Graduate Salaries 2010 Explanatory Notes

Welcome to Graduate Salaries 2010 Explanatory Notes. These notes are designed to both act as a guide to some of the discussion contained within the 2010 Graduate Salaries report, and as a glossary to some of the terms and concepts, including of the use of Male Average Weekly Earning (MAWE), interpretation of the statistical significance tests, fields of education and the methodology of the Australian Graduate Survey (AGS), amongst other things..

A copy of the full Graduate Salaries 2010 report can be downloaded from
http://www.graduatecareers.com.au/Research/ResearchReports/GraduateSalaries

Rounding
All annual salary figures in this report are rounded to the nearest $100.00.

Graduate Destination Survey (GDS) salary data
The salary data which form the basis of these reports may include additional payments, such as overtime and bonuses. As a result, figures given in this series do not necessarily reflect award rates. An example of this is the case of medical graduates, whose base salary is increased markedly by overtime payments. It is important to bear this in mind when reading these reports. To aid the interpretation of salary data, Table 15 includes the number of hours worked in an average week and the hourly rate of pay for each field of education.

Graduate starting salaries for individual fields of education are also affected by other considerations, such as requirements for professional registration within an occupation. For example, relatively low starting salaries for graduates in architecture and pharmacy reflect professional requirements for these graduates to complete a period of supervised practical experience in positions which receive relatively low wages in order to gain professional accreditation.

The situation for law graduates is further complicated by differing requirements for admission in different States and Territories. Some have the articled clerk scheme while others have practical legal training courses in place of articled clerk work, and some have a combination of both. As a result, the majority of law graduates have, in the past, been employed at relatively low income levels in their first year after graduation. In recent years, salary levels for law graduates have increased at proportionately higher rates than other fields of education, placing salary levels for law graduates closer to overall median starting salary ranks.

Further information on employment outcomes for law graduates is available from State, Territory and National law societies.

Annual rate of average weekly earnings (AWE)
The 'annual rate of average weekly earnings' is derived by averaging the average weekly earnings (AWE) figures from *Average Weekly Earnings: Original; All Employees Total Earnings* for the February and May quarters in a given year and multiplying by 52. These figures are taken from the Australian Bureau of Statistics (ABS) publication *Average Weekly Earnings*, ABS Catalogue 6302.0 (ABS 2010b).

The predominant measure of average earnings used in this report is that for males. As such, the comparison of starting salaries for female graduates with this measure may seem problematic; however it is intended that the average earnings measure be used as an illustrative benchmark and not in a prescriptive manner. Moreover, the ABS has only been collecting data for female AWE since

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1981, necessitating the use of male AWE as the benchmark for comparing changes in graduate starting salaries from 1977.

The 2003 *Graduate Salaries* report introduced further comparisons of graduate starting salaries to AWE by sex. In order to maintain consistency, these figures are also derived from *Average Weekly Earnings: Original; All Employees Total Earnings*, which includes both part-time and full-time employees. It is important to note that females are typically overrepresented in the part-time workforce in Australia, which may have the effect of making comparative salary figures for female graduates, which are based on full-time employees only, appear overly positive.

The section on Population Aged 20-24 also refers to AWE figures for the combined workforce (males and females) and for the female workforce. The use of these alternative figures is noted in the text. These figures are taken from the ABS publication *Employee Earnings, Benefits and Trade Union Membership*, August 2009, ABS Catalogue no. 6310.0 (ABS 2010a).

Annual rate of inflation

The annual rate of inflation is calculated by determining the percentage change in Consumer Price Index (CPI) figures, which are produced by the ABS each quarter (ending March, June, September and December) in the form of index numbers. This is calculated in two steps.

The first step requires an annual index to be obtained by calculating the average of the quarterly index numbers for a given year. The next step involves finding the difference between the two annual index numbers, then dividing the difference by the earlier index number and multiplying by 100 to calculate the annual inflation rate as a percentage. For example, if the annual index number for 2008 is 164.825 and the annual index number for 2009 is 167.825, the annual rate of inflation from 2008 to 2009 (to one decimal place) is calculated as:

$$((167.825-164.825)/164.825) \times 100 = 1.8 \text{ per cent}$$

CPI index numbers are also used to adjust for the effects of inflation when comparing salary figures from different time periods. This is accomplished by multiplying the salary figure from a selected prior year by the ratio of the index for the current year to the index for an earlier year. For example, if the median graduate starting salary in 1982 was $14,900, the annual index number for 1982 is 57.7 and the annual index number for 2009 is 167.825, the real value of a 1982 median graduate starting salary in terms of 2008 dollars (to the nearest hundred dollars) is calculated as:

$$\$14,900 \times (167.825/57.7) = \$43,300$$

Thus, if the median graduate starting salary in 2009 is $48,000, it can be seen that the real value of a median graduate starting salary in 1982 was comparatively lower (10.9 per cent) than a median graduate starting salary in 2009 when adjusted for the effects of inflation.

For further information, see *A Guide to the Consumer Price Index, 13th Series*, ABS Catalogue no. 6440.0 (ABS 1999). Quarterly and annual index numbers are presented in Table 27 in Appendix B.

Statistical significance

This edition of the Graduate Salaries report incorporates statistical significance tests for differences in starting salary, hourly rate and hours worked between groups of interest. A statistically significant difference simply means that there is adequate statistical evidence to conclude that a difference actually exists in the overall graduate population and is not a chance occurrence.

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Put simply, if a difference between groups in the AGS sample (and hence in this report) is identified as being statistically significant, this indicates with a high degree of certainty that this difference also exists in the overall graduate population and is not merely a result of sampling error.

This report flags differences which are statistically significant at the five per cent level (marked with one asterisk) and the one per cent level (marked with two asterisks). Being statistically significant at the five per cent level means that there is a less than one-in-twenty chance that a difference observed between groups in the AGS sample does not also occur in the overall graduate population. Likewise, being statistically significant at the one per cent level means that there is a less than one-in-a-hundred chance that a difference observed in the AGS sample does not also occur in the overall graduate population. If a difference observed between groups in the AGS sample is not statistically significant, this basically means that there is inadequate statistical evidence to conclude that this difference actually occurs in the overall graduate population. It should be noted that the choice of significance levels is largely arbitrary. Five per cent and one per cent significance levels have been used in this report as a matter of convention.

Statistical significance should not be confused with the common meaning of significance (i.e. important; notable). Being statistically significant does not necessarily make a difference important or notable. It simply means that any such difference can be reliably inferred to exist in the overall graduate population — that the difference is *real*.

For instance, a difference of $100 in the median salaries of two groups is hardly notable, but it can still be statistically significant if there is adequate evidence to suggest that this difference actually exists in the overall graduate population and is not merely a chance occurrence. Conversely, a difference of $10,000 may be a notable finding, but if there is inadequate evidence to conclude that this difference is not merely the result of sampling error then it is not statistically significant.

Consequently, when interpreting the findings contained within this report, the nominal difference between groups in the AGS sample (i.e. the difference in dollars, hours, etc.) and whether any such difference is statistically significant should both be considered in order to gain a robust understanding of the differences between groups of interest in the overall graduate population.

Non-parametric tests were used in this report because exploratory data analysis revealed the data to not conform to a normal distribution, even following attempts at data transformation. The Mann-Whitney test was used to examine differences between two groups while the Kruskal-Wallis one way analysis of variance method was used for tests involving more than two groups. Essentially, these tests examine whether the distributions of ranks for a specified test variable differ between groups.

Differences between groups are flagged as either being statistically significant at the five per cent or one per cent level in the relevant tables within the body of this report. When a difference is significant at the five per cent level, for example, this means that there is only a five per cent chance that the observed difference does not actually exist in the overall graduate population. Lower significance levels mean that there is stronger evidence that a difference is statistically significant.

Summary tables of test statistics are provided in Tables 26 and 26a in Appendix B. For each Kruskal-Wallis test a chi-square statistic (X2), the number of degrees of freedom (df) and a *p*-value are presented. For each Mann-Whitney test a *U*-statistic (U) and a *p*-value are presented. An explanation of these terms can be obtained from any introductory statistics textbook.

It is important to note that a statistically significant difference does not necessarily mean that a difference is practically significant. When examining any differences between groups, the nominal difference (in absolute dollars/hours) should be examined in addition to whether it is statistically significant to understand the scale of the difference in practical terms.

Log-linear regression models

In this edition of *Graduate Salaries*, the chapter 'Factors affecting starting salaries' examines the impact of a range of factors on graduates' hourly earnings by means of a series of four log-linear cross-sectional regression models. The general form of the regression model is

$$\log H_{ir} = \alpha + \beta X_{ir} + \beta \log U_r + \varepsilon_{ir}$$

where the dependent variable H_{ir} is the calculated hourly starting salary of graduate i observed in region r (corresponding to the graduate's State or Territory of employment), U_r is the average annual unemployment rate for 2008 in region r while X_{ir} is a set of characteristics for graduate i including their broad field of education and other enrolment characteristics (honours degree and double degree), personal characteristics (gender, disability status and language background), employment characteristics (region, organisation size, sector, contract length, importance of field of study and whether they worked full-time in their final year of study), plus a range of 11 occupation and 21 industry variables. A summary of these variables is presented in Table 28 in Appendix B.

Because extreme values of the dependent variable (calculated hourly rate) would be likely to affect the results of the regression analysis, values identified as being extreme outliers (defined here as being more than 5.2 median absolute deviation units below and above the median) were excluded from the sample. This 'trimmed' dependent variable has a mean of $21.70 and approximately follows a normal distribution. Additionally, cases with missing responses for either the dependent variable or any of the independent variables were excluded. The regression analysis was based on the resulting subset of 10,230 graduates.

Categorical independent variables (field of education, sex, etc.) have been coded as 0/1 dummy variables. Each dummy variable (or set of dummy variables in the case of broad field of education) includes an 'omitted' reference category which serves as a baseline against which the other categories are compared. For example, a negative regression coefficient of -0.031 for the 'Female' variable (see Table 25) indicates that female graduates earn an hourly salary 3.1 per cent lower than graduates in the reference category which was, of course, male graduates. A positive regression coefficient indicates a higher value relative to the reference category. A summary of these dummy variables and their corresponding reference categories is presented in Table 28 in Appendix B.

From the analysis undertaken, relatively high values of the F-statistic for each version of the model (see Table 25) indicate that all are statistically significant: each version of the regression model is more effective in terms of predicting the dependent variable than chance alone.

ABS Catalogue 6310.0 Employee Earnings, Benefits and Trade Union Membership

The ABS has made a change in the method used to determine whether an employee works full time or part time in their main job. Prior to 2002, full-time or part-time status in main job was derived from a self-perception question in which employees were asked 'Is your job full-time or part-time?'. Following the redesign of the Labour Force Survey questionnaire in 2001, actual hours worked in main job in the reference week are now collected.

For further information, see *Information Paper: Implementing the Redesigned Labour Force Survey Questionnaire*, ABS Catalogue no. 6295.0 (ABS 2001b) and *Information Paper: Questionnaires Used in the Labour Force Survey*, ABS Catalogue no. 6232.0 (ABS 2004).

Sector of employment

Tables 1, 17 and 17a present salary data by sector of employment. Total figures in each of these tables include 'other employers not elsewhere indicated' (including non-profit employers).

In Table 1, the education columns include both public and private education. The public health sector in Table 1 is presented separately but the private health sector is subsumed under professional practice or commerce and industry, as appropriate.

In Table 1 the category 'Total Govt' includes local government, which is not recorded separately. In tables 17 and 17a, the category 'Total Govt' includes federal, state and local government.

Abbreviations in tables

The following abbreviations are used in tables in this report:

Prof. Pract.
Professional practice

Ind./Com.
Industry and commerce

Tert. Ed.
Tertiary education

Time series data

For the majority of fields of education in this report, time series data are available from 1977. However, the fields of art and design, optometry, and paramedical studies were not disaggregated until 1988. Consequently, time series data for these three fields begin in 1988.

Data for 1978 are not consistent with those for other years and have been removed from time series tables and figures so that the remaining data are comparable over time.

Due to technical issues with data collection at the institutional level, time series tables do not include 2000 salaries data for QUT and 2002 salaries data from Southern Cross University.

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Cell sizes

Some fields of education are represented by relatively small numbers. In cases where numbers within a given field of education are small, results should be interpreted with caution and generalisations based on the data should be avoided. Furthermore, in keeping with the current AVCC-GCCA Code of Practice (available from www.graduatecareers.com.au), this report does not include salary data for cells containing fewer than 10 respondents.

Australian Standard Classification of Education (ASCED)

In 2001, GCA introduced the *Australian Standard Classification of Education (ASCED)* in the aggregations of fields of education.

From 2002, criminology is classified as humanities. (Prior to 2002 it was classified as social sciences).

Field of education

The 23 fields of education in this report are aggregations of a number of ASCED subject areas. The order in which fields of education appear in tables is either alphabetical or ranked, depending on the particular table.

The subject areas included within each of these fields of education are given below:

Accounting

Agricultural Science
agriculture, animal husbandry, soil & plant science, horticulture, forestry, agricultural management, parks and wildlife management

Architecture & Building
architecture, landscape architecture, environmental & industrial design, urban & regional planning, building, quantity surveying

Art & Design
art and craft, dance, dramatic arts, music (performance), graphic arts, other visual and performing arts

Biological Sciences
Biochemistry, microbiology, biological sciences, environmental sciences, zoology, human movement (science)

Computer Science

Dentistry

Earth Sciences
geology, geophysics, soil mechanics, geodesy, surveying, cartography

Economics, Business
economics, business, banking, finance, marketing, valuation & real estate, administration and management, hospitality

Education

Engineering

Humanities
liberal arts, languages, linguistics, history, literature, philosophy, political science, criminology

Law

Mathematics
pure mathematics, applied mathematics, statistics

Medicine

Optometry

Paramedical Studies
nursing, radiography, podiatry, occupational therapy, audiology, speech therapy, physiotherapy, dietetics, other health- and rehabilitation-related professional studies

Pharmacy

Physical Sciences
chemistry, physics

Psychology

Social Sciences
sociology, anthropology, archaeology, geography, jurisprudence, legal studies (non-professional), police studies

Social Work
social work, welfare studies

Veterinary Science

Queries

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