ECONOMICS

THE INFLUENCES OF INSTITUTION ATTENDED AND FIELD OF STUDY ON GRADUATES' STARTING SALARIES

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DISCUSSION PAPER 08.04

February 2008

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Abstract

This paper examines the determinants of Australian university graduates' starting salaries, with an emphasis on the institution attended and field of study. It is shown that there is little difference between the starting salaries of students who attended Go8 universities and those who attended other universities. There are modest differences in starting salaries according to field of study. However, these differences are considerably less than those associated with the type of employment obtained. These results suggest it is what you do in the labour market, rather than where or what you have studied, that is the main determinant of labour market outcomes.

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I. INTRODUCTION

Universities in Australia have recently started to place greater emphasis on differentiating themselves on the basis of quality. A cursory examination of university websites certainly attests to this, with references to Go8 membership, various accreditations, status in Hobsons' *Good Universities Guide* (Hobsons, 2007), and placements in national and international rankings. The proposed Research Quality Framework is further, institutional, evidence of this. In the eyes of most, there are quality differences across universities. But what about the labour market? Does it respond to quality differences across universities?

It is also widely perceived that labour market rewards differ by field of study, and this is, in part, the basis for the differences in HECS bands. Chia and Miller (2008) reported that field of study was an important determinant of graduates' starting salaries, though that study was limited to graduates from a single university. Whether the Chia and Miller (2008) findings generalise to other universities is unknown at the present time.

This paper examines whether graduates of universities typically associated with higher quality have superior labour market outcomes. Or to pose the focus in another way, is there a university quality premium in the Australian labour market? The paper also examines whether the differences in starting salaries across fields of study reported by Chia and Miller (2008) carry across to the broader university sector. The investigation of the influences of the institution attended and field of study on graduates' starting salaries is conducted within the context of an analysis of the effects that a wide range of other variables have on graduates' salaries. Included are age, gender, enrolment type, and job characteristics.

The study is based on data from the 2003 Graduate Destination Survey of the graduates from all Australian universities of the same year. By covering all

universities it complements the study by Chia and Miller (2008), which was restricted to graduates from the University of Western Australia.

Section II provides a review of selected studies of the impacts that the institution attended and field of study have on earnings. Section III details the data procurement procedure, describes the data, and outlines the models employed in the analysis. Section IV presents the results of the regression analyses, and explores an alternative way to conduct further analysis of institutional quality effects on graduates' starting salaries. Section V highlights the key findings, and provides some discussion of directions for future research.

II. LITERATURE REVIEW

The impacts that field of study and the university attended have on earnings are assessed in this study using a standard earnings function that is augmented with various university characteristics. As there is a wealth of information on the usual regressors in such an approach (see, for example, Preston (1997) for discussion on influences such as gender and occupation), only the university attended and major field of study variables that are the feature of the current study are covered in detail.

(a) Institution attended

Attending a higher quality institution [1], where quality is associated with the intensiveness of investment (Wachtel 1976), is usually shown in overseas studies to lead to higher earnings (Smart 1988; James, Alsalam, Conaty and To 1989; Callaway, Fuller and Schoenberger 1996), though the size of the impact varies from "negligible to large" (Brewer, Eide and Ehrenberg 1999, p.106). Brewer *et al*. (1999), for example, report that there is a large premium associated with attending an elite private institution in the US, and a smaller premium to attending a middle-rated private institution, relative to a bottom-rated public institution. Brewer *et al.'s* (1999) evidence on returns to quality across public institutions was weak, a finding that may be particularly relevant to the analyses below of graduates from Australian universities, which are predominately public institutions. Some studies (see, for

[1] Quality, for the case of Australian universities, could be measured by the audited number of PhD completions, publications, research grant income, the number of academic staff per student, or the various rankings that are now available (Valadkhani and Worthington 2006).

example, Black and Smith 2006) have attempted to link the quality premium to particular institutional characteristics (*e.g.*, ability scores, faculty/student ratios, rejection rates), though as Brewer *et al*. (1999, p.106) note, "there is little evidence that particular college characteristics are systematically associated with differences in earnings, although the effect of any individual variable is shown to be small". Various reasons have been advanced for the quality earnings premium, including differences in peer effects, curricular design, quality of teachers and quality of instruction given, which all facilitate the accumulation of human capital at varying rates (Lindahl and Regnér 2005).

Several overseas studies have examined changes in the quality premium over time. Brewer *et al*. (1999) report that, in line with increases in the costs of education at the more prestigious private institutions, the quality earnings premium for more recent cohorts of graduates has exceeded that of earlier cohorts. There was also some evidence that this finding carries over to the more prestigious public institutions, though clear patterns over time among the middle- and lower-rated institutions could not be established. For hourly earnings, the institution quality premium was as high as 20 percent, although when the focus was on colleges other than the elite private ones, statistically significant differences of up to only 12 percent were reported.

There is limited Australian evidence on the university earnings premia, and no Australian evidence on changes in the institutional quality premia over time. Miller and Volker (1983) examined starting salary data for 1980 university graduates. They distinguished four groups of universities: (i) older state universities; (ii) other metropolitan universities; (iii) the Australian National University (ANU); and (iv) other universities. Compared to graduates from the older state universities, male graduates from the ANU were reported to have 9 percent higher earnings, and female graduates from other metropolitan universities a marginally significant 2 percent higher earnings.[2] All the other variables for the university attended were statistically insignificant. Miller and Volker (1983) argued that their results showed that

[2] The male ANU result was attributed to factors associated with employment in the Commonwealth Public Service that were not captured by the other employment variables in the earnings equation.

Australian students do not benefit financially from attending one university in preference to another.[3]

(b) Field of study

Three main reasons have been advanced in explanation of differences in earnings by field of study. First, some majors may be associated with particular high-paying jobs. Second, graduates with certain majors may have skills that are in short supply in the labour market, and therefore may enter jobs which have higher pay, while other graduates may have skills that are in surplus and therefore need to take whatever jobs are available to them. Third, employers may view certain majors as more difficult fields of study and assume that graduates with these skills are more capable and hardworking, and therefore deserve higher earnings.

Consistent with these explanations, numerous overseas studies have found substantial differences in earnings across major field of study (Rumberger 1984; James *et al*. 1989; Berger 1988; Rumberger and Thomas 1993; Grogger and Eide 1995). Hecker (1996), for example, found that in the US majors in physics, pharmacy, economics and engineering had the highest earnings. In contrast, theology, religion and philosophy majors had the lowest earnings.

Finnie and Frenette's (2003) study of Canadian college graduates also reported differences in earnings by the major field of study, with majors such as engineering, computer science and other health occupying the higher end of the scale, while agriculture and biological sciences, arts and humanities majors were found to have lower earnings. Salaries differed by up to 59 percentage points across fields of study, and while there was some variation in this range according to the graduate cohort studied (1982, 1986 or 1990), and time after graduation (two or five years), the range did not fall below 26 percent.

[3] The early Miller and Volker (1983) evidence on the marginal importance of the university wage premia is consistent with the evidence on wage differentials across types of high schools in Australia. Vella (1999) reports that attending a Catholic school in Australia has, at best, a modest direct effect on the hourly rate of pay. The analysis by Marks and Fleming (1998) showed that attendance at a Catholic or Independent school rather than at a Government school does not have a direct effect on earnings in Australia. Similarly, Chia and Miller's (2008) analysis of the starting salaries of university graduates shows that the wage effects associated with type of high school attended are small, and not strong statistically.

Turning to the Australian evidence, Miller and Volker (1983) found that field of study was a significant determinant of graduates' starting salaries in Australia. The highest earnings were for graduates with medical training, followed by engineering. The lowest earnings were among those who studied architecture, science or in the humanities. Earnings differed by 30 percent across subject areas for males, and by 49 percent across subject areas for females.

The range of starting salaries across majors was even greater in the Chia and Miller (2008) study of graduates from the University of Western Australia, being over 100 percent. However, if dentistry is excluded, the range is 35 percent. Other than for dentistry, health science, computer science and music were high-earning fields of study, while architecture, psychology and science provided the least in terms of starting salaries.

Thus, the Australian evidence is broadly consistent with the overseas literature. Differences across institutions in graduates' starting salaries were modest in 1980, though differences by field of study were important then, and appear from analysis of data from the University of Western Australia to have retained their importance. The analyses below seek to establish if the increased emphasis on university quality has been matched by changes in the labour market rewards to attending particular institutions, and also if the salary differentials by field of study in the Chia and Miller (2008) study apply to the broader graduate population.

III. DATA AND MODEL DESCRIPTION

The data for this study are from the 2003 Graduate Destination Survey (GDS). The GDS has been conducted annually since 1974 by Graduate Careers Australia (GCA, 2007). Its target population is university graduates who had completed requirements for higher education qualifications in the previous calendar year, including graduates residing overseas and international students. A Code of Practice, set by the Graduate Careers Council of Australia (GCCA), governs the use and public disclosure of data

from the GDS.[4] One restriction on the use of GDS data is that it cannot be utilised to knowingly undermine the reputation and standing of institutions. Therefore, individual institutions will not be named in this study.

The survey format, code of practice, and standard recommended methodology for the GDS are provided by GCA, but each university is responsible for conducting the survey for its graduates. Typically each graduate receives a copy of the GDS together with the Course Experience Questionnaire or Postgraduate Research Experience Questionnaire in April or October. Reminders are sent to non-respondents, though this is at the discretion of the Survey Manager within each institution (Guthrie 2003).

The 2003 GDS comprises 107,436 observations. This gives a response rate of 62.7 percent (Gradstats 2003). While this is below the 70 percent target response rate set by the GCCA, it is well above the 50 percent benchmark argued to be required for reliable analysis.[5] The reliability of the GDS has been assessed by Guthrie and Johnson (1997). They concluded (chapter 5) that the data are likely to be "reasonable indicators of the full-time labour market position of the population of graduates from that relevant cohort".

The survey variables can be broadly categorised into three areas of investigation: course; employment; and further study. Other background characteristics of the graduates, such as age and gender, are also obtained. More details on the data sample are provided in Section IV.

The analyses presented below are restricted to graduates with either a bachelor pass or honours degree, who were earning a salary through either full-time or part-time employment in Australia. Graduates with missing information in their surveys regarding salary, mode of attendance at university, age, disability status, double-degree, occupation, sector of employment, industry of employment, length of employment contract, hours of work, mode of study, language background, residency

[4] See Australian Vice-Chancellors' Committee and the Graduate Careers Council of Australia (AVCC-GCCA) (2001).

[5] See AVCC-GCCA (2001).

status, gender, or self-employment status were excluded from the study. Following these exclusions, a 'purged' sample of 30,529 graduates remained.

The dependent variable in this study is the starting salary. Focusing attention on the starting salaries of graduates is advantageous for a number of reasons (Miller and Volker 1983).[6] First, salaries of new entrants are less dispersed around the mean than those of older workers and are therefore more meaningful indicators of returns to specialised training. Second, discounting back of future cash flows in cost-benefit analysis implies that starting salaries are of a substantial weighting, and are therefore important in estimating the expected return to education. Third, assuming that age-earning profiles are relatively stable over time, starting salaries give a good indication of lifetime opportunities.

Variation in these starting salaries are explained using a reasonably standard earnings equation. There are, however, three comments that need to be advanced in relation to the specification adopted. These concern: (i) the way in which the information on age (or experience) is modelled; (ii) the inclusion of information on institution attended; and (iii) the inclusion of information on field of study.

The information on graduates' age is entered into the estimating equation in Gompertz form. This functional form is often used for the study of labour market entrants (see Borland and Suen 1994; Le, Miller, Heath and Martin 2005), on the grounds that it provides a better fit to the data, and avoids the unrealistic declines in predicted earnings among quite young age groups associated with the more conventional quadratic age specification. The particular specification adopted in this study is *gage* = $\exp^{-0.1\times Age}$, where *Age* is the graduate's age and exp refers to the exponential function.

In terms of the institutional data, only broad indicators of the institution attended are used in the main set of analyses.[7] This is in compliance with the Code of Practice

[6] Studies such as Brewer *et al*. (1999) and Finnie and Frenette (2003) examine salaries at a given point in time, after several years of work experience.

[7] An alternative approach that uses more detail on the institution attended is explored in Section V.

mentioned above. The institutions are categorised into three groups: (i) the Group of Eight (Go8) universities; (ii) Australian Technology Network Universities; and (iii) all other universities which do not belong to either the Go8 or the Australian Technology Network.[8]

The Go8 universities are considered the most prestigious and research-intensive universities in Australia. For example, the study by Valadkhani and Worthington (2006) found that the Go8 universities came out consistently on top in areas such as the audited number of PhD completions, number of publications, research grant income and academic staff per student, all of which are indicators of institutional quality. As such, if institutional quality has a positive effect on labour market outcomes, these universities should be associated with relatively high graduate starting salaries.

The Australian Technology Network was established in the 1990s, and comprises five universities. While these universities (see footnote 8) are relatively new compared to universities in the Go8, they enjoy a strong presence in the community and strategic partnerships with businesses and industry.

Finally, while the models estimated contain several variables summarising the graduates' enrolment details, the analyses below will mainly highlight the variables for major field of study. Eleven separate fields of study are distinguished in the analysis.

Estimation of the impacts of the type of university attended and field of study on starting salaries is done using four models. The first two models contain only variables for, respectively, university attended and field of study. The third model includes both these sets of variables and a range of personal characteristics and other enrolment variables. Employment characteristics are included in the final model.

[8] The Go8 universities are: University of Queensland, University of New South Wales, University of Sydney, ANU, University of Melbourne, Monash University, University of Adelaide and University of Western Australia. The Australian Technology Network Universities are: Curtin University of Technology, University of South Australia, RMIT University, University of Technology Sydney, and Queensland University of Technology.

Models 1 and 2 thus describe the variation in mean starting salaries by institution attended and field of study, respectively. They can be written as:

$$ln\,hrsal_i = \beta_0 + \beta_1 go8_i + \beta_2 tech_i + \varepsilon_i \quad (1)$$

$$ln\,hrsal_i = \beta_0 + \beta_3 sci_i + \beta_4 it_i + \beta_5 eng_i + \beta_6 archi_i + \beta_7 agri_i + \beta_8 med_i + \beta_9 pubh_i + \beta_{10} edu_i + \beta_{11} socc_i + \beta_{12} creat_i + \varepsilon_i \quad (2)$$

where $ln\ hrsal_i$ refers to the hourly salary of graduate i expressed in logarithmic form, *go8* refers to institutions in the Go8, *tech* refers to institutions in the Australian Technological Network, and ε is an error term. Universities other than Go8 or Australian Technological Network members form the benchmark group. The major fields of study are provided in Table 1. The reference group is management and commerce.

The third model combines the variables in models (1) and (2) and augments the specification with information on the personal and enrolment characteristics of the graduate. These include gender (*female*), age (*gage*), disability status (*diab*), whether the graduate came from a non-English-speaking background (*nesb*), engagement in further studies (*fstudy*), mode of attendance (*part*), mode of study (*ext*), whether the graduate held a double degree (*doub*), and the level of qualifications (*hons*). This extended model can be written as:

$$ln\ hrsal_i = \beta_0 + \beta_1 go8_i + \beta_2 tech_i + \beta_3 sci_i + \beta_4 it_i + \beta_5 eng_i + \beta_6 archi_i + \beta_7 agri_i + \beta_8 med_i + \beta_9 pubh_i + \beta_{10} edu_i + \beta_{11} socc_i + \beta_{12} creat_i + \beta_{13} female_i + \beta_{14} gage_i + \beta_{15} diab_i + \beta_{16} nesb_i + \beta_{17} fstudy_i + \beta_{18} part_i + \beta_{19} ext_i + \beta_{20} doub_i + \beta_{21} hons_i + \varepsilon_i \quad (3)$$

Differences in the estimated effects from model (3) and the difference in mean earnings revealed using models (1) and (2) can be attributed to differences in the student mix across institutions.

The final model adds in information on the work undertaken. The variables are for self-employment (*selfemp*), sector of employment (*empgovt*), employment type

(*shother*), and industry of employment (*agriforest*, *mining*, …, *otherservs*) and occupation (managers,…advanced clerical).[9] This extended model can be written as:

$$\begin{aligned} ln\ hrsal_i = {} & \beta_0 + \beta_1 go8_i + \beta_2 tech_i + \beta_3 sci_i + \beta_4 it_i + \beta_5 eng_i + \beta_6 archi_i + \beta_7 agri_i + \\ & \beta_8 med_i + \beta_9 pubh_i + \beta_{10} edu_i + \beta_{11} socc_i + \beta_{12} creat_i + \beta_{13} female_i + \beta_{14} gage_i + \\ & \beta_{15} diab_i + \beta_{16} nesb_i + \beta_{17} fstudy_i + \beta_{18} part_i + \beta_{19} ext_i + \beta_{20} doub_i + \beta_{21} hons_i \\ & + \beta_{22} doub_i + \beta_{23} hons_i + \beta_{24} selfemp_i + \beta_{25} empgovt_i + \beta_{26} shother_i + \\ & f(22\ industry\ variables_i) + g(11\ occupation\ variables_i) + \varepsilon_i \end{aligned} \tag{4}$$

Model (4) permits assessment of whether it is what you do in the labour market (as captured by the various employment type variables) rather than your university background (as captured by institution attended and field of study) that is the main determinant of starting salaries.[10]

A description of the main variables used in the analysis, along with mnemonics, is presented in Table 1. This table also contain the means and standard deviations of the variables. Details on other variables are presented in Appendix A.

The dependent variable used in the analysis is the natural logarithm of hourly earnings. The mean logarithmic hourly earnings is 2.884 ($17.89). From Table 1, 28.7 percent of graduates come from the Group of Eight Universities, 9 percent from the Australian Technology Network universities, and 62.3 percent from the other universities. The most popular broad field of study is management and commerce, with over one-fifth of graduates being in this group.

[9] See Appendix A for the list of industry and occupation variables.

[10] Note that unlike Chia and Miller (2008), this study cannot condition on academic performance at university. This "within institution" effect should not impact the across-institution comparisons. To the extent that prior academic achievements matter, their omission here should accentuate any institution effects, and this makes the findings reported below even more compelling.

Table 1: Description and Summary Statistics of the Dependent and University Type Explanatory Variables

Variable	Description	Mean	Std Dev
Salary			
ln hrsal	Continuous variable for hourly earnings, expressed in logarithmic form.	2.884	0.40
University Groups			
go8	Dummy variable for institutions in the Group of Eight Universities, which are given in Appendix A.	0.287	0.45
tech	Dummy variable for institutions in the Australian Technology Network Universities, which are given in Appendix A.	0.090	0.29
oth	Omitted category: Institutions not in the Group of Eight or the Technology Network.	0.623	0.49
Broad field of study Dummy variables for study in (mnemonics and means in parentheses): Science (*sci*, 0.078); Information technology (*it*, 0.054); Engineering (*eng*, 0.059); Architecture (*archi*, 0.019); Agricultural (*agri*, 0.024); Medicine (*med*, 0.111); Public health (*pubh*, 0.059); Education (*edu*, 0.107); Society, cultural, food, hospitality or personal services (*socc*, 0.212); Creative arts (*creat*, 0.062). Omitted category: Management and commerce (*mgtcm*, 0.215)			

The distribution of graduates across the personal and employment characteristics listed in Appendix A is as expected, with the exception of gender. There is a disproportionate number of female graduates (64 percent) in the sample, and this is inconsistent with other data, which put the proportion of female university students at 54.4 percent in 2002 (Pitman *et al.* 2003). The over-representation of females in the data set appears to be attributable to females being more likely than males to fill out the GDS (see Guthrie and Johnson 1997).

IV. STATISTICAL ANALYSES

(a) Aggregate-level Results

Selected results from the estimation of the four models described above are set out in Table 2. The discussion of these results will focus on the comparison of graduate earnings between Go8 universities, Australian Technology Network (Technology) universities, and universities not belonging to either group mentioned above (others),

and on the results for field of study. Comment on key findings in relation to the employment type variables is provided later in this sub-section.

Table 2: Estimates of Determinants of Australian Graduates' Starting Salaries

Variable	model (1)	model (2)	model (3)	model (4)
Constant	2.892	2.886	3.060	2.961
	(1006.13)	(637.18)	(316.31)	(243.81)
Institution Attended (Other Universities)				
*go*8	-0.032	(a)	0.015	0.006
	(6.22)		(2.91)	(1.16)
tech	0.006	(a)	0.033	0.016
	(0.68)		(3.98)	(1.95)
Major Field of Study (Management and Commerce)				
Science	(a)	-0.072	-0.063	-0.065
		(7.01)	(6.30)	(5.92)
Inform. Technology	(a)	0.030	0.027	-0.015
		(2.71)	(2.46)	(1.34)
Engineering	(a)	0.082	0.062	-0.021
		(9.26)	(7.02)	(1.57)
Architecture	(a)	-0.073	-0.082	-0.062
		(4.29)	(5.04)	(2.94)
Agriculture	(a)	-0.129	-0.134	-0.100
		(7.72)	(8.25)	(5.81)
Medicine	(a)	-0.004	-0.004	-0.095
		(0.58)	(0.61)	(5.99)
Public Health	(a)	0.042	0.064	0.007
		(4.34)	(6.79)	(0.53)
Education	(a)	0.086	0.078	-0.004
		(10.52)	(9.59)	(0.26)
Society etc.	(a)	-0.012	-0.043	-0.035
		(1.68)	(6.39)	(4.68)
Creative Arts	(a)	-0.116	-0.087	-0.055
		(9.47)	(7.33)	(4.57)
Personal and Other Enrolment Characteristics				
Female	(a)	(a)	-0.030	-0.026
			(6.12)	(5.48)
Age (*gage*)	(a)	(a)	-2.210	-1.678
			(29.32)	(22.49)
Disablility	(a)	(a)	-0.022	-0.019
			(1.40)	(1.29)
Non-English Speaking *(nesb*)	(a)	(a)	-0.006	-0.003
			(0.99)	(0.51)
Further Study	(a)	(a)	-0.000	0.031
			(0.03)	(5.06)
Part-time Study	(a)	(a)	0.082	0.068
			(12.96)	(11.12)
External Student	(a)	(a)	0.065	0.042
			(8.54)	(5.71)
Double Degree	(a)	(a)	0.029	0.008
			(4.61)	(1.22)
Honours Degree	(a)	(a)	0.074	0.052
			(8.91)	(6.42)
Industry, Occupation, Other Employment Characteristics	Not Inc.	Not Inc.	Not Inc.	Inc.
Adjusted R^2	0.0013	0.0194	0.0976	0.1621
F- statistic	21.47	60.51	158.25	102.80
Sample size	30,529	30,529	30,529	30,529

Notes: Absolute value of heteroscedasticity-consistent 't' statistics in parentheses; (a) = variable not entered.

The adjusted R^2 for the basic model of equation (1) is 0.0013, showing that these broad indicators of the university attended account for only 0.13 of one percent of the variation in graduates' starting salaries around their mean value. This indicates that the broad category of institution attended is a very small part of the reason for why some graduates earn more than others, and that within-institution variation in starting salaries across graduates is of far greater importance than across-institution variation in starting salaries. The coefficient for Go8 graduates (*go8*) reveals a highly significant 3.2 percent earnings disadvantage, compared to graduates from other universities. The variable for graduates from the Technology universities (*tech*) is not statistically significant in this basic model. Thus, this examination of differences in mean earnings across groups of institutions suggests that the institution attended does not matter a great deal, and in any case, the pattern of differences is perverse.

Model (2) includes information on the major field of study. The estimated coefficients range from around -0.12 (agriculture, creative arts) to 0.08 (engineering) and 0.09 (education). Despite this 20 percentage point range in estimated impacts, the variables for major field of study account for only 1.9 percent of the variation in starting salaries. As with the preliminary analysis of the role of institution attended, the course studied does not account for much of the variation in graduates' salaries in the immediate post-graduation period.

Model (3) combines the information on institution attended and major field of study with variables for students' personal and other enrolment characteristics. The adjusted R^2 for this model is 0.0976. The additional variables are associated with the expected signs, with female graduates earning less than their male counterparts, earnings increasing with age (or experience)[11], and honours students, double degree students as well as those who were enrolled as part-time or external students earning more than other graduates. The favourable earnings effects associated with part-time and external student status are presumably reflecting the effects of labour market experience obtained concurrently with university study.

[11] Given the use of the Gompertz functional form, the partial effect of age (or experience) on log earnings is given by $-0.1\times\widehat{\beta}\exp(-0.1\times Age)$, where $\widehat{\beta}$ is the estimated coefficient from Table 2.

The female wage disadvantage recorded in these data for recent graduates is only 3 percent. This is far less than the wage gaps of around 15 percent reported in research into the gender wage differential for the general population (Borland 1999). A plausible reason for this difference is that the gender wage gap increases the longer an individual stays in the labour market, possibly reflecting the cumulative/feedback effects of some initial disadvantage, or shortcomings of the usual measures of potential rather than actual experience used in part studies (Mincer and Polachek 1978).

An honours degree is associated with a highly significant earnings premium of 7.4 percent compared to graduates with bachelor degrees. The honours premia reported by Miller and Volker (1983) were lower than this, being only 2.6 percent for males and a marginally significant 1.9 percent for females.

The coefficient for double degree holders indicates a 2.9 percent earnings premium over non-double degree holders. Given that double degree holders are trained and educated in two disciplines, an earnings premium is to be expected since these double degree holders should be more productive and knowledgeable. However, the modest size of the earnings premium reported here does not seem sufficient to justify the additional amount of time and money, as well as opportunity costs, that procuring a double degree is expected to entail. Given the growth in double degree enrolments in recent years, the apparent small return is an issue that requires further research. This is particularly the case given the finding in the extended model of equation (4), where the double degree variable is statistically insignificant.

Model (4) includes the wide range of employment variables. The addition of these variables raised the adjusted R^2 to 0.1621. This value is low for an earnings equation that includes a reasonably extensive list of variables (see Preston (1997) for comparison). However, it needs to be remembered that this sample of recent university graduates is more homogeneous with respect to educational attainment and labour market experience than, say, the samples of the general population in the comparison studies in Preston (1997). Accordingly, the considerable incremental explanatory power of the educational attainment and labour market experience

variables in studies of all workers will be missing in the current analysis that is restricted to university graduates' starting salaries.

All sets of variables other than for institution attended are statistically significant in this extended model. The results of F-tests of the incremental explanatory power of various sets of variables are presented in Table 3. The institutional attended is only a marginally significant contributor (at the 10 percent level of significance) to the explanatory power of the model.

Table 3: Summary of F-tests of Incremental Explanatory Power of Sets of Variables in Model 3 of Table 2

Variables representing	Number of Variables	F-statistic	Significance Level
Institution attended	2	2.26	0.104
Major field of study	10	15.85	0.000
Personal and other enrolment characteristics	9	166.93	0.000
Employment	37	64.42	0.000
Industry	23	21.16	0.000
Occupation	11	64.97	0.000
Other employment	3	89.17	0.000

The coefficients for institution, *go8* and *tech*, were positive in this extended model, but only that for *tech* was statistically significant (at the 6 percent level). However, even for graduates from the Technology universities, the estimated impact on starting salaries is very small, at 1.6 percent. As with the earlier Miller and Volker (1983) study, these analyses show that there is not a great deal of benefit for Australian students from attending one university in preference to another.

There is reduced variation in starting salaries across disciplines once employment characteristics are held constant. Graduates who had studied in the broad discipline of agriculture have the lowest *ceteris paribus* earnings, 10 percent below the benchmark group of graduates who studied in the broad field of management and commerce. Conversely, the best performers in terms of starting salaries were graduates in the fields of information technology, engineering, public health, education and management and commerce: the starting salaries do not differ significantly across

these groups. In terms of point estimates, there is a 12 percentage point earnings differential across disciplines (compared to the 20 percentage point range in the differences in the unconditional means). It is also noted that graduates from science streams were at a 7 percent wage disadvantage from the benchmark group of management and commerce graduates. This is consistent with Chia and Miller's (2008) analysis, which reported that UWA science graduates had starting salaries about 10 percent lower than those who hold economics degrees. According to Chia and Miller (2008), this is likely to be a reflection of poor market prospects, and attempts to increase the supply of science graduates through lower tuition fees is likely to be counterproductive in the long run.

Table 4 lists the coefficients for the industry and occupation variables from model (4). The coefficients on the various industries of employment are vastly different, indicating that the industry of employment plays a significant role in the determination of graduates' starting salaries. For example, graduates employed in the mining industry (*mining*) had a 16.2 percent earnings premium over the benchmark group of graduates employed in the finance, insurance, personal or business services. In contrast, graduates employed in the accommodation and architectural services industries had an earnings disadvantage of 14 percent, compared to the same benchmark group of graduates. This indicates a substantial earnings differential across industries of 30 percentage points. Industry of employment thus dominates the university attended as a determinant of graduates' starting salaries.

Table 4: Estimated Coefficients of Industry and Occupation Variables in Starting Salary Model

Industry (Finance, Insurance, Business Services)		Industry (cont)	
Agric & Forestry	-0.105	Dental/Medical	0.150
	(3.76)		(5.96)
Mining	0.162	Vet. Services	-0.098
	(9.18)		(4.42)
Manufacturing	0.011	Cultural	-0.103
	(1.03)	Services	(6.82)
Electricity, Gas	0.081	Personal	-0.106
& Water	(4.31)	Services	(2.73)
Construction	-0.038	Other Services	-0.059
	(2.48)		(3.51)
		Occupation (intermediate/elementary	
Wholesale &	-0.049	clerical, sales and service workers)	
Retail Trade	(5.06)	Managers	0.242
Accommodation	-0.140		(18.58)
	(9.83)	Natural & Physical	0.120
Transport	0.047	Sciences Profs.	(7.56)
	(2.05)	Building &	0.145
Communication	0.060	Engineering Profs.	(10.02)
Services	(3.28)	Accounting Profs.	0.097
Architectural	-0.138		(8.65)
Services	(4.85)	Business Profs.	0.144
Engineering	0.003		(16.41)
	(0.18)	Health Profs.	0.144
Legal	0.033		(9.11)
	(2.51)	Education Profs.	0.181
Accountancy	-0.079		(10.27)
	(6.80)	Social, Arts Profs.	0.094
Defence	0.028		(8.69)
	(1.66)	Associate Profs.	0.105
Government	0.025		(12.65)
	(2.52)	Advanced Clerical	0.060
Education	-0.046		(4.85)
	(3.45)	Other Occupations	-0.094
Health Services	-0.010		(4.26)
	(0.93)		
Medical Care	-0.029		
	(2.33)		

Note: Absolute value of heteroscedasticity-consistent 't' statistics in parentheses.

Similarly, there are major differences in graduates' starting salaries according to occupation. The highest earnings are among managers, being fully 24 percent higher than the benchmark group of intermediate/elementary clerical, sales and service workers. The lowest earnings are among the residual group of "other" occupations—these are the less-skilled occupations—where earnings are 9 percent below the earnings of the benchmark group. Hence, the range of earnings across occupations is around 33 percentage points. In the Chia and Miller (2008) study of graduates from

UWA, a higher range of earnings across occupations (of about 54 percentage points) was reported. Thus, according to the Chia and Miller (2008) study, natural and physical science professionals had earnings 39 percent higher than the benchmark group of intermediate clerical, sales and service workers, while individuals in "other occupations" earned about 15 percent less than the benchmark group. In part this may be due to the different specifications of the earnings equations: Chia and Miller (2008) did not control for industry of employment. However, replication of model (4) omitting the industry variables resulted in only a modest widening of the range of the salary differentials across occupations (to 35 percentage points).

In summary, while enrolling in a different university can give graduates a small increase (of less than 2 percent) on their starting salaries, a wise choice of the discipline in which to enrol can be far more financially rewarding, as earnings differ across disciplines by up to 12 percent. Alternatively, doing well in studies and enrolling in an honours program offers an earnings premium of more than three times the earnings premium offered by enrolling in a "good" institution. At the same time, it is apparent that the type of work undertaken (whether according to industry or occupation) is of far greater importance than these degree details. Clearly, it is what you do upon graduation, rather than where or in what you get your degree, that is the main determinant of immediate graduate labour market outcomes.

(b) Analyses by Gender

While the coefficient on the gender variable is modest in size in the pooled model (−0.026 in the most comprehensive model), this may be more of a reflection of the inappropriateness of the reliance on the intercept shift to capture gender differences than a true reflection of limited differences in the determinants of graduate starting salaries on the basis of gender. Separate models were therefore estimated for males and females, and statistical tests of the appropriateness of pooling undertaken. This approach seems particularly important in the current study, as there are no obvious reasons why the university earnings premium reported in the pooled model should vary by gender.[12] A similar prior is held with respect to earnings differentials across

[12] Given occupational segregation in the Australian labour market, and the wage differences associated with this (see, for example, Miller (1994)), there could be differences in starting salaries on the basis of work type variables.

the major fields of study. Hence, the study of the separate samples of male and female graduates offers a useful test of the robustness of the findings reported above.

Selected results from the analyses conducted separately for males and females are presented in Table 5. Only the results from analysis of differences in the unconditional means across institutions (model 1) and field of study (model 2) as well as the most encompassing model of equation (4) are presented.

The F-tests undertaken on the similarity of the coefficients for males and females showed that the estimated coefficients in each model differed significantly between males and females. However, for models (1) and (2), only an intercept shift for gender is required to adequately characterise the data: the slope coefficients in the model do not differ between males and females. In the more extensive specifications of model (3) and model (4), however, both an intercept shift and slope coefficient differences between males and females must be accommodated. The absence of gender differences across institutions and fields of study is reassuring from the perspective of being consistent with the priors expressed above.

According to the simple model of equation (1), male Go8 graduates have mean earnings 4 percent lower than the benchmark group of graduates of other universities. The mean earnings of female Go8 graduates are 3.2 percent lower than the mean earnings of female graduates of other universities. These differences in mean earnings are therefore approximately the same as was reported for the pooled sample.

The coefficient for Technology university graduates is insignificant, for both male and female graduates, implying that mean starting salaries of these graduates do not differ significantly from the mean starting salaries of graduates of the same gender in the benchmark group of other universities. These results are similar to those reported for the full sample, again implying that, at this simple level, the findings are robust to the choice of sample.

Table 5: Estimates of Determinants of Graduates' Starting Salaries From Models Estimated Separately for Males and Females

	Model (1)		Model 2		Model (4)	
Variable	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**
Constant	2.926	2.875	2.916	2.864	2.996	2.915
	(574.64)	(829.52)	(402.62)	(496.71)	(146.09)	(200.15)
Institution Attended (Other Universities)						
*go*8	-0.040	-0.032	(a)	(a)	0.012	0.003
	(4.68)	(4.93)			(1.34)	(0.53)
tech	0.006	0.001	(a)	(a)	0.020	0.015
	(0.44)	(0.14)			(1.55)	(1.44)
Major Field of Study (Management and Commerce)						
Science	(a)	(a)	-0.090	-0.057	-0.063	-0.064
			(5.08)	(4.59)	(3.53)	(4.64)
Inform. Technology	(a)	(a)	0.006	0.037	-0.022	0.006
			(0.40)	(1.85)	(1.55)	(0.32)
Engineering	(a)	(a)	0.058	0.077	-0.018	-0.014
			(5.13)	(4.55)	(1.17)	(0.55)
Architecture	(a)	(a)	-0.091	-0.069	-0.071	-0.042
			(4.09)	(2.59)	(2.69)	(1.22)
Agriculture	(a)	(a)	-0.134	-0.136	-0.083	-0.112
			(5.81)	(5.78)	(3.46)	(4.58)
Medicine	(a)	(a)	0.007	0.008	-0.085	-0.095
			(0.45)	(0.89)	(2.52)	(5.24)
Public Health	(a)	(a)	0.035	0.054	0.009	0.006
			(1.71)	(4.99)	(0.35)	(0.34)
Education	(a)	(a)	0.120	0.092	0.016	-0.016
			(8.31)	(9.50)	(0.61)	(0.83)
Society etc.	(a)	(a)	-0.004	-0.005	-0.027	-0.039
			(0.35)	(0.63)	(2.15)	(4.18)
Creative Arts	(a)	(a)	-0.100	-0.112	-0.028	-0.067*
			(4.09)	(7.98)	(1.15)	(4.72)
Personal and Other Enrolment Characteristics						
Age (*gage*)	(a)	(a)	(a)	(a)	-2.181	-1.414*
					(17.24)	(15.29)
Disablility	(a)	(a)	(a)	(a)	-0.057	0.007*
					(2.62)	(0.35)
Non-English Speaking	(a)	(a)	(a)	(a)	-0.003	-0.004
					(0.28)	(0.51)
Further Study	(a)	(a)	(a)	(a)	0.031	0.033
					(3.10)	(4.22)
Part-time Study	(a)	(a)	(a)	(a)	0.084	0.060*
					(8.91)	(7.50)
External Student	(a)	(a)	(a)	(a)	0.074	0.026*
					(6.42)	(2.72)
Double Degree	(a)	(a)	(a)	(a)	0.010	0.007
					(1.00)	(0.87)
Honours Degree	(a)	(a)	(a)	(a)	0.053	0.054
					(4.05)	(5.24)
Industry, Occupation, Other Employment Characteristics	Not Inc.	Not Inc.	Not Inc.	Not Inc.	Inc.	Inc.
Adjusted R^2	0.002	0.001	0.019	0.019	0.196	0.142

F- statistic	12.12	12.92	22.20	38.90	48.71	57.18
Sample size	11,121	19,408	11,121	19,408	11,121	19,408

Note: Absolute value of heteroscedasticity-consistent 't' statistics in parentheses; a * against a coefficients for females indicates that there is a statistically significant difference at the 10 percent level or higher in the effects of the particular variable for males and females.

The pattern of effects of major field of study on starting salaries in model (2) is similar for males and females. While the partial effects differ by up to 3.3 percentage points between males and females, none of the estimated coefficients for males differed significantly from the respective coefficient for females. As there is no obvious reason to expect there to be gender differences in starting salaries across major fields of study on the basis of gender, this finding is reassuring.

In the extended model of equation (4), there are statistically significant gender differences. In total, 16 of the 58 coefficients in the model for females are significantly different from those in the model for males at the 10 percent or higher level of significance. The coefficients that differed significantly are gender (females have eight percent lower starting salaries, *ceteris paribus*), for enrolment in creative arts (females fare worse), age (a flatter earnings-age profile for females), disability (no adverse effect for females), part-time and external student status (positive earnings effect is smaller for females), seven industry variables, two occupation variables as well as one other employment variable (for short-term position).

According to the extended model of equation (4), the institution attended is an insignificant determinant of starting salaries for both males and females. While graduates of the Technology universities were associated with a small, marginally significant earnings premium in the analyses of the pooled sample of males and females, a reasonable conclusion from these analyses is that the findings for institution attended are robust to the choice of sample. Compared with personal characteristics, employment characteristics, and enrolment characteristics, institution effects have only minimal impacts on graduates' starting salaries.

V. EXTENSIONS

There are various ways the analyses reported above could be extended. One way might be to use the employment probability for the respective groups of institutions to

form an expected earnings concept (of earnings × employment probability), along the lines of Miller and Volker (1983). Table 6 shows the respective employment ratio of graduates in the three groups of universities used in the analysis.

Table 6: Employment Probabilities across Institutes

	Go8	**Technology**	**Other**
Unemployed/not in labour force	0.058	0.049	0.062
Employed full-time or part-time	0.942	0.952	0.939
Total	1.000	1.000	1.000

The employment probabilites for Go8 universities, Technology universities, and all other universities are 0.942, 0.952 and 0.939, respectively. As the difference between the highest and lowest probability is only approximately 1 percentage point, this indicates that employment probability does not differ much by the institution attended, and hence application of the Miller and Volker (1983) approach is unlikely to make much of a difference to the findings reported above. This is confirmed in analyses that are not reported here.

A second possible refinement addresses the concern that the modest effects reported in the above analyses may be linked to the broad nature of the three groups of institutions (Go8, Technology and other). These three broad groups were used to allow informed discussion of the institutional effects while complying with the GCA's Code of Practice. By identifying and analysing individual universities, however, institution effects which might be obscured at the aggregate level could possibly be unveiled.

As an illustration of the type of analysis that might be done at the disaggregated level, estimations of models (1) and (2) were undertaken where the variables for the broad groupings of universities (*go8* and *tech*) are replaced with variables for individual institutions. As individual institutions are not allowed to be named in the analysis in compliance with the Code of Practice, the institutions are named *uni1*, *uni2*, *uni3 etc*. in the analysis. There are 41 institutions in the data set. The results of the estimation of the two models are presented in Table 7. Only the estimated coefficients for the institution variables are included in this table.

Table 7: Selected Coefficients from Estimates of Models of Starting Salaries for University Graduates with Detailed Institution Information[(a)]

Variable	Model (1)	Model (4)	Variable	Model (1)	Model (4)
Constant	2.851	2.948	uni8	0.036	-0.010
	(323.79)	(191.91)		(2.12)	(0.64)
Go8 (omitted category is a Go8 university)			uni9	0.167	0.099
uni1	-0.009	0.001		(1.43)	(1.26)
	(0.52)	(0.07)	uni10	0.044	0.025
uni2	-0.024	-0.020		(2.32)	(1.41)
	(1.02)	(0.86)	uni11	-0.013	-0.005
uni3	0.059	0.069		(0.43)	(0.18)
	(3.68)	(4.40)	uni12	0.069	-0.053
uni4	-0.037	-0.015		(2.35)	(1.94)
	(2.61)	(1.10)	uni13	0.067	0.055
uni5	0.100	0.091		(5.02)	(4.00)
	(4.25)	(4.04)	uni14	0.151	0.000
uni6	0.014	0.002		(10.37)	(0.01)
	(1.18)	(0.17)	uni15	0.005	0.008
uni7	0.029	0.048		(0.31)	(0.55)
	(1.99)	(3.29)	uni16	0.014	0.002
Tech				(0.95)	(0.15)
uni1	0.010	-0.017	uni17	-0.010	-0.019
	(0.49)	(0.93)		(0.56)	(1.07)
uni2	0.013	-0.003	uni18	0.098	0.046
	(0.97)	(0.23)		(6.52)	(3.17)
uni3	0.030	0.023	uni19	-0.010	0.013
	(1.93)	(1.52)		(0.77)	(1.03)
uni4	0.082	0.064	uni20	0.079	0.050
	(5.24)	(4.14)		(4.95)	(3.26)
uni5	0.014	-0.060	uni21	-0.039	-0.044
	(0.55)	(2.62)		(2.36)	(2.75)
Other			uni22	0.031	0.022
uni1	-0.004	-0.035		(2.01)	(1.55)
	(0.23)	(2.14)	uni23	0.003	0.005
uni2	-0.055	-0.065		(0.22)	(0.39)
	(2.46)	(3.06)	uni24	0.063	0.004
uni3	0.069	0.049		(2.56)	(0.18)
	(4.28)	(3.21)	uni25	0.157	-0.004
uni4	-0.005	0.003		(6.99)	(0.19)
	(0.18)	(0.10)	uni26	-0.130	-0.103
uni5	0.010	0.009		(4.01)	(3.59)
	(0.50)	(0.46)	uni27	0.102	0.077
uni6	0.108	0.009		(1.62)	(1.38)
	(7.34)	(0.56)	uni28	-0.089	-0.154
uni7	0.109	-0.032		(0.78)	(1.34)
	(5.64)	(1.77)			
Adjusted R^2	0.0150	0.1671			
F-Statistic	12.65	64.80			
Sample Size	30,529	30,529			

Notes: Absolute value of heteroscedasticity-consistent 't' statistics in parentheses; (a) Personal, employment and enrolment characteristics are included in model (4), but results are not presented here.

The adjusted R^2s for the models of Table 7 are higher than the adjusted R^2s for the original models in Table 2, though the changes are certainly not dramatic. For example, for the most comprehensive specification, model (4), the adjusted R^2 in Table 7 is 0.1671. It was 0.1621 in Table 2.

Disaggregating the university groups into individual universities for the analysis reveals substantial variation in starting salaries across universities. In the comprehensive model of equation (4), for example, it can be seen that the coefficient on Go8 *uni5* indicates a 9 percent earnings premium for graduates of that university, compared to the benchmark university (a Go8 member) in the regression analysis. Conversely, the coefficient on Other *uni25* indicates an earnings disadvantage of 10 percent for graduates of that particular university. There is therefore a substantial earnings gap of almost 25 percent across institutions at this disaggregated level. However, 27 of the 40 institution variables included in this analysis are statistically insignificant at the 5 percent level.

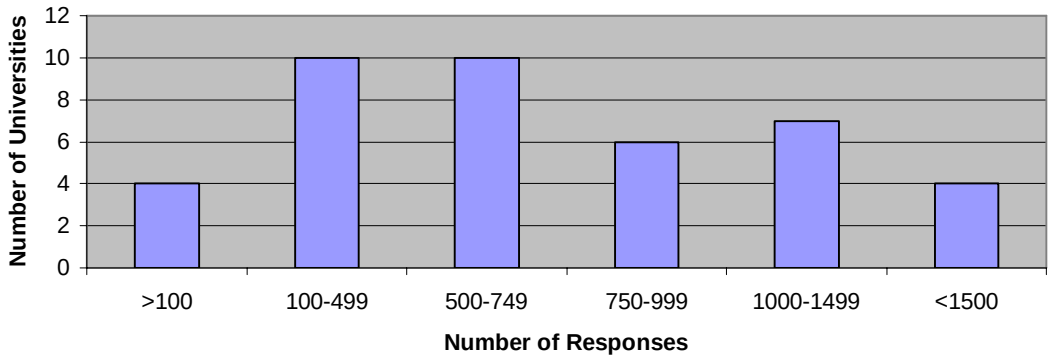
Of special importance is that graduates from one university in the Australian Technology Network (Tech *uni4*) do better in terms of starting salaries than graduates from a number of the Go8 universities. There are also four universities in the "Other" group (Other *uni3, uni13, uni18, uni20*) where the graduates have relatively high starting salaries. The starting salaries of graduates from these four universities are 5 to 6 percentage points higher than the starting salaries of graduates from the Go8 university that is the benchmark in the analysis.

None of the Go8 universities are associated with statistically significantly lower starting salaries than the benchmark Go8 university. However, the graduates from one institution in the Australian Technology Network (namely Tech *uni5*) have earnings significantly lower (by six percent) than the benchmark group. Four of the "Other" universities are associated with statistically significant lower starting salaries.

Perhaps the best assessment of these results is that institution matters, but in a very specific way that does not appear to be related to the broad indicators of quality typically used in Australia.

One drawback of conducting analyses at the disaggregated level lies in the relatively small number of graduates from some institutions. Figure 1 informs on this.

Figure 1: Sample Sizes for Institutions in the Restricted Data Sample



It can be seen from Figure 1 that the representation is very low for four of the institutions. The small sample size for some universities at the disaggregated level could have an adverse impact on the quality of the analysis. This is particularly the case where separate analyses are to be undertaken for males and females, or even for separate disciplines. Analysis of disaggregated data might need to be based on data pooled across years of the GDS. Even then, a further limitation of this approach is that the GCA's Code of Practice prevents naming the institutions in Table 7. It is all very well knowing that the graduates of some institutions earn 25 percent less than the graduates of other universities. But understanding the reasons for this type of earnings differential, or having a reader appreciate them, really needs names to be attached to institutional earnings effects.

VI. CONCLUSION

The analyses above utilised a semi-logarithmic earnings equation to estimate the magnitude of institute and field of study effects on graduate starting salaries in Australia. The results indicated there are minimal effects associated with attending a Go8 or Australian Technology Network university rather than another university.

Field of study was of modest importance to starting salary determination, with starting salaries varying by 12 percentage points across disciplines. The better paying fields of study are information technology, engineering, public health, education, and management and commerce. Agriculture and science graduates are among the groups that have relatively low starting salaries. The finding for science graduates is consistent with results in the study by Chia and Miller (2008) for graduates from UWA.

In comparison to the modest effects of the degree type variables, employment-related variables have strong effects. Starting salaries differed by up to 30 percentage points across industries, and by up to 33 percentage points across occupations. These findings suggest that instead of enrolling in a university with the expectation that the institution's prestige or quality might fetch a premium in the labour market, it is better to try to enrol in "premium" disciplines like engineering, public health, and management and commerce, or to pursue a career in an industry or occupation that pays well.

The limited evidence in favour of a university quality premia in the Australian labour market in the analyses that distinguished Go8, Australian Technology and other universities is surprising, given the claims in the recent press about differences across universities (to cite but one example, see the article "One size won't fit all" in the *Sydney Morning Herald*, 21 February, 2008). Even more surprising is the evidence of graduates from specific universities in the Australian Technology and other universities groups having higher starting salaries, *ceteris paribus*, than graduates from some of the universities in the Go8. It may be that the Australian labour market is not all that discerning when it comes to the university a graduate attended. Or perhaps graduates of the Australian higher education system are simply far more homogeneous than one would expect from all the recent hype about university rankings. The caveat that the analysis has only examined starting salaries needs to be added here.

The use of this more detailed information on the specific institution graduates attended added considerable value to the analysis. However, as previously noted, the GCA's Code of Practice governing the use of GDS data also acts as a limitation, as it

essentially prevents the naming of individual institutions. Without the name attached to individual institutions for the analysis of institute effects on earnings, the exercise may prove to be meaningless, as the knowledge that a certain university carries a wage premium or disadvantage has little value in the absence of knowledge of the identity of the institution involved.

Finally, the analysis of the GDS data necessarily has a focus on starting salaries, and this was mentioned above as an important caveat to the interpretation of the findings. Empirical research in labour economics in other fields has moved beyond a focus on a single data point very early in a person's career. The GDS could provide a much more valuable platform for analysis of graduate labour market success if it were to follow graduates for at least a limited period of time. Collecting longitudinal information on a large sample of graduates should be seen as a priority at the current time.

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APPENDIX A

DATA APPENDIX

Table A.1: Description and Summary Statistics of the Personal Characteristics Explanatory Variables

Variable	Description	Mean	Std Dev
Full- or Part-time Enrolment			
part	Dummy variable for students enrolled part-time in their studies.	0.207	0.41
full	Omitted category: full-time.	0.793	0.41
Mode of Study			
ext	Dummy variable for graduates who studied off campus.	0.135	0.34
nternal	Omitted category: on campus study.	0.865	0.34
Disability Status			
diab	Dummy variable for students with disabilities.	0.024	0.15
no diab	Omitted category: no disabilities.	0.976	0.15
Gender			
female	Dummy variable for female students.	0.636	0.48
male	Omitted category: male students.	0.364	0.48
Age			
gage	Continuous variable for the age of the graduate, presented in Gompertz form, ($\exp^{-0.1\times Age}$).	0.087	0.04
Double Degree			
doub	Dummy variable for students with double degrees.	0.135	0.34
n*on doub*	Omitted category: without double degrees.	0.865	0.34
Level of Qualification			
hons	ummy variable for graduates with honours degrees.	0.109	0.31
Bach	Omitted category: bachelor degrees.	0.891	0.31
Further Studies			
Fstud	Dummy variable for students doing further study.	0.225	0.42
no fstud	Omitted category: not doing further study.	0.775	0.42
Non-English Speaking Background			
nesb	Dummy variable for students from non-English speaking backgrounds.	0.171	0.38
esb	Omitted category: English speaking backgrounds.	0.829	0.38

Table A.2: Description and Summary Statistics of the Employment Characteristics Explanatory Variables

Variable	Description	Mean	Std Dev
Self-employment			
semp	Dummy variable for self-employed graduates.	0.033	0.18
not semp	Omitted category: students not self-employed.	0.967	0.18
Sector of employment			
govt	Dummy variable for graduates employed in the public sector.	0.352	0.48
private	Omitted category: employed in private sector.	0.648	0.48
Length of employment			
shother	Dummy variable for graduates in short term employment	0.317	0.47
perm	Omitted category: permanent employment	0.683	0.47

Industry of employment Dummy variable for graduates employed in (means in parentheses):
Agriculture or forestry (0.011); Mining (0.010); Manufacturing (0.045); Electricity, gas or water (0.007); Construction (0.014); Wholesale or retail (0.094); Accommodation (0.038); Transport or storage (0.011); Communication services (0.011); Architectural services (0.008); Consultant engineering (0.016); Legal (0.033); Accountancy (0.041); Defence (0.011); Goverment (0.075); Education (0.171); Health services (0.073); Medical care (0.102); Medical or dental (0.012); Veterinary services (0.005); Cultural services (0.032); Personal services (0.006); Other services (0.021).
Omitted category: graduates who were employed in Finance, insurance, personal and business services (0.158).

Occupation of employment Dummy variable for graduates employed in (means in parentheses):
Managers (0.036), Natural and physical sciences professionals (0.023), Building and engineering professionals (0.048), Accounting professionals (0.061), Business professionals (0.102), Health professionals (0.148), Education professionals (0.135), Social and arts professionals (0.074), Associate professionals (0.119), Advanced clerical, sales and services (0.030), Other occupations (0.021).
Omitted category: graduates employed in Intermediate/elementary clerical, sales and service workers (0.203).

Table 2: Estimates of Determinants of Australian Graduates' Starting Salaries

Variable	model (1)	model (2)	model (3)	model (4)
Constant	2.892	2.886	3.060	2.961
	(1006.13)	(637.18)	(316.31)	(243.81)
Institution Attended (Other Universities)				
*go*8	-0.032	(a)	0.015	0.006
	(6.22)		(2.91)	(1.16)
tech	0.006	(a)	0.033	0.016
	(0.68)		(3.98)	(1.95)
Major Field of Study (Management and Commerce)				
Science	(a)	-0.072	-0.063	-0.065
		(7.01)	(6.30)	(5.92)
Inform. Technology	(a)	0.030	0.027	-0.015
		(2.71)	(2.46)	(1.34)
Engineering	(a)	0.082	0.062	-0.021
		(9.26)	(7.02)	(1.57)
Architecture	(a)	-0.073	-0.082	-0.062
		(4.29)	(5.04)	(2.94)
Agriculture	(a)	-0.129	-0.134	-0.100
		(7.72)	(8.25)	(5.81)
Medicine	(a)	-0.004	-0.004	-0.095
		(0.58)	(0.61)	(5.99)
Public Health	(a)	0.042	0.064	0.007
		(4.34)	(6.79)	(0.53)
Education	(a)	0.086	0.078	-0.004
		(10.52)	(9.59)	(0.26)
Society etc.	(a)	-0.012	-0.043	-0.035
		(1.68)	(6.39)	(4.68)
Creative Arts	(a)	-0.116	-0.087	-0.055
		(9.47)	(7.33)	(4.57)
Personal and Other Enrolment Characteristics				
Female	(a)	(a)	-0.030	-0.026
			(6.12)	(5.48)
Age (*gage*)	(a)	(a)	-2.210	-1.678
			(29.32)	(22.49)
Disablility	(a)	(a)	-0.022	-0.019
			(1.40)	(1.29)
Non_English	(a)	(a)	-0.006	-0.003
Speaking *(nesb*)			(0.99)	(0.51)
Further Study	(a)	(a)	-0.000	0.031
			(0.03)	(5.06)
Part-time Study	(a)	(a)	0.082	0.068
			(12.96)	(11.12)
External Student	(a)	(a)	0.065	0.042
			(8.54)	(5.71)
Double Degree	(a)	(a)	0.029	0.008
			(4.61)	(1.22)
Honours Degree	(a)	(a)	0.074	0.052
			(8.91)	(6.42)
Industry of Employment (Finance, Insurance, Personal and Business Services)				
Agric & Forestry	(a)	(a)	(a)	-0.105
				(3.76)
Mining	(a)	(a)	(a)	0.162
				(9.18)
Manufacturing	(a)	(a)	(a)	0.011
				(1.03)

Electricity, Gas & Water	(a)	(a)	(a)	0.081 (4.31)
Construction	(a)	(a)	(a)	-0.038 (2.48)
Wholesale & Retail Trade	(a)	(a)	(a)	-0.049 (5.06)
Accommodation	(a)	(a)	(a)	-0.140 (9.83)
Transport	(a)	(a)	(a)	0.047 (2.05)
Communication Services	(a)	(a)	(a)	0.060 (3.28)
Architectural Services	(a)	(a)	(a)	-0.138 (4.85)
Engineering	(a)	(a)	(a)	0.003 (0.18)
Legal	(a)	(a)	(a)	0.033 (2.51)
Accountancy	(a)	(a)	(a)	-0.079 (6.80)
Defence	(a)	(a)	(a)	0.028 (1.66)
Government	(a)	(a)	(a)	0.025 (2.52)
Education	(a)	(a)	(a)	-0.046 (3.45)
Health Services	(a)	(a)	(a)	-0.010 (0.93)
Medical Care	(a)	(a)	(a)	-0.029 (2.33)
Dental/Medical	(a)	(a)	(a)	0.150 (5.96)
Vet. Services	(a)	(a)	(a)	-0.098 (4.42)
Cultural Services	(a)	(a)	(a)	-0.103 (6.82)
Personal Services	(a)	(a)	(a)	-0.106 (2.73)
Other Services	(a)	(a)	(a)	-0.059 (3.51)
<u>Occupation</u> (Intermediate or Elementary Clerical, Sales and Service Workers				
Managers	(a)	(a)	(a)	0.242 (18.58)
Natural & Physical Sciences Profs.	(a)	(a)	(a)	0.120 (7.56)
Building & Engineering Profs.	(a)	(a)	(a)	0.145 (10.02)
Accounting Profs.	(a)	(a)	(a)	0.097 (8.65)
Business Profs.	(a)	(a)	(a)	0.144 (16.41)
Health Profs.	(a)	(a)	(a)	0.144 (9.11)
Education Profs.	(a)	(a)	(a)	0.181 (10.27)
Social, Arts Profs.	(a)	(a)	(a)	0.094 (8.69)

Associate Profs.	(a)	(a)	(a)	0.105
				(12.65)
Advanced Clerical	(a)	(a)	(a)	0.060
				(4.85)
Other Occupations	(a)	(a)	(a)	-0.094
				(4.26)
Other Employment Characteristics				
Government	(a)	(a)	(a)	0.067
Employment				(10.27)
Self Employment	(a)	(a)	(a)	0.033
				(1.71)
Short-Term Job	(a)	(a)	(a)	-0.064
				(11.93)
Adjusted R^2	0.001	0.019	0.098	0.162
F- statistic	21.47	60.51	158.25	102.80
Sample size	30,529	30,529	30,529	30,529

Notes: Absolute value of heteroscedasticity-consistent 't' statistics in parentheses; (a) = variable not entered.

males

Variable	**model (1)**	**model (2)**	**model (3)**	**model (4)**
Constant	2.926	2.916	3.096	2.996
	(574.64)	(402.62)	(202.83)	(146.09)
Institution Attended (Other Universities)				
*go*8	-0.040	(a)	0.024	0.012
	(4.68)		(2.71)	(1.34)
tech	0.006	(a)	0.042	0.020
	(0.44)		(3.09)	(1.55)
Major Field of Study (Management and Commerce)				
Science	(a)	-0.090	-0.076	-0.063
		(5.08)	(4.45)	(3.53)
Inform. Technology	(a)	0.006	0.022	-0.022
		(0.40)	(1.64)	(1.55)
Engineering	(a)	0.058	0.060	-0.018
		(5.13)	(5.52)	(1.17)
Architecture	(a)	-0.091	-0.094	-0.071
		(4.09)	(4.51)	(2.69)
Agriculture	(a)	-0.134	-0.139	-0.083
		(5.81)	(6.44)	(3.46)
Medicine	(a)	0.007	0.011	-0.085
		(0.45)	(0.74)	(2.52)
Public Health	(a)	0.035	0.047	0.009
		(1.71)	(2.50)	(0.35)
Education	(a)	0.120	0.078	0.016
		(8.31)	(5.31)	(0.61)
Society etc.	(a)	-0.004	-0.046	-0.027
		(0.35)	(3.91)	(2.15)
Creative Arts	(a)	-0.100	-0.071	-0.028
		(4.09)	(2.99)	(1.15)
Personal and Other Enrolment Characteristics				
Age (*gage*)	(a)	(a)	-2.767	-2.181
			(21.87)	(17.24)
Disablility	(a)	(a)	-0.067	-0.057
			(2.93)	(2.62)
Non_English	(a)	(a)	-0.008	-0.003
Speaking *(nesb*)			(0.77)	(0.28)
Further Study	(a)	(a)	0.006	0.031

			(0.56)	(3.10)
Part-time Study	(a)	(a)	0.104	0.084
			(10.58)	(8.91)
External Student	(a)	(a)	0.102	0.074
			(8.35)	(6.42)
Double Degree	(a)	(a)	0.029	0.010
			(2.95)	(1.00)
Honours Degree	(a)	(a)	0.074	0.053
			(5.60)	(4.05)
Industry of Employment (Finance, Insurance, Personal and Business Services)				
Agric & Forestry	(a)	(a)	(a)	-0.140
				(3.50)
Mining	(a)	(a)	(a)	0.159
				(7.27)
Manufacturing	(a)	(a)	(a)	0.006
				(0.35)
Electricity, Gas & Water	(a)	(a)	(a)	0.073
				(2.81)
Construction	(a)	(a)	(a)	-0.052
				(2.65)
Wholesale & Retail Trade	(a)	(a)	(a)	-0.023
				(1.45)
Accommodation	(a)	(a)	(a)	-0.089
				(4.03)
Transport	(a)	(a)	(a)	0.035
				(1.10)
Communication Services	(a)	(a)	(a)	0.084
				(3.68)
Architectural Services	(a)	(a)	(a)	-0.145
				(3.52)
Engineering	(a)	(a)	(a)	-0.018
				(1.04)
Legal	(a)	(a)	(a)	-0.050
				(2.20)
Accountancy	(a)	(a)	(a)	-0.073
				(3.86)
Defence	(a)	(a)	(a)	0.004
				(0.15)
Government	(a)	(a)	(a)	-0.008
				(0.46)
Education	(a)	(a)	(a)	-0.077
				(2.99)
Health Services	(a)	(a)	(a)	-0.019
				(0.85)
Medical Care	(a)	(a)	(a)	-0.057
				(2.29)
Dental/Medical	(a)	(a)	(a)	0.266
				(4.99)
Vet. Services	(a)	(a)	(a)	-0.123
				(2.36)
Cultural Services	(a)	(a)	(a)	-0.123
				(4.36)
Personal Services	(a)	(a)	(a)	-0.080
				(1.40)
Other Services	(a)	(a)	(a)	-0.135
				(4.72)
Occupation (Intermediate or Elementary Clerical, Sales and Service Workers				

Managers	(a)	(a)	(a)	0.246
				(12.53)
Natural & Physical Sciences Profs.	(a)	(a)	(a)	0.108
				(4.02)
Building & Engineering Profs.	(a)	(a)	(a)	0.155
				(8.24)
Accounting Profs.	(a)	(a)	(a)	0.079
				(4.11)
Business Profs.	(a)	(a)	(a)	0.151
				(10.06)
Health Profs.	(a)	(a)	(a)	0.159
				(4.78)
Education Profs.	(a)	(a)	(a)	0.184
				(5.59)
Social, Arts Profs.	(a)	(a)	(a)	0.094
				(4.64)
Associate Profs.	(a)	(a)	(a)	0.100
				(6.98)
Advanced Clerical	(a)	(a)	(a)	0.095
				(4.08)
Other Occupations	(a)	(a)	(a)	-0.067
				(2.63)
Other Employment Characteristics				
Government. Employment	(a)	(a)	(a)	0.082
				(6.58)
Self Employment	(a)	(a)	(a)	0.016
				(0.55)
Short-Term Job	(a)	(a)	(a)	-0.080
				(8.47)
Adjusted R^2	0.002	0.019	0.129	0.196
F- statistic	12.12	22.20	83.01	48.71
Sample size	11,121	11,121	11,121	11,121

females

Variable	**model (1)**	**model (2)**	**model (3)**	**model (4)**
Constant	2.875	2.864	3.009	2.915
	(829.52)	(496.71)	(253.75)	(200.15)
Institution Attended (Other Universities)				
*go*8	-0.032	(a)	0.011	0.003
	(4.93)		(1.64)	(0.53)
tech	0.001	(a)	0.029	0.015
	(0.14)		(2.74)	(1.44)
Major Field of Study (Management and Commerce)				
Science	(a)	-0.057	-0.055	-0.064
		(4.59)	(4.46)	(4.64)
Inform. Technology	(a)	0.037	0.042	0.006
		(1.85)	(2.18)	(0.32)
Engineering	(a)	0.077	0.077	-0.014
		(4.55)	(4.61)	(0.55)
Architecture	(a)	-0.069	-0.067	-0.042
		(2.59)	(2.60)	(1.22)
Agriculture	(a)	-0.136	-0.133	-0.112
		(5.78)	(5.43)	(4.58)
Medicine	(a)	0.008	-0.005	-0.095
		(0.89)	(0.58)	(5.24)

Public Health	(a)	0.054	0.070	0.006
		(4.99)	(6.42)	(0.34)
Education	(a)	0.092	0.079	-0.016
		(9.50)	(8.19)	(0.83)
Society etc.	(a)	-0.005	-0.040	-0.039
		(0.63)	(4.89)	(4.18)
Creative Arts	(a)	-0.112	-0.094	-0.067
		(7.98)	(6.87)	(4.72)
Personal and Other Enrolment Characteristics				
Age (*gage*)	(a)	(a)	-1.934	-1.414
			(20.61)	(15.29)
Disablility	(a)	(a)	0.010	0.007
			(0.49)	(0.35)
Non_English Speaking *(nesb*)	(a)	(a)	-0.005	-0.004
			(0.64)	(0.51)
Further Study	(a)	(a)	-0.003	0.033
			(0.39)	(4.22)
Part-time Study	(a)	(a)	0.070	0.060
			(8.39)	(7.50)
External Student	(a)	(a)	0.046	0.026
			(4.68)	(2.72)
Double Degree	(a)	(a)	0.029	0.007
			(3.65)	(0.87)
Honours Degree	(a)	(a)	0.077	0.054
			(7.19)	(5.24)
Industry of Employment (Finance, Insurance, Personal and Business Services)				
Agric & Forestry	(a)	(a)	(a)	-0.062
				(1.63)
Mining	(a)	(a)	(a)	0.155
				(5.21)
Manufacturing	(a)	(a)	(a)	0.010
				(0.66)
Electricity, Gas & Water	(a)	(a)	(a)	0.063
				(2.39)
Construction	(a)	(a)	(a)	-0.028
				(1.21)
Wholesale & Retail Trade	(a)	(a)	(a)	-0.064
				(5.28)
Accommodation	(a)	(a)	(a)	-0.167
				(9.08)
Transport	(a)	(a)	(a)	0.049
				(1.58)
Communication Services	(a)	(a)	(a)	0.018
				(0.60)
Architectural Services	(a)	(a)	(a)	-0.131
				(3.27)
Engineering	(a)	(a)	(a)	0.042
				(1.65)
Legal	(a)	(a)	(a)	-0.025
				(1.53)
Accountancy	(a)	(a)	(a)	-0.080
				(5.45)
Defence	(a)	(a)	(a)	0.027
				(1.15)
Government	(a)	(a)	(a)	0.041
				(3.23)
Education	(a)	(a)	(a)	-0.029

				(1.87)
Health Services	(a)	(a)	(a)	0.001
				(0.05)
Medical Care	(a)	(a)	(a)	-0.013
				(0.90)
Dental/Medical	(a)	(a)	(a)	0.117
				(4.13)
Vet. Services	(a)	(a)	(a)	-0.086
				(3.60)
Cultural Services	(a)	(a)	(a)	-0.093
				(5.26)
Personal Services	(a)	(a)	(a)	-0.116
				(2.27)
Other Services	(a)	(a)	(a)	-0.016
				(0.79)
Occupation (Intermediate or Elementary Clerical, Sales and Service Workers				
Managers	(a)	(a)	(a)	0.226
				(12.76)
Natural & Physical Sciences Profs.	(a)	(a)	(a)	0.123
				(6.40)
Building & Engineering Profs.	(a)	(a)	(a)	0.127
				(4.63)
Accounting Profs.	(a)	(a)	(a)	0.110
				(7.88)
Business Profs.	(a)	(a)	(a)	0.139
				(12.84)
Health Profs.	(a)	(a)	(a)	0.130
				(7.29)
Education Profs.	(a)	(a)	(a)	0.177
				(8.44)
Social, Arts Profs.	(a)	(a)	(a)	0.090
				(7.09)
Associate Profs.	(a)	(a)	(a)	0.105
				(10.27)
Advanced Clerical	(a)	(a)	(a)	0.046
				(3.14)
Other Occupations	(a)	(a)	(a)	-0.149
				(3.22)
Other Employment Characteristics				
Government. Employment	(a)	(a)	(a)	0.061
				(7.96)
Self Employment	(a)	(a)	(a)	0.048
				(1.79)
Short-Term Job	(a)	(a)	(a)	-0.055
				(8.44)
Adjusted R^2	0.001	0.019	0.079	0.142
F- statistic	12.92	38.90	84.01	57.18
Sample size	19,408	19,408	19,408	19,408