

**A Technical Report on the  
Gender Wage Gap in the  
Australian Graduate Labour Market,  
2002–11**

*Prepared for*

**Office for Women;  
Department of Families, Housing,  
Community Services and Indigenous Affairs**

*By*



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## **Abstract**

The existence of a gender wage gap is widely documented in many labour markets. This technical report disaggregates graduate labour market data from the Australian Graduate Survey (AGS) and the Beyond Graduation Survey (BGS) to investigate the nature of the gender wage gap in the Australian graduate labour market over the decade 2002-11. As expected from prior research and a large body of anecdotal evidence, we find evidence of a gender wage gap favouring men in the Australian graduate labour market. An analysis of hourly wages suggests that this gap cannot easily be explained by men working longer hours than women. The extent of the gender wage gap varied greatly across fields of education. Within specific fields, the size of the gender wage gap remained fairly consistent across the decade under examination. Gender wage gaps were frequently observed for graduates at the bachelor degree, postgraduate certificate/diploma and master/PhD degree levels. Relatively smaller wage gaps were observed for graduates in part-time work, suggesting that women in the professional workforce are affected to a greater degree. In general, the wage gap that was observed for graduates shortly after course completion was still present three years later, which suggests that the gender wage gap cannot be considered a short-term phenomenon. An analysis of wage determinants suggests that men tend to enjoy a higher return to age (or potential experience) than women, which may be a contributing factor to these results. Additional survey questions added to the 2012 BGS may provide further evidence in future as to whether differences in pay-setting behaviour can be considered a contributing factor to the gender wage gap.

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## **1. Introduction**

### 1.1. Authorisation

This technical report has been prepared by Graduate Careers Australia (GCA) for the Office for Women (OFW) as an analysis of the gender wage gap in the Australian graduate labour market.

### 1.2. Purpose and scope

This report disaggregates graduate labour market data from the Australian Graduate Survey (AGS) and the Beyond Graduation Survey (BGS) to investigate the nature of the gender wage gap in the Australian graduate labour market, with particular focus on broad field of education. The AGS provides detailed information on the outcomes of recent higher education graduates, with responses collected around four months after course completion. The BGS provides a longitudinal perspective, surveying a subset of AGS respondents approximately three years after the completion of their studies to investigate how their outcomes have changed over time. These data sources are discussed in more detail in Section 2 of this report. This report addresses the following research questions:

Q1. Does a gender wage gap actually exist in the Australian graduate labour market?

Q2. What is the size of the gap at the aggregate level and within important population subgroups?

Q3. How much has the gap for new graduates varied over the decade to 2011?

Q4. If a gap is identified for new graduates, does it still exist three years into their careers?

### 1.3. Background

The existence of a gender wage gap is widely documented in many different labour markets, including Australia. In fact, Borland (1999), and Eastough and Miller (2004) note that for most of the 20th Century, industrial tribunals enforced a policy of wage discrimination against female workers. It was not until 1969 that the idea of “equal pay for equal work” was introduced to the Australian labour market through the Equal Pay Case (Baron and Cobb-Clark, 2008). In the years since, however, many studies have continued to identify substantial differences in wages between men and women who are

performing similar jobs. Cassells, Vidyattama, Miranti and McNamara (2009), for example, found that men tend to earn around 11% more than women, on average. They found the key drivers of this result to be industrial segregation, differences in labour force history between men and women, under-representation of women with vocational qualifications and under-representation of women in large firms. Using data from the mid-1990s, Daly, Kawaguchi, Meng and Mumford (2006) found that the average Australian woman received 90% of the average Australian man's earnings, which was less than comparative wage gaps in the labour markets of France, Japan and Britain. They also found that men received a larger premium for post-secondary qualifications than did women, and that employer size was a contributing factor to this wage gap. Baron and Cobb-Clark (2008), using more recent data, found that while men earned higher wages than women at all points of the wage distribution, the gap is largest amongst high earners, especially in the private sector. They concluded that demographics and education have no statistically significant effect on the gender wage gap throughout the wage distribution, but that differences in experience between men and women account for around a third of the gender wage gap at the midpoint of the wage distribution. In a large review of Australian gender wage gap studies from the 1990s, Langford (1995) concluded that roughly half of the gender wage gap can be attributed each to discrimination and productivity differences between men and women. Concerning the impact of tertiary education, he noted that women were disadvantaged by not taking education in the physical trades and sciences. Watson (2010), studying the gender wage gap for Australian managerial workers, concluded that full-time employed women earned about 27% less than comparable men. He noted that between 65-90% of this differential cannot be explained by the characteristics of the workers and is possibly due to discrimination in the labour market. Focusing on recent higher education graduates, Birch, Li and Miller (2009) identified a number of differences between men and women in terms of the factors that influence earnings, including age (a flatter earnings-age profile for women), part-time and external student status (the positive effect of each is smaller for women), and graduation from the creative arts field (women fare relatively worse). Moreover, they indicated that there were statistically significant gender wage differences across a range of occupational characteristics, but provided no further details in this regard in their discussion

of results. Cassells et al. (2009), Borland (1999) and Langford (1995) ably survey much of the extant Australian gender wage gap literature.

While these studies are difficult to directly compare due to differences in survey populations, time periods under review and methodological approaches, we feel that there is sufficient evidence of a gender wage gap to warrant a detailed investigation in the context of the Australian graduate labour market. To account for gender-based study field segregation alluded to by Langford (1995), much of our descriptive analysis is stratified by broad field of education.

#### 1.4. Report structure

The rest of this report is organised as follows. Section 2 provides a comprehensive overview of our data sources. Section 3 gives detailed information on the gender wage gap for bachelor degree graduates, while Section 4 presents the same for postgraduates. Section 5 concludes. References and appendices are included at the end of this report.

## 2. Data Sources

### 2.1. Australian Graduate Survey

Since 1974, graduates from Australian higher education institutions have been invited to participate in a nationally-representative census-style survey of their labour market outcomes and further study activities approximately four months after course completion. The AGS is the current incarnation of this national survey. To accommodate the fact that most Australian higher education providers have two major graduation rounds in a given year, graduates who complete their studies in the first half of the year are surveyed in October, while graduates who complete their studies in the second half of the year are surveyed in April of the following year. Data are gathered by online and paper survey, and computer-assisted telephone interview. While non-response to the survey averaged 44% over the decade to 2011, various non-responder studies (e.g. Coates et al., 2006; Guthrie and Johnson, 1997) have established that the survey is not subject to problematic non-response bias.

We created two analysis data sets for this study into the gender wage gap. The first is a ten-year pooled data set that contains observations on domestic graduates in paid work in Australia at the time of the AGS. This data set spans the years 2002-11. Prior to analysis, we removed from this data set any respondents who did not indicate their field of education, degree level and work type (i.e. full-time or part-time). We also excluded respondents with wage outliers so as to avoid any skewing of the data. In line with standard GCA practice, for full-time employed graduates this involved the removal of all wage observations below a fixed threshold, and the top 3% of cases in the wage distribution. For part-time graduates, which saw a relatively greater proportion of unrealistically low and high wage observations,<sup>1</sup> we removed the top and bottom 5% of cases in the wage distribution following visual and statistical inspection of the survey data. Table 1 gives an overview of response to the AGS over the decade in question, and lists the number of usable cases in the data set following the exclusions noted above. Tables 2 and 3 present descriptive statistics for the pooled AGS sample, stratified by gender and degree level. We have combined master coursework graduates and higher degree research

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<sup>1</sup> This may be an artefact of salary item on the AGS, which asks respondents to give a yearly figure. This type of item is clearly more appropriate for an investigation of full-time wages. As such, readers are advised to interpret part-time wage figures presented in this report with due caution.



graduates into a single category labelled “master degree/PhD” to avoid overly low cell sizes. We do not believe that this will impact our findings. The summary statistics presented in Table 3 provide our first evidence of a gender wage gap in the Australian graduate labour market. Overall, female bachelor degree graduates earn 87% of the mean salary of male bachelor degree graduates. For postgraduate certificate/diploma and master degree/PhD graduates the corresponding figures are 80% and 85%, respectively. When interpreting these findings, it is important to bear in mind that female graduates are more likely to be in part-time employment (see Table 2), which might contribute to this wage gap. To address this, we focus primarily on full-time employed graduates in our analysis, since full-time employment remains the most likely destination for recent graduates of both genders.

**Table 1.**

*Summary of response to the AGS, 2002-11*

Survey year	Population (n)	Total responses (n)	Response rate (%)	Usable responses <sup>a</sup> (n)
2002	173,083	95,630	55.3	47,724
2003	189,775	107,436	56.6	51,262
2004	195,263	108,824	55.7	55,422
2005	191,998	107,385	55.9	56,843
2006	198,607	111,997	56.4	59,786
2007	199,111	113,059	56.8	59,671
2008	205,049	115,494	56.3	62,615
2009	211,825	118,006	55.7	62,983
2010	215,685	121,676	56.4	62,315
2011	231,858	134,388	58.0	66,782
Pooled	2,012,254	1,133,895	56.3	585,403

<sup>a</sup> Cases retained in the final analysis sample.

The second data set spans the years 2008-2011, and has been created to investigate the gender wage gap within important subgroups within the overall sample. We have chosen these four years on the basis of the fact that the AGS questionnaire remained consistent over this period. To account for hours worked as a potential driver of the gender wage gap, this data set considers graduates’ hourly wages instead of their annual salaries. We computed individual hourly wages from the AGS data by dividing reported annual salary figures by 52 to arrive at an approximate weekly figure, which was then divided by reported weekly working hours. All pre-2011 figures are converted to 2011 dollars

using the Consumer Price Index. Because this calculation is clearly more appropriate for graduates in full-time work, we have restricted this second data set to full-time employed graduates. Respondents with missing data on any variable of interest are excluded from the final analysis sample.

**Table 2.**

*Summary statistics (% , n) for the pooled AGS sample, 2002-11*

Cohort	Bachelor degree		Postgraduate certificate/diploma		Master degree/PhD	
	%	n	%	n	%	n
<b>Male</b>						
<u>Broad field of education</u>						
Natural and physical sciences	8.0	11,804	3.0	948	6.7	2,844
Information technology	8.4	12,469	5.5	1,701	7.9	3,376
Engineering and related tech.	13.6	20,167	4.1	1,272	8.6	3,654
Architecture and building	3.8	5,589	2.5	778	2.7	1,155
Agriculture and environment	2.6	3,840	1.7	528	2.4	1,002
Medicine and related	9.1	13,447	7.5	2,344	7.2	3,076
Nursing	2.1	3,134	2.9	905	1.1	457
Education	6.7	9,852	23.9	7,454	9.2	3,932
Management and commerce	23.8	35,194	29.5	9,187	35.8	15,261
Law	3.5	5,145	5.2	1,623	3.4	1,461
Society and culture	12.7	18,831	11.7	3,644	12.0	5,095
Creative arts	5.6	8,316	2.4	761	3.0	1,281
<u>Work status</u>						
Full-time work	75.6	111,732	88.6	27,584	88.9	37,853
Part-time work	24.4	36,056	11.4	3,561	11.1	4,741
<b>Female</b>						
<u>Broad field of education</u>						
Natural and physical sciences	7.0	17,602	2.1	1,288	5.3	2,875
Information technology	1.5	3,736	1.3	803	2.0	1,058
Engineering and related tech.	1.6	4,055	0.5	307	1.7	910
Architecture and building	1.6	4,064	1.0	574	1.8	986
Agriculture and environment	1.6	4,026	0.9	549	2.1	1,148
Medicine and related	12.1	30,103	8.9	5,375	13.3	7,190
Nursing	10.4	25,918	15.4	9,273	5.2	2,806
Education	14.9	37,282	31.5	18,948	19.1	10,315
Management and commerce	18.7	46,600	15.0	9,020	22.9	12,356
Law	3.4	8,439	4.1	2,487	3.2	1,700
Society and culture	19.5	48,622	15.7	9,444	19.2	10,366
Creative arts	7.7	19,351	3.4	2,055	4.2	2,245
<u>Work status</u>						
Full-time work	69.6	173,745	73.6	44,247	79.7	42,988
Part-time work	30.4	76,053	26.4	15,876	20.3	10,967

Sample means for this data set are presented in Table A1 (pp. 47-48). All variables except for “hourly wage in logarithmic form”, “hourly wage” and “age in years” have been dummy coded as discrete (0/1) variables for analytical reasons. The mean of such a variable is simply the proportion of respondents that fall into that particular category. For example, the mean of 0.059 on the “Natural and physical sciences” variable for male bachelor degree graduates indicates that roughly 6% of graduates in that subsample graduated from the field of natural and physical sciences. The mean of a continuous variable, such as age in years, is simply the (conventional) average of that variable. The interpretation of regression models is outlined later in this report.

**Table 3.**

*Summary statistics (X, n) for the pooled AGS sample, 2002-11<sup>a</sup>*

Characteristic	Bachelor degree		Postgraduate certificate/diploma		Master degree/PhD	
	X	n	X	n	X	n
<b>Male</b>						
Age in years	26	147,702	37	31,120	36	42,555
Annual salary (\$)	41,574	147,788	62,297	31,145	66,750	42,594
<b>Female</b>						
Age in years	26	249,675	35	60,071	36	53,908
Annual salary (\$)	36,279	249,798	49,675	60,123	56,645	53,955

<sup>a</sup> X denotes the mean.

## 2.2. Beyond Graduation Survey

The BGS is a cohort-style follow-up to the AGS. The 2011 BGS, which we utilise for our analysis, invited graduates who completed the 2008 AGS to respond to a survey on their work and study activities in the three years following course completion. The majority of the higher education institutions that participated in the 2008 AGS also participated in the 2011 BGS, thus ensuring a large, nationally-representative sample from a wide range of institutions. Graduates were invited to respond to the survey by email. Graduates who completed the 2008 AGS were asked at the time to supply a long-term email address as a means of facilitating follow-up research, which was used by GCA as the primary means of inviting graduates to participate in the 2011 BGS. The survey response rate was approximately 17%, and the sample of secured responses was established as being representative of

the overall graduate population (GCA, 2012). As with our pooled AGS sample, we excluded full-time salary figures below a fixed threshold, and the top 3% of cases in the wage distribution. Respondents who failed to provide valid information on their field of study and degree level were excluded from the analysis sample. As before, Tables 4 and 5 present descriptive statistics for the 2011 BGS analysis sample, stratified by gender and degree level. Because of the smaller response numbers for the BGS, we have needed to further aggregate the postgraduate certificate/diploma and master degree/PhD degree levels into a single degree level for postgraduates. The summary statistics presented in Table 5 suggest that the gender wage gap is, at an overall level, relatively stable over time. Female bachelor degree graduates in full-time work earn 87% of the mean salary of comparable male graduates after course completion and 88% three years into their careers. The corresponding figures are 84% and 86% for female postgraduates.

### 2.3. Analytical considerations

Although the AGS and BGS are notionally administered as national graduate censuses, the extent of non-response to each survey means that it is reasonable to use statistical methods to analyse the secured responses. To this end, figures comparing the mean salaries of men and women include bars representing the 95% uncertainty interval, which have been calculated as 1.96 times the standard error. Because the sample of AGS responses represents a large proportion of the graduate population, we have adjusted the standard errors by a finite population correction factor, or *fpc*. We calculate the *fpc* as  $(1-f)$ , where  $f$  is the response fraction. In the case of the AGS data, applying the *fpc* reduces the magnitude of the standard errors by around a third, and hence increases the contrast between the point estimates. Because the sample of secured BGS responses represents a much smaller proportion of the survey population, the impact of the *fpc* is negligible. A similar correction has also been applied when calculating *t*-statistics. Simply put, overlapping error bars infer no statistically significant difference in mean wages between men and women. In tables, statistically significant differences are indicated with asterisks.

**Table 4.***Summary statistics (% , n) for the 2011 BGS sample*

Cohort	Bachelor degree				Postgraduate degree			
	2008		2011		2008		2011	
	%	n	%	n	%	n	%	n
<b>Male</b>								
Natural and physical sciences	6.0	75	7.6	100	6.4	55	6.4	50
Information technology	10.9	136	10.9	143	7.1	61	7.5	59
Engineering and related tech.	17.5	218	15.7	205	8.6	74	8.7	68
Architecture and building	2.6	33	2.6	34	1.5	13	1.4	11
Agriculture and environment	2.3	29	2.5	33	1.4	12	1.8	14
Medicine and related	8.1	101	7.3	95	7.0	60	6.2	49
Nursing	1.8	22	1.3	17	1.6	14	1.8	14
Education	6.1	76	6.0	78	13.2	114	13.8	108
Management and commerce	24.6	307	23.0	301	32.4	279	32.4	254
Law	3.0	37	3.1	40	4.3	37	3.9	31
Society and culture	13.6	170	15.8	207	14.6	126	13.2	104
Creative arts	3.5	44	4.3	56	2.0	17	2.9	23
<b>Female</b>								
Natural and physical sciences	7.1	150	8.8	205	5.3	63	5.7	60
Information technology	1.1	24	1.2	28	1.8	22	2.1	22
Engineering and related tech.	2.7	57	2.5	58	1.3	16	1.4	15
Architecture and building	1.8	37	2.0	47	1.0	12	0.8	8
Agriculture and environment	1.3	28	1.6	38	1.6	19	2.1	22
Medicine and related	15.0	315	12.7	297	12.2	146	12.3	130
Nursing	8.9	187	6.5	152	5.4	65	4.4	46
Education	12.9	272	12.5	292	23.2	278	23.4	247
Management and commerce	17.5	368	16.3	381	20.1	240	17.8	188
Law	3.4	72	3.3	77	5.5	66	4.6	49
Society and culture	21.0	441	23.6	551	18.7	224	21.1	223
Creative arts	7.1	150	9.0	211	3.8	46	4.3	45

Statistical significance should not be confused with the common meaning of significance (i.e. important or notable). Being statistically significant does not necessarily make a difference important or notable. It simply means that any difference can be reliably inferred to exist in the overall graduate population. For instance, a difference in hourly wages of 10 cents is hardly notable in economic terms, but it can still be statistically significant if there is adequate evidence to suggest that the difference is not merely due to sampling error. Conversely, a difference of ten dollars may be a notable finding, but if there is insufficient evidence to conclude that it is not merely the result of sampling error then it will not be a statistically significant one. It is arguable, however, that the magnitude of an effect is at least

as important as the statistical significance of the effect, because statistical significance is affected by sample size. It is easier to achieve significance in larger samples, such as our pooled AGS samples, than smaller samples, such as our 2011 BGS sample. The same is true for small versus large fields of education. Consequently, the magnitude of a result should be considered in addition to whether that result is statistically significant.

**Table 5.**

*Summary statistics ( $X, n$ ) for the 2011 BGS sample<sup>a</sup>*

Cohort	Bachelor degree				Postgraduate degree			
	2008		2011		2008		2011	
	X	n	X	n	X	n	X	n
	<b>Male</b>							
Age in years	27	1,248	29	1,309	37	864	39	787
Annual salary (\$)	53,423	1,248	74,130	1,309	75,288	865	93,273	788
	<b>Female</b>							
Age in years	26	2,102	29	2,337	36	1,197	38	1,057
Annual salary (\$)	46,609	2,102	64,985	2,338	63,168	1,199	80,011	1,057

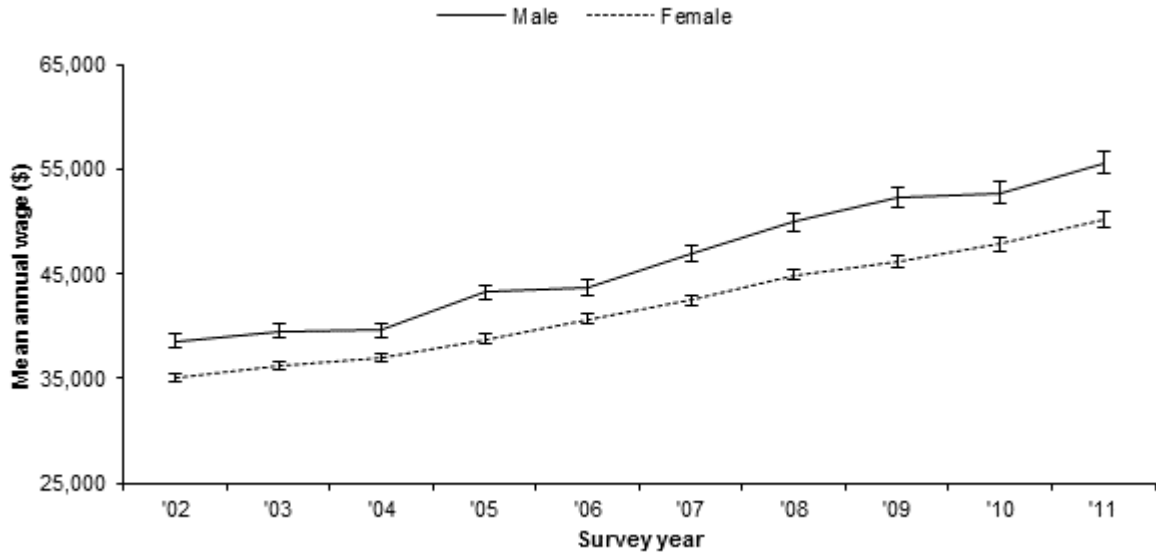
<sup>a</sup>  $X$  denotes the mean.

### **3. Results for Bachelor Degree Graduates**

#### 3.1. Time-series results

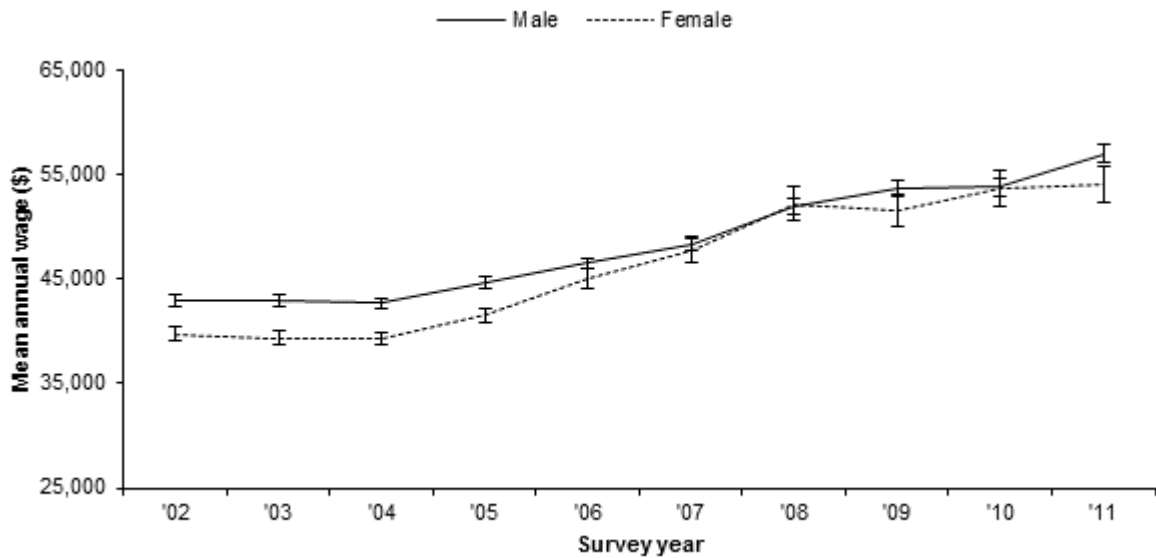
Figures 1 to 12 plot mean annual earnings for full-time employed bachelor degree graduates from the 12 broad fields of education under consideration in this report. Aside from the information technology field (Figure 2), all other fields exhibited clear and persistent gender wage differences favouring men. (Recall from our discussion in Section 2.3 that the difference between means in a given year can be considered statistically significant at the 95% confidence level if the uncertainty intervals do not overlap.) Statistical significance aside, information technology also recorded the smallest wage gap in terms of magnitude over the decade under examination, on average, although this did tend to vary. Relatively small wage gaps over the decade were also observed for the broad fields of engineering and related technologies, nursing, creative arts and education; however all were statistically significant. The largest wage gap was observed for architecture and building graduates, which saw women earn 84% of the comparable male wage over the decade under examination, on average.

Much of our analysis focuses on full-time employed graduates for two reasons. First, the full-time labour force is, by far, the most common employment destination for graduates of both genders (see Table 2). Second, the annual salary data collected on the AGS (and BGS) are better suited to an analysis of full-time earnings. This view is apparently supported by the relatively large proportion of extreme salary observations given by graduates in part-time employment, as previously discussed in Section 2.1. In the interest of completeness, however, we present equivalent data for bachelor degree graduates in part-time employment in Figures A1 to A12 in Appendix A. In general, the statistically significant wage gaps favouring men observed in the full-time graduate labour market do not appear in the part-time labour market for recent bachelor degree graduates. In the majority of cases, the wide uncertainty intervals imply considerable variability in wages in our relatively small sample of part-time workers.



**Figure 1. Natural and Physical Sciences**

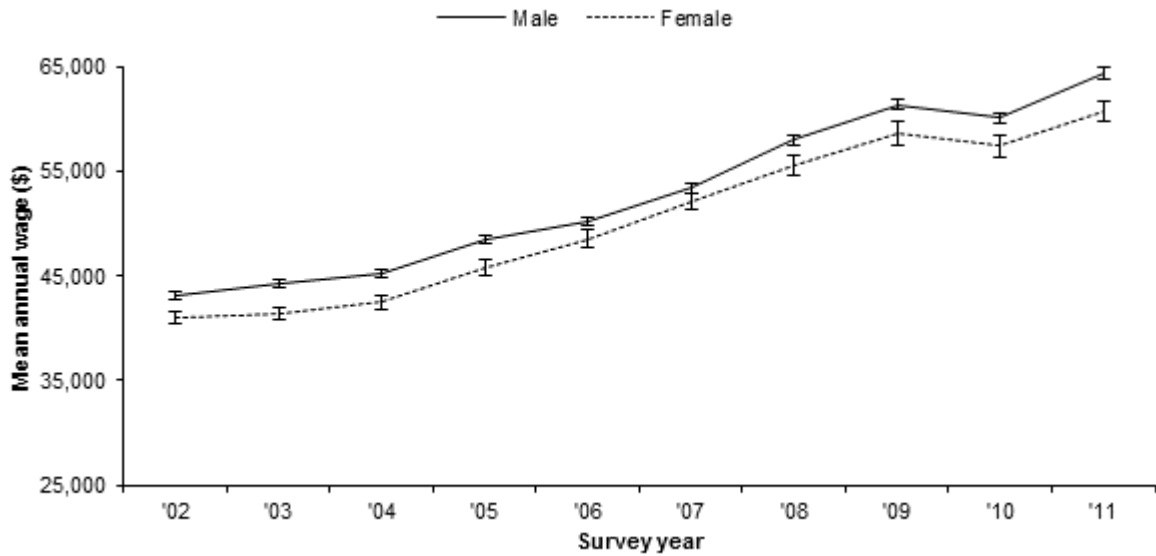
*Gender-specific mean annual earnings for full-time employed graduates from the Natural and Physical Sciences broad field of education (bachelor graduates)*



**Figure 2. Information Technology**

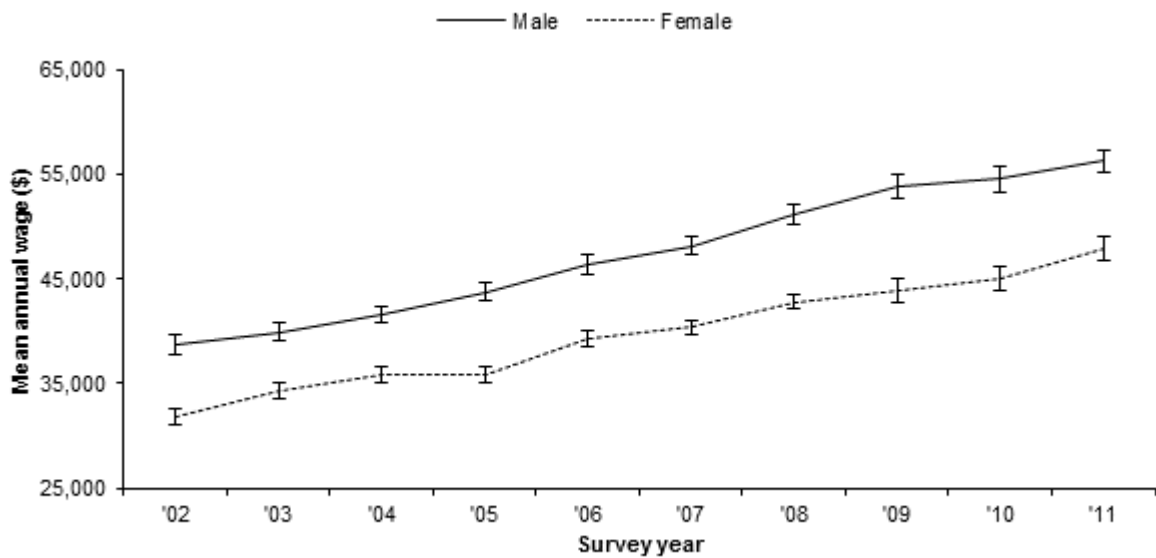
*Gender-specific mean annual earnings for full-time employed graduates from the Information Technology broad field of education (bachelor graduates)*





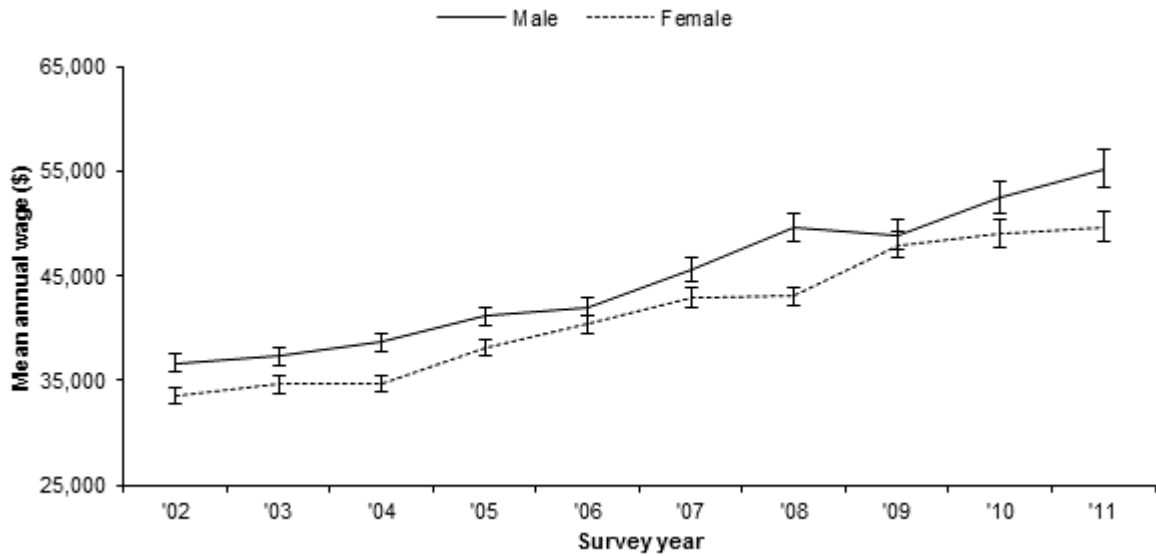
**Figure 3. Engineering and Related Technologies**

*Gender-specific mean annual earnings for full-time employed graduates from the Engineering and Related Technologies broad field of education (bachelor graduates)*



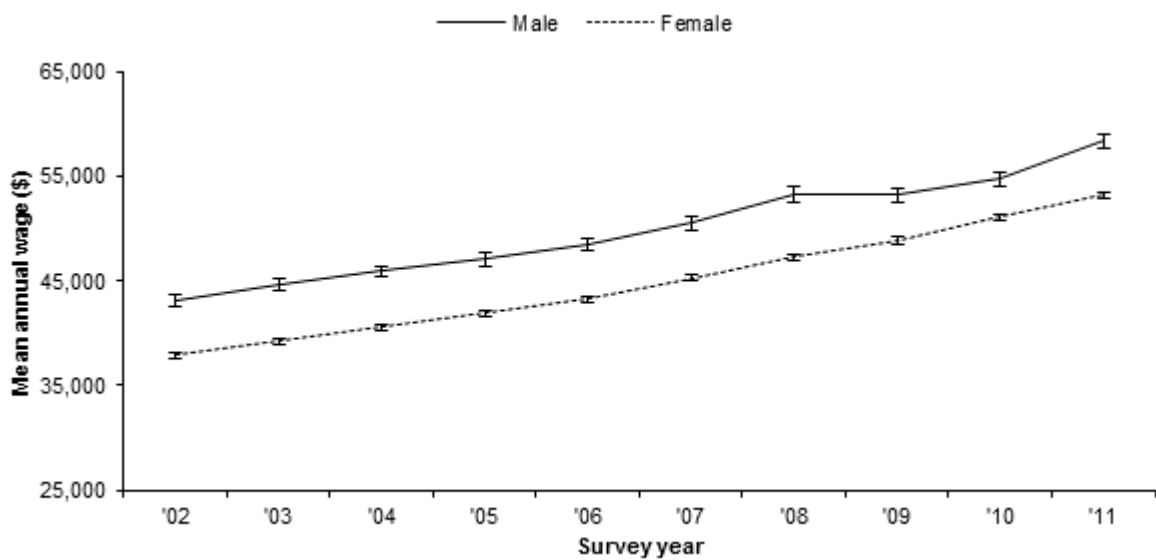
**Figure 4. Architecture and Building**

*Gender-specific mean annual earnings for full-time employed graduates from the Architecture and Building broad field of education (bachelor graduates)*



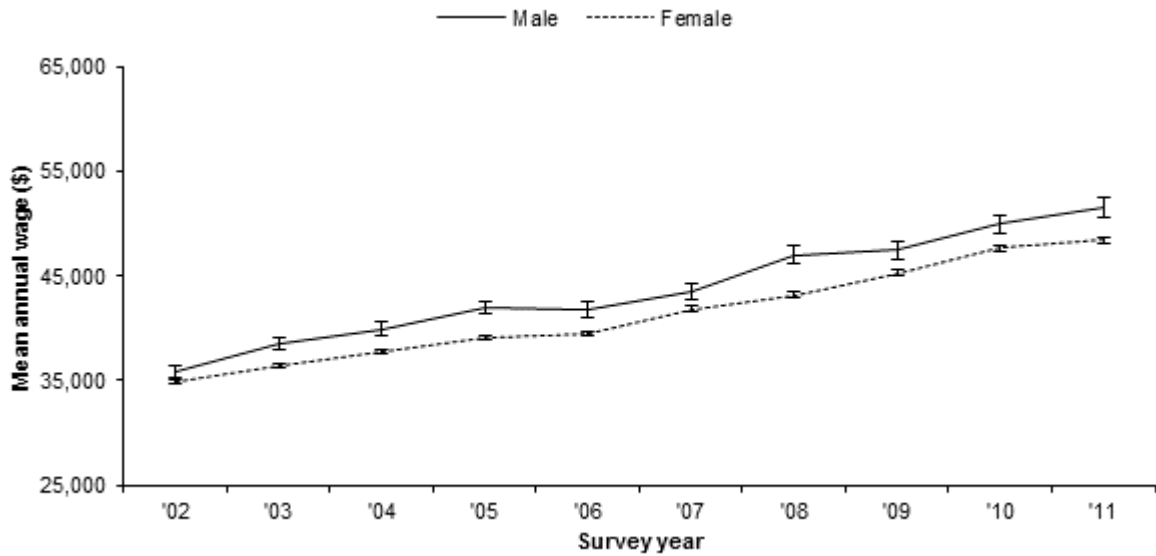
**Figure 5. Agriculture and Environment**

*Gender-specific mean annual earnings for full-time employed graduates from the Agriculture and Environment broad field of education (bachelor graduates)*



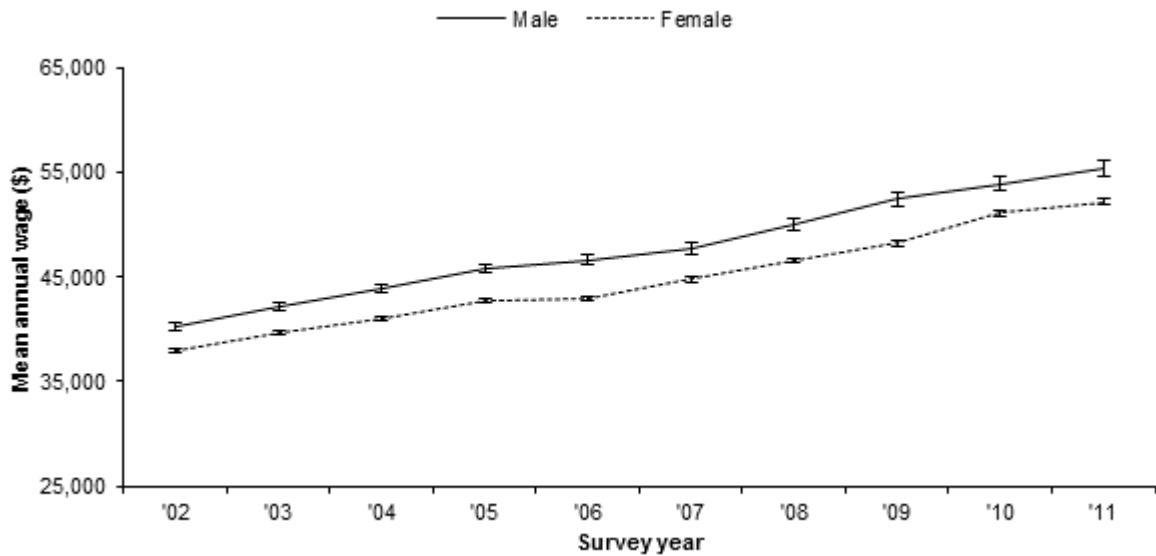
**Figure 6. Medicine and Related**

*Gender-specific mean annual earnings for full-time employed graduates from the Medicine and Related broad field of education (bachelor graduates)*



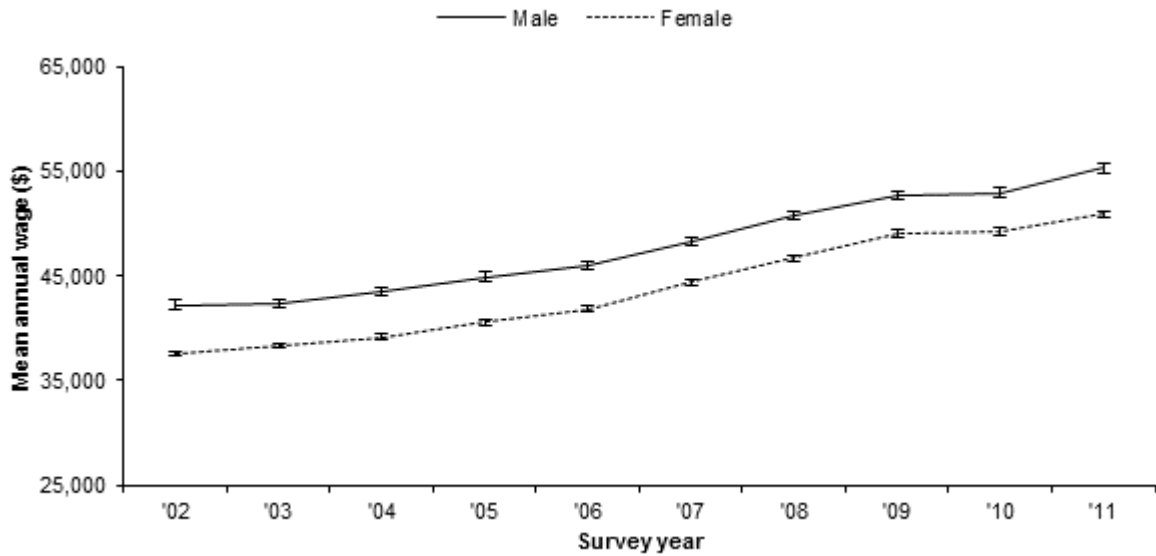
**Figure 7. Nursing**

*Gender-specific mean annual earnings for full-time employed graduates from the Nursing broad field of education (bachelor graduates)*



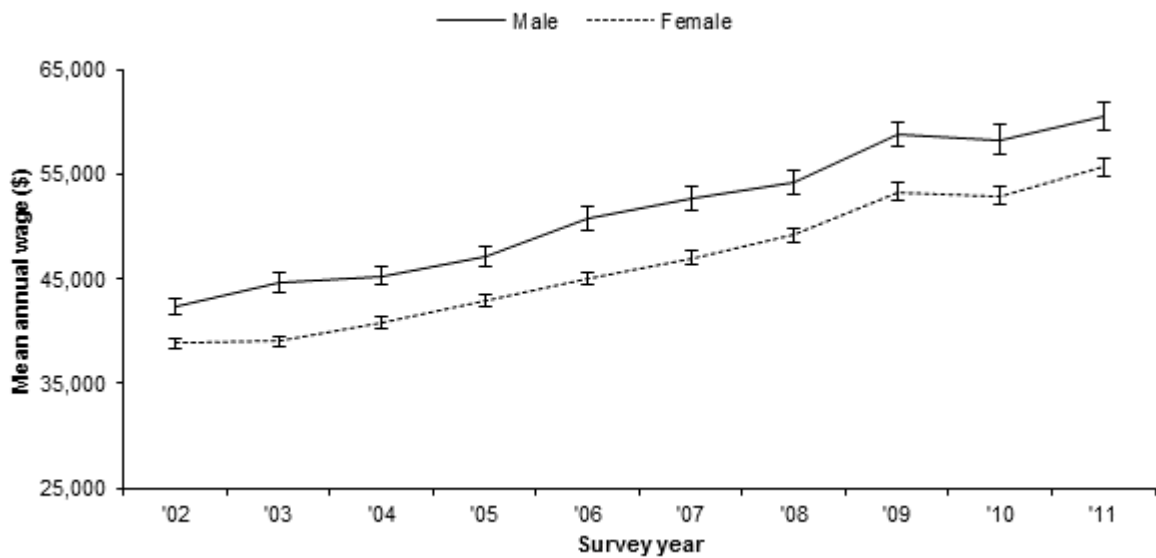
**Figure 8. Education**

*Gender-specific mean annual earnings for full-time employed graduates from the Education broad field of education (bachelor graduates)*



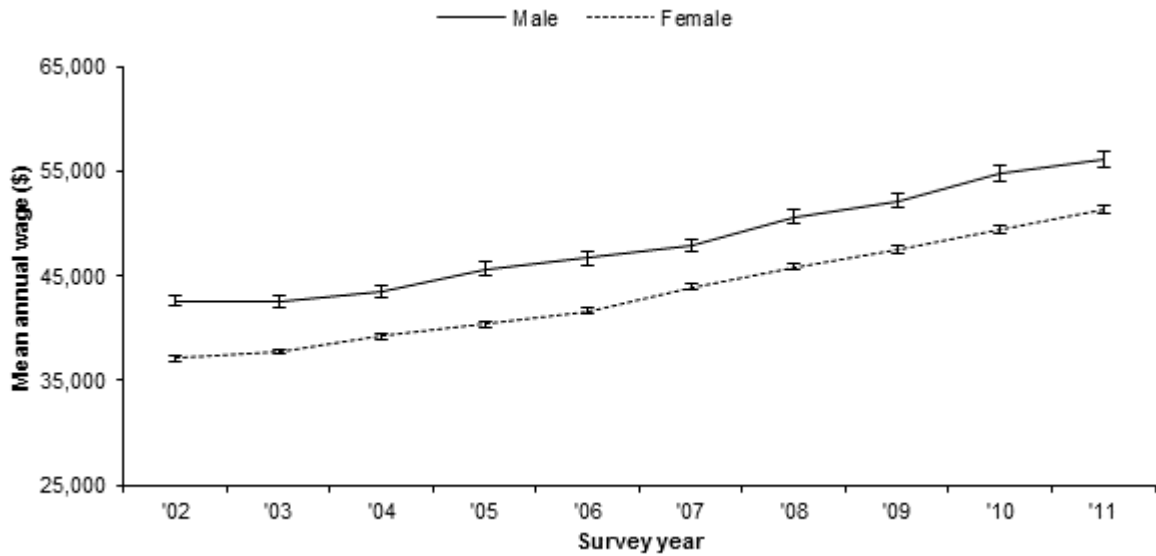
**Figure 9. Management and Commerce**

*Gender-specific mean annual earnings for full-time employed graduates from the Management and Commerce broad field of education (bachelor graduates)*



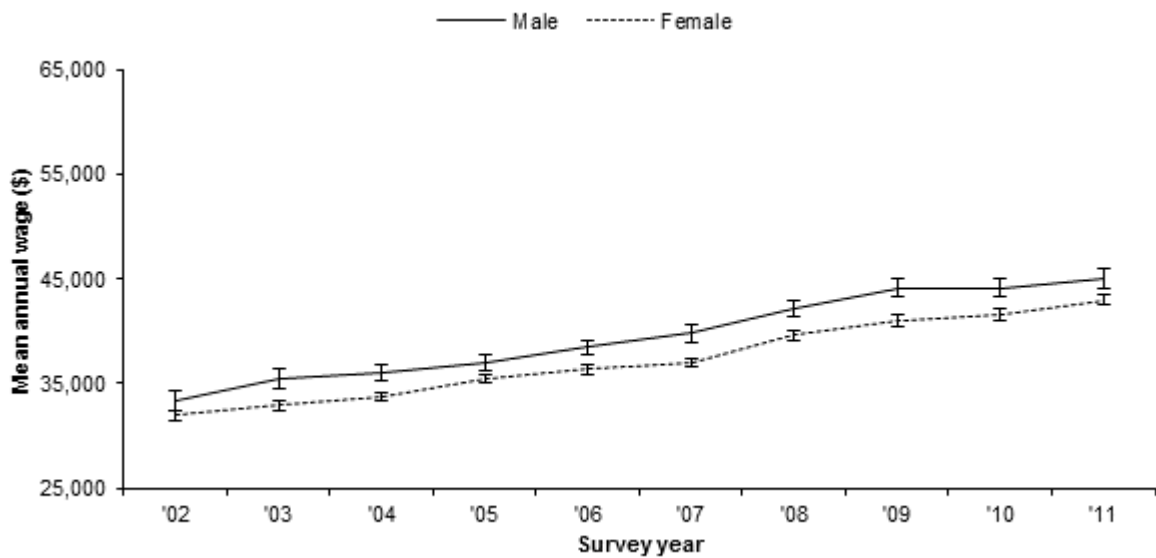
**Figure 10. Law**

*Gender-specific mean annual earnings for full-time employed graduates from the Law broad field of education (bachelor graduates)*



**Figure 11. Society and Culture**

*Gender-specific mean annual earnings for full-time employed graduates from the Society and Culture broad field of education (bachelor graduates)*



**Figure 12. Creative Arts**

*Gender-specific mean annual earnings for full-time employed graduates from the Creative Arts broad field of education (bachelor graduates)*

The only field that saw a consistent pay advantage for part-time employed male graduates was education. In fact, female graduates from the fields of medicine and law earned higher average wages than their male counterparts for much of the decade under review; however, as noted before, few of these differences were statistically significant. These findings suggest that the gender wage gap tends to mainly affect female graduates in the full-time professional workforce.

### 3.2. Differences within groups

Table 6 considers the gender wage gap with regard to important subgroups. This analysis is based on our second data set, which pools data for 2008 to 2011 (for consistent variable definitions) and uses hourly wage instead of annual salary as a measure of graduate earnings. Considering first broad field of education, we see a highly similar trend to that illustrated in Figures 1 to 12. Only the field of information technology did not record a statistically significant gender wage gap and, while the difference in mean hourly wages for men and women from this field is small and not statistically significant, it still favours men. The largest gender wage gap in both nominal and percentage terms was observed for graduates from the field of architecture and building: \$2.97 per hour, which equates to 13.1% by dividing the nominal difference by the female mean hourly wage. We can conclude from this result that the gender wage gap previously observed in our time-series cannot be easily attributed to men working longer hours.

Statistically significant gender wage gaps were observed for every occupational category save machinery operators and drivers, which, as noted earlier, is likely an artefact of the small number of graduates employed within this category. As with broad field of education, all of the observed wage gaps favoured men. The largest wage gaps were observed for graduates employed as community and personal service workers, and technicians and trades workers. The smallest wage gap was recorded for graduates employed as clerical and administrative workers, although this gap was still equivalent to \$1.48 per hour or 6.4% of the mean hourly wage for women in that occupational category.

An altogether similar story was observed with regard to industry of employment. The only industry that saw a gender wage gap favouring women was agriculture, forestry and fishing, but that gap was small (\$0.26 per hour or 1.2%) and not statistically significant. All other industries recorded

statistically significant wage gaps favouring men. The largest gaps in nominal terms were observed in mining, information media and telecommunications, and manufacturing, whereas the smallest were in education and training, and other services. Percentage differences yield similar findings.

**Table 6.**

*Gender-specific mean hourly wages for full-time employed bachelor degree graduates, by broad field of education, occupation, and industry of employment<sup>a</sup>*

Cohort	Male		Female		Difference		
	X	SD	X	SD	\$	%	
<u>Broad field of education</u>							
Natural and physical sciences	25.99	8.32	24.17	6.71	1.82	7.52	**
Information technology	27.35	8.44	27.06	7.86	0.29	1.08	
Engineering and related tech.	29.64	7.60	28.82	6.37	0.82	2.83	**
Architecture and building	25.73	8.25	22.76	6.61	2.97	13.06	**
Agriculture and environment	25.29	8.19	23.94	7.12	1.35	5.65	**
Medicine and related	26.21	8.50	24.86	6.96	1.35	5.41	**
Nursing	25.07	5.65	23.76	5.36	1.31	5.53	**
Education	26.43	6.92	24.93	5.88	1.51	6.04	**
Management and commerce	25.84	8.26	24.62	7.26	1.22	4.98	**
Law	27.91	9.52	25.98	7.73	1.93	7.42	**
Society and culture	26.66	9.04	24.93	7.17	1.73	6.93	**
Creative arts	22.10	7.04	21.01	6.32	1.10	5.22	**
<u>Occupation</u>							
Managers	30.21	11.36	27.39	10.29	2.83	10.33	**
Professionals	27.07	7.71	24.98	6.29	2.10	8.40	**
Technicians and trades workers	24.67	7.96	21.62	6.68	3.05	14.13	**
Community and personal service workers	26.63	10.02	23.28	7.97	3.35	14.37	**
Clerical and administrative workers	24.68	7.28	23.19	6.43	1.48	6.39	**
Sales workers	20.78	6.81	18.97	5.59	1.80	9.51	**
Machinery operators and drivers	23.31	10.21	20.99	9.22	2.32	11.04	
Labourers	21.08	8.17	19.05	6.62	2.02	10.61	**
<u>Industry</u>							
Agriculture, forestry and fishing	22.47	7.92	22.73	7.08	-0.26	-1.15	
Mining	35.92	8.88	32.40	8.61	3.52	10.87	**
Manufacturing	27.86	8.68	24.77	7.66	3.10	12.51	**
Electricity, gas and water supply	32.39	8.61	29.60	8.03	2.79	9.43	**
Construction	27.19	8.04	25.47	7.16	1.72	6.75	**
Wholesale trade	24.47	9.07	23.06	6.66	1.41	6.10	**
Retail trade	21.12	6.99	19.39	5.82	1.73	8.95	**
Accommodation and food services	20.43	6.21	18.89	5.83	1.54	8.15	**
Transport, postal and warehousing	28.60	10.26	26.18	8.15	2.43	9.27	**

Cohort	Male		Female		Difference		
	X	SD	X	SD	\$	%	
Information media and telecommunications	25.14	8.76	21.80	6.81	3.33	15.29	**
Financial and insurance services	27.65	8.32	26.14	7.30	1.52	5.80	**
Rental, hiring and real estate services	24.54	8.44	22.79	7.69	1.74	7.65	**
Professional, scientific and technical services	25.73	7.19	23.47	6.10	2.26	9.65	**
Administrative and support services	23.02	7.48	21.73	6.19	1.29	5.94	**
Public administration and safety	29.97	8.09	28.24	7.19	1.73	6.14	**
Education and training	26.25	7.28	25.23	6.02	1.03	4.07	**
Health care and social assistance	26.76	7.84	24.79	6.25	1.97	7.93	**
Arts and recreation services	23.01	7.94	20.89	6.19	2.12	10.15	**
Other services	23.40	7.65	22.63	6.71	0.77	3.42	*

<sup>a</sup> X denotes the mean. SD denotes the standard deviation.

\* significant at 5%; \*\* significant at 1%

To obtain a better understanding of some of the factors that may be driving these results, we estimate a simple log earnings function separately for men and women using ordinary least squares (OLS) regression. The dependent variable in this analysis is hourly wage, as defined previously. The results from these model can be interpreted as percentage differences. In the case of age, the results are equivalent to the percentage difference associated with a one-unit (i.e. year) change. In the case of the remaining categorical independent variables, the results are equivalent to percentage differences relative to the omitted reference categories. For example, an estimate of 0.0476 associated with the categorical “Government job” variable means that graduates working in government jobs earn around 4.8% more per hour, on average, than similar graduates in non-government jobs. We control for broad field of education, occupation and industry in these models, but do not report the estimates. Table 7 presents the results for these models. The “Difference” column shows the extent to which the relative returns to a particular variable differ between male and female graduates in full-time work.

Age, which may also be considered to be a proxy for potential labour market experience, is a strong wage determinant for both male and female graduates. The positive association between age and earnings suggests that previous experience translates into higher earnings; however the negative coefficient on the age squared variable suggests that marginal returns to age fall as age increases. The average return to a year of age is greater for men than women, even after statistically controlling for an extensive set of observed characteristics. This may reflect discrimination against women, in terms



of their ability to secure promotions and pay rises. It could also be the result of some women spending less time in the workforce due to pregnancy and childcare. Because the AGS does not capture data on actual work experience or family structure, we cannot be any more specific. Male graduates enjoyed a higher rate of return to off-campus study than their female counterparts, but were at a greater relative earnings disadvantage as a result of being in temporary (non-permanent) employment. Both male and female graduates enjoyed similar returns to completing a bachelor degree with honours, undertaking their study on a part-time basis, and working in a government job. The R-squared values suggest that our models explain roughly 29% of the variance in hourly wages for male graduates and 23% of the same for females graduates. Hence, there are clearly other factors beyond those that we observe that influence the earnings of graduates in full-time work. It is important to note that our methodology is unable to control for unobserved effects (e.g. innate ability, workplace discrimination), which may be correlated with the independent variables. Our results should be interpreted accordingly.

**Table 7.**

*Estimates of the factors influencing bachelor degree graduates' hourly wages<sup>ab</sup>*

Variable	Male		Female		Difference
	B	SE	B	SE	
<u>Personal and other enrolment characteristics</u>					
Age in years	0.0195 **	0.001	0.0134 **	0.000	0.0061 **
Age in years squared/100	-0.0335 **	0.002	-0.0259 **	0.001	-0.0076 **
Non-English speaking background	-0.0005	0.004	0.0004	0.003	-0.0008
Honours degree	0.0306 **	0.004	0.0340 **	0.004	-0.0034
Part-time study	0.0914 **	0.004	0.0818 **	0.003	0.0096
Off-campus study	0.0338 **	0.004	0.0128 **	0.003	0.0210 **
Engaged in further study	-0.0100 *	0.004	-0.0042	0.003	-0.0059
<u>Employment characteristics</u>					
Government job	0.0476 **	0.004	0.0433 **	0.003	0.0043
Temporary contract	-0.0718 **	0.003	-0.0470 **	0.002	-0.0248 **
N		42,381		63,938	
Prob > F		0.000		0.000	
R-squared		0.285		0.229	

<sup>a</sup> B denotes the regression coefficient. SE denotes the standard error.

<sup>b</sup> Dummy control variables included for broad field of education (11), occupation (7), industry (18), and survey year (3).

\* significant at 5%; \*\* significant at 1%

### 3.3. Differences in the years after course completion

All of the preceding analysis has focused on graduates shortly after the completion of their studies. Table 8 reports full-time annual salaries based on data from the 2011 BGS, which contains matched observations collected shortly after course completion (2008) and roughly three years later (2011). When interpreting these findings, it is important to recall that statistical significance is harder to achieve in the smaller BGS data set, so the magnitude of the effect should also be considered. The 2008 results are broadly in line with those presented in Figures 1 to 12, with substantive gender wage gaps observed in every broad field of education except information technology. The 2011 results are generally similar again, in that all but two broad fields of education (information technology and law) recorded large gender wage gaps that favoured men. The somewhat surprising result for the law field, which saw a large gender wage gap favouring female graduates three years after course completion (implied by the negative difference) should be viewed with some caution, because the large standard deviations suggest that the mean values hide a great deal of individual variation. Considering only the magnitude of the differences and not whether they are statistically significant in the smaller BGS sample, the gender wage gap for nursing graduates widened notably in percentage terms in the years after the completion of their studies, while the wage gap for agriculture and environment graduates narrowed substantially. Overall, the gaps observed in six broad fields of education narrowed between 2008 and 2011, whereas six widened over the same period.

**Table 8.**

*Gender-specific mean annual earnings for full-time employed bachelor degree graduates after course completion (2008) and three years later (2011), by broad field of education<sup>a</sup>*

Cohort	Male		Female		Difference		
	X	SD	X	SD	\$	%	
<b>2008</b>							
Natural and physical sciences	52,067	18,048	45,883	10,890	6,184	13.5	**
Information technology	54,397	16,275	54,392	22,927	5	0.0	
Engineering and related tech.	57,442	14,874	56,691	14,882	751	1.3	
Architecture and building	50,742	19,943	43,815	11,427	6,927	15.8	
Agriculture and environment	53,933	18,112	43,482	7,703	10,451	24.0	**
Medicine and related	51,442	16,112	46,640	12,616	4,802	10.3	**
Nursing	47,497	13,019	43,857	10,223	3,640	8.3	
Education	51,216	12,482	47,596	9,667	3,620	7.6	*
Management and commerce	55,497	21,314	47,609	14,463	7,888	16.6	**
Law	51,459	17,396	49,410	11,579	2,049	4.1	
Society and culture	50,371	15,927	46,816	13,874	3,555	7.6	**
Creative arts	44,771	13,407	40,481	11,476	4,290	10.6	*
<b>2011</b>							
Natural and physical sciences	68,850	23,771	60,154	17,083	8,696	14.5	**
Information technology	74,664	22,405	74,879	23,844	-214	-0.3	
Engineering and related tech.	81,984	27,154	80,064	26,449	1,920	2.4	
Architecture and building	70,658	27,869	60,415	13,190	10,243	17.0	*
Agriculture and environment	64,697	19,944	59,438	13,487	5,259	8.8	
Medicine and related	83,453	27,971	70,839	21,024	12,614	17.8	**
Nursing	77,523	27,647	61,920	14,525	15,603	25.2	*
Education	67,525	19,370	63,132	10,118	4,393	7.0	*
Management and commerce	76,354	25,386	68,740	20,768	7,614	11.1	**
Law	72,919	18,927	77,228	21,149	-4,308	-5.6	
Society and culture	69,796	21,445	63,615	17,913	6,181	9.7	**
Creative arts	58,405	16,022	54,916	15,355	3,489	6.4	

<sup>a</sup> X denotes the mean. SD denotes the standard deviation.

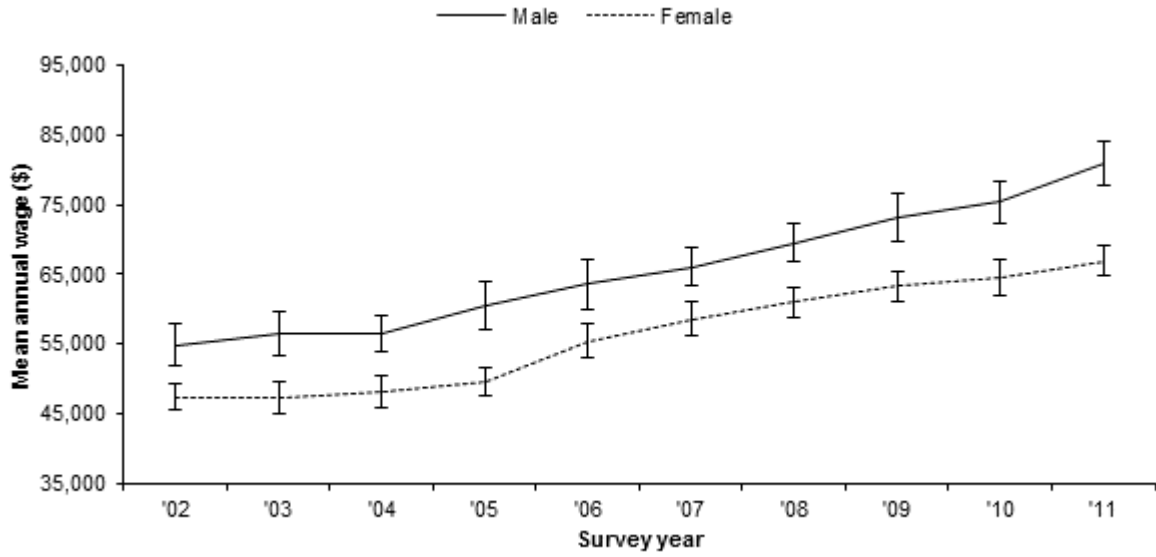
\* significant at 5%; \*\* significant at 1%

## **4. Results for Postgraduates**

### 4.1. Time-series results

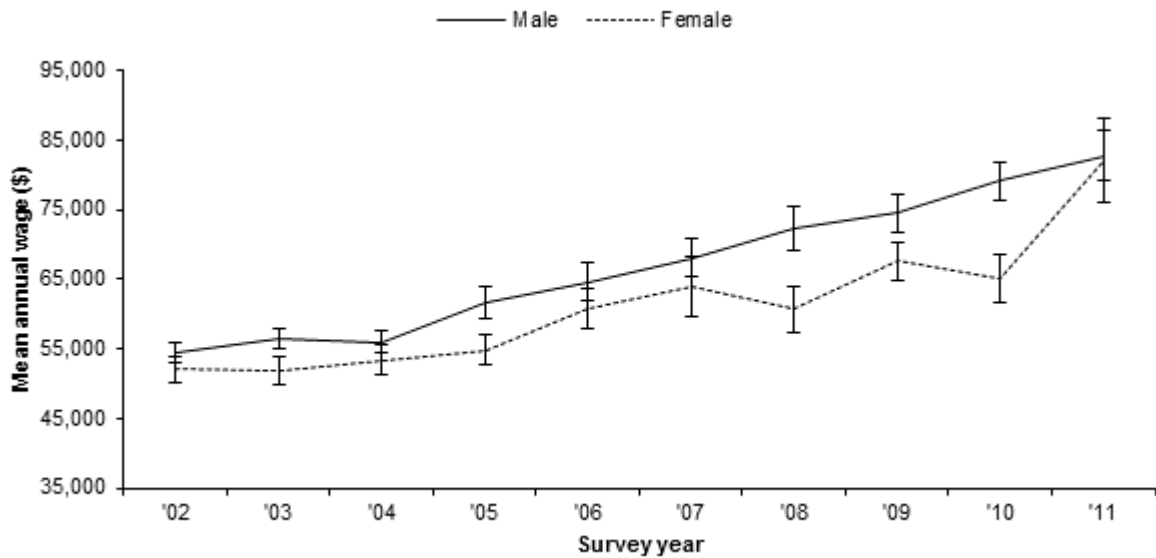
Figures 13 to 24 plot mean annual full-time earnings for postgraduate diploma/certificate graduates from each of our twelve broad fields of education, whereas Figures 25 to 36 do the same for master/PhD graduates. Considering first the postgraduate diploma/certificate graduates, we see that gender wage gaps favouring men were common throughout the decade under examination across all broad fields of study, although these varied considerably in magnitude. On average, the smallest wage gaps were observed for education and nursing graduates, while larger wage gaps were observed in the fields of natural and physical sciences, and society and culture. There was considerable variability in the size and magnitude of the gender wage gap in some of the smaller fields of education at this level of award, with the field of agriculture and environment a prime example of this. The wide uncertainty intervals in some of these fields also suggest considerable variability in earnings.

Higher mean salaries were also typically observed for males at the master/PhD level, with the largest wage gaps in recent years observed in the fields of architecture and building, medicine, and management and commerce. The size of the gender wage gap for architecture and building graduates did, however, vary considerably over the decade under examination. As in other similar instances, the relatively small number of graduates from this field is likely a contributing factor. The smallest wage gaps were observed for graduates from the fields of engineering and related technologies, agriculture and environment, and creative arts. Indeed, many of these wage gaps were not statistically significant at the 95% confidence level.



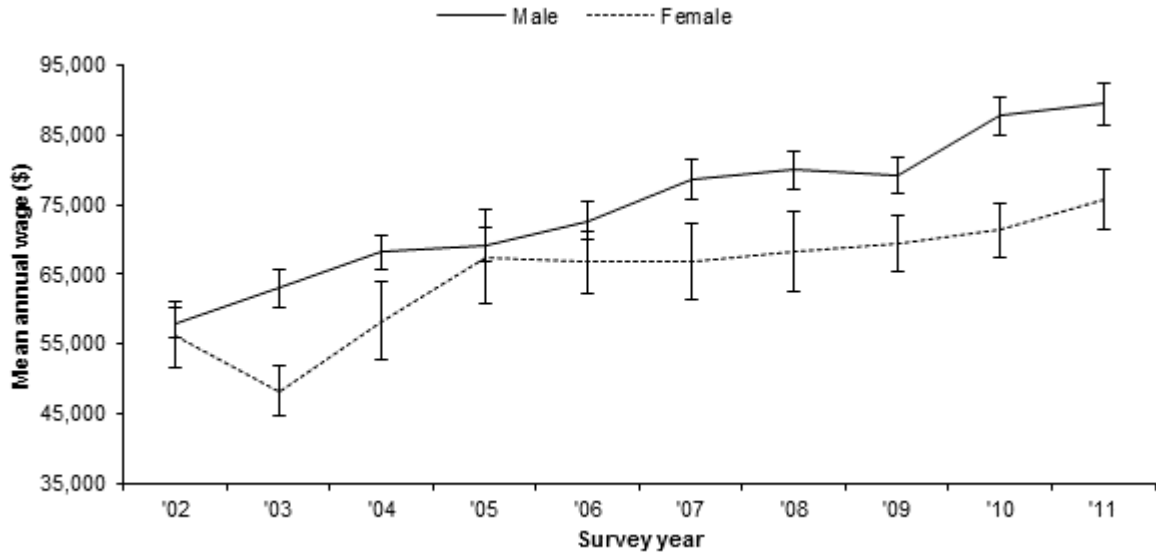
**Figure 13. Natural and Physical Sciences**

*Gender-specific mean annual earnings for full-time employed graduates from the Natural and Physical Sciences broad field of education (postgraduate certificate/diploma graduates)*



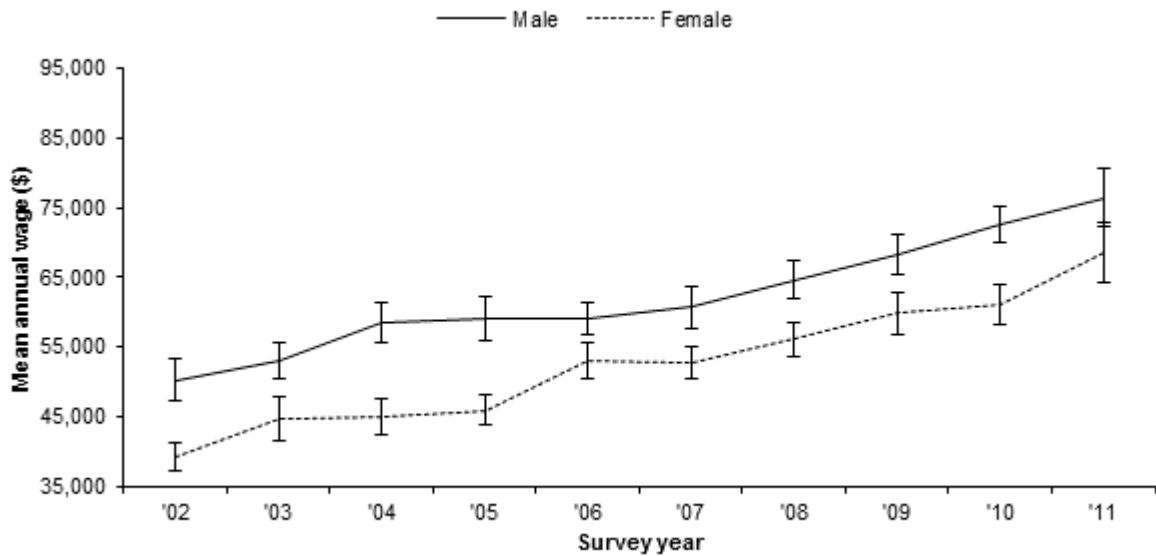
**Figure 14. Information Technology**

*Gender-specific mean annual earnings for full-time employed graduates from the Information Technology broad field of education (postgraduate certificate/diploma graduates)*



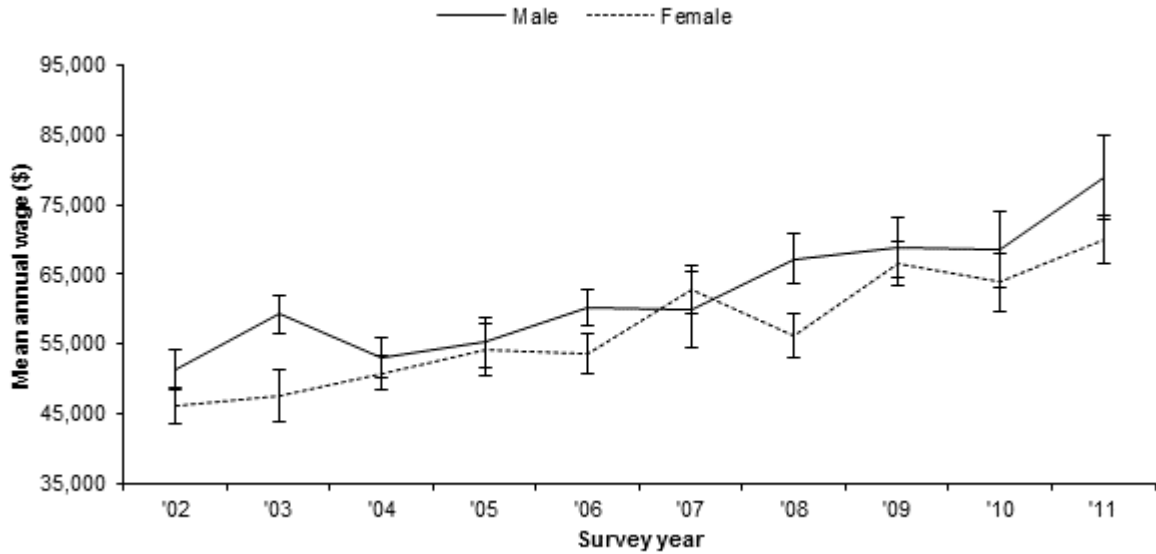
**Figure 15. Engineering and Related Technologies**

*Gender-specific mean annual earnings for full-time employed graduates from the Engineering and Related Technologies broad field of education (postgraduate certificate/diploma graduates)*



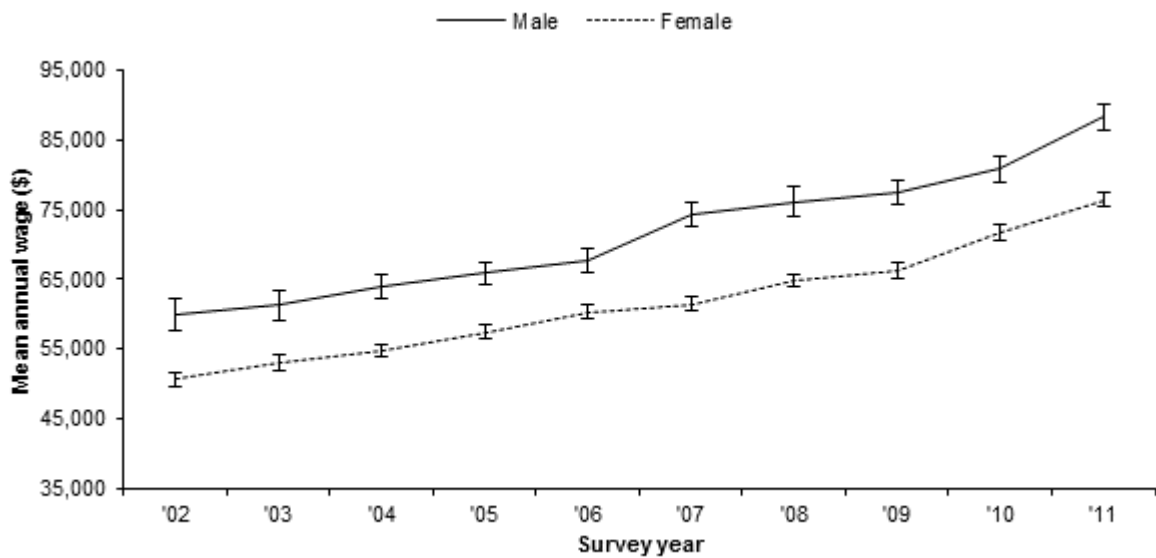
**Figure 16. Architecture and Building**

*Gender-specific mean annual earnings for full-time employed graduates from the Architecture and Building broad field of education (postgraduate certificate/diploma graduates)*



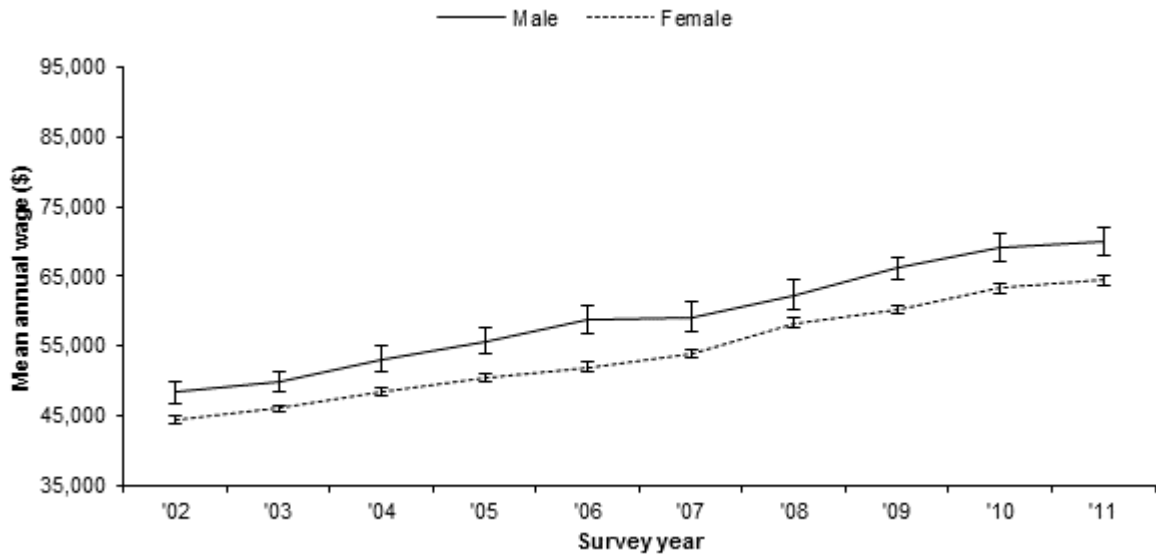
**Figure 17. Agriculture and Environment**

*Gender-specific mean annual earnings for full-time employed graduates from the Agriculture and Environment broad field of education (postgraduate certificate/diploma graduates)*



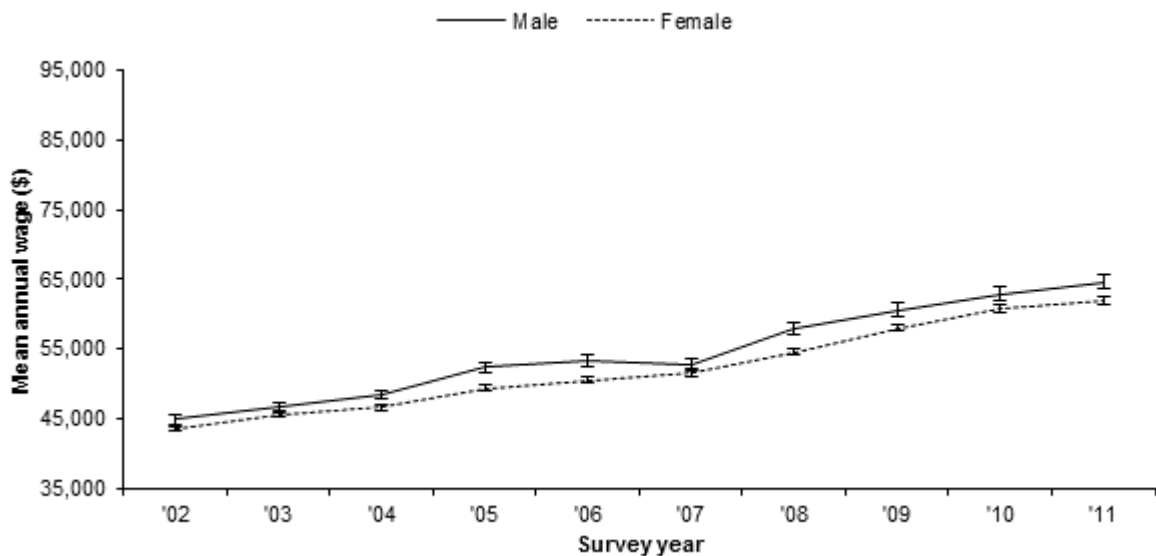
**Figure 18. Medicine and Related**

*Gender-specific mean annual earnings for full-time employed graduates from the Medicine and Related broad field of education (postgraduate certificate/diploma graduates)*



**Figure 19. Nursing**

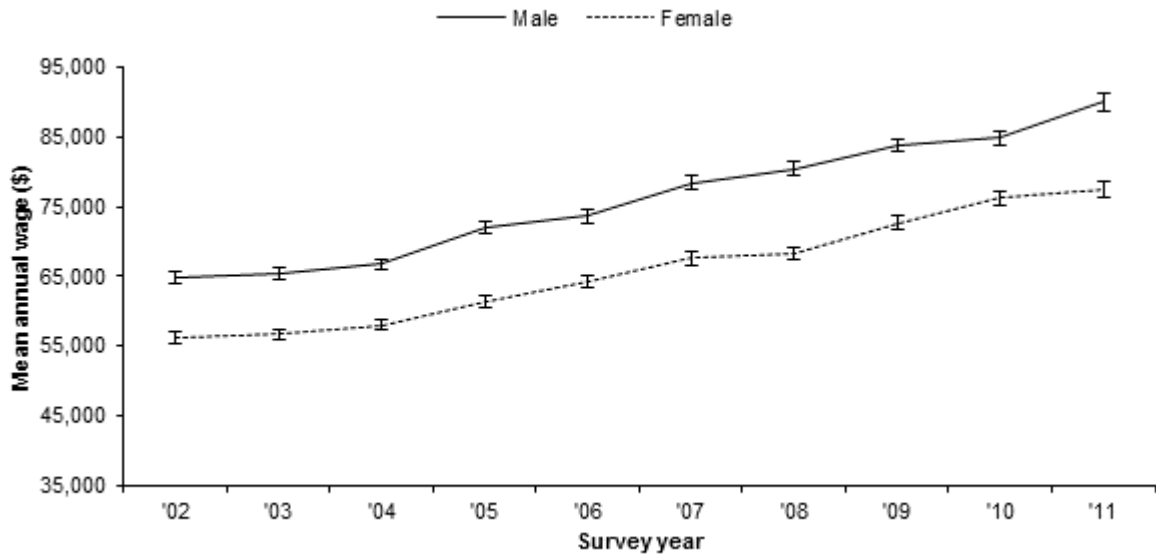
*Gender-specific mean annual earnings for full-time employed graduates from the Nursing broad field of education (postgraduate certificate/diploma graduates)*



**Figure 20. Education**

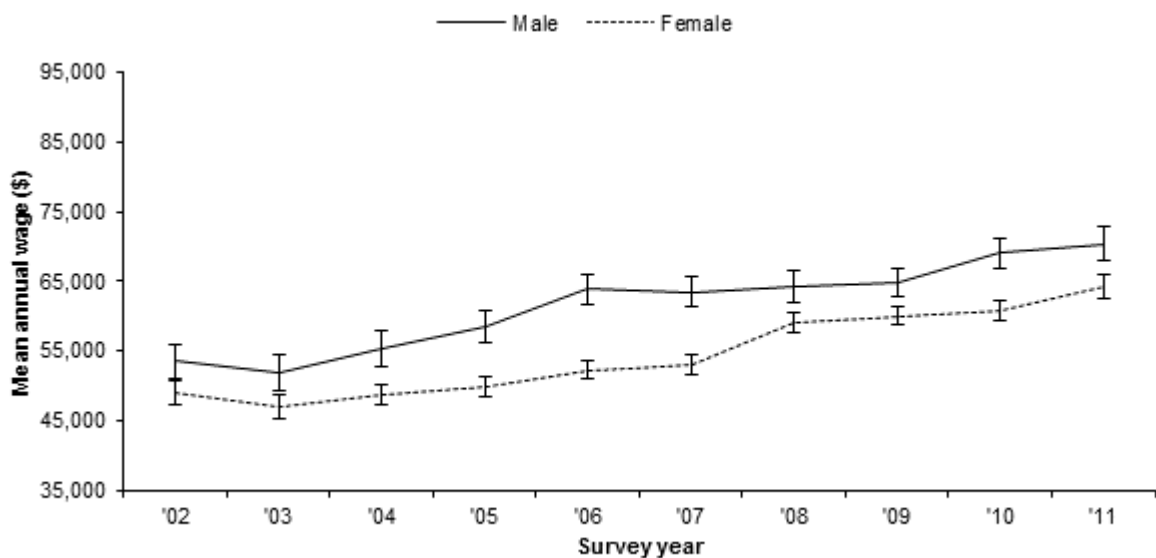
*Gender-specific mean annual earnings for full-time employed graduates from the Education broad field of education (postgraduate certificate/diploma graduates)*





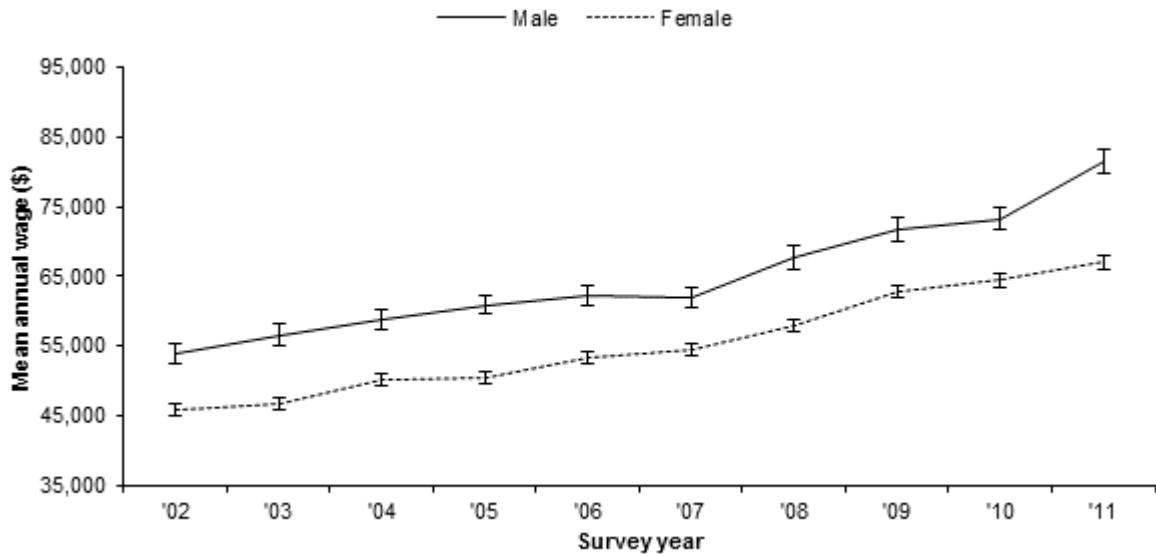
**Figure 21. Management and Commerce**

*Gender-specific mean annual earnings for full-time employed graduates from the Management and Commerce broad field of education (postgraduate certificate/diploma graduates)*



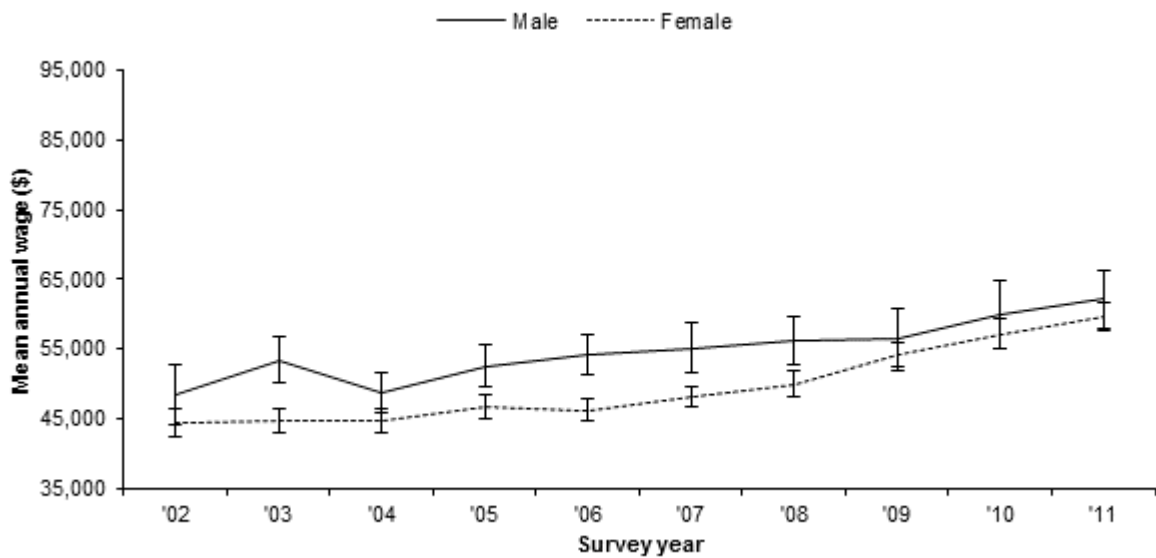
**Figure 22. Law**

*Gender-specific mean annual earnings for full-time employed graduates from the Law broad field of education (postgraduate certificate/diploma graduates)*



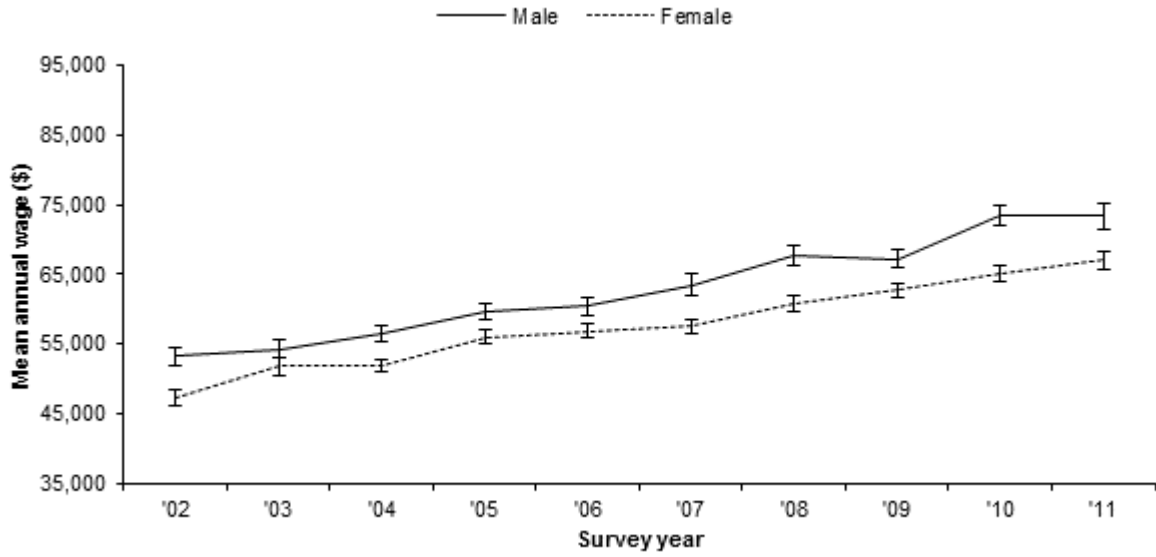
**Figure 23. Society and Culture**

*Gender-specific mean annual earnings for full-time employed graduates from the Society and Culture broad field of education (postgraduate certificate/diploma graduates)*



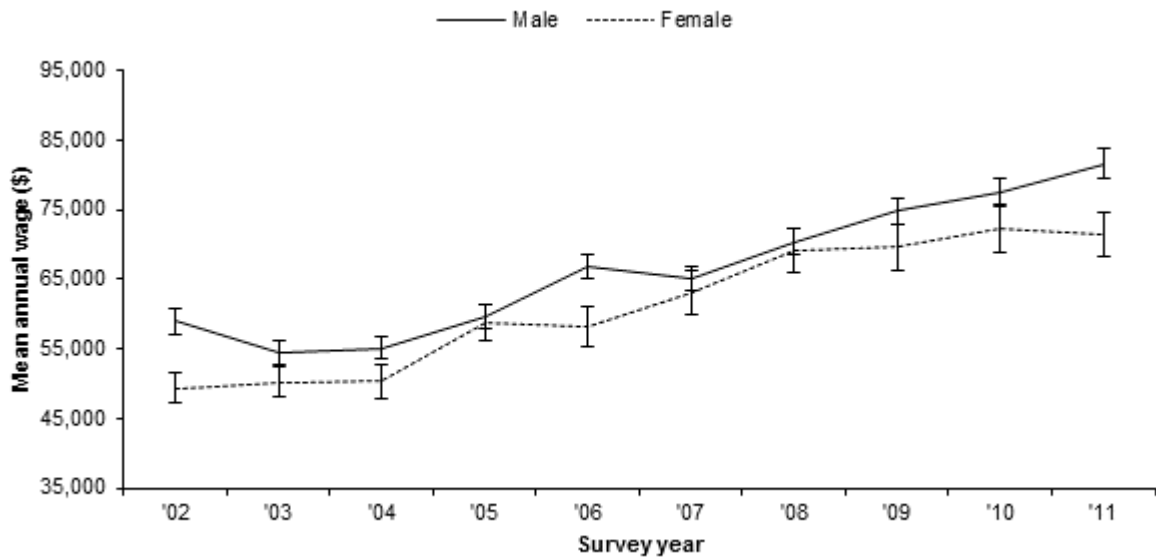
**Figure 24. Creative Arts**

*Gender-specific mean annual earnings for full-time employed graduates from the Creative Arts broad field of education (postgraduate certificate/diploma graduates)*



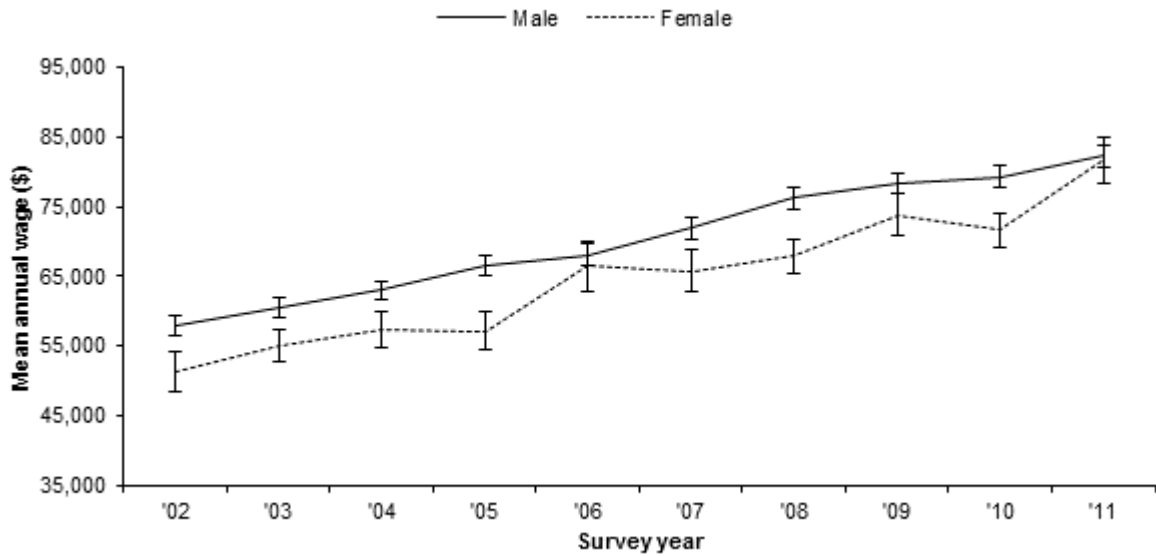
**Figure 25. Natural and Physical Sciences**

*Gender-specific mean annual earnings for full-time employed graduates from the Natural and Physical Sciences broad field of education (master/PhD graduates)*



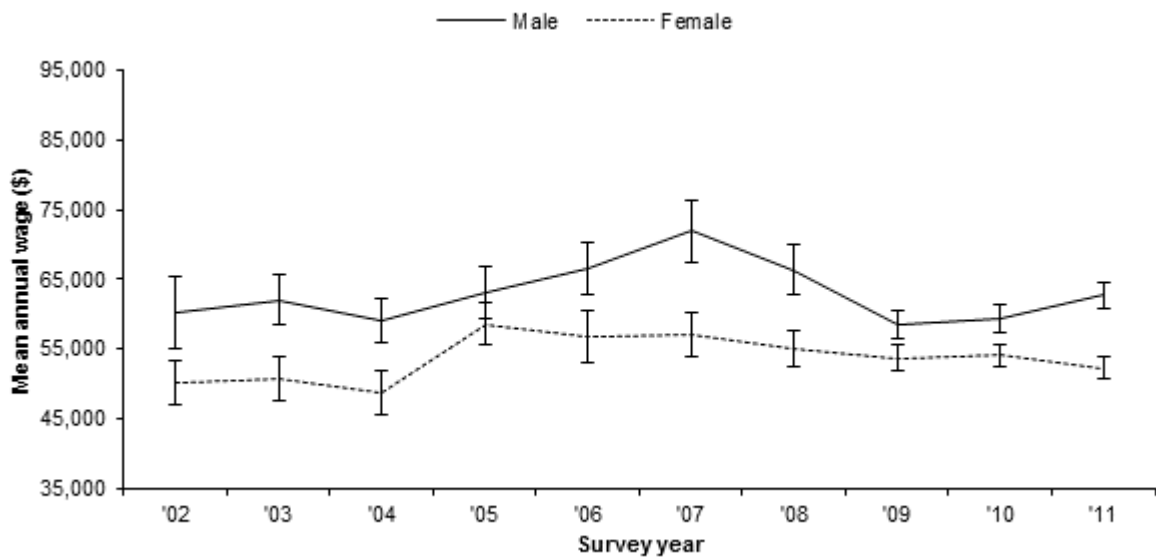
**Figure 26. Information Technology**

*Gender-specific mean annual earnings for full-time employed graduates from the Information Technology broad field of education (master/PhD graduates)*



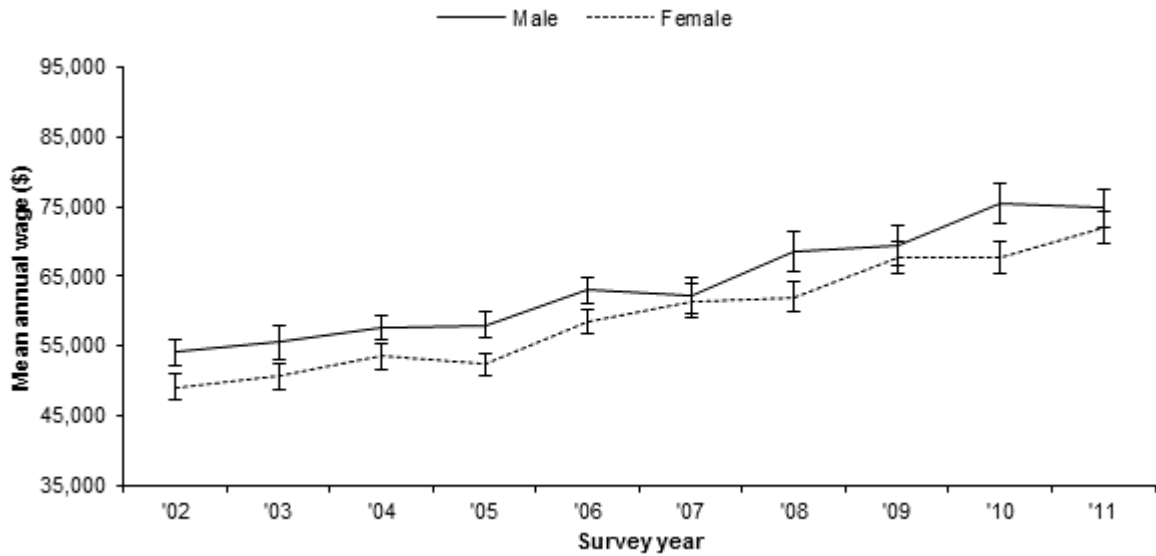
**Figure 27. Engineering and Related Technologies**

*Gender-specific mean annual earnings for full-time employed graduates from the Engineering and Related Technologies broad field of education (master/PhD graduates)*



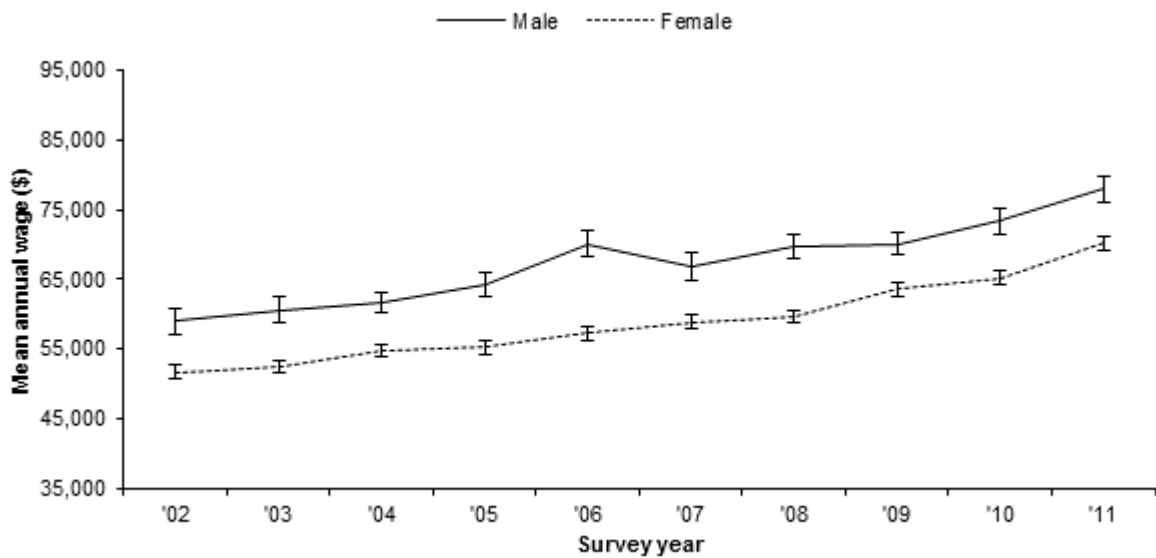
**Figure 28. Architecture and Building**

*Gender-specific mean annual earnings for full-time employed graduates from the Architecture and Building broad field of education (master/PhD graduates)*



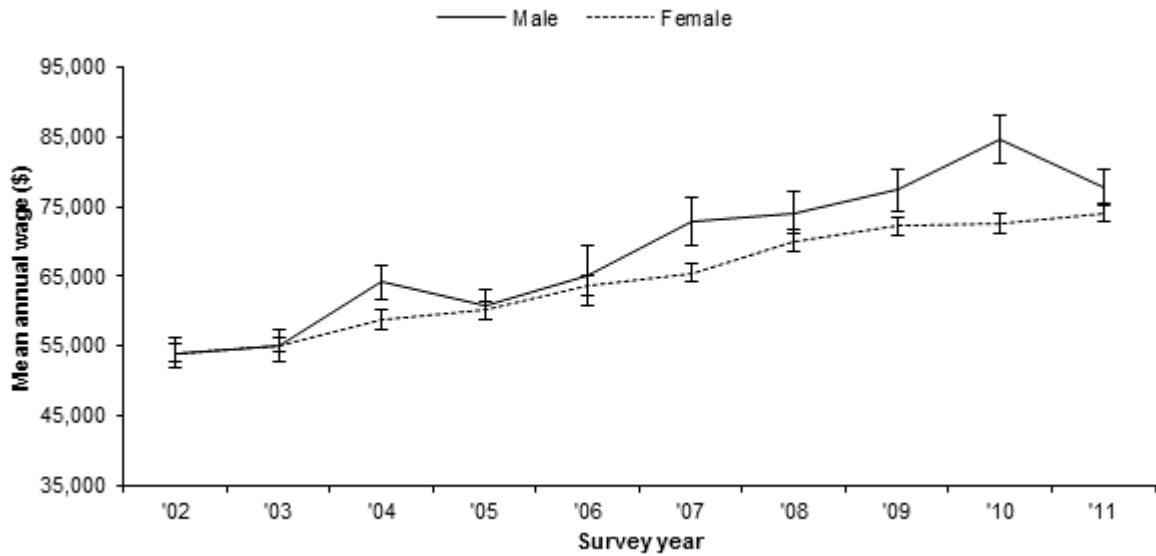
**Figure 29. Agriculture and Environment**

*Gender-specific mean annual earnings for full-time employed graduates from the Agriculture and Environment broad field of education (master/PhD graduates)*



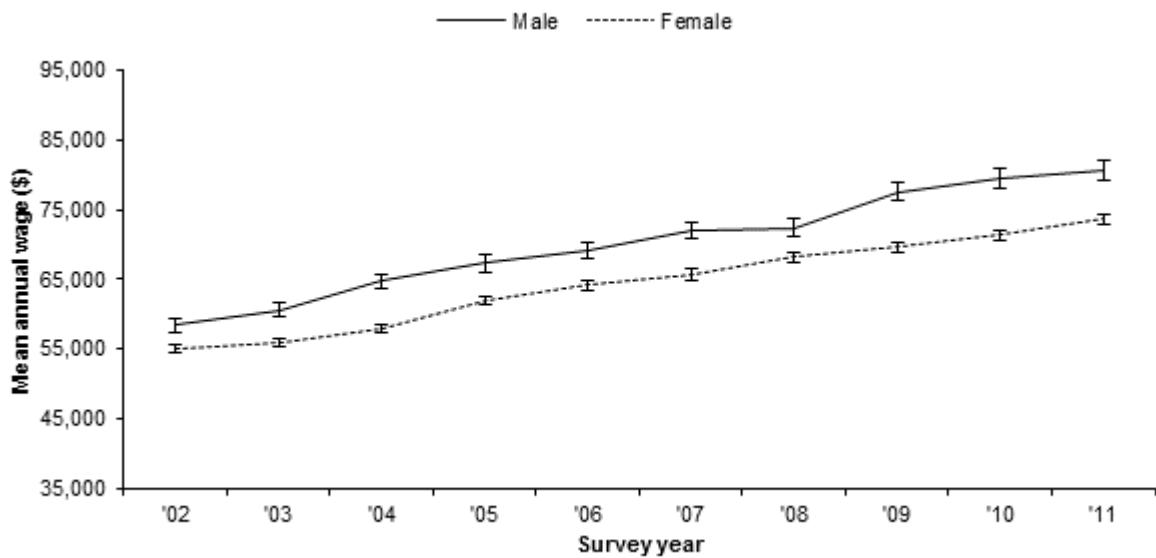
**Figure 30. Medicine and Related**

*Gender-specific mean annual earnings for full-time employed graduates from the Medicine and Related broad field of education (master/PhD graduates)*



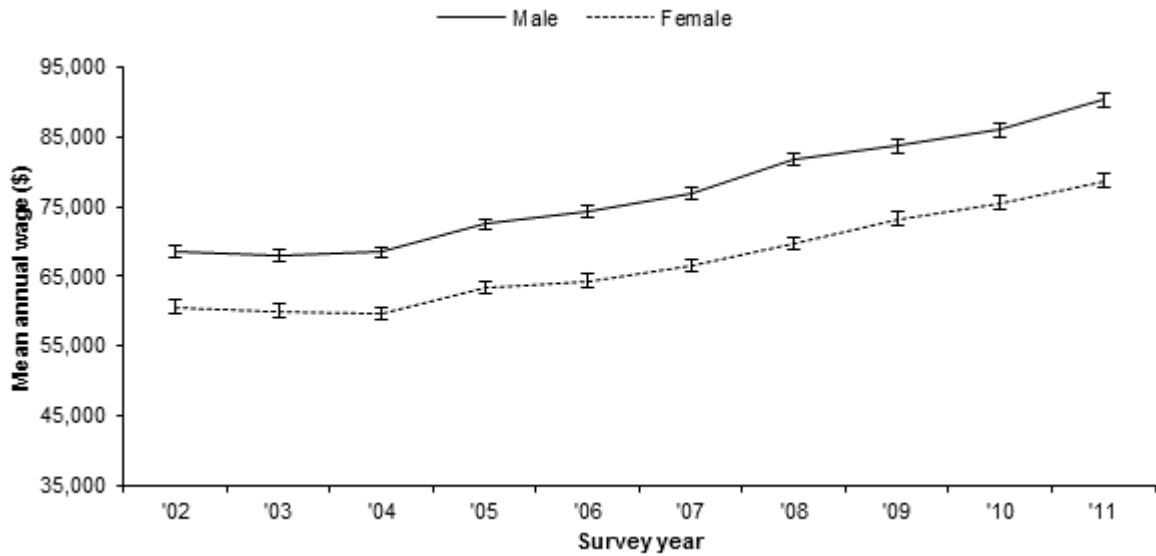
**Figure 31. Nursing**

*Gender-specific mean annual earnings for full-time employed graduates from the Nursing broad field of education (master/PhD graduates)*



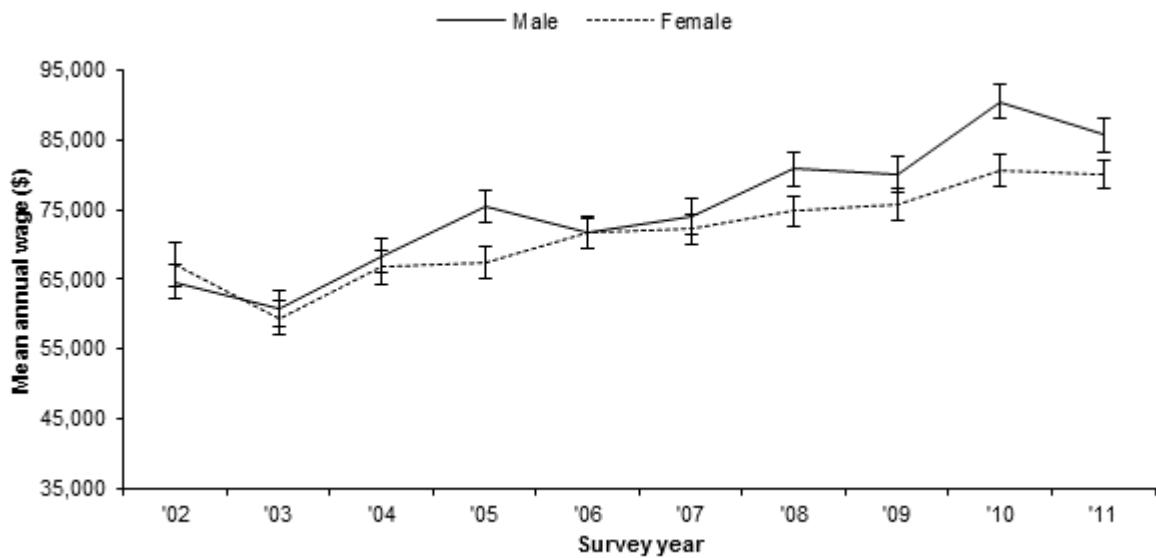
**Figure 32. Education**

*Gender-specific mean annual earnings for full-time employed graduates from the Education broad field of education (master/PhD graduates)*



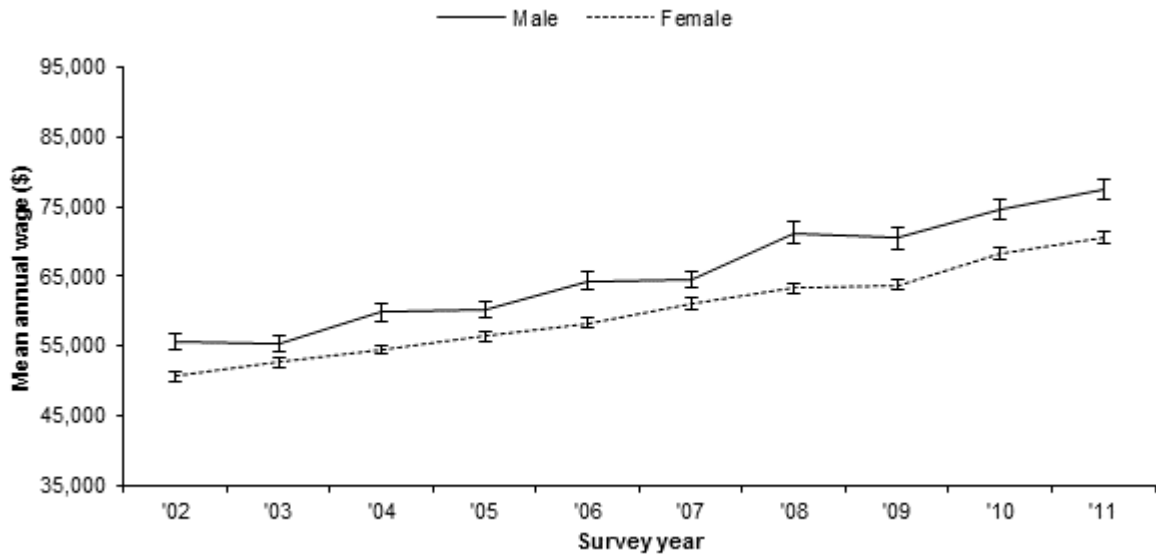
**Figure 33. Management and Commerce**

*Gender-specific mean annual earnings for full-time employed graduates from the Management and Commerce broad field of education (master/PhD graduates)*



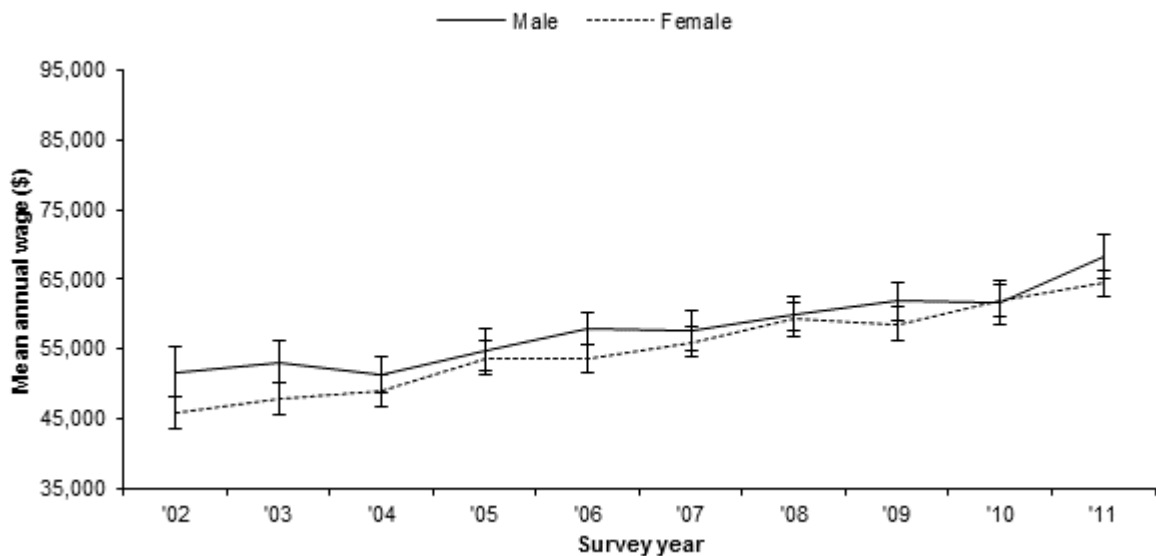
**Figure 34. Law**

*Gender-specific mean annual earnings for full-time employed graduates from the Law broad field of education (master/PhD graduates)*



**Figure 35. Society and Culture**

*Gender-specific mean annual earnings for full-time employed graduates from the Society and Culture broad field of education (master/PhD graduates)*



**Figure 36. Creative Arts**

*Gender-specific mean annual earnings for full-time employed graduates from the Creative Arts broad field of education (master/PhD graduates)*



#### 4.2. Differences within groups

Tables 9 and 10 consider the gender wage gap with regard to key subgroups in the broader populations of postgraduate diploma/certificate graduates and master/PhD graduates, respectively. As with bachelor degree graduates, this analysis is based on our second pooled AGS data set, which covers the years 2008 to 2011 and uses hourly wage as a measure of graduate earnings. Looking first at postgraduate diploma/certificate graduates, we see a similar trend to that illustrated in Figures 13 to 24. In percentage terms, the largest gender wage gaps were observed for graduates in the broad fields of society and culture, architecture and building, natural and physical sciences, and management and commerce. The smallest wage gaps in percentage terms were recorded for the fields of agriculture and environment, education and creative arts, with those for the former and latter not statistically different from zero. Within different occupations, statistically significant gender wage gaps favouring men were observed for six of the eight, with the largest gaps (in percentage terms) recorded for community and personal service workers, technicians and trades workers, and sales workers. Women employed as machinery operators and drivers enjoyed an earnings advantage over their male counterparts, but this figure was based on relatively few cases and was not statistically significant. With regard to employer industry, we find statistically significant wage gaps in all but three categories. All of these wage gaps favour men. The largest wage gap was observed for graduates employed in information media and telecommunications, whereas the smallest statistically significant wage gap was observed for those in the education and training industry. Women employed in other services enjoyed a small premium over men, but this difference was not statistically significant.

The results for master/PhD graduates are broadly similar to those for postgraduate diploma/certificate graduates. Female graduates employed as labourers enjoy a sizable earnings advantage over their male counterparts, but this result is based on a small number of cases and should be viewed with a certain degree of caution. Regarding employer industry, the largest gender wage gaps were recorded for graduates working in wholesale trade, and information media and telecommunications. As before, the smallest statistically significant wage gap was observed for those in education and training.

**Table 9.**

*Gender-specific mean hourly wages for full-time employed postgraduate certificate/diploma graduates, by broad field of education, occupation, and industry of employment*

Cohort	Male		Female		Difference		
	X	SD	X	SD	\$	%	
<u>Broad field of education</u>							
Natural and physical sciences	35.65	10.60	32.14	9.15	3.51	10.9	**
Information technology	37.39	11.68	34.44	8.72	2.95	8.6	**
Engineering and related tech.	39.84	11.60	36.26	10.67	3.58	9.9	**
Architecture and building	34.68	9.61	31.15	8.50	3.52	11.3	**
Agriculture and environment	34.10	11.46	33.02	9.49	1.08	3.3	
Medicine and related	38.70	11.14	35.35	9.32	3.35	9.5	**
Nursing	34.28	7.50	31.83	7.14	2.46	7.7	**
Education	30.30	8.61	29.22	7.92	1.08	3.7	**
Management and commerce	39.78	11.44	36.10	10.34	3.68	10.2	**
Law	32.23	11.38	29.96	9.36	2.27	7.6	**
Society and culture	35.66	11.47	31.89	8.90	3.78	11.8	**
Creative arts	29.05	10.90	28.07	9.01	0.98	3.5	
<u>Occupation</u>							
Managers	42.34	11.18	38.80	10.58	3.54	9.1	**
Professionals	34.43	10.68	31.54	8.55	2.88	9.1	**
Technicians and trades workers	35.69	11.95	29.90	9.51	5.79	19.4	**
Community and personal service workers	35.52	10.10	29.05	8.85	6.47	22.3	**
Clerical and administrative workers	33.53	11.09	29.86	8.91	3.67	12.3	**
Sales workers	29.08	11.14	24.42	7.95	4.67	19.1	**
Machinery operators and drivers	27.57	12.97	31.39	11.38	-3.82	-12.2	
Labourers	27.04	13.04	24.02	10.83	3.01	12.6	
<u>Industry</u>							
Agriculture, forestry and fishing	30.58	12.41	30.30	10.63	0.28	0.9	
Mining	46.54	10.95	41.35	10.03	5.19	12.5	**
Manufacturing	37.59	11.34	34.70	10.89	2.88	8.3	**
Electricity, gas and water supply	44.69	11.56	38.98	9.81	5.71	14.6	**
Construction	37.74	11.41	34.29	10.47	3.45	10.1	**
Wholesale trade	34.17	12.56	31.06	10.16	3.11	10.0	*
Retail trade	34.70	12.64	29.64	10.95	5.05	17.1	**
Accommodation and food services	28.27	11.72	25.42	9.98	2.85	11.2	
Transport, postal and warehousing	40.04	12.23	36.74	10.73	3.29	9.0	**
Information media and telecommunications	35.81	14.32	27.65	9.58	8.15	29.5	**
Financial and insurance services	39.29	12.01	35.04	10.52	4.25	12.1	**
Rental, hiring and real estate services	32.92	12.56	28.56	10.48	4.35	15.2	**
Professional, scientific and technical services	35.06	12.37	30.37	10.44	4.69	15.4	**
Administrative and support services	32.90	11.54	28.19	9.39	4.71	16.7	**
Public administration and safety	39.40	9.67	35.46	8.71	3.94	11.1	**
Education and training	31.33	8.74	29.93	7.78	1.40	4.7	**

Cohort	Male		Female		Difference		
	X	SD	X	SD	\$	%	
Health care and social assistance	36.41	10.39	33.22	8.66	3.19	9.6	**
Arts and recreation services	31.43	10.99	26.00	8.06	5.43	20.9	**
Other services	29.46	11.97	30.74	10.86	-1.27	-4.1	

<sup>a</sup> X denotes the mean. SD denotes the standard deviation.

\* significant at 5%; \*\* significant at 1%

**Table 10.**

*Gender-specific mean hourly wages for full-time employed master/PhD graduates, by broad field of education, occupation, and industry of employment*

Cohort	Male		Female		Difference		
	X	SD	X	SD	\$	%	
<u>Broad field of education</u>							
Natural and physical sciences	34.70	9.57	32.07	7.67	2.63	8.2	**
Information technology	37.58	12.37	35.53	10.70	2.05	5.8	**
Engineering and related tech.	38.70	11.05	36.55	9.54	2.15	5.9	**
Architecture and building	29.65	10.70	26.92	8.66	2.73	10.1	**
Agriculture and environment	35.06	9.51	34.28	9.20	0.78	2.3	
Medicine and related	35.78	11.94	32.60	10.06	3.18	9.7	**
Nursing	39.05	9.03	36.26	8.29	2.79	7.7	**
Education	36.35	8.81	34.50	8.42	1.85	5.4	**
Management and commerce	40.03	12.82	35.87	12.15	4.16	11.6	**
Law	39.94	11.95	37.22	11.29	2.72	7.3	**
Society and culture	35.67	11.79	33.86	9.25	1.81	5.3	**
Creative arts	31.01	10.24	30.29	10.88	0.72	2.4	
<u>Occupation</u>							
Managers	43.95	11.57	41.29	10.74	2.66	6.4	**
Professionals	36.27	11.19	33.63	9.43	2.65	7.9	**
Technicians and trades workers	31.30	12.24	27.30	8.25	4.00	14.7	**
Community and personal service workers	37.20	11.72	30.65	9.99	6.55	21.4	**
Clerical and administrative workers	33.65	11.90	29.74	10.04	3.91	13.1	**
Sales workers	28.75	13.18	24.58	11.72	4.17	17.0	**
Machinery operators and drivers	25.41	12.03	25.04	10.29	0.38	1.5	
Labourers	23.20	11.40	27.82	9.40	-4.62	-16.6	*
<u>Industry</u>							
Agriculture, forestry and fishing	38.11	11.60	32.55	10.99	5.56	17.1	**
Mining	46.67	11.06	40.91	12.12	5.75	14.1	**
Manufacturing	39.56	11.98	35.77	12.09	3.78	10.6	**
Electricity, gas and water supply	45.18	11.20	41.31	12.80	3.87	9.4	**
Construction	37.44	12.52	33.59	12.52	3.85	11.5	**
Wholesale trade	38.17	13.80	28.19	10.69	9.99	35.4	**
Retail trade	28.21	13.68	24.59	10.78	3.62	14.7	**

Cohort	Male		Female		Difference			
	X	SD	X	SD	\$	%		
Accommodation and food services	27.56	12.09	25.66	10.87	1.90	7.4		
Transport, postal and warehousing	41.41	13.93	35.23	12.90	6.19	17.6	**	
Information media and telecommunications	38.47	14.11	32.13	12.25	6.34	19.7	**	
Financial and insurance services	38.91	13.29	35.89	12.12	3.02	8.4	**	
Rental, hiring and real estate services	34.55	12.21	30.72	13.34	3.83	12.5	**	
Professional, scientific and technical services	36.25	12.65	32.11	11.09	4.14	12.9	**	
Administrative and support services	34.59	14.00	32.06	12.12	2.53	7.9	*	
Public administration and safety	41.59	9.94	38.05	9.30	3.54	9.3	**	
Education and training	35.72	8.85	34.40	8.42	1.32	3.8	**	
Health care and social assistance	37.33	11.14	34.30	9.57	3.03	8.8	**	
Arts and recreation services	31.92	11.34	29.06	10.04	2.86	9.8	**	
Other services	30.31	13.69	31.48	11.81	-1.17	-3.7		

<sup>a</sup> X denotes the mean. SD denotes the standard deviation.

\* significant at 5%; \*\* significant at 1%

**Table 11.**

*Estimates of the factors influencing postgraduate diploma/certificate graduates' hourly wages<sup>ab</sup>*

Variable	Male		Female		Difference			
	B	SE	B	SE				
<u>Personal and other enrolment characteristics</u>								
Age in years	0.0235	**	0.001	0.0180	**	0.001	0.0055	**
Age in years squared/100	-0.0415	**	0.003	-0.0315	**	0.002	-0.0100	**
Non-English speaking background	-0.0171	*	0.008	-0.0061		0.006	-0.0110	
Part-time study	0.1180	**	0.007	0.1021	**	0.005	0.0158	
Off-campus study	0.0125	*	0.006	0.0118	**	0.004	0.0007	
Engaged in further study	0.0018		0.006	0.0097	*	0.005	-0.0079	
<u>Employment characteristics</u>								
Government job	0.0684	**	0.007	0.0520	**	0.004	0.0164	*
Temporary contract	-0.0558	**	0.007	-0.0586	**	0.005	0.0029	
n			11,193			18,267		
Prob > F			0.000			0.000		
R-squared			0.338			0.310		

<sup>a</sup> B denotes the regression coefficient. SE denotes the standard error.

<sup>b</sup> Dummy control variables included for broad field of education (11), occupation (7), industry (18), and survey year (3).

\* significant at 5%; \*\* significant at 1%

**Table 12.***Estimates of the factors influencing master/PhD graduates' hourly wages<sup>ab</sup>*

Variable	Male		Female		Difference			
	B	SE	B	SE				
<u>Personal and other enrolment characteristics</u>								
Age in years	0.0339	**	0.001	0.0283	**	0.001	0.0056	**
Age in years squared/100	-0.0640	**	0.002	-0.0532	**	0.002	-0.0108	**
Non-English speaking background	-0.0599	**	0.006	-0.0594	**	0.005	-0.0005	
Research degree	0.0467	**	0.007	0.0646	**	0.006	-0.0180	
Part-time study	0.1285	**	0.005	0.1050	**	0.005	0.0235	**
Off-campus study	0.0321	**	0.005	0.0217	**	0.004	0.0104	
Engaged in further study	-0.0276	**	0.007	-0.0328	**	0.007	0.0052	
<u>Employment characteristics</u>								
Government job	0.0710	**	0.006	0.0691	**	0.005	0.0018	
Temporary contract	-0.0469	**	0.006	-0.0505	**	0.005	0.0036	
n			16,608			19,472		
Prob > F			0.000			0.000		
R-squared			0.372			0.353		

<sup>a</sup> B denotes the regression coefficient. SE denotes the standard error.

<sup>b</sup> Dummy control variables included for broad field of education (11), occupation (7), industry (18), and survey year (3).

\* significant at 5%; \*\* significant at 1%

The key finding from our earlier regression models, that age is a strong wage determinant for both men and women, reappears when we replicate the analysis for postgraduate diploma/certificate graduates (Table 11) and master/PhD graduates (Table 12). As before, the average return to a year of age is greater for men than women, even after statistically controlling for the same extensive set of observed characteristics. The relative earnings advantage enjoyed by postgraduate diploma/certificate graduates in government employment was higher for men than women; however, at roughly 1.6%, this advantage was only marginal at best. The relative earnings advantage obtained by completing a research degree (i.e. a master/doctorate by research) did not differ statistically significantly between men and women (see Table 12). While both male and female master/PhD graduates who studied part-time enjoyed a statistically significant wage advantage over those who studied full-time, the relative advantage was statistically significantly higher for men than women. As with our earlier analysis of bachelor degree graduates, our empirical method cannot account for unobserved effects.

### 4.3. Differences in the years after course completion

As previously noted in Section 2.2, the smaller response numbers to the BGS has necessitated the amalgamation of postgraduate certificate/diploma and master/PhD graduates into a single degree level for postgraduates. This is necessary for statistical reasons, but it does make comparisons with Figures 13 to 36 problematic. Table 13 presents full-time annual salaries for postgraduates, both soon after course completion (2008) and three years later (2011). Again, it should be noted that statistical significance is harder to achieve in this smaller data set. In the three years after course completion, the gender wage gaps initially observed for postgraduates from the fields of information technology and law narrowed substantially. In fact, women from these two fields earned higher mean salaries than men within three years of course completion, although neither difference was statistically different from zero in our smaller BGS sample, and both were quite small in magnitude. These results mirror those for bachelor degree graduates from the same two fields of education (see Table 8). On the other hand, the wage gaps observed for postgraduates from the agriculture and environment, and creative arts fields widened substantially. Although these were statistically significant, it must be restated that these salary figures are based on relatively small numbers of cases and should be interpreted with due caution. Overall, the wage gaps observed in six broad fields of education narrowed in the years after course completion, while six widened over the same period.

**Table 13.**

*Gender-specific mean annual earnings for full-time employed postgraduates after course completion (2008) and three years later (2011), by broad field of education<sup>a</sup>*

Cohort	Male		Female		Difference		
	X	SD	X	SD	\$	%	
<b>2008</b>							
Natural and physical sciences	68,415	20,292	59,670	14,681	8,746	14.7	**
Information technology	74,629	26,248	63,775	21,459	10,854	17.0	
Engineering and related tech.	81,588	24,709	67,194	19,746	14,395	21.4	*
Architecture and building	68,138	28,054	60,083	17,148	8,055	13.4	
Agriculture and environment	69,474	18,345	60,540	17,295	8,934	14.8	
Medicine and related	76,919	28,127	62,038	17,822	14,880	24.0	**
Nursing	65,768	22,248	61,207	15,745	4,560	7.5	
Education	63,867	16,945	59,110	16,540	4,757	8.0	**
Management and commerce	83,949	26,335	72,349	25,550	11,600	16.0	**
Law	73,196	29,249	66,208	18,837	6,988	10.6	
Society and culture	69,364	24,192	60,507	18,533	8,857	14.6	**
Creative arts	62,577	17,373	59,009	24,455	3,568	6.0	
<b>2011</b>							
Natural and physical sciences	88,619	25,796	74,755	18,965	13,864	18.5	**
Information technology	89,479	27,671	90,243	31,480	-764	-0.8	
Engineering and related tech.	97,288	26,552	79,613	16,033	17,675	22.2	**
Architecture and building	80,864	31,426	76,875	22,203	3,989	5.2	
Agriculture and environment	94,857	28,311	74,455	20,120	20,403	27.4	*
Medicine and related	95,782	26,233	78,395	20,897	17,387	22.2	**
Nursing	90,571	21,671	80,141	18,599	10,430	13.0	
Education	78,844	20,024	76,185	17,910	2,660	3.5	
Management and commerce	105,230	32,186	90,452	30,708	14,778	16.3	**
Law	89,031	36,278	90,034	24,237	-1,003	-1.1	
Society and culture	84,385	27,834	77,822	22,096	6,563	8.4	*
Creative arts	81,090	29,526	66,378	20,844	14,712	22.2	*

<sup>a</sup> X denotes the mean. SD denotes the standard deviation.

\* significant at 5%; \*\* significant at 1%

## 5. Conclusions

This report has provided compelling evidence of the existence of a gender wage gap in the Australian graduate labour market. As expected from previous research and considerable anecdotal evidence, this wage gap typically favours men. By analysing annual salaries and hourly wages, we feel that there is no evidence that this wage gap can be easily explained by male graduates working longer hours than their female counterparts. The extent of variation in the size of this gender wage gap suggests that the very notion of an “aggregate” gender wage gap is of little utility, as it hides much of the detail contained within different fields of education, occupations and industries of employment. In most cases, the size of the gender wage gap is relatively constant over the decade under examination, especially with regard to the larger fields of education, where the mean values tend to be fairly stable over time. Although not the only consideration in assessing the importance of our results, the majority of the observed gender wage gaps were statistically significant at the 95% confidence level. Gender wage gaps were often observed for graduates at the bachelor degree, postgraduate certificate/diploma and master/PhD degree levels. Interestingly, the wage gaps observed for bachelor degree graduates in part-time work tended to be much narrower than the wage gaps observed for those in full-time work, which suggests that the phenomenon afflicts women in the professional workforce to a much greater degree. In almost all cases, the gender wage gap that was observed for graduates shortly after course completion was still observed three years later, which suggests that, for many graduates, it cannot be considered a short-term phenomenon affecting women new to the graduate labour market.

While the main purpose of this report was to document the gender wage gap in the Australian graduate labour market, we have attempted to identify factors that contribute to its existence. A strong wage determinant for both male and female graduates was found to be age, which could be considered potential labour market experience in the context of our analysis. Across all three degree levels, men enjoyed higher returns to age (or experience) than women, which is likely a contributing factor. As discussed earlier in this report, this may reflect discrimination against women in the labour market, in terms of their ability to secure promotions and pay rises relative to their male colleagues. It could also partially reflect the fact that women spend less time, on average, in the labour force due to pregnancy



and childcare. This relates to the distinction between *potential* and *actual* work experience; however our data do not make this distinction, so we are not able to investigate this empirically.

Because there is much variation in wages that our analysis does not explain, we can only speculate as to the reasons why male graduates tend to earn higher average wages than female graduates across numerous fields of study. Speculation should itself be supported by further research. For example, the gap in earnings does not necessarily mean that a female graduate commencing with a particular employer is paid less than a comparable male recruit as a result of her sex, although this may indeed happen. While only representing formal graduate entry programs and not the broader graduate labour market, a 2010 survey of 365 Australian organisations that recruit new graduates into formal graduate programs found that the overwhelming majority indicated that they pay equivalent graduates at the same rate, regardless of whether they are men or women (GCA, 2011).

There is some anecdotal evidence that suggests gender differences in negotiating behaviour can have an impact on the gender wage gap in situations where graduates negotiate their starting salary. In order to investigate this, a set of survey questions was developed and added to the 2012 BGS, which was underway at the time this report was prepared. These questions are presented in Appendix B (p. 55). When these data become available, they may shed some light on the link between pay-setting arrangements and the gender wage gap for recent graduates.

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## Appendix A. Supplementary tables and figures

**Table A1.**

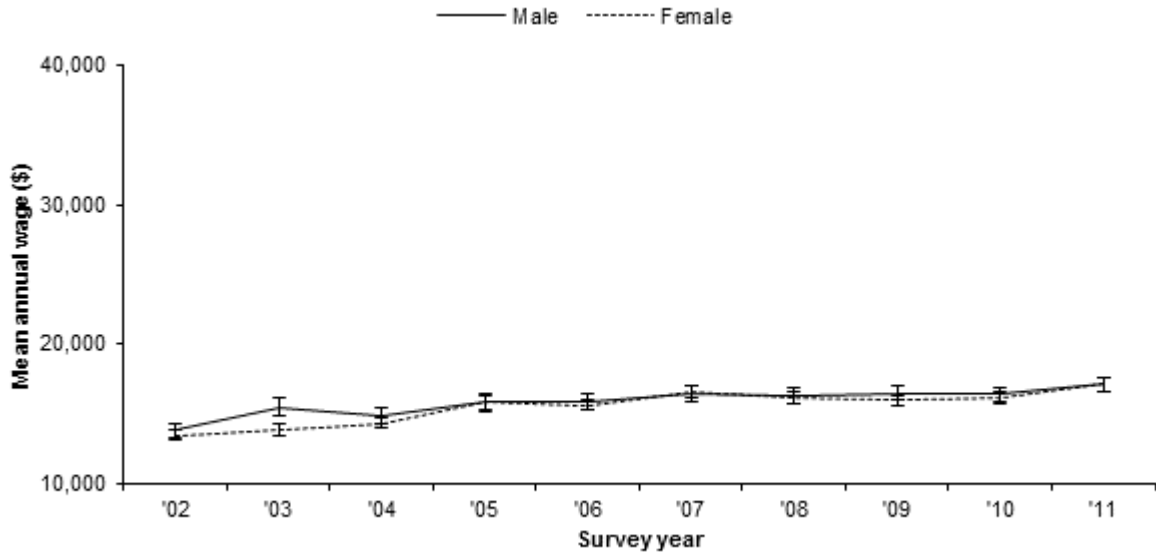
*Sample means for the pooled AGS sample, 2008-11*

Variable	Bachelor degree		Postgraduate certificate/diploma		Master degree/PhD	
	Male	Female	Male	Female	Male	Female
Hourly wage in logarithmic form <sup>a</sup>	3.238	3.161	3.529	3.425	3.569	3.485
Hourly wage <sup>a</sup>	26.684	24.523	35.934	32.028	37.530	34.224
<u>Broad field of education</u>						
Natural and physical sciences	0.059	0.050	0.034	0.024	0.062	0.052
Information technology	0.072	0.010	0.036	0.008	0.068	0.016
Engineering and related tech.	0.178	0.020	0.053	0.008	0.092	0.018
Architecture and building	0.045	0.018	0.026	0.012	0.041	0.029
Agriculture and environment	0.020	0.014	0.015	0.010	0.022	0.022
Medicine and related	0.101	0.154	0.092	0.107	0.080	0.145
Nursing	0.024	0.125	0.033	0.135	0.015	0.055
Education	0.061	0.139	0.206	0.289	0.087	0.179
Law	0.037	0.040	0.067	0.061	0.038	0.041
Society and culture	0.102	0.155	0.116	0.146	0.108	0.168
Creative arts	0.039	0.059	0.017	0.030	0.022	0.033
<i>Management and commerce</i>	<i>0.263</i>	<i>0.217</i>	<i>0.304</i>	<i>0.169</i>	<i>0.365</i>	<i>0.244</i>
<u>Personal and other enrolment characteristics</u>						
Age in years <sup>a</sup>	26.150	26.068	36.757	35.003	35.939	35.370
Non-English speaking background	0.138	0.113	0.114	0.089	0.204	0.156
Honours degree	0.105	0.085	b	b	b	b
Research degree	b	b	b	b	0.180	0.159
Part-time study	0.189	0.166	0.718	0.669	0.632	0.611
Off-campus study	0.159	0.183	0.527	0.541	0.377	0.404
Engaged in further study	0.113	0.102	0.252	0.186	0.096	0.082
<u>Employment characteristics</u>						
Government job	0.328	0.461	0.502	0.590	0.430	0.541
Temporary contract	0.284	0.405	0.186	0.254	0.209	0.270
<u>Occupation</u>						
Managers	0.078	0.054	0.200	0.106	0.220	0.150
Professionals	0.691	0.710	0.621	0.763	0.652	0.728
Technicians and trades workers	0.052	0.026	0.040	0.012	0.028	0.019
Community and personal service workers	0.042	0.051	0.052	0.031	0.024	0.018
Sales workers	0.028	0.026	0.010	0.006	0.013	0.008
Machinery operators and drivers	0.006	0.001	0.004	0.000	0.002	0.000
Labourers	0.012	0.003	0.005	0.001	0.003	0.001
<i>Clerical and administrative workers</i>	<i>0.091</i>	<i>0.129</i>	<i>0.068</i>	<i>0.081</i>	<i>0.057</i>	<i>0.076</i>
<u>Industry</u>						
Agriculture, forestry and fishing	0.009	0.004	0.006	0.003	0.006	0.003
Mining	0.033	0.013	0.030	0.012	0.017	0.007
Manufacturing	0.046	0.022	0.048	0.017	0.051	0.021

	Bachelor degree		Postgraduate certificate/diploma		Master degree/PhD	
	Male	Female	Male	Female	Male	Female
Electricity, gas and water supply	0.018	0.007	0.019	0.007	0.020	0.008
Construction	0.047	0.010	0.023	0.005	0.020	0.009
Wholesale trade	0.009	0.006	0.008	0.004	0.010	0.007
Retail trade	0.046	0.046	0.022	0.012	0.024	0.021
Accommodation and food services	0.016	0.019	0.005	0.005	0.008	0.005
Transport, postal and warehousing	0.019	0.008	0.025	0.008	0.021	0.008
Information media and telecommunications	0.034	0.027	0.022	0.016	0.033	0.021
Rental, hiring and real estate services	0.012	0.008	0.011	0.004	0.009	0.005
Professional, scientific and technical services	0.270	0.175	0.131	0.086	0.208	0.137
Administrative and support services	0.014	0.021	0.014	0.013	0.011	0.012
Public administration and safety	0.102	0.088	0.190	0.128	0.156	0.129
Education and training	0.094	0.173	0.241	0.337	0.198	0.298
Health care and social assistance	0.127	0.306	0.134	0.298	0.110	0.243
Arts and recreation services	0.016	0.014	0.012	0.009	0.014	0.013
Other services	0.013	0.011	0.015	0.011	0.022	0.014
<i>Financial and insurance services</i>	<i>0.075</i>	<i>0.043</i>	<i>0.042</i>	<i>0.024</i>	<i>0.062</i>	<i>0.040</i>
<u>Survey year</u>						
Year 2009	0.248	0.247	0.254	0.260	0.244	0.237
Year 2010	0.230	0.235	0.256	0.259	0.243	0.247
Year 2011	0.258	0.245	0.248	0.244	0.282	0.280
<i>Year 2008</i>	<i>0.264</i>	<i>0.273</i>	<i>0.242</i>	<i>0.237</i>	<i>0.232</i>	<i>0.237</i>
n	42,381	63,938	11,193	18,267	16,608	19,472

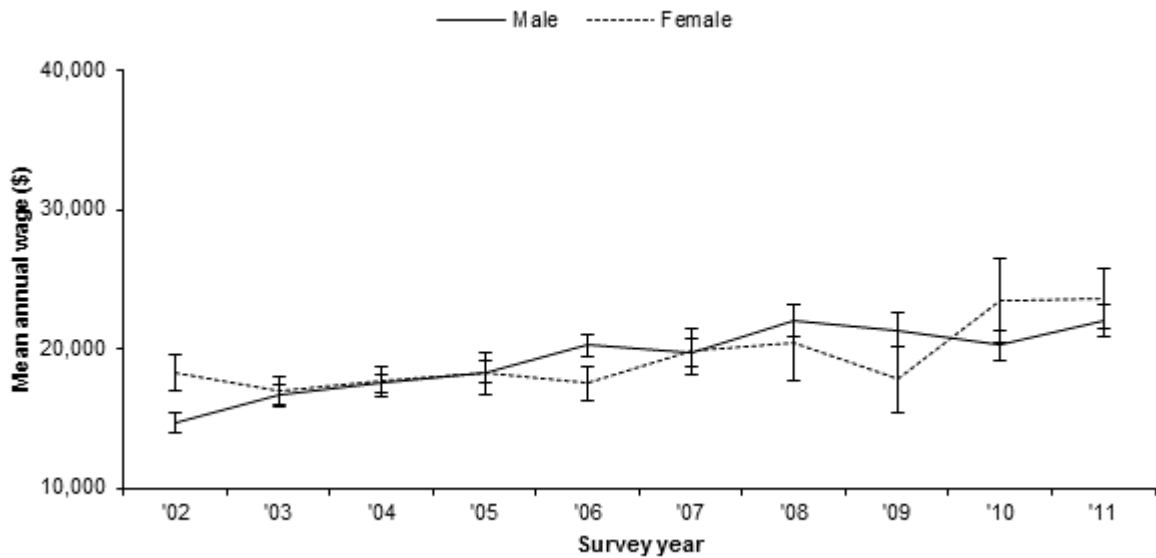
<sup>a</sup> Continuous variable.

<sup>b</sup> Not applicable.



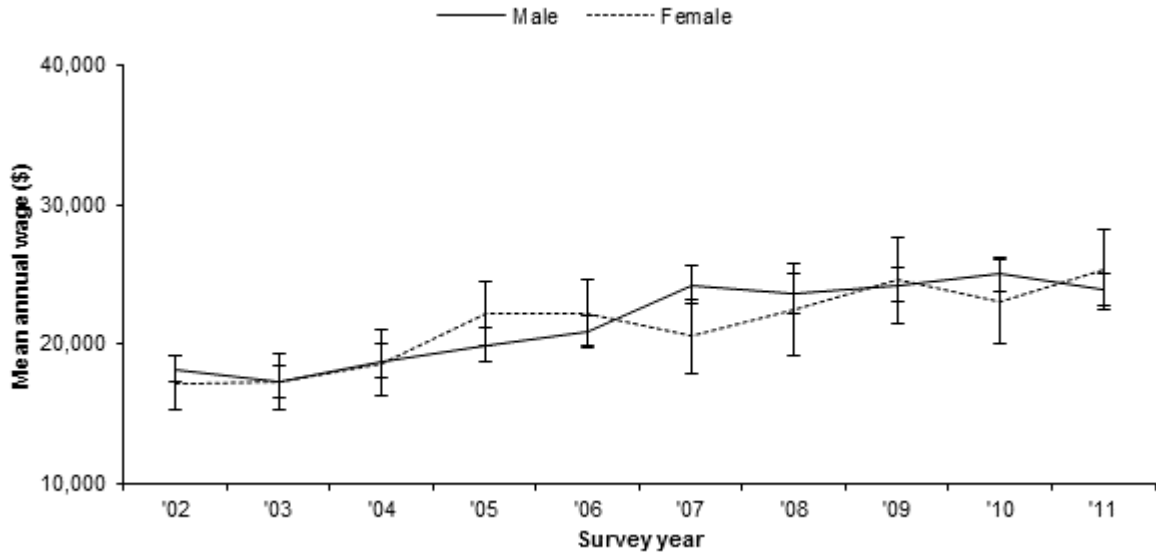
**Figure A1. Natural and Physical Sciences**

*Gender-specific mean annual earnings for part-time employed graduates from the Natural and Physical Sciences broad field of education (bachelor graduates)*



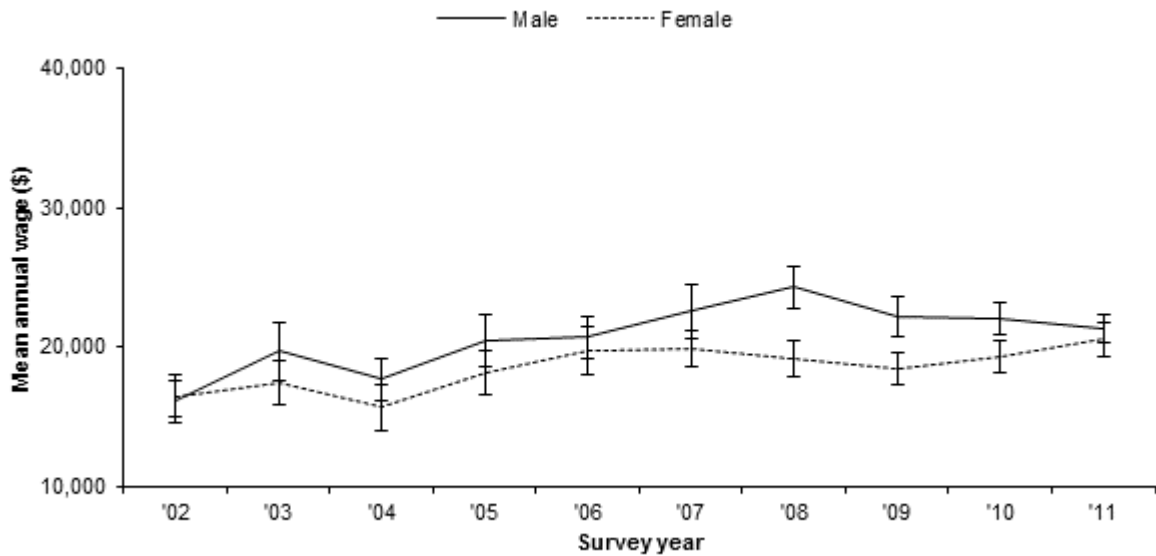
**Figure A2. Information Technology**

*Gender-specific mean annual earnings for part-time employed graduates from the Information Technology broad field of education (bachelor graduates)*



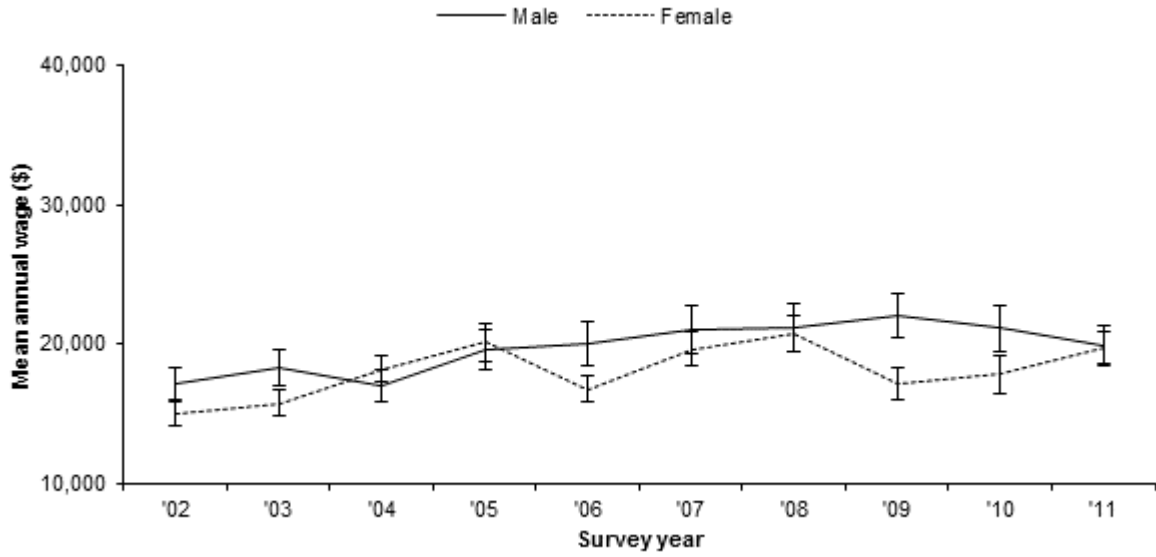
**Figure A3. Engineering and Related Technologies**

*Gender-specific mean annual earnings for part-time employed graduates from the Engineering and Related Technologies broad field of education (bachelor graduates)*



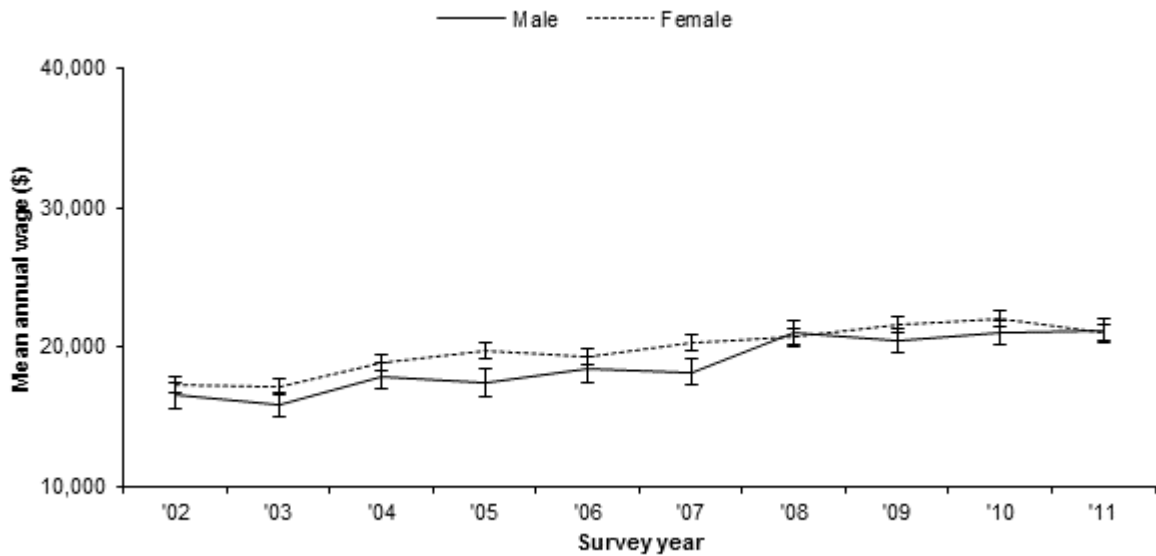
**Figure A4. Architecture and Building**

*Gender-specific mean annual earnings for part-time employed graduates from the Architecture and Building broad field of education (bachelor graduates)*



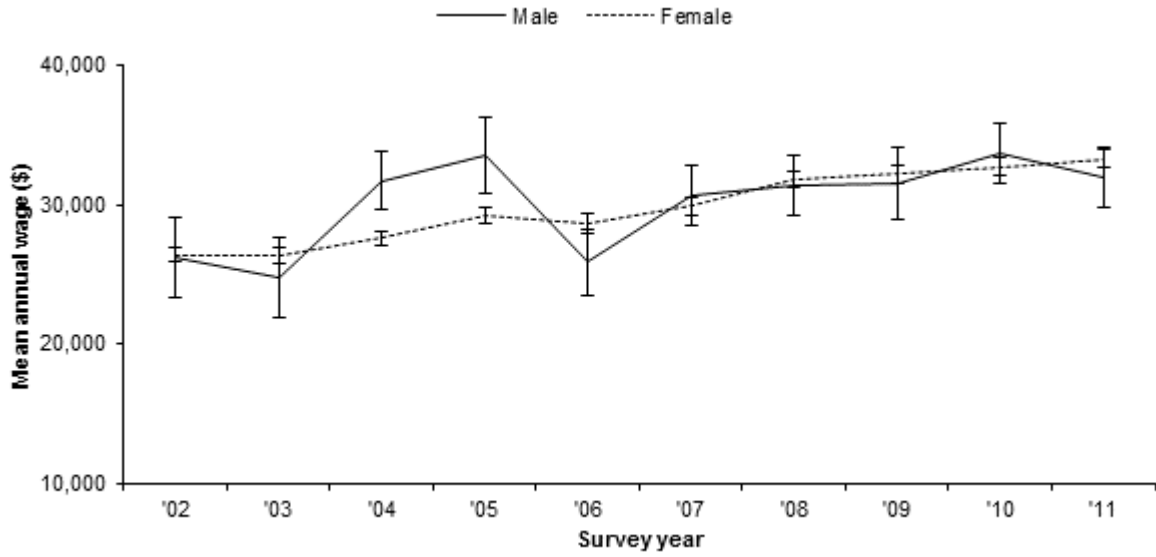
**Figure A5. Agriculture and Environment**

*Gender-specific mean annual earnings for part-time employed graduates from the Agriculture and Environment broad field of education (bachelor graduates)*



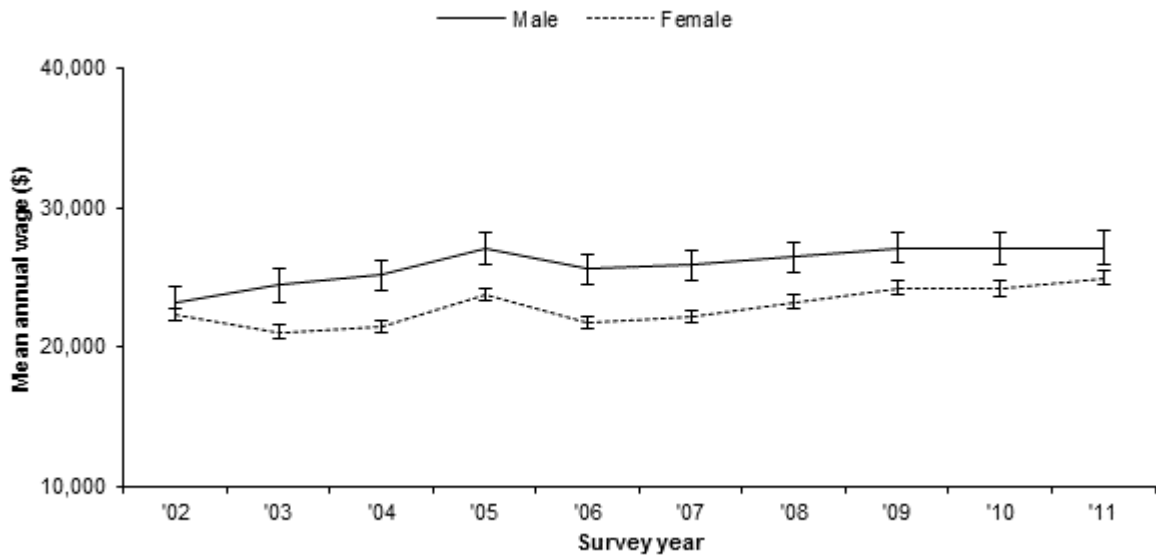
**Figure A6. Medicine and Related**

*Gender-specific mean annual earnings for part-time employed graduates from the Medicine and Related broad field of education (bachelor graduates)*



**Figure A7. Nursing**

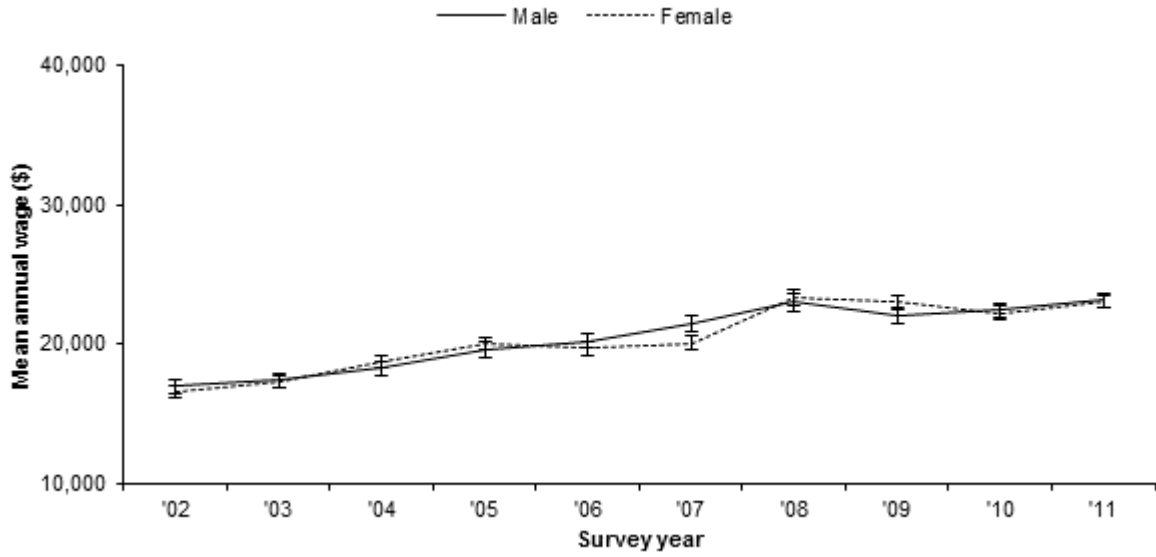
*Gender-specific mean annual earnings for part-time employed graduates from the Nursing broad field of education (bachelor graduates)*



**Figure A8. Education**

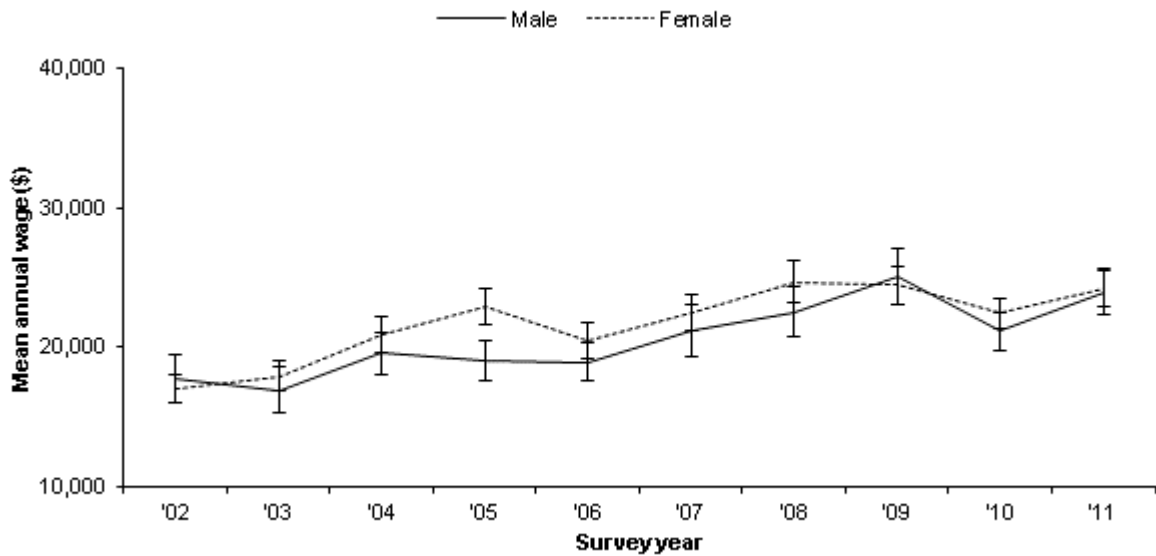
*Gender-specific mean annual earnings for part-time employed graduates from the Education broad field of education (bachelor graduates)*





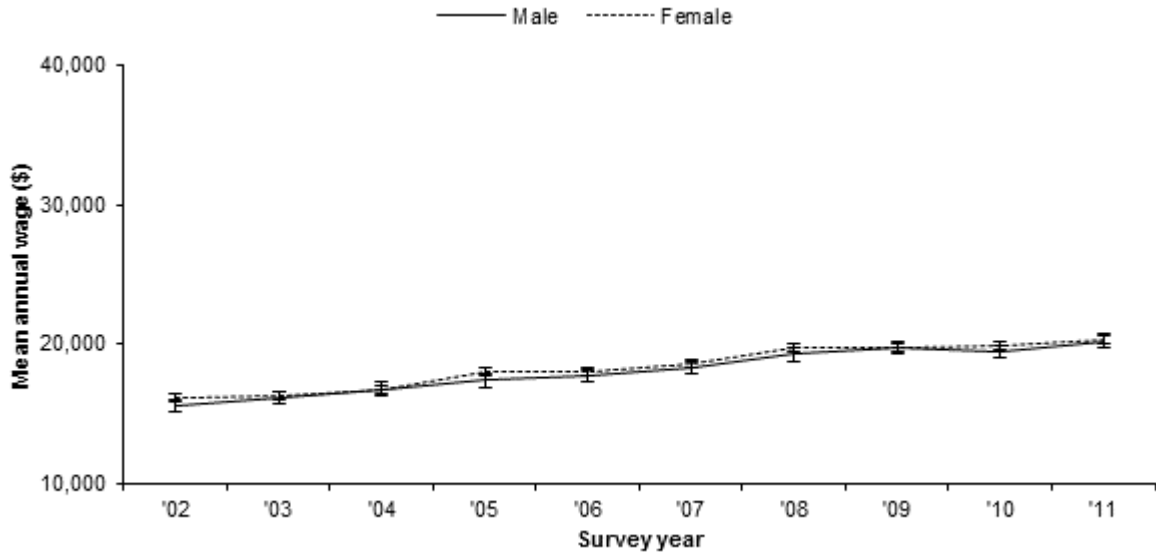
**Figure A9. Management and Commerce**

*Gender-specific mean annual earnings for part-time employed graduates from the Management and Commerce broad field of education (bachelor graduates)*



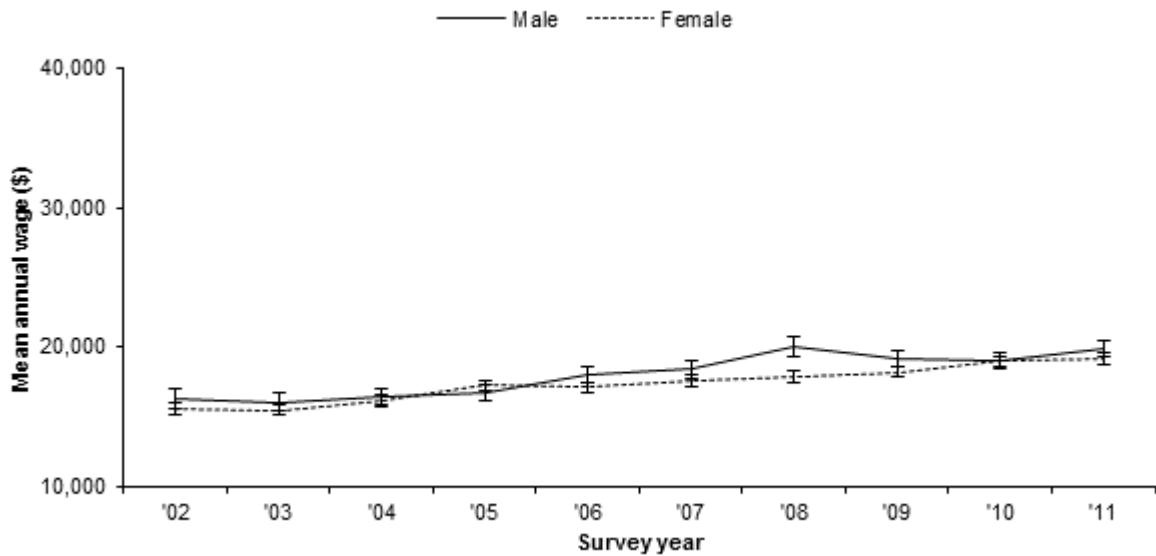
**Figure A10. Law**

*Gender-specific mean annual earnings for part-time employed graduates from the Law broad field of education (bachelor graduates)*



**Figure A11. Society and Culture**

*Gender-specific mean annual earnings for part-time employed graduates from the Society and Culture broad field of education (bachelor graduates)*



**Figure A12. Creative Arts**

*Gender-specific mean annual earnings for part-time employed graduates from the Creative Arts broad field of education (bachelor graduates)*

## Appendix B. Pay-setting questions added to the 2012 BGS

**Thinking about the selection process you went through to obtain this job, which of the following activities did you complete? (mark all that apply)**

- Group intake/group activities
- An interview with one or two interviewers
- Panel interview (three or more interviewers)
- Testing (e.g. psychometric or aptitude testing)
- Other (please specify)

**How was your salary set when you first started this job?**

- Award only (i.e. your salary was set by an award, and you could not be paid more than that award rate)
- Collective agreement (i.e. your salary was set by a collective or enterprise agreement)
- Individual agreement (i.e. your salary was set by an individual contract, registered individual agreement, common law contract, or an agreement to receive over-award payments)
- Other (please specify) \_\_\_\_\_

**Did you negotiate your salary package when starting this job? (please select the response that best fits your outcome)**

- Yes, I negotiated a better salary than was initially offered.
- Yes, I negotiated better non-salary benefits than were initially offered.
- Yes, I negotiated both a better salary and better non-salary benefits than were initially offered.
- Yes, but I was not able to negotiate a better salary nor better non-salary benefits.
- No, I did not negotiate my salary package.

**Which of the following do you receive as part of your current salary package? (mark all that apply)**

- Company-paid training and development
- Additional leave
- Flexible working arrangements
- Performance-related bonus
- Housing or housing allowance
- Car or car allowance
- Additional superannuation
- Relocation assistance
- Mobile device (e.g. smartphone, laptop, tablet) for personal use
- Other (please specify)

**What was the value of your total annual salary package in Australian dollars on 30 April 2012? This figure should include your gross salary, other monetary benefits such as superannuation, and the value of any non-monetary benefits (e.g. car allowance). IMPORTANT: ESTIMATE IF NECESSARY. WRITE A YEARLY FIGURE.**







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