2016 GOS respondents; that is, they received a WAM equal to or better than ~69 per cent of the GOS respondents at their university in

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[1] The GOS replaced the long-running Australian Graduate Survey (AGS) from 2016.

[2] The largest deviation was observed in relation to citizenship. Given that the present study is restricted to domestic students, this is not especially problematic.

[3] See, for example, Chia and Miller (2008).

[4] $WAM = sum(unit\ points \times unit\ mark)/sum(unit\ points)$

[5] Note that as the study sample is based on the Graduate Outcomes Survey, these are technically graduates that are being referred to.

[6] $Standardised\ WAM = (WAM - mean(WAM))/stdev(WAM)$

2016; a WAM of -0.4 indicates that they received a WAM equal to or better than ~34 per cent of GOS respondents[7].

Equity group definitions

This study considers six equity groups, all of which are identified based on variables contained within the GOS data file (variable names in square brackets)[8].

- Aboriginal and Torres Strait Islander students (ATSI): includes all students identifying as Aboriginal and/or Torres Strait Islander [E940].
- Low SES students: includes all students with a socioeconomic status of 'l' [first_SA1], itself based on the socioeconomic status of students' home locality.
- Students with disability: includes all students who have a disability, impairment or long term medical condition that may affect their studies [E943].
- Students from regional and remote Australia: includes all students whose home locality is classified as <50 per cent metropolitan [first_ASGS_metro].[9]
- Students from non-English speaking background (NESB): includes all students who use a language other than English at their permanent home residence [E941].
- Women in STEM (Science, Technology, Engineering, and Mathematics) fields of study: includes all female students [E315] enrolled in a course within the broad fields of natural and physical sciences, information technology, or engineering and related technologies [BROADFOE].

These equity group indicators are included in the analyses as a set of dichotomous variables, where one indicates group membership and zero otherwise (excluding missing data).

Outcomes indicators

This study considers five key graduate outcomes indicators; four dichotomous and one continuous (GOS variable names in square brackets):

- Overall employment, which takes the value of one if a student is employed (full- or part-time) [GENEMP] and zero if they are available for employment [AVAILEMP] but unemployed.
- Further study, which takes the value of one if a student is engaged in further study (full- or part-time) [FURSTUD] and zero if they indicate no further study.
- Full-time employment, which takes the value of one if a student is employed full-time [FULLEMP] and zero if they are available for full-time employment [AVAILFT] but unemployed.
- Labour market mismatch, which takes the value of one if an employed student rates their qualification as being 'Very important' or 'Important' for their current job, and zero if they provide a rating of 'Fairly important', 'Not that important' or 'Not at all important' [QUALIMP].
- Graduate earnings, which is constructed as annual salary [SALARYA] divided by 52 weeks and then by weekly working hours [ACTLHRS], yielding a derived hourly wage

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[7] This is calculated as the area under the standard normal curve associated with a given z-score.

[8] Variables taking the form 'Exxx' are Higher Education Information Management System (HEIMS) data elements. Refer to Department of Education and Training (2018) for detailed definitions.

[9] Regionality in the GOS is captured by three variables, giving the respective proportion of students' home locality classified as metropolitan, regional and remote [first_ASGS_metro; first_ASGS_regional; first_ASGS_remote]. Naturally, these three variables sum to 100 per cent.

rate. Wage observations respectively above and below the 99th and 1st percentiles of the log-transformed distribution were excluded as outliers[10].

Missing data

The statistical procedures in this study use listwise deletion, whereby any missing data on the outcome and explanatory variables results in an entire case being dropped from the analysis sample, effectively reducing its size. Missing data in the initial sample is summarised in Table 1 and detailed in Appendix B. There is relatively little missing data on any of the student characteristics variables, with the largest amounts being observed in relation to the low SES and regional/remote equity indicators, both of which are based on students' geocoded home addresses. In total, 3,023 students had missing data on their personal and enrolment characteristics (6.0 per cent of the initial sample of 50,383). In terms of the key pathway variables in the study, 8.0 per cent of the initial sample had missing data on their employment status[11] and 6.3 per cent had missing data on their further study status, with a total of 6,895 students having missing data on one or both of their post-completion pathways (13.7 per cent). The final analysis sample consists of 40,852 students with a full matrix of values on their characteristics and pathways.

Table 1. Missing Data Summary

Missing data on characteristics	Missing data on pathways					
	No		Yes		Total	
	N	%	N	%	N	%
No	40,852	81.1	6,508	12.9	47,360	94.0
Yes	2,636	5.2	387	0.8	3,023	6.0
Total	43,488	86.3	6,895	13.7	50,383	100.0

As shown in Appendix B, there are relatively larger proportions of missing data observed in relation to the employment outcomes variables. This is due in part to their not being observed for all students[12], simple item nonresponse and, in the case of earnings, the exclusion of outlying values. Students with missing data on these variables are not excluded from the full analysis sample — this would see all students not in employment excluded; however, they are excluded from the respective estimations that use these variables as outcomes. There is relatively little missing data on students' WAMs, with only 1.8 per cent of cases in the WAM subsample[13] having no valid WAM.

Sample description

Summary statistics on the categorical and continuous explanatory variables used in this study are presented in Tables 2 and 3, respectively. Statistics are presented for each equity group and all respondents ('Total'). These tables contain considerable detail, and are not discussed at length here. Some key observations include the following:

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[10] This involved excluding wage observations below $9.12 and above $120.41.

[11] For the purposes of this study, students unavailable for employment are treated as missing on this variable.

[12] Full-time employment is only observed for those available for full-time employment; mismatch and earnings are only observed for those in employment (full- and part-time).

[13] That is, cases from the 19 institutions that consented to provide data on their graduates' WAMs.

- The relative sizes of the equity groups vary considerably, from around one per cent of the sample for ATSI graduates through to around a quarter for regional/remote graduates.
- There are some notable intersections in equity group membership. For example, ATSI and regional/remote graduates are much more likely than graduates overall and graduates in other equity groups to be low SES.
- Graduates in each equity group also tend to differ in their demographic and enrolment characteristics, both across groups and compared with students overall. Graduates identifying as disabled, for example, are overrepresented amongst part-time students; and women in STEM tend to be younger, on average, and overrepresented in terms of the proportion attending a Go8 university.

Given the fact that graduates can be members of multiple equity groups, and the extent of the differences in characteristics across students in different equity groups and students generally, a multivariate approach is needed to control for these potential confounding factors when investigating post-completion pathways and outcomes. This approach is described in the following section.

Table 2. Sample Percentages

		ATSI	Low SES	Disability	Regional/ remote	NESB	Women in STEM	Total
Equity groups								
ATSI	Yes	100.0	2.1	1.7	2.1	0.0	0.5	1.1
	No	0.0	97.9	98.3	97.9	100.0	99.5	98.9
Low SES	Yes	34.6	100.0	17.3	34.3	19.9	16.6	17.2
	No	65.4	0.0	82.7	65.7	80.1	83.4	82.8
Disability	Yes	9.4	6.0	100.0	6.4	2.1	6.8	5.9
	No	90.6	94.0	0.0	93.6	97.9	93.2	94.1
Regional/ remote	Yes	44.5	46.1	24.9	100.0	8.6	19.3	23.0
	No	55.5	53.9	75.1	0.0	91.4	80.7	77.0
NESB	Yes	0.0	3.0	0.9	1.0	100.0	3.5	2.6
	No	100.0	97.0	99.1	99.0	0.0	96.5	97.4
Women in STEM	Yes	4.1	7.9	9.4	6.9	11.3	100.0	8.2
	No	95.9	92.1	90.6	93.1	88.7	0.0	91.8
Other characteristics								
Sex	Female	74.2	68.7	68.4	69.3	58.1	100.0	64.8
	Male	25.8	31.3	31.6	30.7	41.9	0.0	35.2
Attendance type	Full-time	80.0	76.4	72.0	76.6	82.6	81.0	77.6
	Part-time	20.0	23.6	28.0	23.4	17.4	19.0	22.4
Combined degree	No	92.6	91.4	89.9	90.9	93.0	91.2	88.9
	Yes	7.4	8.6	10.1	9.1	7.0	8.8	11.1
Study area (defined in Appendix C)	Sci and math	5.1	10.3	12.5	9.7	13.3	76.7	11.0
	Comp and info	1.6	3.4	3.8	2.2	5.0	5.4	3.2
	Engineering	1.6	6.2	4.5	6.1	11.3	10.3	6.0
	Arch and build	1.4	1.9	1.2	1.6	2.6	0.1	2.4
	Ag and env	2.1	2.0	1.9	2.9	0.3	1.3	1.8
	Health serv	9.0	7.7	5.4	8.5	4.6	1.1	7.3
	Medicine	2.1	1.3	1.1	2.0	1.2	0.9	1.9
	Nursing	10.8	10.9	7.9	10.4	18.3	0.0	7.9

		ATSI	Low SES	Disability	Regional/remote	NESB	Women in STEM	Total
	Pharmacy	0.2	0.8	0.4	0.8	2.0	0.0	0.8
	Dentistry	0.2	0.7	0.3	0.7	1.0	0.0	0.6
	Vet science	0.7	0.4	0.5	0.6	0.2	0.4	0.4
	Rehabilitation	2.8	2.0	1.3	2.7	1.0	0.3	2.0
	Teacher ed	17.1	10.8	8.1	10.4	2.8	0.0	8.4
	Mgt and comm	9.7	13.8	10.7	12.0	19.0	0.1	14.1
	Hum and soc sci	12.4	9.0	13.6	10.0	6.1	0.8	10.7
	Social work	4.4	3.3	3.2	2.8	1.7	0.0	2.2
	Psychology	4.6	4.7	7.1	4.8	2.8	2.4	5.4
	Law and p'legal	4.1	3.3	4.7	3.6	2.2	0.2	4.6
	Creative arts	5.1	3.7	6.4	4.5	3.2	0.0	4.9
	Communications	4.6	3.3	5.3	3.3	1.2	0.0	4.2
	Tour, hosp, etc.	0.5	0.3	0.1	0.3	0.2	0.0	0.3
University groups (defined in Appendix D)	Go8	19.1	19.5	27.4	17.5	34.1	49.9	29.3
	ATN	11.8	14.9	13.0	9.4	20.3	13.8	16.1
	IRU	18.2	20.4	16.4	21.1	12.3	12.8	15.6
	RUN	13.6	15.6	9.9	19.8	4.0	6.0	8.5
	Ungrouped	37.3	29.7	33.3	32.1	29.3	17.4	30.5
Observations (N)		434	7,008	2,416	9,410	1,042	3,344	40,852

Table 3. Sample Means

	ATSI	Low SES	Disability	Regional/remote	NESB	Women in STEM	Total
Age	27.8	25.7	27.0	26.2	25.7	22.8	25.2
WAM (standardised)	-0.3633	-0.1088	-0.1406	0.0206	-0.3766	0.1334	-0.0306

Methodology and Estimating Equations

The propensities that graduates engage in employment and further study after course completion are investigated using a bivariate probit model[14]. This approach is more appropriate than a conventional univariate probit model, as the latter does not account for correlation across outcomes.

Hence, a bivariate probit model of students' post-completion pathways may be expressed as:

$$y_1^* = \beta_1 X + \varepsilon_1; \ y_1 = 1 \ if \ y_1^* > 0, 0 \ otherwise \tag{1}$$

$$y_2^* = \beta_2 X + \varepsilon_2; \ y_2 = 1 \ if \ y_2^* > 0, 0 \ otherwise$$

where y_1^* and y_2^* are unobserved propensities to be engaged in employment and further study, respectively; y_1 and y_2 are dichotomous indicators for engagement in employment and further study (set to equal one if the student is engaged in each respective activity and zero otherwise); X is a vector of characteristics hypothesised to influence graduates' post-completion pathways, including equity groups, other demographic characteristics, enrolment characteristics, field of study, and academic performance; β_1 and β_2 are coefficients to be estimated on X; and ε is a stochastic error term.

Dichotomous employment outcome variables, specifically full-time employment and labour market mismatch, are investigated using conventional univariate probit models with the general form:

$$y^* = \beta X + \varepsilon; \ y = 1 \ if \ y^* > 0, 0 \ otherwise \tag{2}$$

where y^* is the propensity to be employed full-time or mismatched, respectively; X is again a vector of explanatory variables as previous defined, with the addition of a binary-coded indicator for further study; and β are coefficients to be estimated.

Earnings are analysed using linear regression models with the following standard Mincerian form, estimated by ordinary least squares (OLS):

$$\ln(wage) = \beta X + \varepsilon \tag{3}$$

where $\ln(wage)$ denotes derived hourly wage, expressed in logarithmic form; X is a vector of explanatory variables as previously defined, with the further addition of a binary indicator for labour market mismatch, which previous research has shown to influence graduates' earnings (e.g. Carroll and Tani 2013; Li et al. 2018); β are coefficients to be estimated; and ε is a stochastic error term.

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[14] See Li, Harris and Sloane (2018) for a further application of this technique.

Results

Post-degree study and employment rates

Table 4: Proportions of Further Study and Study Type, by Equity Group Membership

	Any further study	Proportion in part-time study	No further study
ATSI	26.7	33.0	73.3
Low SES	24.4	29.1	75.6
Disability	30.1	31.2	69.9
Regional/remote	23.5	31.9	76.5
NESB	26.6	24.1	73.4
Women in STEM	38.4	14.8	61.6
Non-equity	23.0	25.7	77.0

Table 4 presents the proportions of graduates going into further study, by equity group membership. Graduates from equity groups were observed to have higher rates of further study, compared to graduates who did not belong to any of the equity groups. Specifically, around 23 per cent of non-equity group graduates proceeded into further study. Among the equity groups, regional/remote graduates had the lowest rate of further study at 24 per cent, while women in STEM had the highest rate at 38 per cent. Graduates with a disability also had a relatively high rate of further study (30 per cent).

Column (ii) shows graduates in part-time further study as a proportion of all graduates in further study. Of the graduates from non-equity backgrounds engaged in further study, around a quarter were in part-time study. Graduates from equity backgrounds, generally speaking, were considerably more likely than graduates from non-equity backgrounds to be studying part time. The two exceptions are NESB graduates, who had a similar likelihood of part-time study to non-equity graduates, and women in STEM, who were notably less likely than non-equity graduates to be studying part time.

Table 5: Proportions of Further Study Degree Type, by Equity Group Membership

	Undergraduate	Bachelor honours	Postgraduate coursework	Postgraduate research
ATSI	30.4	16.5	40.0	13.0
Low SES	21.8	19.1	45.5	13.6
Disability	18.9	19.6	46.6	14.9
Regional/remote	22.0	21.7	44.3	12.0
NESB	20.0	21.9	48.5	9.6
Women in STEM	13.1	29.1	39.5	18.2
Non-equity	17.5	19.2	49.1	14.2

Table 5 presents a breakdown by degree type of graduates engaged in further study. Across all equity groups and for non-equity graduates, postgraduate coursework was the most common degree type. Women in STEM were least likely to undertake a postgraduate degree by coursework but were overrepresented in bachelor honours and postgraduate research degrees. ATSI graduates were considerably more likely than non-equity graduates to enrol in an additional undergraduate degree. NESB graduates were least likely to undertake a postgraduate research degree, but were only second to non-equity graduates in terms of undertaking postgraduate coursework degrees.

Figure 1: Field of Education in Further Study, by Equity Group
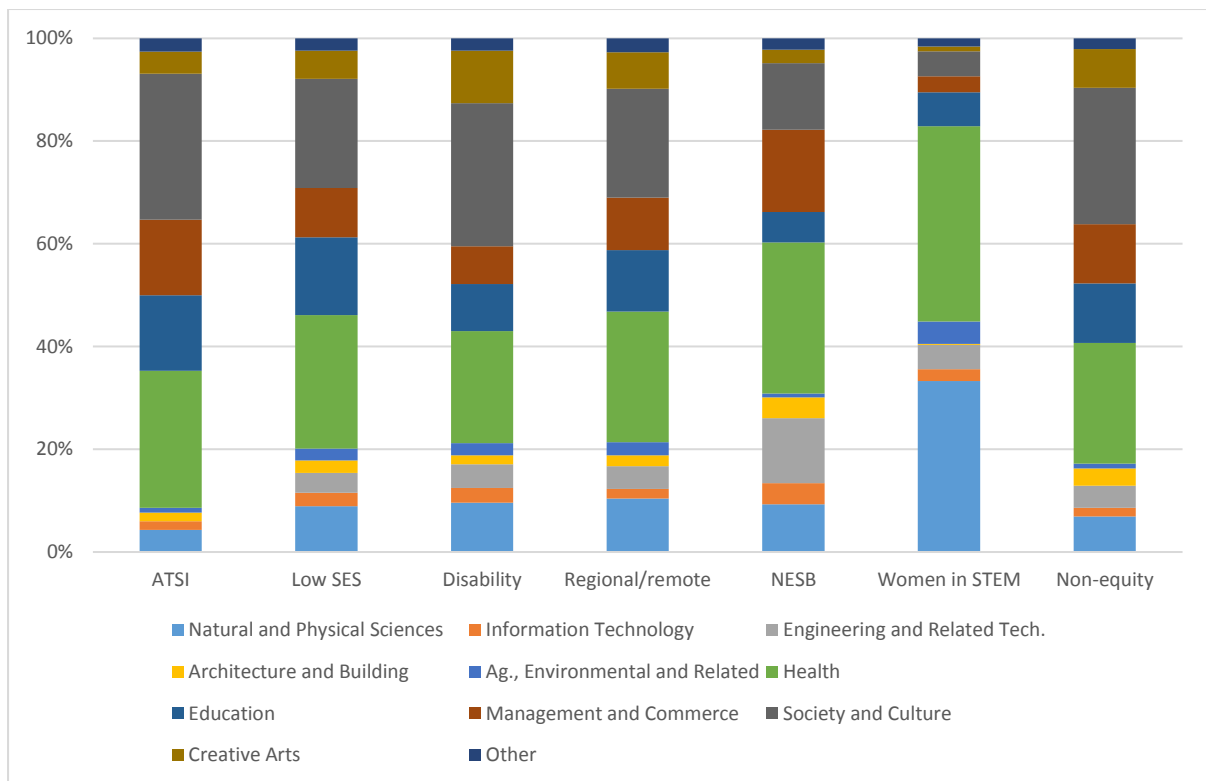
Figure 1 presents the fields of education for those engaged in further study, disaggregated by equity group type. Compared to non-equity groups, ATSI graduates were over-represented in health, management and commerce, and education degrees, and generally underrepresented in STEM disciplines. Graduates from low SES backgrounds had higher rates of further study in the fields of education, health, and natural and physical sciences. Graduates with a disability had higher rates of further study in the fields of Natural and Physical Sciences, and Creative Arts, while having lower rates of further study in Health and Management fields.

Graduates from regional and remote Australia were observed to have higher representation in natural and physical sciences than non-equity graduates, but lower representation in society and culture. NESB graduates had higher rates of further study in the engineering, health, and management and commerce fields, with a notably lower proportion studying society and culture degrees. Finally, women in STEM had substantially higher rates of further study in the fields of natural and physical sciences, agriculture and health. This result is likely to be primarily driven by the definition of the equity group, and in the case of the field of health, by gender preferences for occupational fields that are well-established in the literature.

Table 6: Proportions of Labour Market Activity by Equity Group

	Employed (i)	Not employed (ii)	Proportion employed full-time (iii)
ATSI	85.7	14.3	68.3
Low SES	84.5	15.5	63.3
Disability	79.0	21.0	55.7
Regional/remote	88.0	12.0	65.3
NESB	71.0	29.0	58.7
Women in STEM	82.7	17.3	49.1
Non-equity	87.3	12.7	62.0

Table 6 presents the labour market activity by equity group status. Column (i) presents the proportions for those engaged in any form of employment, while column (ii) presents the proportions for those not employed. Column (iii) presents the proportions of those engaged in full-time employment, expressed as a percentage of those employed.

Around 87 per cent of the graduates from non-equity groups were employed after graduation, with 62 per cent of those employed being employed full-time. The rates of employment differed for all groups. For instance, while graduates from regional and remote Australia appeared to experience slightly higher rates of employment and full-time employment (compared to non-equity graduates) at 88 and 65 per cent, respectively, graduates from NESB had moderately lower rates in comparison, at 71 and 59 per cent, respectively. This result for NESB graduates might be partially driven by their relatively high further study rate, and in particular, further full-time study. Women in STEM were shown earlier to be engaged in high rates of further study and further full-time study and so, have high rates of employment at 83 per cent, although their rate of full-time employment was much lower at 49 per cent.

Until now, our analysis has focused on further study and labour market engagement in isolation, with no attention paid to the intersections between these activities. Table 7 stratifies graduates based on employment and further study into mutually exclusive and collectively inclusive categories, with each row summing to 100 per cent. ATSI students were the most likely to be balancing further study (full- and part-time) with full-time employment; more so than graduates from any other equity group and non-equity graduates. Women in STEM are, by a considerable margin, the most likely to be enrolled in further full-time study whilst working part-time, with more than one-fifth so engaged; with students with a disability the most likely to be studying and working part time. NESB students are the most likely to be studying full-time and not working, followed by women in STEM. NESB students are also most likely to be engaged in neither study nor employment, followed by students with a disability.

Table 7: Intersections in Employment and Further Study by Equity Group

Employment	Full-time employment			Part-time employment			No employment		
Further study	FT	PT	None	FT	PT	None	FT	PT	None
ATSI	4.8	5.8	47.9	9.2	2.1	15.9	3.9	0.9	9.4
Low SES	3.2	4.2	46.1	10.0	1.9	19.1	4.0	1.0	10.5
Disability	2.6	4.4	37.0	12.7	3.4	18.9	5.3	1.6	14.1
Regional/remote	3.1	4.6	49.8	9.5	2.1	18.9	3.5	0.8	7.8
NESB	2.6	3.5	35.7	9.7	1.7	17.9	7.9	1.2	19.9
Women in STEM	3.6	2.8	34.2	22.8	2.0	17.3	6.3	1.0	10.1
Non-equity	3.1	4.1	44.5	12.0	2.1	19.0	4.3	1.0	9.9

Bivariate probit models of employment and further study

Table 8 presents the results from the bivariate probit models of employment and further study after graduation. The first two columns present the results from the parsimonious specification in model 1, which contains variables on equity group membership and basic demographic characteristics, such as age and its squared term, and gender. Model 2 extends the specification in model 1, and includes study area. Model 3 further extends the specification of model 2, and introduces university group membership and enrolment variables in addition to the characteristics regressed in model 2. In order to assist with interpretation of the estimated effects of the bivariate probit model, average marginal effects were calculated and are presented in Table 8.

Attention is first drawn to the correlation coefficients, or the *rho* coefficient from the bivariate probit models. These correlation coefficients are all negative and statistically significant at the one per cent level. In other words, the propensity to be in employment, or be in further study, after graduation are negatively correlated. As such, modelling these outcomes in a bivariate approach is appropriate, as separate probit models are less efficient in comparison. The magnitude of the correlation between employment and further study is moderate, however, with the correlation coefficients across model 1, 2 and 3 being 13.2 per cent, 9.2 per cent, and 8.6 per cent, respectively.

Equity group membership appeared to be moderately associated with the outcomes of being employed or being engaged in further study after graduation. There were varied effects, with negative associations generally being observed between equity group membership and employment, and positive associations being observed between equity group membership and further study. These estimated effects were consistent across the results for models 1 to 3, indicating that the addition of study area, enrolment characteristics and university grouping had limited influence on the employment or further study outcomes for equity groups.

For graduates from an Aboriginal or Torres Strait Islander background, a negative but statistically insignificant association with employment was observed, in comparison to graduates who were not from an Aboriginal or Torres Strait Islander background. However, they were around 4.5 per cent more likely to be engaged in further study, in both the restricted model 1 and full model 3.

Graduates from a low SES background were around three per cent less likely to be employed, compared to their counterparts from more privileged backgrounds. The estimated sign and magnitude of this effect were consistent across all three model specifications. In the full model 3 specification, low SES graduates were also more likely to be engaged in further study, albeit with a very modest estimated effect size of 1.6 per cent.

Graduates with a disability were less likely to be in employment after graduation. This estimated reduced propensity to be employed compared to graduates without disabilities was rather large in effect size, at eight per cent in model 1, and around seven per cent in models 2 and 3. Graduates from regional and remote areas had a modest, increased propensity to be in employment after graduation compared to their metropolitan counterparts, by around two per cent. There does not appear to be a statistically significant difference in terms of further study, for graduates from regional or remote areas.

Table 8: Average Marginal Effects from the Bivariate Probit Models of Employment and Further Study

Variable	Model (1)		Model (2)		Model (3)	
	Employment	Study	Employment	Study	Employment	Study
Equity groups						
ATSI	-0.017 (0.018)	0.045** (0.022)	-0.023 (0.018)	0.050** (0.021)	-0.020 (0.018)	0.046** (0.021)
Low SES	-0.029*** (0.005)	0.003 (0.006)	-0.034*** (0.005)	0.016*** (0.006)	-0.033*** (0.005)	0.016*** (0.006)
Disability	-0.082*** (0.008)	0.064*** (0.010)	-0.070*** (0.008)	0.048*** (0.009)	-0.070*** (0.008)	0.047*** (0.009)
Regional/remote	0.023*** (0.004)	-0.006 (0.005)	0.020*** (0.004)	0.000 (0.005)	0.021*** (0.004)	-0.001 (0.005)
NESB	-0.151*** (0.014)	0.027* (0.014)	-0.161*** (0.014)	0.057*** (0.014)	-0.158*** (0.014)	0.053*** (0.014)
Women in STEM	-0.061*** (0.007)	0.142*** (0.009)	-0.005 (0.008)	0.032*** (0.011)	-0.005 (0.008)	0.031*** (0.011)
Other demographic variables						
Female	0.059*** (0.004)	-0.017*** (0.005)	0.036*** (0.004)	-0.012** (0.005)	0.035*** (0.004)	-0.010** (0.005)
Age	0.010*** (0.001)	-0.026*** (0.002)	0.006*** (0.001)	-0.019*** (0.002)	0.006*** (0.001)	-0.017*** (0.002)
Age squared	-0.156*** (0.018)	0.348*** (0.024)	-0.103*** (0.018)	0.250*** (0.023)	-0.095*** (0.018)	0.228*** (0.023)
Study area (Mgt and comm excluded)						
Sci and math			-0.065*** (0.009)	0.221*** (0.011)	-0.063*** (0.009)	0.212*** (0.011)
Comp and info			-0.028*** (0.011)	-0.053*** (0.010)	-0.030*** (0.011)	-0.049*** (0.010)
Engineering			-0.017** (0.009)	-0.029*** (0.009)	-0.021** (0.009)	-0.024*** (0.009)
Arch and build			-0.017 (0.012)	0.090*** (0.015)	-0.015 (0.012)	0.086*** (0.015)
Ag and env			-0.046*** (0.015)	0.067*** (0.017)	-0.044*** (0.015)	0.063*** (0.016)
Health serv			0.020*** (0.007)	0.106*** (0.010)	0.021*** (0.007)	0.109*** (0.010)
Medicine			0.104*** (0.007)	-0.008 (0.014)	0.103*** (0.007)	-0.002 (0.015)
Nursing			0.056*** (0.006)	-0.069*** (0.007)	0.059*** (0.006)	-0.071*** (0.007)
Pharmacy			0.088*** (0.012)	0.211*** (0.028)	0.090*** (0.012)	0.193*** (0.027)

	Model 1		Model 2		Model 3	
Dentistry			0.072*** (0.016)	-0.050** (0.022)	0.075*** (0.015)	-0.052** (0.022)
Vet science			0.005 (0.027)	0.102*** (0.037)	0.002 (0.028)	0.111*** (0.038)
Rehabilitation			0.070*** (0.009)	-0.119*** (0.009)	0.071*** (0.009)	-0.117*** (0.009)
Teacher ed			0.071*** (0.006)	-0.048*** (0.008)	0.072*** (0.006)	-0.048*** (0.008)
Hum and soc sci			-0.051*** (0.007)	0.206*** (0.009)	-0.053*** (0.007)	0.207*** (0.009)
Social work			-0.020 (0.013)	0.014 (0.014)	-0.020 (0.013)	0.018 (0.014)
Psychology			-0.037*** (0.009)	0.257*** (0.012)	-0.036*** (0.009)	0.256*** (0.012)
Law and p'legal			-0.041*** (0.010)	0.188*** (0.012)	-0.055*** (0.010)	0.233*** (0.013)
Creative arts			-0.065*** (0.010)	0.115*** (0.011)	-0.062*** (0.010)	0.116*** (0.011)
Communications			-0.043*** (0.010)	0.025** (0.011)	-0.043*** (0.010)	0.030*** (0.011)
Tour, hosp, etc.			0.047** (0.024)	0.140*** (0.039)	0.043* (0.025)	0.167*** (0.041)
Other enrolment variables						
Part-time attendance					0.017*** (0.004)	-0.015*** (0.005)
Not a combined degree					-0.039*** (0.005)	0.104*** (0.006)
University groups (Go8 excluded)						
ATN					-0.001 (0.005)	-0.028*** (0.006)
IRU					-0.013** (0.006)	-0.025*** (0.007)
RUN					-0.001 (0.007)	-0.011 (0.009)
Ungrouped					-0.006 (0.005)	-0.008 (0.006)
N	40,852	40,852	40,852	40,852	40,852	40,852
Correlation coefficient	-0.132*** (0.011)		-0.092*** (0.011)		-0.086*** (0.011)	

Graduates from NESB backgrounds were found to be less likely to be in employment after graduation, compared to their English-speaking counterparts. The reduced propensity to be employed was also estimated to be substantial, with estimated effect sizes of around 16 per cent across the models. At the same time, NESB graduates were more likely to be engaged in further study, with effect sizes ranging from three per cent (model 1) to five per cent (model 3).

Finally, women in STEM fields were observed to be less likely to be in employment by a moderate six per cent, compared to individuals not in this equity group. This equity group was, however, much more likely to be engaged in further study, by 14 per cent. However, in the fuller models 2 and 3 where study areas, enrolment characteristics and university group were controlled for, the estimated effects became much more muted. Specifically, there were

no statistically significant differences for this equity group in terms of employment probability, and a modest three per cent increased propensity to be in further study.

Some other findings of interest from model 3 are reported here. Females were more likely to be in employment, by around four per cent compared to men. Females were also around one per cent less likely to be engaged in further study. Older graduates were modestly more likely to be employed, and moderately less likely to be engaged in further study. A wide range of effects were estimated for employment and further study outcomes, based on field of study. Compared to the benchmark group of management and commerce, graduates in science and mathematics were 6.3 per cent less likely to be employed, while medical graduates were 10.4 per cent more likely to be employment. There is hence an almost 17 per cent spread in the probability of employment, by study area. Graduates from the rehabilitation field were 11.7 per cent less likely to be in further study compared to management and commerce graduates while graduates in psychology were 25.6 per cent more likely to be in further study. Hence, the propensity to be in further study can differ by up to 37 percentage points, depending on study area.

Effect of WAM on employment and further study outcomes

The bivariate probit models were estimated on a restricted sample based on the graduates for whom WAM data were available. In addition, models 2 and 3 in Table 8 were estimated with the inclusion of a regressor on WAM, in order to assess the impact of academic ability on employment and further study outcomes. These results are presented in Table 9.

It is noteworthy that the results in Table 9 remained qualitatively consistent to those in Table 8. That is, equity group membership is generally negatively correlated with employment after graduation, but positively correlated with further study. Further, the estimated marginal effects on equity group membership were consistent in size and of similar magnitude across models 1 to 4 in Table 9. One exception was the estimated marginal effect for Women in STEM for the study equation, which was found to have a large effect of 17 per cent in model 1. In models 2 to 4, the corresponding estimate was still positive, but the estimated effect had decreased to around five per cent. As expected, academic ability, as proxied by WAM, positively impacted on employment and further study outcomes. In particular, a one standard deviation increase in WAM was found to have a modest but statistically significant increase in the probability of being employed or being in further study, by around two per cent.

Labour Market Outcomes

Full-time employment

Table 10 presents results from a probit model which examines the probability of full-time employment. Separate regressions were estimated using the same model, for the full sample and, as a robustness check, the sample for which WAM data were available. In the regression on the sample for which WAM data was available from participating universities, WAM was also added as a control. As with the probit models above, average marginal effects were calculated and are presented in Table 10.

Table 9: Bivariate Probit Models of Employment and Further Study, WAM Sample

Variable	Model (1)		Model (2)		Model (3)		Model (4)	
	Emp	Study	Emp	Study	Emp	Study	Emp	Study
Equity groups								
ATSI	-0.004	0.030	-0.006	0.028	0.002	0.035	0.006	0.031
	(0.023)	(0.029)	(0.023)	(0.027)	(0.022)	(0.028)	(0.021)	(0.027)
Low SES	-0.027***	0.002	-0.031***	0.017**	-0.028***	0.019**	-0.027***	0.021***
	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)
Disability	-0.093***	0.087***	-0.080***	0.062***	-0.074***	0.066***	-0.075***	0.065***
	(0.012)	(0.014)	(0.012)	(0.013)	(0.011)	(0.013)	(0.012)	(0.013)
Regional/remote	0.025***	0.000	0.023***	0.002	0.022***	0.001	0.024***	-0.002
	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)	(0.007)
NESB	-0.161***	0.004	-0.173***	0.046**	-0.163***	0.053***	-0.159***	0.047**
	(0.018)	(0.018)	(0.019)	(0.019)	(0.018)	(0.019)	(0.018)	(0.018)
Women in STEM	-0.057***	0.173***	-0.004	0.048***	-0.003	0.049***	-0.003	0.047***
	(0.009)	(0.011)	(0.011)	(0.014)	(0.011)	(0.014)	(0.011)	(0.014)
Other demographic variables								
Female			0.039***	-0.022***	0.036***	-0.023***	0.036***	-0.022***
			(0.006)	(0.007)	(0.006)	(0.007)	(0.006)	(0.007)
Age			0.003*	-0.023***	0.003*	-0.023***	0.003	-0.021***
			(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Age squared			-0.061**	0.305***	-0.067**	0.302***	-0.060**	0.280***
			(0.026)	(0.033)	(0.026)	(0.033)	(0.026)	(0.033)
Study area (Mgt and comm excluded)								
Sci and math			-0.061***	0.245***	-0.074***	0.225***	-0.073***	0.225***
			(0.012)	(0.015)	(0.012)	(0.015)	(0.012)	(0.015)
Comp and info			-0.022	-0.067***	-0.030**	-0.068***	-0.032**	-0.068***
			(0.015)	(0.014)	(0.015)	(0.014)	(0.015)	(0.014)
Engineering			-0.035***	-0.042***	-0.039***	-0.041***	-0.044***	-0.041***
			(0.012)	(0.011)	(0.012)	(0.012)	(0.012)	(0.012)
Arch and build			-0.016	0.082***	-0.020	0.077***	-0.020	0.077***
			(0.015)	(0.018)	(0.014)	(0.017)	(0.014)	(0.017)
Ag and env			-0.027	0.078***	-0.033*	0.067***	-0.029	0.067***
			(0.019)	(0.022)	(0.019)	(0.022)	(0.018)	(0.022)
Health serv			0.024**	0.125***	0.015	0.117***	0.017*	0.117***
			(0.010)	(0.013)	(0.010)	(0.013)	(0.010)	(0.013)
Medicine			0.113***	-0.002	0.107***	0.007	0.106***	0.007
			(0.009)	(0.019)	(0.009)	(0.020)	(0.009)	(0.020)
Nursing			0.054***	-0.064***	0.051***	-0.064***	0.055***	-0.064***
			(0.009)	(0.010)	(0.009)	(0.010)	(0.009)	(0.010)
Pharmacy			0.101***	0.128***	0.093***	0.106***	0.094***	0.106***
			(0.015)	(0.037)	(0.016)	(0.035)	(0.016)	(0.035)

Dentistry			0.063*** (0.022)	-0.005 (0.031)	0.055** (0.022)	-0.016 (0.030)	0.058*** (0.021)	-0.016 (0.030)
Vet science			-0.055 (0.043)	0.256*** (0.054)	-0.058 (0.042)	0.225*** (0.053)	-0.055 (0.042)	0.225*** (0.053)
Rehabilitation			0.079*** (0.012)	-0.110*** (0.013)	0.067*** (0.013)	-0.115*** (0.013)	0.066*** (0.013)	-0.115*** (0.013)
Teacher ed			0.068*** (0.009)	-0.040*** (0.011)	0.062*** (0.009)	-0.038*** (0.011)	0.064*** (0.009)	-0.038*** (0.011)
Hum and soc sci			-0.047*** (0.010)	0.214*** (0.012)	-0.056*** (0.010)	0.206*** (0.012)	-0.059*** (0.010)	0.206*** (0.012)
Social work			-0.040** (0.019)	-0.020 (0.019)	-0.041** (0.019)	-0.021 (0.019)	-0.034* (0.018)	-0.021 (0.019)
Psychology			-0.043*** (0.013)	0.274*** (0.016)	-0.052*** (0.013)	0.267*** (0.016)	-0.048*** (0.013)	0.267*** (0.016)
Law and p'legal			-0.040*** (0.014)	0.210*** (0.017)	-0.041*** (0.013)	0.266*** (0.018)	-0.057*** (0.014)	0.266*** (0.018)
Creative arts			-0.059*** (0.013)	0.124*** (0.015)	-0.071*** (0.013)	0.117*** (0.015)	-0.070*** (0.013)	0.117*** (0.015)
Communications			-0.053*** (0.014)	0.031** (0.015)	-0.060*** (0.014)	0.040*** (0.015)	-0.064*** (0.014)	0.040*** (0.015)
Tour, hosp, etc.			0.048 (0.037)	0.188*** (0.063)	0.046 (0.036)	0.170*** (0.062)	0.053 (0.033)	0.170*** (0.062)
Other enrolment variables								
Part-time attendance							0.020*** (0.006)	-0.007 (0.007)
Not a combined degree							-0.043*** (0.007)	0.120*** (0.008)
University groups (Go8 excluded)								
ATN							0.003 (0.007)	-0.026*** (0.009)
IRU							-0.006 (0.007)	-0.042*** (0.008)
RUN							-0.005 (0.013)	-0.010 (0.016)
Ungrouped							-0.017*** (0.006)	-0.002 (0.008)
WAM					0.022*** (0.002)	0.020*** (0.003)	0.024*** (0.002)	0.020*** (0.003)
N	23,044	23,044	23,044	23,044	23,044	23,044	23,044	23,044
Correlation coefficient	-0.129*** (0.014)		-0.096*** (0.014)		-0.104*** (0.014)		-0.097*** (0.014)	

Table 10: Probit Models of Full-time Employment

Variable	Full sample		WAM sample	
			No WAM	WAM
Equity groups				
ATSI	0.012 (0.024)	0.016 (0.023)	0.025 (0.031)	0.047 (0.030)
Low SES	-0.037*** (0.007)	-0.036*** (0.007)	-0.039*** (0.010)	-0.034*** (0.009)
Disability	-0.092*** (0.011)	-0.088*** (0.011)	-0.109*** (0.016)	-0.100*** (0.016)
Regional/remote	0.061*** (0.006)	0.061*** (0.006)	0.054*** (0.009)	0.051*** (0.009)
NESB	-0.203*** (0.017)	-0.199*** (0.017)	-0.211*** (0.022)	-0.196*** (0.022)
Women in STEM	0.011 (0.013)	0.013 (0.013)	0.019 (0.017)	0.021 (0.017)
Other demographic variables				
Female	0.019*** (0.006)	0.018*** (0.006)	0.013 (0.009)	0.007 (0.009)
Age	0.022*** (0.002)	0.021*** (0.002)	0.019*** (0.003)	0.019*** (0.003)
Age squared/1000	-0.300*** (0.031)	-0.298*** (0.031)	-0.273*** (0.045)	-0.281*** (0.044)
Study area (Mgt and comm excluded)				
Sci and math	-0.178*** (0.014)	-0.173*** (0.014)	-0.192*** (0.019)	-0.215*** (0.019)
Comp and info	-0.019 (0.014)	-0.023 (0.014)	-0.012 (0.020)	-0.032 (0.020)
Engineering	0.002 (0.011)	0.000 (0.011)	-0.020 (0.016)	-0.032** (0.016)
Arch and build	0.004 (0.016)	0.006 (0.016)	0.020 (0.019)	0.011 (0.019)
Ag and env	-0.175*** (0.022)	-0.174*** (0.022)	-0.193*** (0.029)	-0.205*** (0.028)
Health serv	-0.057*** (0.012)	-0.057*** (0.012)	-0.058*** (0.016)	-0.079*** (0.016)
Medicine	0.221*** (0.008)	0.222*** (0.008)	0.236*** (0.011)	0.225*** (0.011)
Nursing	0.077*** (0.010)	0.074*** (0.010)	0.072*** (0.014)	0.071*** (0.014)
Pharmacy	0.207*** (0.012)	0.212*** (0.011)	0.214*** (0.018)	0.201*** (0.019)
Dentistry	0.078*** (0.029)	0.075** (0.030)	0.019 (0.043)	0.010 (0.043)
Vet science	0.115*** (0.034)	0.111*** (0.035)	0.030 (0.062)	0.032 (0.059)
Rehabilitation	0.084*** (0.015)	0.078*** (0.015)	0.106*** (0.019)	0.076*** (0.020)
Teacher ed	0.041*** (0.010)	0.037*** (0.010)	0.032** (0.015)	0.024* (0.014)
Hum and soc sci	-0.184*** (0.011)	-0.175*** (0.011)	-0.185*** (0.015)	-0.204*** (0.015)

Social work	-0.094*** (0.019)	-0.094*** (0.019)	-0.071*** (0.026)	-0.071*** (0.026)
Psychology	-0.163*** (0.015)	-0.155*** (0.015)	-0.154*** (0.021)	-0.167*** (0.021)
Law and p'legal	-0.080*** (0.013)	-0.062*** (0.013)	-0.097*** (0.019)	-0.100*** (0.019)
Creative arts	-0.205*** (0.015)	-0.205*** (0.015)	-0.199*** (0.021)	-0.220*** (0.020)
Communications	-0.144*** (0.015)	-0.146*** (0.015)	-0.183*** (0.020)	-0.197*** (0.020)
Tour, hosp, etc.	-0.126** (0.049)	-0.119** (0.049)	-0.121 (0.076)	-0.104 (0.074)
Other enrolment variables				
Part-time attendance	0.040*** (0.006)	0.041*** (0.006)	0.039*** (0.009)	0.062*** (0.009)
Not a combined degree	-0.102*** (0.007)	-0.099*** (0.007)	-0.119*** (0.010)	-0.119*** (0.010)
University groups (Go8 excluded)				
ATN	-0.016** (0.008)	-0.017** (0.008)	-0.024** (0.010)	-0.029*** (0.010)
IRU	-0.051*** (0.008)	-0.051*** (0.008)	-0.050*** (0.011)	-0.050*** (0.011)
RUN	-0.004 (0.010)	-0.002 (0.010)	0.004 (0.018)	-0.009 (0.018)
Ungrouped	-0.020*** (0.007)	-0.019*** (0.007)	-0.051*** (0.010)	-0.056*** (0.010)
Further study		-0.076*** (0.007)		
WAM				0.049*** (0.004)
N	30,628	30,628	16,905	16,905

It is noted that the estimates in Table 10 are qualitatively consistent across the two samples. This indicates that the model is robust and, further, that the WAM sample is representative of the full university sample. The estimates indicate that most equity groups are disadvantaged in the graduate labour market in terms of full-time employment, with graduates from low SES backgrounds, with a disability and from NESB backgrounds being estimated to have reduced propensity to be in full-time employment after graduation. These negative marginal effects can be rather substantial. Illustratively, for low SES graduates, the effect was modest at around three to four per cent, while for graduates with a disability, the estimated employment disadvantage was around 10 per cent. For NESB graduates, the estimated employment disadvantage was large, at around 20 per cent. Graduates from regional and remote areas fared better in this regard, with an increased propensity to be in full-time work estimated at around five to six per cent. The estimates for ATSI graduates and female graduates in STEM were statistically insignificant.

Further study was shown to be associated with an eight per cent reduced propensity to be in full-time employment. However, the addition of the further study control term only slightly reduced the estimated marginal effect sizes for equity groups. One standard deviation shift in WAM was associated with a five per cent marginal change in the likelihood to be employed full-time.

Labour market mismatch

Table 11 presents results for the probit models of labour market mismatch, where the dependent variable indicates that a student considers themselves to be well-matched to their job. As with the probit model for full-time employment above, the probit model for labour market mismatch was estimated for the full sample, and for the WAM subsample, as a sensitivity analysis. Once again, the results were robust to the sample utilised. Furthermore, average marginal effects were calculated and reported.

The results from the probit model of mismatch indicate that graduates from certain equity groups generally fared well in terms of being well-matched to their jobs. Of the six equity groups assessed, three groups, namely, ATSI graduates, graduates from regional or remote areas, and NESB graduates were estimated to have increased propensities to be well-matched. Graduates from the women in STEM group were less likely to report being well-matched to their jobs. No statistically significant effects for the rest of the equity groups were observed. For ATSI graduates and NESB graduates, increased propensity of being well-matched by around five per cent were estimated. Graduates who attended university study part-time were less likely to be well-matched. For graduates who did not study in a combined degree course, substantial reduced propensities to be well-matched by about 17 per cent, were estimated. Graduates who studied in a university belonging to the ATN, IRU or RUN groups were all likelier to consider themselves to be well-matched, compared to graduates from the prestigious Go8 research universities, noting that our measure of labour market mismatch is based on graduates' subjective assessments of the importance of their qualification to their current job[15]. The WAM estimate is significantly and positively associated (4.2 per cent) with being well-matched, providing further evidence on the nexus between academic performance and employment outcomes.

Table 11: Probit Models of Labour Market Mismatch

Variable	Full sample		WAM sample	
			No WAM	WAM
Equity groups				
ATSI	0.048** (0.023)	0.052** (0.023)	0.051* (0.030)	0.067** (0.030)
Low SES	0.009 (0.007)	0.010 (0.007)	0.007 (0.009)	0.011 (0.009)
Disability	-0.009 (0.010)	-0.003 (0.010)	0.011 (0.015)	0.016 (0.015)
Regional/remote	0.019*** (0.006)	0.019*** (0.006)	0.002 (0.008)	0.001 (0.008)
NESB	0.051*** (0.017)	0.056*** (0.016)	0.063*** (0.022)	0.077*** (0.022)
Women in STEM	-0.039*** (0.012)	-0.035*** (0.012)	-0.015 (0.016)	-0.015 (0.016)
Other demographic variables				
Female	0.019*** (0.006)	0.018*** (0.006)	-0.003 (0.008)	-0.006 (0.008)
Age	0.012*** (0.002)	0.010*** (0.002)	0.015*** (0.003)	0.014*** (0.003)

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[15] Recall that our definition of 'well-matched' encompasses those who rated their qualification as 'Very important' or 'Important' for their current job on a five-point importance response format.

Age squared/1000	-0.122*** (0.029)	-0.097*** (0.028)	-0.175*** (0.040)	-0.170*** (0.040)
Study area				
Sci and math	-0.154*** (0.014)	-0.127*** (0.014)	-0.179*** (0.018)	-0.206*** (0.018)
Comp and info	0.056*** (0.016)	0.051*** (0.016)	0.064*** (0.022)	0.044* (0.023)
Engineering	0.076*** (0.013)	0.074*** (0.013)	0.067*** (0.018)	0.057*** (0.017)
Arch and build	0.078*** (0.017)	0.087*** (0.017)	0.085*** (0.021)	0.076*** (0.021)
Ag and env	-0.177*** (0.021)	-0.171*** (0.021)	-0.203*** (0.028)	-0.214*** (0.028)
Health serv	-0.025** (0.012)	-0.011 (0.012)	-0.014 (0.016)	-0.034** (0.016)
Medicine	0.303*** (0.013)	0.310*** (0.013)	0.301*** (0.017)	0.289*** (0.017)
Nursing	0.297*** (0.009)	0.298*** (0.009)	0.287*** (0.012)	0.279*** (0.012)
Pharmacy	0.336*** (0.014)	0.348*** (0.013)	0.358*** (0.017)	0.344*** (0.017)
Dentistry	0.312*** (0.019)	0.318*** (0.020)	0.291*** (0.027)	0.278*** (0.027)
Vet science	0.046 (0.043)	0.061 (0.043)	-0.087 (0.059)	-0.085 (0.058)
Rehabilitation	0.256*** (0.014)	0.252*** (0.015)	0.259*** (0.019)	0.234*** (0.019)
Teacher ed	0.242*** (0.009)	0.244*** (0.010)	0.251*** (0.013)	0.242*** (0.013)
Hum and soc sci	-0.268*** (0.011)	-0.244*** (0.011)	-0.248*** (0.014)	-0.268*** (0.014)
Social work	0.066*** (0.019)	0.070*** (0.019)	0.116*** (0.026)	0.112*** (0.026)
Psychology	-0.254*** (0.013)	-0.225*** (0.013)	-0.253*** (0.018)	-0.270*** (0.018)
Law and p'legal	-0.055*** (0.015)	-0.028* (0.015)	-0.056*** (0.020)	-0.061*** (0.020)
Creative arts	-0.146*** (0.014)	-0.132*** (0.014)	-0.139*** (0.018)	-0.163*** (0.018)
Communications	-0.152*** (0.015)	-0.148*** (0.015)	-0.174*** (0.020)	-0.187*** (0.020)
Tour, hosp, etc.	-0.106** (0.045)	-0.088* (0.045)	-0.046 (0.068)	-0.041 (0.067)
Other enrolment variables				
Part-time attendance	-0.059*** (0.006)	-0.060*** (0.006)	-0.079*** (0.009)	-0.058*** (0.009)
Not a combined degree	-0.169*** (0.007)	-0.159*** (0.007)	-0.174*** (0.010)	-0.175*** (0.010)
University groups				
ATN	0.035*** (0.008)	0.032*** (0.008)	0.045*** (0.010)	0.043*** (0.010)
IRU	0.024*** (0.008)	0.022*** (0.008)	0.034*** (0.010)	0.034*** (0.010)

RUN	0.027*** (0.010)	0.027*** (0.010)	0.083*** (0.017)	0.073*** (0.017)
Ungrouped	0.012* (0.007)	0.012* (0.007)	-0.005 (0.009)	-0.009 (0.009)
Further study		-0.097*** (0.006)		
WAM				0.042*** (0.003)
N	34,479	34,479	19,340	19,340

Earnings models

Table 12 presents results for the wage regressions. As with the other outcomes models, the earnings model was estimated for the full sample and for the WAM subsample. Again, the results were generally robust to the sample utilised.

The results of the wage models show that equity graduates generally fare equivalently to, or worse than, their non-equity peers in terms of their hourly earnings. The only exception was observed in relation to ATSI graduates, who earned a substantial six per cent premium after taking academic performance into consideration. Graduates with disability and NESB graduates were both at an earnings disadvantage relative to their non-equity peers — substantially so, in the case of the latter group (eight per cent). Low SES graduates were at a slight earnings disadvantage relative to their more privileged peers, but only in the full sample, and the effect size was relatively small (1.3 per cent).

The familiar pay disparity between men and women is observed in our results, with women earning around three per cent less than men, all else being approximately equal. There are positive and significant, but diminishing returns to age. There is a considerable range in estimated earnings, with around 64 percentage points separating the fields with the highest and lowest hourly earnings (dentistry and pharmacy[16], respectively), when compared to the reference group of graduates in management and commerce. Part-time attendance was associated with an earnings premium, presumably because many part-time graduates are combining study with paid work. Graduates from IRU and ungrouped universities were at an earnings disadvantage relative to their Go8 peers, as were ATN graduates in the full sample. Further study was associated with a substantial earnings premium (10 per cent), and there was a positive wage effect associated with being in a well-matched job. There was a positive and significant association between academic performance and graduate earnings (3.2 per cent).

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[16] Pharmacy graduates must meet additional training requirements in order to gain professional registration, which may explain their relatively low starting salary.

Table 12: OLS Models of Graduates' Hourly Earnings

Variable	Full sample	WAM sample	
		No WAM	WAM
Equity groups			
ATSI	0.028 (0.020)	0.047* (0.027)	0.062** (0.027)
Low SES	-0.013** (0.006)	-0.011 (0.008)	-0.008 (0.008)
Disability	-0.036*** (0.010)	-0.037*** (0.013)	-0.032** (0.013)
Regional/remote	-0.006 (0.005)	-0.010 (0.007)	-0.010 (0.007)
NESB	-0.090*** (0.015)	-0.092*** (0.020)	-0.081*** (0.020)
Women in STEM	0.004 (0.011)	0.005 (0.015)	0.006 (0.015)
Other demographic variables			
Female	-0.028*** (0.005)	-0.028*** (0.007)	-0.031*** (0.007)
Age	0.026*** (0.002)	0.021*** (0.003)	0.021*** (0.003)
Age squared/1000	-0.253*** (0.028)	-0.186*** (0.038)	-0.187*** (0.038)
Study area (Mgt and comm excluded)			
Sci and math	0.016 (0.011)	0.030** (0.014)	0.013 (0.014)
Comp and info	0.082*** (0.014)	0.078*** (0.019)	0.065*** (0.019)
Engineering	0.062*** (0.011)	0.060*** (0.015)	0.053*** (0.015)
Arch and build	-0.052*** (0.015)	-0.054*** (0.018)	-0.060*** (0.018)
Ag and env	-0.039** (0.017)	-0.034 (0.022)	-0.043* (0.022)
Health serv	0.049*** (0.010)	0.074*** (0.013)	0.062*** (0.013)
Medicine	0.046*** (0.015)	0.052*** (0.020)	0.050** (0.020)
Nursing	0.021** (0.009)	0.047*** (0.013)	0.047*** (0.013)
Pharmacy	-0.151*** (0.023)	-0.128*** (0.032)	-0.137*** (0.032)
Dentistry	0.500*** (0.028)	0.501*** (0.035)	0.502*** (0.035)
Vet science	-0.118*** (0.034)	-0.088* (0.047)	-0.085* (0.047)
Rehabilitation	0.081*** (0.015)	0.091*** (0.020)	0.071*** (0.020)
Teacher ed	0.081*** (0.009)	0.102*** (0.014)	0.100*** (0.014)
Hum and soc sci	0.024*** (0.009)	0.039*** (0.012)	0.026** (0.012)

Social work	0.027* (0.016)	0.062*** (0.023)	0.062*** (0.023)
Psychology	0.024** (0.011)	0.054*** (0.015)	0.042*** (0.015)
Law and p'legal	0.030** (0.012)	0.028* (0.016)	0.025 (0.016)
Creative arts	0.006 (0.012)	0.054*** (0.015)	0.038** (0.015)
Communications	-0.061*** (0.012)	-0.046*** (0.017)	-0.056*** (0.017)
Tour, hosp, etc.	-0.068* (0.036)	-0.083 (0.057)	-0.078 (0.056)
Other enrolment variables			
Part-time attendance	0.020*** (0.005)	0.022*** (0.008)	0.037*** (0.008)
Not a combined degree	-0.004 (0.007)	0.011 (0.010)	0.009 (0.010)
University groups (Go8 excluded)			
ATN	-0.014** (0.007)	-0.006 (0.009)	-0.007 (0.009)
IRU	-0.029*** (0.007)	-0.035*** (0.009)	-0.034*** (0.009)
RUN	0.012 (0.009)	0.000 (0.015)	-0.007 (0.015)
Ungrouped	-0.019*** (0.006)	-0.025*** (0.008)	-0.027*** (0.008)
Further study	0.093*** (0.005)	0.105*** (0.006)	0.097*** (0.006)
Qual. important	0.035*** (0.005)	0.042*** (0.007)	0.037*** (0.007)
WAM			0.032*** (0.003)
N	27,737	15,599	15,599
R-squared	0.0894	0.0862	0.0928

Discussion

This study found that graduates from equity groups have higher rates of further study, compared to graduates from non-equity groups, as shown in the descriptive analyses. This was reinforced by the findings from the multivariate analyses, in particular, the bivariate models of employment and further study, which showed that equity graduates had higher propensities to be in further study.

Further, it appears that graduates from equity groups are afforded the same opportunities to engage in full-time study. These are positive findings, given the postgraduate degree premiums found in earlier Australian studies (Leigh 2008), as well as the advantage conferred by postgraduate study in the labour market in terms of employment prospects or managerial roles (Tomlinson 2008; Harvey and Andrewartha 2013). A further positive finding is that there are no substantial differences in the further study degree type by equity group status. From this perspective, higher education equity policy in Australia appears to be working well in terms of levelling the playing field, and providing opportunities for individuals from disadvantaged backgrounds to access higher education.

The summary statistics as well as descriptive analyses showed that individuals from equity groups were concentrated in certain study areas, whether in the undergraduate degree they completed or in their further study. For example, graduates from equity groups have stronger representation in health fields, relative to their counterparts who do not belong to any equity group. Graduates from the ATSI and low SES groups had higher representation proportions in the field of education, while graduates with a disability had higher concentrations in architecture and building, and natural and physical sciences. It is noted that in the multivariate analyses, the addition of controls for study area did not result in sizeable differences to the employment and further study outcomes analysed, for the equity groups. This indicates that individuals from equity groups are not choosing degree fields that negatively impact on their future work or study prospects.

Equity graduates appeared to lag behind their non-equity counterparts in employment outcomes. In particular, graduates from low SES backgrounds, those with a disability, and graduates from an NESB background were less likely to be employed. These particular equity groups were also less likely to be in full-time employment (if they were employed) and earn less. Labour market outcomes were particularly poor for NESB graduates. It is noted that these three groups have also been found in other studies to be vulnerable to discrimination in the labour market, and hence policies to address labour market disadvantage for these groups need to be considered (Li et al. 2017).

Although higher further study rates for equity students is, on the face of it, a positive sign that higher education policy in Australia is levelling the playing field vis-à-vis access to higher education, a less positive interpretation is that students from some equity groups are more likely to undertake further study than their non-equity peers because they feel as though they require additional education to compete for jobs, potentially due to labour market discrimination. Given the direct and opportunity costs associated with further study, this may have negative economic consequences for many. The relatively large proportions of ATSI, regional/remote and NESB students undertaking further *undergraduate* study raises the related question of whether these students feel as though their initial degree did not adequately equip them for the labour market, whether they lacked knowledge (or were badly advised) when choosing their first degree, or are simply returning to study for personal enrichment. It is impossible to address this question with the data available[17], but remains a fertile and important area for further research.

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[17] This would require data on the reasons students undertake study, which the GOS does not capture.

Conclusion

This study contributes to the limited literature looking at employment and further study outcomes for equity graduates in Australia. Assessment and evaluation of post-degree outcomes is important for the purposes of higher education equity and policy planning, and ensuring that policy measures to aid disadvantaged individuals are successful in achieving their aims. While there has been recent work examining the labour market outcomes of equity graduates in Australia, there does not seem to have been any examination of post-degree further study, given the advantages a postgraduate degree confers in terms of earnings and competitiveness in the job market, ensuring equitable access to postgraduate study should also be of policy interest.

The present study has several strengths. First, it utilises robust data from two sources — the Graduate Outcomes Survey and administrative records from universities, and additionally, links them together to create an information rich source for the purposes of analysis. Second, it examines two post-degree completion outcomes—employment and further study—which are important, and in keeping with the related goals of overcoming disadvantage and facilitating social mobility. Third, the study uses a bivariate probit approach in the multivariate regression of outcomes, which is more appropriate compared to basic probit models in looking at dual, inter-related outcomes. As the bivariate probit approach accounts for correlation between employment and further study outcomes, the estimated effects from these models are more efficient in comparison to basic probit approaches.

Nevertheless, there are also limitations in this study. First, the post-degree completion outcomes considered in this study, while important, are obviously non-exhaustive. While the study has considered important labour market outcomes such as full-time employment, labour market mismatch and earnings, it has not considered other important outcomes such as job satisfaction, mainly owing to the unavailability of such data. Second, while the study considers employment and further study outcomes in tandem, this is a potentially complex pair of outcomes, and exact interactions or future impacts are unknown. For example, the impact of a combination of study and workload, and how that might affect labour market outcomes such as mismatch and earnings, was not specifically examined in this study. Such analyses would need to be comprehensive to provide definitive findings, and as such are beyond the scope of this study. Third, the analyses here are static, and examine outcomes at only one point in the short-term. Future research could consider extending the time frame and examining outcomes further in the future. Research looking at labour market outcomes of equity groups after postgraduate study could particularly complement the literature in this area.

Despite these limitations, the findings of this study indicate that access to post-degree further study is favourable for equity graduates. In particular, similar or greater proportions of equity graduates undertake further study in comparison to non-equity graduates. Further, there appears to be little difference in the proportions undertaking full- or part-time study, with the exception of women in STEM, who have a propensity to study full-time. However, employment outcomes for equity graduates are less favourable in comparison. In particular, graduates from low SES backgrounds, graduates with disability or graduates from NESB backgrounds are substantially disadvantaged in the labour market. NESB graduates fare the worst, and face the largest extent of disadvantage. Policy action to address these outcomes should be considered.

References

Borland, J 2002, New Estimates of the Private Rate of Return to University Education in Australia. Available from: http://www.oecd.org/eco/labour/37581238.pdf [10 August 2018]

Bradley, D, Noonan, P, Nugent, H, & Scales, B 2008. Review of Australian Higher Education: Final report. Canberra, ACT: DEEWR. Available from: http://www.deewr.gov.au/highereducation/review/pagesiewofaustralianhighereducatio nreport.aspx/r> [12 October 2018]

Carroll, D and Tani, M 2013, 'Over-education of Recent Higher Education Graduates: New Australian Panel Evidence', *Economics of Education Review*, vol. 32, pp. 207-218.

Chia, G and Miller, PW 2008, 'Tertiary Performance, Field of Study and Graduate Starting Salaries', *Australian Economic Review*, vol. 41, no. 1, pp. 15-31.

Chowdry, H, Crawford, C, Dearden, L, Goodman, A and Vignoles, A 2012, 'Widening Participation in Higher Education: Analysis Using Linked Administrative Data', *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, vol. 176, no. 2, pp. 431-457.

Coates, H and Edwards, D 2009, 'The 2008 Graduate Pathways Survey: Graduates' Education and Employment Outcomes Five Years after Completion of a Bachelor Degree at an Australian University', Australian Council for Education Research. Available from: https://www.research.acer.edu.au/cgi/viewcontent.cgi?article=1011&context=higher_ education [10 August 2018]

Daly, A, Lewis, P, Corliss, M, and Heaslip, T 2015, 'The Private Rate of Return to a University Degree in Australia', *Australian Journal of Education*, vol. 59, no. 1, pp. 97-112.

Department of Education and Training. (2016), uCube. Available from: http://highereducationstatistics.education.gov.au/Default.aspx [10 August 2018]

Department of Education and Training. (2018), Data Element Dictionary. Available from: https://heimshelp.education.gov.au/dictionary August 2018]

Gale, T 2012, 'Towards a Southern Theory of Student Equity in Australian Higher Education: Enlarging the Rationale for Expansion', *International Journal of Sociology of Education*, vol. 1, no. 3, pp. 238-262.

Gale, T and Parker, S 2013, Widening Participation in Australia in Higher Education, Higher Education Funding Council for England. Available from: https://www.ncsehe.edu.au/wp-content/uploads/2013/10/2013_WPeffectivenessAus.pdf [10 August 2018]

Gale, T and Tranter, D 2011, 'Social Justice in Australian Higher Education Policy: An Historical and Conceptual Account of Student Participation', *Critical Studies in Higher Education*, vol. 52, no. 1, pp. 29-46.

Graduate Careers Australia. (2016), 'Postgraduate Destinations 2015'. Available from: http://www.graduatecareers.com.au/wp-content/uploads/2016/11/Postgraduate-Destinations-2015_FINAL.pdf [10 August 2018]

Hout, M 2012, 'Social and Economic Returns to College Education in the United States', *Annual Review of Sociology*, vol.38, pp. 379-400.

Koshy, P (2014), 'Student Equity Performance in Australian Higher Education: 2007 to 2012'. Available from: http://ncsehe.edu.au/wp-content/uploads/2014/02/Student-Equity-Performance-in-Australian-Higher-Education-2007-to-2012-FINAL_V2.pdf [10 August 2018].

Leigh, A 2008, 'Returns to Education in Australia', *Economic Papers*, vol. 27, no. 3, pp. 233-249.

Li, IW, and Carroll, DR 2017, 'Factors Influencing Dropout and Academic Performance: An Australian Higher Education Equity Perspective'. Available from: https://ncsehe.edu.au/wp-content/uploads/2017/03/03LiUWA_Formatted_FINAL.pdf [10 August 2018]

Li, IW, Harris, M and Sloane, PJ 2018, 'Vertical, Horizontal and Residual Skills Mismatch in the Australian Graduate Labour Market', *Economic Record*, vol. 94, no. 306, pp. 301-315.

Li, IW, Mahateau, S, Dockery, AM, and Junankar, PN 2017, 'Equity in Higher Education and Graduate Labour Market Outcomes in Australia', *Journal of Higher Education Policy and Management*, vol. 39, no. 6, pp. 625-641.

Li, IW and Miller, PW 2015, 'Overeducation and Earnings in the Australian Graduate Labour Market: An Application of the Vahey Model', *Education Economics*, vol. 23, no. 1, pp. 63-83.

Norton, A. 2012, Graduate Winners: Assessing the Public and Private Benefits of Higher Education. Available from: https://grattan.edu.au/wp-content/uploads/2014/04/162_graduate_winners_report.pdf [10 August 2018]

Norton, A and Cakitaki, B 2016, *Mapping Australian Higher Education 2016*. Available from: https://grattan.edu.au/report/mapping-australian-higher-education-2016/ [10 August 2018]

Organisation for Economic Co-operation and Development 2017, *Education at a Glance 2017: OECD Indicators.* Available from: https://doi.org/10.1787/eag-2017-en [10 August 2018]

Social Research Centre 2016, '2016 Graduate Outcomes Survey National Report'. Available from: https://www.qilt.edu.au/docs/default-source/gos-reports/2016/gos-national-report.pdf?sfvrsn=423de23c_12 [10 August 2018]

Tomlinson, M 2008, ''The Degree is not Enough'':Students' Perceptions of the Role of Higher Education Credentials for Employability', *British Journal of Sociology of Education*, vol. 29, no. 1, pp. 49-61.

Wakeling, P 2009, Social Class and Access to Postgraduate Education in the UK: A Sociological Analysis, PhD Thesis, University of Manchester, UK.

Wakeling, P and Kyriacou C. 2010, 'Widening Participation from Undergraduate to Postgraduate Research Degrees: A Research Synthesis. Available from: https://www2.le.ac.uk/departments/doctoralcollege/about/external/publications/widening-participation.pdf [10 August 2018]

Appendix

Appendix A: WAM subsample

Table A1: Universities in the WAM Subsample

Institution	Valid N
CQUniversity	577
Curtin University	1,594
Deakin University	1,860
Edith Cowan University	937
Flinders University	658
Griffith University	1,548
Queensland University of Technology	1,405
Southern Cross University	484
The University of Adelaide	1,162
The University of Melbourne	1,383
The University of Queensland	1,708
The University of Sydney	1,790
The University of Western Australia	1,100
University of Canberra	518
University of New South Wales	1,614
The University of Newcastle	1,404
University of South Australia	918
University of Tasmania	864
Western Sydney University	1,520
Total N	23,044

Appendix B: Missing data

Table B1: Missing Data on Explanatory and Outcome Variables

Variable	Missing (N)	Missing (%)
Missing data on explanatory variables		
ATSI	0	0.0
Low SES	3,000	6.0
Disability	0	0.0
Regional/ remote	2,965	5.9
NESB	0	0.0
Women in STEM	7	0.0
Gender	7	0.0
Age	0	0.0
Attendance type	5	0.0
Combined degree	0	0.0
Study area	0	0.0
University groups	0	0.0
Total missing characteristics	*3,023*	*6.0*
Overall employment	4,041	8.0
Further study	3,147	6.3
Total missing pathways	*6,895*	*13.7*
WAM (WAM subsample only)	525	1.8
Missing data on outcome variables		
Full-time employment	15,610	31.0
Importance of qualification	13,341	26.5
Derived hourly wage	19,354	38.4
Total observations		
Initial sample	50,383	
Analysis sample†	40,852	
WAM subsample (see Appendix A)	23,044	

† Excludes observations with missing data on one or more characteristics and/or pathways.

Appendix C: Study area definitions

Table C1: Study Area Abbreviations and Associated Definitions

Abbreviation	Definition
Ag and env	Agriculture and environmental studies
Arch and build	Architecture and built environment
Bus and mgt	Business and management
Communications	Communications
Comp and info	Computing and information systems
Creative arts	Creative arts
Dentistry	Dentistry
Engineering	Engineering
Health serv	Health services and support
Hum and soc sci	Humanities, culture and social sciences
Law and p'legal	Law and paralegal studies
Mgt and comm	Management and commerce
Medicine	Medicine
Nursing	Nursing
Pharmacy	Pharmacy
Psychology	Psychology
Rehabilitation	Rehabilitation
Sci and math	Science and mathematics
Social work	Social work
Teacher ed	Teacher education
Tour, hosp, etc.	Tourism, hospitality, personal services, sport and recreation
Vet science	Veterinary science

Appendix D: University group definitions

The majority of Australian universities have formed groups to promote their mutual objectives and build inter-university cooperation. As such, these groups represent universities with a similar style and focus.

- Group of Eight (Go8) universities are generally considered to be the most prestigious and research intensive in Australia, and tend to be among the most selective.
- The Australian Technology Network (ATN) consists of five universities, all former institutes of technology, with a heritage of working closely with industry.
- The Innovative Research Universities (IRU) group consists of seven institutions, all formed in the 1960s and 1970s as research intensive universities.
- The Regional Universities Network (RUN) comprises six institutions located outside of capital cities, most of which were granted university status in the 1990s.

In addition to these four groups, there are 13 institutions that do not belong to a university group ('Ungrouped'). The universities belonging to each group are listed in Table D1.

Table D1: University Groups and Member Institutions

Group	Institution
Group of Eight (Go8)	Monash University
	The Australian National University
	The University of Adelaide
	The University of Melbourne
	The University of Queensland
	The University of Sydney
	The University of Western Australia
	University of New South Wales
Australian Technology Network (ATN)	Curtin University of Technology
	Queensland University of Technology
	RMIT University
	University of South Australia
	University of Technology, Sydney
Innovative Research Universities (IRU)	Charles Darwin University
	Flinders University
	Griffith University
	James Cook University
	La Trobe University
	Murdoch University
	University of Newcastle
Regional Universities Network (RUN)	Central Queensland University
	Federation University Australia
	Southern Cross University
	University of New England
	University of Southern Queensland
	University of the Sunshine Coast

Ungrouped	Australian Catholic University
	Bond University
	Charles Sturt University
	Deakin University
	Edith Cowan University
	Macquarie University
	Swinburne University of Technology
	The University of Notre Dame Australia
	University of Canberra
	University of Tasmania
	University of Wollongong
	Victoria University
	Western Sydney University