An analysis of the gender wage gap in the Australian graduate labour market, 2013

Graduate Careers Australia

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Contents

Executive Summary **1**

Introduction **2**

1. Background **3**

2. Literature **3**

3. Data **4**

4. Statistical Analysis **5**

4.1 Model 1: Gender only 8

4.2 Model 2: Gender, enrolment and personal characteristics 8

4.3 Model 3: Occupation 9

5. Conclusions **12**

Appendix **14**

References **15**

Executive Summary

This study investigates (1) whether a gender wage gap exists within the labour market for recent Australian graduates and, if so, (2) the extent of the gender wage gap when the personal, enrolment and employment characteristics of graduates are held constant.

Before controlling for field of education, and a range of personal, enrolment and occupational characteristics, an aggregate gender wage gap of 9.4 per cent favouring males was identified.

When the field of education, personal, enrolment and occupational characteristics of male and female graduates were taken into account, males' starting salaries were 4.4 per cent higher than those for females, on average.

The analysis suggested that the overall wage gap favouring males can be partly attributed to an over-representation of males in fields of education that typically attract higher starting salaries, such as Engineering. Likewise, females were over-represented relative to males when it came to Humanities, which was ranked at the lower end of the salary distribution.

When selected large occupations were considered, few statistically significant differences were found. This provides some evidence that the observed gender wage gap is related to female graduates being less likely than male graduates to secure higher-paying roles, even within similar broad occupation areas.

A key recommendation from our analysis is that female students be given more information about career choices, and encouraged to consider training for traditionally 'male' occupations.

Introduction

The gender wage gap is a long-established phenomenon that has generated decades of discussion. Since the 1970s, Australia has witnessed rising rates of female participation in both the labour force and the Australian higher education system. This has invited investigation into the gender wage gap in Australia; i.e. the difference between the earnings of males and females.

According to its latest Average Weekly Earnings report (ABS 2014), the ABS measured the gender wage gap in the broader Australian labour market as favouring men by 17.1 per cent, having risen by .9 of a percentage point since 1994. However, in interpreting this national gender wage gap figure, it is important to note that the reported earnings do not account for age, level of education and training, occupational choices and region of employment characteristics; key factors which can vary for males and females and which can mediate salary differences. Therefore, an analysis of the gender wage gap for recent higher education graduates, a time when their labour market worth is arguably equal, has much appeal.

This study investigates (1) whether a gender wage gap exists within the labour market for recent Australian graduates and, if so, (2) the extent of the gender wage gap when the personal, enrolment and employment characteristics of graduates are held constant[1]. This study is based on data from the 2013 Graduate Destination Survey (GDS), a survey on the employment outcomes of recent graduates from all Australian universities and a number of non-university higher education providers[2]. The investigation presented in this study will serve to assist education, labour market, and organisation decision makers in executing informed decisions associated with pay equity in the years ahead.

Section 1 of this report provides an overview of the gender wage gap within the Australian context, followed by an examination of the research that has explored the determinants of male and female graduate starting salaries in Section 2. The data on which this study is based are described in Section 3, and Section 4 presents an analysis of the various factors which have an impact on the starting salaries of Australian graduates. Section 5 presents the conclusions of this study.

[1] Aggregate gender wage gaps can be calculated in various other ways, such as calculating the gaps between male and female graduates within fields of education. However, this would not take into account the vital determinants being considered in this paper.

[2] This study also attempts to build on an analysis of factors affecting starting salaries presented in the *Graduate Salaries 2009* report (GCA 2010) as well as complement Graduate Careers Australia's forthcoming *2013 Graduate Salaries* report.

1. Background

In reviewing the gender wage gap within the broader Australian labour market, there have been a number of advances in the political framework. Prior to the 1960s, wages for females were generally set lower than those of their male counterparts on the belief that underpinning the male wage was an obligation for the male to provide for the family (Chapman 2004). It was not until the National Wage Case of 1967 that the basic wage as a solitary societal institution was abolished. Two years later, during the Equal Pay Case of 1969, the Commonwealth Conciliation and Arbitration Commission enacted a new set of principles which reviewed the wage structure for female employees. As befitted a modern post-war society which had seen a surge of female participation in the workforce, the Equal Pay Case aimed to eliminate gender wage discrimination in order to make female pay equal to male pay for equivalent work. Further legislative safeguards primarily implemented within the Australian industrial relations system since then have included the 1984 Sex Discrimination Act, the maintenance of the Australian award system as well as the implementation of the 2006 Work Choices, the 2009 Fair Work and the 2012 Workplace Gender Equality legislation.

2. Literature

Previous studies exploring the determinants of male and female salaries have established that the gender wage gap tends to increase as age increases (Finnie and Wannell 2004; Li and Miller 2012). This finding has been due in part to the disproportionate levels of labour market experience amongst older men and women, partly triggered by career breaks. Since young graduates have similar human capital and work experience, an analysis of the starting salaries of recent male and female graduates allows us to estimate the gender wage gap without having to be concerned about differences in work experience between men and women; an issue which has been identified as a possible contributing factor in other studies (for example, Finnie and Wannell 2004; Gustafson 2012).

When reviewing the literature examining the gender wage gap amongst graduates, much of the Australian research has been consistent with that from overseas. Overseas studies have found that some of the key contributors to the gender wage gap are 'observed' factors such as field of education, occupation and industry of employment; however after controlling for these factors there remains a significant proportion of the gender wage gap that cannot be explained (Finnie and Wannell 2004; Jewell 2008). Finnie and Wannell (2004), in their longitudinal study of Canadian bachelor degree graduates (1982, 1986, and 1990 cohorts) using a regression-based decomposition methodology, found that field of education was a significant contributor to the overall wage gap, and that women tended to be over-represented in lower-earning fields of education. Finnie and Wannell (2004) also found that differences between males and females in average hours worked were an important factor in the gender wage gap. Similar to Finnie and Wannell's (2004) analysis, Jewell (2008), in a UK study analysing University of Reading graduates in 2006 and 2007, found that when controlling for field of education and industry variables, a significant proportion of the gender wage gap remained unaccounted for. Jewell (2008) also reported that male graduates were more likely to be found in higher paying occupations than their female counterparts.

Field of education has been documented within the international literature as a major contributor to the gender wage gap and most Australian studies find similar results (Miller and Volker 1983; Chia and Miller 2008; Birch, Li and Miller 2009). Birch, Li and Miller (2009), using data from the 2003 GDS, found that even after controlling for a range of factors including industry of employment and type of work undertaken, there were differences in starting salaries across different fields of education. Comparing men and women in similar fields of education, Birch, Li and Miller (2009) found no evidence of a significant gender wage gap; however they reported a modest gap of approximately three per cent favouring males in a pooled sample.

Another study conducted by Li and Miller (2012) examined gender differences using pooled GDS data (1999–2009). Using the Blinder-Oaxaca decomposition, they reported a slightly larger gender wage gap of five per cent in the Australian graduate labour market, although it was much smaller than the 15 per cent found in earlier research examining the gender wage gap in the broader Australian labour market (Borland 1999).

3. Data

This analysis draws on data from the Graduate Destination Survey[3] (GDS), a national census of new higher education graduates, conducted by Graduate Careers Australia (GCA). The GDS gathers data from graduates about aspects of their employment activities and other labour market outcomes four months after course completion. The method of data collection for the GDS is multi-modal; conducted in both online and paper formats, complemented with Computer-Assisted Telephone Interviews (CATI). Overall, 109,304 Australian resident graduates responded to the 2013 GDS, a response rate of 60.0 per cent (GCA 2013). Previous studies (for example, Guthrie and Johnson 1997) have established that the GDS data are reliable indicators of the full-time labour market outcomes of recent graduates.

The data set for this analysis was restricted to a subset of respondents who were Australian citizens or permanent residents, had recently completed a bachelor degree, were aged less than 25 at the time of the survey, were in their first full-time employment in Australia, and had indicated their gender. Graduates with missing data in any of the variables of interest in this study were excluded from the analysis sample, as were those with an annual salary below $20,000 or above $112,500 (in line with standard GCA practice) to clean the data of unrealistically high and low full-time salaries for new graduates[4]. The final analysis sample contained 8,185 graduates, consisting of 3,103 males (37.9 per cent of the sample) and 5,082 females (62.1 per cent of the sample). Figure 1 presents the distribution of full-time starting salaries for male and female graduates in the sample.

[3] The GDS is a component of the Australian Graduate Survey (AGS).
[4] Many of these deleted cases are attributed to response error.

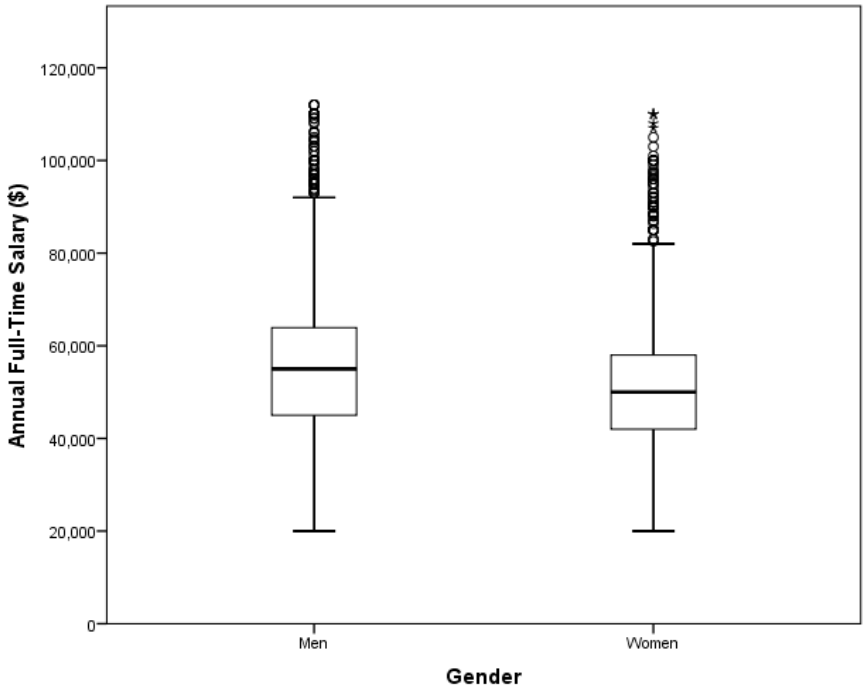

Figure 1: Distribution of full-time starting salaries for male and female graduates, 2013

4. Statistical Analysis

The purpose of our statistical analysis is to investigate the factors influencing the initial earnings of graduates, with a particular focus on gender. This analysis consists of a series of multiple regression models predicting annual starting salary on the basis of a set of potential influencing factors which include personal, enrolment and occupational characteristics. The general form of the regression model can be written as:

$$lnS_i = \beta_0 + \beta F_i + \beta X_i + \varepsilon_i$$

where lnS_i refers to the annual starting salary of graduate *i* expressed in logarithmic form, β_0 is the constant, F_i is a variable indicating that graduate *i* is female, the vector X_i contains the various characteristics of graduate *i* (including personal, enrolment and occupational characteristics), and ε_i is an error term. All explanatory variables with the exception of weekly working hours were coded as dummy variables which take the value of 1 if a characteristic is present and 0 otherwise. The estimate on a dummy variable is approximately the percentage change relative to the omitted reference category. For example, an estimate of -0.094 on the female dummy variable indicates that female graduates earn approximately 9.4 per cent less, on average, than graduates in the reference category, which is, of course, male graduates.

A summary of the dependent and explanatory variables used within the regression analysis, along with their corresponding reference categories is presented by gender in Table 1a in the Appendix.

Table 1 presents the enrolment patterns of male and female graduates. The different distributions of males and females across fields of education mainly continue to reflect traditional gender patterns, and reflect how occupations and professions are often identified with one particular gender (for example, Engineering as predominantly male and Paramedical Studies as predominantly female). These findings help to explain a number of the results from the multiple regression models in the following sections.

Table 1: Graduates' field of education enrolment patterns, by gender, 2013 (%)

	Male	Female	Total		Male	Female	Total
Gender	37.9	62.1	100.0	Humanities	5.7	11.6	9.3
Field of education				Law	2.4	3.4	3.0
Accounting	9.4	6.6	7.7	Mathematics	1.0	0.3	0.6
Agricultural Science	1.1	0.9	1.0	Medicine	2.3	2.0	2.1
Architecture & Building	4.0	2.1	2.8	Optometry	0.2	0.2	0.2
Art & Design	2.0	2.9	2.5	Paramedical Studies	6.3	21.0	15.4
Biological Sciences	3.1	4.4	3.9	Pharmacy	2.2	3.0	2.7
Computer Sciences	6.0	0.8	2.8	Physical Sciences	1.2	0.4	0.7
Dentistry	0.2	0.4	0.3	Psychology	1.1	3.3	2.4
Earth Sciences	1.4	0.4	0.8	Social Sciences	0.6	1.3	1.1
Economics & Business	21.6	18.8	19.8	Social Work	0.2	1.3	0.8
Education	3.5	10.9	8.1	Veterinary Science	0.0	0.6	0.4
Engineering	24.6	3.7	11.6	**Observations**	**3,103**	**5,082**	**8,185**

Each following model builds on the previous model, augmenting the base specification containing only a female dummy variable with information on the enrolment and employment characteristics of the graduates. Results from the three models are presented in Table 2 and are discussed in detail in the following section. Each cell in Table 2 contains a regression coefficient and, in parentheses, a standard error.

Table 2: Gender differences in graduates' average annual starting salaries when controlling for various personal, enrolment and employment characteristics, OLS estimates, 2013†¥

	Model 1	Model 2	Model 3		Model 3
Gender				**State of employment (b)**	
Female	-0.094 (0.006)**	-0.047 (0.006)**	-0.044 (0.006)**	NSW Capital	-0.017 (0.015)
Field of education (a)				NSW Regional	-0.044 (0.018)*
Accounting		0.070 (0.014)**	0.035 (0.013)**	VIC Capital	-0.061 (0.015)**
Agricultural Science		0.069 (0.029)*	0.077 (0.027)**	VIC Regional	-0.048 (0.019)*
Architecture & Building		0.061 (0.019)**	0.078 (0.018)**	QLD Capital	-0.029 (0.016)
Art & Design		-0.121 (0.020)**	-0.074 (0.018)**	QLD Regional	-0.028 (0.017)
Biological Sciences		-0.002 (0.017)	0.028 (0.015)	SA Capital	-0.024 (0.017)
Computer Sciences		0.125 (0.019)**	0.100 (0.018)**	WA Capital	0.041 (0.016)*
Dentistry		0.446 (0.052)**	0.452 (0.048)**	WA Regional	0.146 (0.026)**
Earth Sciences		0.285 (0.033)**	0.197 (0.031)**	TAS Capital	-0.037 (0.033)
Economics & Business		0.059 (0.011)**	0.046 (0.010)**	TAS Regional	-0.021 (0.035)
Education		0.177 (0.013)**	0.141 (0.013)**	NT Capital	0.030 (0.047)
Engineering		0.306 (0.013)**	0.230 (0.012)**	NT Regional	0.028 (0.074)
Law		0.152 (0.019)**	0.117 (0.017)**	ACT	0.026 (0.019)
Mathematics		0.134 (0.038)**	0.074 (0.035)*	**Other employment characteristics**	
Medicine		0.238 (0.021)**	0.130 (0.020)**	Weekly working hours in logarithmic form	0.240 (0.013)**
Optometry		0.529 (0.060)**	0.504 (0.055)**	Small and medium enterprise	-0.108 (0.006)**
Paramedical Studies		0.155 (0.012)**	0.093 (0.011)**	Public/government sector	0.029 (0.007)**
Pharmacy		-0.110 (0.020)**	-0.124 (0.019)**	Short-term contract	-0.030 (0.006)**
Physical Sciences		0.101 (0.034)**	0.076 (0.031)*	Field of study of limited importance	-0.044 (0.006)**
Psychology		0.026 (0.020)	0.043 (0.018)*	In full-time work in final year of study	0.002 (0.008)
Social Sciences		0.023 (0.029)	0.047 (0.026)	**Occupation (c)**	
Social Work		0.028 (0.032)	0.035 (0.029)	Managers	0.097 (0.017)**
Veterinary Science		0.024 (0.048)	0.054 (0.044)	Professionals	0.143 (0.014)**
Personal characteristics				Technicians and Trades workers	0.037 (0.019)
Disability		0.023 (0.016)	0.006 (0.015)	Clerical and administrative workers	0.079 (0.015)**
Non-English speaking background		-0.003 (0.008)	0.000 (0.008)	Sales workers	-0.091 (0.019)**
Enrolment characteristics				Machinery operators and drivers	0.170 (0.065)**
Honours bachelor		0.114 (0.010)**	0.079 (0.010)**	Labourers	-0.100 (0.032)**
Double degree		0.107 (0.008)**	0.076 (0.007)**		
Adjusted *R*-squared	**.026**	**.203**	**.344**	**Adjusted *R*-squared**	**.344**
F-statistic	**221.85**	**78.03**	**80.57**	**F-statistic**	**80.57**
Sample size	**8,185**	**8,185**	**8,185**	**Sample size**	**8,185**

† Standard errors are reported in parentheses.

* = statistically significant at 5 per cent level; ** = statistically significant at 1 per cent level.

¥ Reference categories are (a) Humanities (b) regional South Australia (c) Community and Personal Service workers.

4.1 Model 1: Gender only

The first model is restricted to estimating the overall impact of gender on starting salaries, and contains the female dummy variable only. It can be seen in the Model 1 column of Table 2 that female graduates earn approximately 9.4 per cent less than male graduates, on average, controlling for no other factors. This finding is in line with earlier studies that identify an aggregate gender wage gap in the graduate labour market.

However, capturing the impact of gender alone is not a true reflection of the determinants of the starting salaries of graduates (Birch, Li and Miller 2009), because men and women enrol in different fields of education and have different occupational pathways as a result. Moreover, it is important to note that the amount of variation in starting salaries explained by the gender variable alone was only 2.6 per cent (denoted by an adjusted *R*-squared of .026). This model, however, does not take into account vital factors that can be used to explain much of the difference in the graduate starting salaries earned by males and females, such as differences in fields of education studied.

Many factors can influence the choice of field of education, including socio-economic factors, geographical considerations and gender expectations. In terms of the latter, it can be argued that the field of education choices of men and women are influenced by gender stereotypes socialised at a young age. This may help to explain the notable differences in the fields of education studied by young men and women in Australia (see Table 1); however establishing this as fact would need further investigation with prospective tertiary students and is outside the scope of our current study.

4.2 Model 2: Gender, enrolment and personal characteristics

Model 2 builds on Model 1 by controlling for fields of education studied, and a range of other personal characteristics (disability status, language background) and enrolment characteristics (honours degree, double degree) that may influence graduates' starting salaries. The 22 fields of education included in the model represent an unusually detailed set of control variables compared with other studies. The inclusion of these detailed field of education variables allows us to identify high-earning disciplines, which may help to explain part of the gender wage gap observed in relation to Model 1.

From the results of Model 2, the addition of field of education control variables halved the coefficient on the female dummy variable from -0.094 to -0.047[5]. This suggests that female graduates earn approximately 4.7 per cent less, on average, than male graduates when field of education, and other personal and enrolment characteristics are taken into account. Furthermore, the explanatory power of the model increased substantially, with Model 2 explaining 20.3 per cent of the variation in annual starting salaries. This finding reinforces the evidence presented in Section 2 that field of education has considerable explanatory power on the starting salaries of graduates. In other words, later earnings potential is influenced considerably by field of education choice.

The notion that males tend to pursue fields of education which typically lead to higher paying occupations, known as occupational segregation (Jewell 2008), has some merit when cross-examining the composition of female and male graduates in the sample (Table 1) with the results from Model 2 (Table 2).

[5] A model estimating the impacts of occupation controls on the female variable excluding field of education controls was conducted. The estimated wage impact explained by the addition of occupation variables increased the female coefficient by only 1.6 percentage points, from -0.094 to -0.078. This finding underscores the importance of field of education as a salary determinant.

Table 1 reports that 24.6 per cent of males and 3.7 per cent of females studied Engineering. According to Model 2 (Table 2), Engineering is associated with a 30.6 per cent salary advantage compared with the reference category of Humanities. Similarly, Computer Studies, in which males were relatively more common than females (by 5.2 percentage points, Table 1), was associated with a starting salary premium of 12.5 per cent. This over-representation of males in jobs at the higher end of the pay distribution seems to be a key contributor to the gender wage gap; a finding supported by Jewell (2008) and Birch, Li and Miller (2009).

Similarly, female-dominated fields of education tend to be associated with lower starting salaries. For example, according to Table 1, a higher concentration of females than males was found in Humanities (a difference of 5.9 percentage points), which was positioned at the lower end of the pay distribution. As shown in Table 2, there were only three fields of education with lower earnings than Humanities, namely Art and Design (12.1 per cent less than Humanities), Pharmacy (11.0 per cent less than Humanities) and Biological Sciences (0.2 per cent less than Humanities).

However, not all female-dominated fields of education are associated with lower starting salaries. Education and Paramedical Studies, both female-dominated fields of education, were among the best performers in terms of starting salaries, earning 17.7 and 15.5 per cent more respectively than those who studied Humanities. Nevertheless, as demonstrated in this section, it appears likely that gendered field of education selection (which later translates into occupational segregation) is one of the key factors underlying the gender wage gap.

4.3 Model 3: Occupation

The final model builds on Models 1 and 2 by estimating the impacts of broad occupation groupings and other employment characteristics on graduates' average annual starting salaries. In addition to personal, field of education, and enrolment variables, Model 3 (Table 2) includes an extensive list of employment variables such as weekly working hours in logarithmic form, whether the graduate was employed in a small or medium enterprise, whether they worked in the public/government sector, were on a short-term contract, whether they considered their field of education to be of only limited importance to their current employment, and whether they were employed full time in their final year of study. Furthermore, Model 3 includes 14 region of employment variables and seven broad occupation variables[6] (with reference categories of regional South Australia, and Community and Personal Service workers, respectively).

The inclusion of the various employment characteristics in Model 3 explained an additional 14 per cent of the variation in graduates' annual starting salaries compared to Model 2, as evidenced by the adjusted *R*-squared of .344. Notably, the female coefficient was not as affected as it was in Model 2. The addition of the various employment variables in Model 3 only changed the female coefficient marginally, from -0.047 to -0.044[7]. This appears to confirm the earlier finding that much of the aggregate gender wage gap for recent graduates can be attributed to differences in the fields of education studied by men and women, and the differences in occupational pathways resulting from these choices.

[6] As a sensitivity test we estimated a model augmenting the base specification with variables for industry of employment; however, these controls did not change the magnitude of the female coefficient to an appreciable degree.

[7] For another robustness check, we analysed interaction effects between occupation and sector type (e.g. public/government, private, not for profit), and the findings did not substantially change the results on the female variable. For a further sensitivity exercise, we disaggregated the sector variable (Table 2, Model 3) into public/government and not for profit (with private sector as the reference category) and added them to Model 3. The addition of these dummy variables did not alter the female variable in a notable way (-0.044 to -0.042).

However, even after controlling for an unusually detailed set of fields of education controls, as well as an extensive set of personal, enrolment and employment characteristics, a statistically significant gender wage gap of 4.4 per cent remained. When comparing this with other studies examining the gender wage gap within the Australian graduate labour market, the findings are similar. Over the last five years, the gap has been estimated to be around three per cent by Birch, Li and Miller (2009) and five per cent by Li and Miller (2012). The 4.4 per cent figure reported in Model 3 is also notably smaller than the results found at the broader Australian labour market level, recent estimates of which have ranged from 15 per cent (Borland 1999) to 17.1 per cent (ABS 2014).

The results presented up to this point show that, on average, women from the same educational field, working in the same broad occupation type, earn less than men. It is important to note that this does not necessarily mean that women are paid less, on average, than men doing identical jobs, but it does imply that within a given occupation area, women are more likely to hold lower paying jobs than men.

It is important to note that some of the gender wage gap in our statistical analysis may reflect occupational differences between men and women that our fairly broad occupation controls variables do not capture. To investigate this further, we present average starting salaries for male and female graduates by detailed occupation classification in Table 3, including occupations with 75 or more observations in the analysis sample to avoid making inferences based on very small numbers of observations. Also presented are the results of a series of unrelated *t*-tests indicating whether differences in mean starting salaries for men and women are statistically significant. A negative difference indicates that the average starting salary for females is higher than the average starting salary for males.

In short, this analysis revealed very few significant differences at the detailed occupation level; however it should be kept in mind that statistical significance is harder to achieve in smaller sample sizes. In the cases where significant differences were observed, males working as nurses and primary school teachers earned higher average starting salaries than females. In spite of us using the most detailed occupational classifications available in the data, the nature of work performed in many of these occupations, including those with significant differences between men and women, could be quite wide-ranging. Thus, if available, further information regarding the specific duties performed within these occupations could assist in highlighting the gaps across comparable occupational roles. This analysis, which we acknowledge is somewhat limited in scope, has provided some evidence that the starting salaries of male and female graduates do not differ significantly at the detailed occupation level, which supports the view that the gender wage gap observed in our statistical analysis is related to female graduates being less likely to secure higher-paying roles, even within similar broad occupation areas.

Table 3: Differences in graduates' average annual starting salaries by detailed occupation and gender, 2013 ($,000)

	Average Annual Starting Salary							
	Men			Women			Difference	
Detailed Occupation	Mean	SD	n	Mean	SD	n	$, '000	Sig.
Accountants	50.1	10.2	248	48.4	9.7	295	1.7	
Registered Nurses	54.6	9.3	46	50.9	9.4	460	3.7	*
Primary School Teachers	57.7	7.2	38	54.5	10.6	336	3.2	*
Civil Engineering Professionals	63.4	12.5	225	62.4	10.7	69	1.0	
Secondary School Teachers	57.1	10.8	83	55.6	8.2	168	1.4	
Physiotherapists	56.3	11.4	73	55.7	8.7	152	0.6	
Pharmacists	40.3	8.6	57	40.6	10.2	131	-0.3	
Solicitors	60.0	11.2	70	58.6	11.9	115	1.4	
Industrial, Mechanical and Production Engineers	68.3	16.1	123	71.0	12.4	24	-2.6	
Generalist Medical Practitioners	60.8	10.3	67	60.7	7.9	77	0.1	
Sales Assistants (General)	37.4	9.8	41	36.5	10.5	95	0.9	
Other Engineering Professionals	63.6	12.6	94	59.0	10.2	24	4.6	
Software and Applications Programmers	57.9	11.7	101	54.5	8.6	16	3.4	
Management and Organisation Analysts	62.3	15.1	65	57.6	12.5	51	4.7	
Auditors, Company Secretaries and Corporate Treasurers	51.4	6.5	49	51.1	7.9	59	0.3	
Human Resource Professionals	49.3	9.3	12	51.8	11.2	92	-2.4	
Court and Legal Clerks	54.7	14.9	29	55.2	11.9	64	-0.5	
Medical Imaging Professionals	52.9	9.3	21	53.0	9.2	72	-0.1	
Public Relations Professionals	52.3	19.1	16	46.3	13.0	69	6.0	
Graphic and Web Designers, and Illustrators	41.7	11.4	26	40.5	10.8	53	1.3	
Medical Technicians	42.4	8.4	14	43.7	10.6	61	-1.3	
Journalists and Other Writers	44.1	9.9	20	41.2	7.5	55	2.9	
* = difference statistically significant at 5 per cent level. SD = standard deviation.								

5. Conclusions

A number of conclusions and recommendations can be drawn from this analysis.

Field of education characteristics assert considerable explanatory power on the starting salaries of recent graduates. Much of the gap in starting salaries between male and female graduates in Australia can be explained by differences in the choice of fields of education by men and women, which contributes toward occupational segregation in the labour force.

The inclusion of field of education controls in this analysis reduced the aggregate gender wage gap from 9.4 per cent to 4.7 per cent. The study has also found that, after further controlling for personal, enrolment and broad occupational characteristics of male and female graduates, a gender wage gap of 4.4 per cent remained unexplained by our data.

These results suggest that, if higher earnings are of importance to students, then the strategic selection of field of education at an earlier point in the graduates' education is likely to reward them with higher earnings in the graduate labour market. The 9.4 per cent aggregate gender wage gap could be narrowed if female students were given more information about career choices and opportunities in primary and secondary school, with encouragement to consider training for occupations that are often traditionally thought of as 'male' roles. From a policy standpoint, implementing education campaigns and programs that encourage the participation of women in STEM subjects (Science, Technology, Engineering and Mathematics) during secondary schooling could see the aggregate wage gap in favour of males reduced for future generations.

Considerations regarding the relative value placed on work done in female and male-dominated industries and roles could be another contributing factor to the overall 9.4 per cent aggregate wage gap, however, it cannot be measured by the data analysed in this paper.

The residual unexplained 4.4 per cent gap could be partly attributable to other differences between men and women not captured in our data and models. While these unobserved differences could potentially include gender differences in negotiating behaviour, they could also be explained by discriminatory practices within the workplace. Future research could take this into account. If true, this could be addressed by organisations implementing gender-neutral wage practices that ensure equal wage structures for males and females who work in comparable levels of employment, and training staff and managers on the issue of gender bias (WGEA 2014). However, the salaries paid for many graduate entry positions are fixed and often applicants are advised of these initial earnings levels early in the recruitment process, so opportunities for salary negotiation at this early career stage might be limited.

The unexplained gap could also be due to differences in the nature of work performed that are not captured by our fairly broad occupational control variables, as suggested by the results in Table 3. Further research, perhaps using a matching technique, might be able to clarify whether female graduates are actually earning less than male graduates, on average, for seemingly equivalent work.

Finally, other studies have concluded that the gender wage gap tends to widen with age. Finnie and Wannell (2004), for example, found that the gender wage gap for graduates narrowed two years after course completion, but widened two to five years out for all cohorts. The analysis undertaken in the current study is limited in that the GDS data relate exclusively to recent graduates at the beginning of their careers. This limitation may be addressed by future research based on longitudinal data such as those contained within the Beyond Graduation Survey[8], in order to determine whether the magnitude of the gender wage gap for recent Australian graduates fluctuates over time.

[8] Graduate Careers Australia's *Beyond Graduation Survey* investigates the activities and outcomes of graduates three and five years after course completion.

Appendix

Table 1a: Summary of dependent and explanatory variables for OLS regression models, by gender, 2013[¥†9]

Explanatory Variable	Male	Female	Total	Explanatory Variable	Male	Female	Total
Dependent variable				**State of employment**			
	53,424	48,622	50,390	NSW Capital	0.235	0.237	0.236
Variable of interest				NSW Regional	0.055	0.057	0.056
Female			0.621	VIC Capital	0.233	0.211	0.219
Omitted: Male			*0.379*	VIC Regional	0.029	0.043	0.038
				QLD Capital	0.130	0.114	0.120
Field of education				QLD Regional	0.065	0.073	0.070
Accounting	0.094	0.066	0.077	SA Capital	0.052	0.073	0.065
Agricultural Science	0.011	0.009	0.010	WA Capital	0.094	0.087	0.090
Architecture & Building	0.040	0.021	0.028	WA Regional	0.015	0.012	0.013
Art & Design	0.020	0.029	0.025	TAS Capital	0.008	0.007	0.007
Biological Sciences	0.031	0.044	0.039	TAS Regional	0.004	0.008	0.006
Computer Sciences	0.060	0.008	0.028	NT Capital	0.002	0.004	0.003
Dentistry	0.002	0.004	0.003	NT Regional	0.001	0.002	0.001
Earth Sciences	0.014	0.004	0.008	ACT	0.050	0.040	0.043
Economics & Business	0.216	0.188	0.198	*Omitted: Regional South Australia*	*0.028*	*0.035*	*0.032*
Education	0.035	0.109	0.081				
Engineering	0.246	0.037	0.116	**Employment characteristics**			
Law	0.024	0.034	0.030	Weekly working hours	40.400	38.931	39.481
Mathematics	0.010	0.003	0.006				
Medicine	0.023	0.020	0.021	**Other employment characteristics**			
Optometry	0.002	0.002	0.002	Small and medium enterprise	0.316	0.339	0.330
Paramedical Studies	0.063	0.210	0.154	*Omitted: large enterprise*	*0.684*	*0.661*	*0.670*
Pharmacy	0.022	0.030	0.027	Public/government sector	0.245	0.359	0.316
Physical Sciences	0.012	0.004	0.007	*Omitted: private/not for profit sector*	*0.755*	*0.641*	*0.684*
Psychology	0.011	0.033	0.024	Short-term contract	0.321	0.449	0.400
Social Sciences	0.006	0.013	0.011	*Omitted: permanent or open-ended contract*	*0.679*	*0.551*	*0.600*
Social Work	0.002	0.013	0.008	Field of study of limited importance	0.292	0.282	0.286
Veterinary Science	0.000	0.006	0.004	*Omitted: field of study important/formal requirement*	*0.708*	*0.718*	*0.714*
Omitted: Humanities	*0.057*	*0.116*	*0.139*	In full-time work in final year of study	0.182	0.112	0.139
				Omitted: not in full-time work in final year of study	*0.818*	*0.888*	*0.861*
Personal characteristics							
Disability	0.028	0.033	0.031	**Occupation**			
Omitted: No disability	*0.972*	*0.967*	*0.969*	Managers	0.063	0.046	0.053
Non-English speaking background	0.144	0.122	0.130	Professionals	0.731	0.705	0.715
Omitted: English speaking background	*0.856*	*0.878*	*0.870*	Technicians and Trades workers	0.038	0.029	0.032
				Clerical and administrative workers	0.092	0.137	0.120
Enrolment characteristics				Sales workers	0.036	0.036	0.036
Honours bachelor	0.099	0.074	0.084	Machinery operators and drivers	0.003	0.001	0.002
Omitted: pass bachelor	*0.901*	*0.926*	*0.916*	Labourers	0.014	0.005	0.008
Double degree	0.178	0.165	0.170	*Omitted: Community and personal service workers*	*0.023*	*0.042*	*0.035*
Omitted: single degree	*0.822*	*0.835*	*0.830*				

¥ The mean for the omitted variables are presented in italics.
† The mean of a dummy variable represents the proportion of cases which fall into that particular category.

[9] It is important to note that the summary of dependent and explanatory variables in Table 1a is presented in the mean and not the median.

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