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Is There a 'Rising Tide' of Graduate Overeducation in Australia?

by

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Is There a 'Rising Tide' of Graduate Overeducation in Australia?

This paper studies the extent of graduate overeducation and graduate gender income differences in Australia. As well, the paper tests for non-linear returns to overeducation. It is found that the rates of graduate overeducation vary by both gender and time and range between 16% - 22%. Returns to graduate overeducation increased over the time period but were consistent with the stylised facts found in the literature. Non-linear returns to overeducation is weakly evident for female graduates in 1996. The graduate gender income gap narrowed by 5.6% between 1991-1996, mainly due to the improvement of the position of female graduates within the male graduate income distribution and improvements in their human capital characteristic endowments relative to male graduates.

I. Introduction

While there exists strong evidence that more education tends to lead to superior outcomes for those who do 'invest' in post-compulsory education (Mincer, 1974; Psacharopoulos, 1981; Preston, 1997 and Borland, 2002), it is far from clear if all these 'investors' actually obtain their expected returns to their education investment, especially given the expansion of tertiary study in OECD countries in the last thirty years[1]. Ever since Freeman's (1976) seminal work on overeducation, more studies are beginning to highlight heterogeneity in employment and remunerative outcomes for those with similar qualifications, including at the graduate level. Graduates who fail to gain employment in jobs that match their qualifications either find themselves in occupations where their educational attainments are underutilised (overeducated) or are in occupations where they possess less than the required paper qualifications (undereducated).

[1] For instance, the number of persons aged 15 to 24 in tertiary education in Australia rose from 630, 100 in 1992 to 693, 000 in 1997. This reflected a rise in the education participation rate from 23% to 26.3% (ABS, 1998).

Hiring overeducated workers can be considered an inefficient allocation of resources as these workers find themselves in jobs where their qualifications are not fully utilised[2]. Graduates are not immune to being overeducated (Robst, 1995; Patrinos, 1997; Alpin *et al.*, 1998; Battu *et al.*, 1999 and 2000; Dolton and Vignoles, 2000; Kler, 2003) and it would seem that a sizeable percentage of graduates (who invest heavily in time, if not financially in post-compulsory education) are not obtaining their expected returns to investment. From a policy perspective, governmental subsidies to the tertiary sector would seem to be producing a sub-optimal outcome for the public dollar. Nonetheless, firms might continue to hire mismatched workers for a myriad of reasons including for insurance (Bulmahn and Krakel, 2002) or training purposes. Moreover, overeducated graduates might take up mismatched work to upgrade their skills and move into matched work as their work experience increase, or simply because no other work is available. This mismatch can be either temporary or permanent (Hartog, 2000). As well, the higher growth rate of female participation in the tertiary sector[3] could conceivably lead to female graduates being more prone to being mismatched, or at least have a larger impact on their earnings.

This paper investigates the extent and measurement of graduate educational mismatch[4] in Australia in 1991 using Australian census data to gauge first, the level of graduate

[2] Overeducation exists if a worker has excess education to do his/her job. Conversely, undereducation results in workers not having enough education to do the job (Green *et al*, 1999: 2). While the total number of overeducated and undereducated workers provides us with the rate of labour mismatch, remuneration is used to measure the return accruing to labour mismatch, since the earnings of the mismatched can be compared to those who are job matched.

[3] There were 41,200 more females than males in institutions of higher education in Australia in 1997. In 1991, there were 4,500 more males than females in these institutions (ABS, 1998).

[4] The terms 'over and undereducation' are used interchangeably in this paper with the term 'mismatch' while the 'adequately educated' (for their jobs) are also termed as being 'matched.' This is consistent with the general literature. For an example of how these terms can differ, see Chevalier (2001).

overeducation and second, to investigate the returns to graduate required education and graduate overeducation. Results show an increase in the level of graduate overeducation between the two years of comparison, with graduate females more likely to be mismatched. Returns to graduate overeducation rise over time with female graduates obtaining higher returns to both required and surplus education in both 1991 and 1996. Following on from this, the graduate gender income gap over this period is examined using a re-worked Juhn, Murphy and Pierce (JMP) decomposition (Kidd and Shannon, 2001). It is found that the graduate gender income gap narrows by 5.6% due mainly to improvements in gender specific effect. Educational mismatch plays a small but significant role in explaining the graduate gender income gap.

Section II provides a brief background of overeducation, including the types of overeducation measures available. Section III introduces the econometric framework to test for over and undereducation as well as the graduate gender income gap. The dataset is outlined and explained in Section IV. Results are presented in Section V and Section VI summarises and concludes.

II. Background

The three main measures for calculating over and undereducation are the subjective or Worker Self-Assessment (WA) method, the objective or Job Analysis (JA) method and the statistical or Realised Matches (RM) method (Halaby, 1994 and Hartog, 2000). The subjective method measures mismatch by obtaining data from workers themselves,

usually via surveys and questionnaires. It "has the advantage of drawing on all local, up-to-date information" but does lack "rigorous instruction" (Hartog, 2000: 132). For example, respondents might actually overstate job requirement or regurgitate hiring practice standards.

The objective measure utilises job analysis data to gauge the extent of labour mismatch. In the USA, for example, the Dictionary of Occupational Titles (DOT[5]) provides a detailed list of minimum required qualifications to undertake a particular job. It has clear definitions and detailed measurement instructions. It does, however ignore the mean years educational variations of jobs within occupations due to jobs aggregation (Halaby, 1994). This can occur particularly if the job analysis data utilised lacks depth (i.e., uses only broad occupational groups rather than detailed sub-occupational groups) and only looks at educational requirements rather than other non-educational human capital characteristics such as experience and skill.

The statistical method generally utilises the two-sided 'one-standard deviation away from the mean[6]' criterion on either side of the distribution as a measure of labour mismatch. It has the advantage of not needing detailed educational requirements for a job but on the other hand, its disadvantage lies in its arbitrary cut-off distinction and its failure to account for job variations within occupations (Halaby, 1994). Chevalier (2001: 6) notes that 'it is sensitive to cohort effects, especially in the case of a rapid change in the education level required for a given occupation.' It also assumes that jobs with the same

[5] The Australian equivalent is the Australian Standard Classification of Occupations (ASCO).
[6] This is the orthodox definition of the statistical measure, but other statistical measures, such as the mode, have also been used.

titles have the same skill requirements when this is patently not always the case. Hartog (2000) reports that this measure leads to symmetrical findings of over and undereducation, owing to the mismatched being found on either side of an education distribution.

A number of stylised facts are evident across all three measures. It is found that the returns to overeducation are positive but are lower than the returns to required education. As well, the returns to undereducation are negative but the penalty to undereducation in absolute terms is smaller than the return to overeducation (Hartog, 2000).

Groot and Maassen van den Brink (2000) list studies on overeducation based on the methodology used[7]. All studies find a significant incidence of overeducation. For the objective measure, incidences of overeducation (undereducation) range between 11-40% (20-44%). Following the statistical measure, overeducation (undereducation) is between 7-20% (5-22%). Subjective measures yield results of around 14-42% for overeducation and 2-28% for undereducation. Results vary depending on factors such as the data set utilised, the time-frame investigated, the region/country considered, the sample group (e.g. graduates only, white males only *et cetera*) and the method utilised to calculate labour mismatch. Overall, overeducation (undereducation) is averaged out at 26.4% (30.2%) for the objective measure, and 13.1% (9.6%) for the statistical measure. On two subjective measures, overeducation (undereducation) is estimated to be 24.8% or 28.6% (11.2% or 15.5%).

[7] Their review is not exhaustive but does show the results of most major studies in the area including Duncan and Hoffman (1981), Verdugo and Verdugo (1989), Sicherman (1991), Alba-Ramirez (1993), Halaby (1994), Groot (1996), Daly *et al.* (2000) and Dolton and Vignoles (2000) among others.

Only a handful of studies of overeducation have restricted attention to graduates. These include Robst (1995) who found male graduate overeducation in the USA to stand at 44.68% (subjective measure) with undereducation at 11.30%. Patrinos (1997) found graduate overeducation in Greece to be 16% (objective measure), with fluctuations depending upon the subject matter studied by the graduate. He states that "(t)he incidence of overeducation is greater for those graduating from university courses associated with disciplines that do not have a close fit with the labour market" (1997: 214). As well, overeducation was more prevalent among graduates from poorer socio-economic backgrounds.

Alpin, Shackleton and Walsh (1998) studied the extent and reasons for graduate over and undereducation in the UK. Results differed depending on the type of method used. Using an objective measure, they found overeducation (undereducation) to be 27% (17.8%). The 'modal' measure yielded overeducation (undereducation) at 37.7% (8.4%). Males were more likely to be undereducated and females more prone to be overeducated according to the objective method and less likely following the modal method. Age was inversely related to overeducation and positively with undereducation. Outcomes varied widely depending on subjects studied. Regional variations were also evident.

Battu, Belfield and Sloane (1999) investigated the outcome of UK graduate cohorts over time. They found initial matching to be lower for 1990 graduates (compared to 1985 graduates) but that the gap narrows over time. Males had a better chance of being

adequately matched immediately after graduation but females did manage to improve their matching over time. Subject area of study had immediate and persistent effects. In 2000 they again investigated graduate overeducation in the UK. Specifically, they looked at overeducation via three methods[8]. Results placed graduate overeducation between a band of 15.2-41%. Gender differences varied by method utilised. Overall, across the measures, Battu *et al.* (2000) reported that matched males (compared to overeducated males) had an earnings premium of between 7-10% (1985) and 8-12% (1990). For females, it was 16-29% (1985) and 14-19% (1990). They also found that "(a)lthough we cannot identify whether or not females are more prone to overeducation, it has a stronger effect on their earnings" (2000: 88).

Dolton and Vignoles (2000) found initial graduate overeducation in the UK to be 38% (graduates in first jobs in 1980). This figure fell to 30% by 1986 for those in the 1980 group. Gender variations were not evident. Those with better grades were less likely to be mismatched, as were university graduates (compared to polytechnic graduates) and graduates in Engineering, Technical or Science degrees. The wage penalty for the overeducated in 1980 depended upon job type, sector and gender. By 1986, the wage penalty had fallen for the overeducated but females continued to be penalised more than males.

Kler (2003) looked at variations in returns to graduate overeducation in Australia in 1996 by investigating two different methods; objective and statistical. He found that incidences of overeducation varied depending on method utilised. The mean method produced rates

[8] Two subjective measures as well as an objective measure.

of graduate overeducation between 38-46% and around 21% following the objective method. There was some evidence of non-linear returns to overeducation among graduate groups, mainly with the mean measure. Returns to overeducation are far higher (7.3-8.3%) following the mean measure relative to the objective measure (4-4.9%). Interestingly, young male graduates seem to suffer no penalty for being overeducated compared to their matched peers. This may be due technological change altering workplace requirements faster than changes in occupational titles, especially in occupations with high technological infusion. Indeed, 32% of young male graduates had studied engineering or the sciences, compared to only 13% of young female graduates.

III. Methodology

III.I Overeducation

This paper investigates overeducation using augmented human capital models. The human capital regressions take the following standard form:

$$ln\ Y_i = \delta_0 + \delta_1 Z_i + \delta_2 ex_i + \delta_3 ex_i^2 + \delta_j X_{ij} + \varepsilon_i \qquad (1)$$

$ln\ Y_i$ is the dependent variable which signifies the log value of weekly income for individual i. The δs measure the returns to a number of characteristics. Z represents qualification attainments, ex and ex^2 signify the returns to potential labour market

experience and its square. X is a vector of personal characteristics while ε is the error term for individual i.

This is then augmented to allow for the effects of over and undereducation:

$$In\ Y_i = \alpha_0 + \alpha_1 Sr_i + \alpha_2 Ss_i + \alpha_3 Ss_i^2 + \alpha_4 Sd_i + \alpha_5 Sd_i^2 + \alpha_6 ex_i + \alpha_7 ex_i^2 + \alpha_j X_{ij} + \varepsilon_i \quad (2)$$

Sr represents the returns to required education, while Ss and Sd represent the returns to surplus education (i.e., overeducated for a job) and the returns to deficit education (i.e., undereducated for a job) respectively. Ss^2 and Sd^2 signify the squared terms of over and undereducation in order to capture any non-linear effects. ε is the error term.

Human capital theory in its purest formulation assumes fully flexible labour markets and all workers earn a wage equal to their marginal product. However, equation 2 allows for imperfection in the relationship between qualification and employment. Thus, equation 2 is used to empirically investigate the returns to mismatch in this paper.

III.II The Graduate Gender Income Gap

We examine the graduate gender income gap changes over time following Kidd and Shannon (2001). The following JMP[9] equation provides a decomposition estimate of the gender income[10] gap between 1991 and 1996:

$$D_{91} - D_{96} = (\Delta X_{91} - \Delta X_{96})\, \beta^{m}_{96} + \Delta X_{91}\, (\beta^{m}_{91} - \beta^{m}_{96}) + (\Delta\theta_{91} - \Delta\, \theta_{96})\, \sigma^{m}_{91} + \Delta\theta_{91}\, (\sigma^{m}_{91} - \sigma^{m}_{96}) \qquad (3)$$

D_{91} and D_{96} denote the gender income differences in 1991 and 1996 respectively. Both consist of the differences in mean log weekly income between the genders in each time period. The right hand side provides a decomposition of the differences. The first right hand term measures the contribution of the augmented human capital effects (Equation 2) on a hypothesised narrowing of the gender income gap by looking at differences in male and female relative endowments. The ΔXs represent the difference between the mean characteristics of male and females while β^{m}_{96} represents OLS parameter estimates of equation 2 for males in 1996. The second right-hand term highlights the changing rewards to the term 'Observed Prices,' i.e., the augmented human capital related characteristics. Terms one and two provide an estimate of income variation.

Terms three and four calculate income inequality. Term three is known as the 'Gap Effect' and term four captures 'Unobserved Prices.' The 'Gap Effect' gauges the effect of the changes in the relative position of females within the male income distribution.

[9] The JMP decomposition extends upon the Oaxaca (1973) method by separating 'the role of changes in wage structure and changes in gender-specific characteristics such as relative educational attainment' (Kidd and Shannon, 2001: 930). See Appendix 1 for more information.

[10] Kidd and Shannon (2001) look at wages while in this paper, the data provides income information.

'Unobserved Prices' measures the convergence (divergence) in the gender income gap due to changes in the spread of the male income function with the gap in gender unmeasured endowments held constant (Arabsheibani *et al.*, 2002). In essence, this means that 'Unobserved Prices' is dependent upon changes in the shape of the male residual distribution over time (Kidd and Shannon, 2001). To calculate terms three and four, it is first necessary to calculate 'the distribution of income equation residuals for males' (Kidd and Shannon, 2001: 931) in 1991 (base year) so as to create a point of comparison for female observations. The σs equal the standard deviation of the residual of each gender income regression while the θs represent the standardised residual of each income regression.

While terms one and two calculate wage variation and terms three and four constitute wage inequality, terms one and three can also be added together to produce gender-specific effects, with terms two and four coupled to gauge wage structure changes (Kidd and Shannon, 2001). It is this breakdown rather than the wage variation/wage inequality distribution that is followed in this paper.

IV. Data

Data for both 1991 and 1996 are obtained from the Australian Bureau of Statistics Households Sample Files (HSFs). Both are cross-sectional datasets containing one percent samples of the corresponding census data. After data manipulation, the samples are restricted to Australian born residents employed in either full or part-time work aged

between 20 to 64 years. As Preston (1997) noted the HSF has the advantage of allowing for a high level of disaggregation due to its large number of observations. It also provides detailed information on occupation (two-digit ASCO codes) and industry of employment.

From the initial samples, migrants are dropped as the data does not allow for a separation between education (and qualification) gained in Australia and the home country[11] as are individuals whose response to industry, occupation, income, marital status and qualification level was unstated or inadequately described. The resulting sample sizes are 28,927 (1991) and 36,886 (1996). Of these, 4,032 and 6,631 are graduates. The HSF age and income information is listed in bands and mid-points of the bands are used to create new age and income variables. There are also variables to indicate regional, ethnic, sectoral, industrial, occupational, educational, gender and marital status characteristics that are entered as dummy variables. Potential labour market experience is calculated in the standard fashion (see Appendix 2). Finally, average years of education are estimated and over and undereducation variables are created by deducting or adding to ASCO determined minimum occupation qualifications. Variables are listed and explained in detail in Appendix 2.

Not all variables are directly comparable between datasets and concordance codes are utilised to ensure uniformity between datasets. Thus, income for 1991 is adjusted to 1996 dollars following the procedure undertaken by Gibbs and Knight (2000). As well, 1991

[11] Flatau *et al.* (1995) find a higher incidence of overeducation among migrants and state that among the possible reasons include impediments to the transfer of skills from one country to another or the recognition of those skills.

ASCO codes are changed to reflect updated ASCO codes as used in 1996 census data. Variables for various regions in Australia follow the 1991 dataset.

One drawback of the dataset is that the variable representing weekly income is calculated from all sources including overtime, allowances and interest. Thus, it is not possible to separate salary earnings from other sources of income. Given that graduates are expected, *a priori*, to be found in occupations with better remunerative benefits, it is reasonable to assume that they would be in a position to save and invest more than non-graduates. As such, restricting the study to graduate overeducation with income being the explanatory variable is likely to bias returns to required education and overeducation upwards.

[Table I.a]

[Table I.b]

Tables I.a and I.b list the mean values and standard deviations of relevant variables for three groups; the graduate sample and the graduate-gender sub-samples in 1991 and 1996 respectively. Both tables show that male graduates have more potential experience than their female counterparts though potential labour market experiences rises for both groups in 1996. As well, there exists substantial variation between fields of study undertaken by male and female graduates. While both genders are well represented in social and cultural studies, females are predominantly found in health and education while males are more likely to have graduated from the fields of business administration and the sciences in 1996 though this is not so pronounced in 1991. Graduates are

predominantly found in government jobs in 1991 but not in 1996. Nine-tenths of male graduates are in full-time work compared to seven-tenths of female graduates. Occupation distribution varies by gender. While professional work predominates for both genders less than 10% of female graduates are in management work compared to 20% of their male counterparts. Female graduates are vastly over-represented in public and community services. There are clearly distinct differences between male and female graduates though these appear to be changing over time.

[Table II]

Table II presents income statistics for the whole sample as well as graduates to provide a point of comparison. A look at mean gross weekly income shows substantial variation across occupations, gender and qualifications. As expected, those in managerial and professional jobs earn the most. Graduates earn significantly more than non-graduates. The average graduate earns $819.07 in 1991 and $838.70 in 1996. Females have, on average, smaller incomes than males, across all occupations and educational qualifications, earning between 68.14% (1991) and 69.55% (1996) of the average male income, or between 79.45% (1991) and 80.45% (1996) of the average income. This figure is fairly consistent across the graduate and non-graduate sample.

The general literature on overeducation suggests that incidences of labour mismatch are manifested via earnings variation (Verdugo and Verdugo, 1989; Groot, 1996; Green *et al*., 1999; Cohn and Ng, 2000). In this paper it is found that substantial variations do exist

within the graduate sub-group. For example, only 55% of male graduates in full-time managerial work in 1991 were earning within one-standard deviation of the mean of male graduate income for full-time managerial work, indicating heterogeneity of graduate outcomes in the labour market.

[Figure I.a]

[Figure I.b]

[Figure II.a]

[Figure II.b]

Figures I and II illustrate the existence of labour mismatch in Australia. Some features of the data are worth noting. Graduates are a distinct group in the labour market, as their incidences of required and overeducation differ from non-graduates. Using the objective measure, graduates cannot be undereducated as the graduates possess paper qualifications that match, at the very least, the minimum qualifications required for all 2 digit ASCO coded occupations. The graphs show that the incidence of graduate overeducation rose between 1991 and 1996[12] with female graduates slightly more likely to be overeducated compared to male graduates. This compares favourably with other findings on graduate overeducation, alongside Greece's 16% rate of graduate overeducation and the lower end of Battu *et al.*'s (2000) finding of between 15.2-41% in the UK. It is substantially lower than Robst's US report of 44.68% and Alpin *et al.*'s (1998) band of 27-37.7% as well as Battu *et al.'s* upper band.

[12] 15.88% to 20.54% for male graduates and from 18.78% to 21.50% for female graduates.

[Figure III.a]

[Figure III.b]

The extent of mismatch is not uniform across age groups. Figure III shows that age influences a graduate's probability of being mismatched. The 20-24 age group is far more likely to be overeducated compared to older age groups. Indeed, incidences of overeducation decrease with age for both genders in 1991 and 1996. This tends to suggest that overeducation might well be both a short and a long-term phenomenon, with some graduates moving into matched work while others remain overeducated. This is consistent with the findings of Battu *et al.* (1999). Nonetheless, this could also indicate the existence of a cohort effect with newer batches of graduates being more prone to being overeducated. There is however, not enough data available at this time to test for cohort effects. Neither has a study into cohort effects influencing rates of graduate overeducation been undertaken as yet.

V. Results

We now turn to a more formal econometric evaluation of earnings determinants.

V.I Returns to Required and Surplus Graduate Education

[Table III.a]

Table III.a shows the returns to required education and overeducation for the graduate-gender samples using equation (2) in 1991. Results are fairly consistent with the stylised facts found in the overeducation literature (Green *et al.*, 1999). Returns to surplus education (3.2-4.2%) are lower than returns to required education (11–13%) but remain positive. Hence, while highly overeducated individuals might earn less than their adequately educated and matched peers (for their excess years of education), they still earn a premium for their excess education.

Results for other variables largely match *a priori* expectations. Experience has a higher pay-off to male graduates and marriage benefits male graduates in terms of remuneration, and penalise female graduates. Nonetheless, the expected income penalty for being an Aboriginal or Torres Strait Islander (*atsi*) or for coming from a non-English speaking background (*nesb*) only eventuates for *atsi* female graduates, a finding similar to that of Barooah and Mangan (2002). Male graduates in health (omitted case engineering) and female graduates in engineering are the best remunerated, while government employees and those working overtime continue to receive positive pay-offs with part-time workers penalised[13]. The level of overtime positively affects income, with male graduates working in excess of 48 hours (*overtime_2*) earning more than those doing more than the full-time load (37 hours) but less than 48 hours (*overtime_1*)[14]. As well, graduates in Victoria and Queensland as well as female graduates in Adelaide (*sa_cap*) suffer an earnings penalty compared to their NSW (omitted case) counterparts. Male graduates in the mining industry earn more than those in the trade industry (omitted case) with those

[13] This matched findings by Borland *et al.* (1998) and Kler (2003).
[14] Although we should keep in mind that graduates might well be undertaking unpaid overtime.

in agriculture and personal services faring the worst. Results for female graduates are much more different with those in the mining, manufacturing, transport and communications and business and finance industries earning more than those in trade.

[Table III.b]

Table III.b show that the returns to overeducation in 1996 (4.1 – 5.2%) were higher than in 1991 for both genders. Surplus education for male graduates is not subject to diminishing returns but diminishing returns to surplus education is weakly significant for female graduates. Returns to required education remain unchanged from 1991. The rates of return accruing to overeducation in both 1991 and 1996 are higher than the 'average' returns to surplus education (1.4% in the 1990s) as found by Groot and Maassen van den Brink (2000) in their meta-analysis.

Similar to the findings for 1991, results for other variables are largely unchanged with minor variations. Experience and marriage variables remain consistent with 1991 results though the pay-off for experience and marriage increases for male graduates. The pay-off to experience falls for female graduates though so does the penalty to being married. Male graduates in health remain the best remunerated in 1996 though female graduates in Engineering no longer earn significantly more than female graduates in other fields bar education and architecture, where the findings are significant only at the 5% and 10% level respectively. This might be due to the number of females studying engineering increasing from 4.2% (1991) to 8.1% (1996). As in 1991, government employees and

those working overtime continue to receive positive pay-offs with part-time workers penalised. The NSW earnings premium remains evident and actually extends to include male graduates in the areas defined to include the 'rest of Australia' and also Perth (*wa_cap*) for female graduates. A number of changes occur between 1991 and 1996 at industry level with male graduates in mining, manufacturing, power, transport and communications as well as business and finance industries earning a premium over those in the trade industry, whereas in 1991 only male graduates in the mining industry earned a premium. As well, there is no longer any significant earnings variation between those in trade work and public services. For female graduates, the earnings premium only accrue to those in transport and communication while those in the trade industry earn more than in accommodation and food as well as personal services.

V.II Graduate Gender Income Gap

[Table IV]

Table IV shows the decomposition of the graduate gender income gap between 1991 and 1996 as per Equation 3. Table IV shows that there was income convergence between the genders of 5.6% across this period. This is somewhat higher than Kidd and Shannon's (2001) finding of 4.39% wage convergence among the general population between 1981/2 and 1989/90. The sum total of this convergence is made up of the four terms in Table IV numbered (1) to (4). Each term has a specific role in explaining convergence or divergence. Other variables are listed to highlight their more limited role in explaining

either income convergence or divergence. For example, the variable *cultural studies* as found within the human capital endowment component explains 5% of the graduate gender income gap convergence. Essentially, this means that female graduates had increased their human capital endowment in *cultural studies* relative to male graduates. When found within the term 'Observed Prices' it actually shows that the reward accruing to female graduates for improving their human capital endowment in *cultural studies* is negative, relative to male graduates. It also does not explain convergence, but actually shows a graduate gender income gap divergence effect of 4.29%.

The relative male-female endowments of human capital characteristics explain 36% of this convergence, indicating that graduate females are improving their human capital characteristics *vis-a-vis* male graduates in the early to mid 1990s. Surprisingly, this is not due to female graduates increasing their potential labour market experience[15]. However, both fields of study and industry variables show convergence, as a whole, though certain areas of study and work indicate divergence. This might indicate that female graduates are moving into occupations previously dominated by males. In terms of labour market (mis)match, there is evidence of female graduates improving their educational endowments relative to male graduates (8% of convergence explained) though overeducation shows a divergence effect of around 5%[16].

[15] Kidd and Shannon (2001) found that changes in labour market experience contributed towards convergence.

[16] While incidences of overeducation rose for both genders in 1996, and while the incidences of graduate female overeducation remain higher than for male graduates, the increase in mismatch for male graduates between 1991 and 1996 rose by 29%. For female graduates, the rise was about 14%. Hence the increase in 'overeducation endowment' was higher for male graduates than female graduates.

The ‘Gap Effect’ narrows considerably over time, indicating the substantial improvement of the position of female graduates in the male graduate income distribution. This highlights either falling discrimination against female graduates, improvements in their ‘unobserved earnings generating endowments,’ or a combination of both (Arabsheibani *et al.*, 2002). This constitutes roughly 130% of the total change[17]. This might be due to an acceptance of female graduates in traditional male occupations. Kidd and Shannon (2001) found the Gap Effect to explain 51% of the wage convergence, and including human capital effects, they found that gender specific effects explain 95% of the convergence. In this paper, the figure is around 166%.

Observed and Unobserved Price effects measure income structure changes over time. It can be seen that while the returns to human capital characteristics were negative (shows divergence of 18%), the rewards to experience, fields of study and industry were, overall, positive, and indicative of convergence. Nonetheless, it is worthy of note that while female graduates were improving their human capital characteristics relative to male graduates, the returns to their endowments exhibits overall divergence rather than convergence. Returns to required education show divergence of around 1.5%, which is a cause for concern. On the other hand, returns to overeducation actually explain some convergence, though small in total (0.41%). The negative figure for Unobserved Prices suggests a rise in the level of residual income inequality over time.

[17] A percentage change of more than a hundred simply means that in the overall context of the gender income gap, other components combined to produce a ‘divergence effect,’ or a negative percentage change.

VI. Summary and Conclusion

Despite there being remunerative benefits to being tertiary educated in Australia, evidence in this paper points to around one-sixth to one-fifth of the graduate population being overeducated and hence, penalised (in terms of remuneration) for their excess qualifications. Nevertheless, compared to other overseas studies of graduate overeducation, the Australian results show that Australia is not in the midst of a 'serious' case of graduate labour market mismatch. This is not to say that the issue is insignificant. The data shows that between 1991 to 1996 the incidences of overeducation have risen for both genders, though the increase has been small. Given that further enrolment expansion in the tertiary sector can be assumed[18], this might to further mismatch between graduates' qualifications and job requirements.

The narrowing of the graduate gender income gap indicates that female graduates are seeing their income rising faster than their male counterparts. A closer inspection indicates that while their human capital endowments are improving relative to male graduates, the rewards (i.e., returns) female graduates obtain for them is actually leading to divergence rather than convergence. Indeed, convergence is mainly explained by the improvement of the position of female graduates in the male graduate income distribution. Whether or not this suggests falling levels of discrimination against female graduates requires further research. Tentative results do however suggest that increased

[18] The establishment of differential HECS and the introduction of limited full-fee paying domestic students has not slowed the growth in tertiary enrolments (ABS, 2000).

female enrolment in the tertiary sector has increased their presence in traditionally male dominated occupations and this might have broken down previous barriers to entry.

Appendix 1 – Explaining the Gender Wage Gap

As a starting point in dissecting the gender wage gap, it is divided in two: explained and unexplained sections. The difference between male and female wages in the explained section is not due to discrimination; rather it reflects a whole range of factors, education and experience usually being the most important. This is *wage variation*. The unexplained section, on the other hand, highlights the factors that lead to the gender wage gap that cannot be accounted for and in the gender wage gap literature is usually referred to the discrimination portion of the male-female wage differential, or *wage inequality*.

According to the JMP decomposition, the wage gap is due to characteristics, prices (rewards) to these characteristics and an unobservable component made up of, as best as can be conjectured, unmeasured characteristics and their associated unknown prices (the residual).

Following Kidd and Shannon (2001) four terms are constructed (Equation 3) to measure the gender wage gap, two measuring variation and two inequality.

- The first term measures the change over time in male-female relative endowments of human capital (i.e. characteristics).
- The second measures the change in price (rewards) of these characteristics.
- The third measures what is known as a 'gap effect.' It shows the change in unobserved female characteristics and or/ discrimination. This alters the percentile position of the mean female residual within the male residual distribution.

Essentially, the female residual wage is inserted into the male residual wage to gauge changes in the wage position of females *vis-à-vis* males over time.

- The last term is measures 'unobserved prices.' It highlights the change in the form of the male residual over time. The mean female residual is fixed at base year.

The following diagramme illustrates the concept from its basic form through to its final form:

Wage Gap = Explained + Unexplained Sections

Wage Gap = Wage Variation + Wage Inequality

Wage Variation = Characteristics (e.g. Human Capital) + Observed Prices (or Coefficients, Rewards)

Wage Inequality = The Residual

Wage Inequality = Unobserved Characteristics + Unobserved Prices

Wage Inequality = Gap Effect + Unobserved Prices

Wage Gap = Human Capital + Observed prices + Gap effect + Unobserved Prices

Appendix 2

Variable Definitions

Variable Name	Description
logY	Log of gross weekly income
experience	Potential labour market experience derived from the equation ex = *(age – education years- 5)*, where *age* indicates age, *education years* indicates years spent studying and 5 the age at which compulsory schooling begins
$experience^2$	Potential labour market experience squared
nesb	Dummy variable indicating individuals claiming a mother tongue other than English
atsi	Dummy variable indicating individuals that are indigenous Australian
married	Dummy variable capturing marital status
male	Dummy variable indicating the male gender
female	Dummy variable indicating the female gender
age	Variable indicates age of individual
Qualifications	
no qualification	Dummy variable indicating no formal qualifications beyond that earned at school
vocational	Dummy variable indicating completion of Basic or Skill Vocational studies
diploma	Dummy variable indicating completion of Undergraduate or Associate Diplomas
degree	Dummy variable indicating completion of Bachelor Degree
postgrad dip.	Dummy variable indicating completion of Post-Graduate Diploma
higher degree	Dummy variable indicating completion of Higher Degree
Education Years	
obsch required	Continuous variables indicating the number of years of education required in an occupation
obsch surplus	Continuous variables indicating surplus schooling
obsch deficit	Continuous variables indicating deficit schooling
$obsch\ surplus^2$	Surplus schooling squared
$obsch\ deficit^2$	Deficit schooling squared
State and Territories	
nsw	Dummy variable indicating New South Wales (omitted case)
vic	Dummy variable indicating Victoria
qld	Dummy variable indicating Queensland
sa_cap	Dummy variable indicating Adelaide
wa_cap	Dummy variable indicating Perth
rest_oz	Dummy variable indicating Tasmania, ACT, Northern Territory, South Australia excluding Adelaide and Western Australia excluding Perth
Work Sector	
private	Dummy variable indicating private sector work (omitted case)
government	Dummy variable indicating public sector work
other sector	Dummy variable indicating non-determinable sector work
Labour Force	
part-time	Variable indicates hours of work a week defined as being part-time
full-time	Variable indicates hours of work a week defined as being full-time (omitted case)
overtime_1	Variable indicates hours of work a week defined as being overtime but less

	than 49 hours
overtime_2	Variable indicates hours of work a week defined as being overtime and more than 48 hours
Occupations	
management	Dummy variable indicating managerial jobs
professional	Dummy variable indicating professional jobs (omitted case)
associate prof.	Dummy variable indicating associate professional jobs
trade prof.	Dummy variable indicating trade professional jobs
advanced serv.	Dummy variable indicating advance services jobs
I/mediate serv.	Dummy variable indicating intermediate services jobs
I/mediate prod.	Dummy variable indicating intermediate production jobs
elementary	Dummy variable indicating elementary jobs
labour	Dummy variable indicating labour jobs
Industrial Sectors	
agricultural	Dummy variable indicating agricultural sector
mining	Dummy variable indicating mining sector
manufacturing	Dummy variable indicating manufacturing sector
power	Dummy variable indicating energy sector
construction	Dummy variable indicating construction sector
trade	Dummy variable indicating trade sector (omitted case)
accom. & food	Dummy variable indicating accommodation, cafes and restaurants sectors
Transport & communication	Dummy variable indicating transport and communication sectors
business & fin.	Dummy variable indicating business and financial services sectors
public serv.	Dummy variable indicating community and public services sectors
personal serv.	Dummy variable indicating personal, sport, cultural and other types of personal services sectors
Fields of Study	
agriculture	Dummy variable indicating agricultural studies
business admin.	Dummy variable indicating business and administration studies
health	Dummy variable indicating health studies
education	Dummy variable indicating education studies
cultural studies	Dummy variable indicating social and culture studies
engineering	Dummy variable indicating engineering studies (omitted case)
sciences	Dummy variable indicating natural and physical sciences studies
architecture	Dummy variable indicating architecture and buildings studies
miscellaneous	Dummy variable indicating miscellaneous studies

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Table I.a. Sample Means - 1991

	Graduates		*Male Graduates*		*Female Graduates*	
Variables	**Mean**	**SD.**	**Mean**	**SD.**	**Mean**	**SD.**
logY	6.59	0.56	6.79	0.44	6.36	0.59
female	0.47	0.50				
male	0.53	0.50				
atsi	0.0015	0.039	0.0014	0.037	0.0016	0.040
nesb	0.053	0.22	0.047	0.21	0.059	0.24
experience	15.41	9.25	16.23	9.25	14.48	9.17
experience^2	323.08	347.46	348.76	358.11	293.83	332.60
married	0.59	0.49	0.64	0.48	0.53	0.50
Education						
education years	15.54	0.76	15.59	0.82	15.48	0.67
obsch required	14.53	1.20	14.59	1.12	14.46	1.29
obsch surplus	1.01	1.37	1.00	1.33	1.02	1.41
obsch surplus^2	2.90	6.46	2.77	6.07	3.04	6.87
Qualifications						
degree	0.72	0.45	0.73	0.44	0.72	0.45
postgrad dip.	0.17	0.38	0.12	0.33	0.23	0.42
higher degree	0.11	0.31	0.15	0.36	0.055	0.23
Fields of Study						
agriculture	0.011	0.11	0.018	0.13	0.0037	0.061
business admin.	0.13	0.33	0.17	0.38	0.073	0.26
health	0.12	0.32	0.066	0.25	0.17	0.38
education	0.27	0.44	0.18	0.39	0.37	0.48
cultural studies	0.25	0.43	0.22	0.41	0.28	0.45
sciences	0.14	0.34	0.18	0.39	0.086	0.28
engineering	0.078	0.27	0.14	0.35	0.0042	0.065
architecture	0.0094	0.097	0.012	0.11	0.0064	0.080
miscellaneous	0.00025	0.016	0.00047	0.022	0	0
Regions						
nsw	0.33	0.47	0.33	0.47	0.34	0.47
vic	0.29	0.45	0.29	0.45	0.29	0.46
qld	0.14	0.35	0.14	0.35	0.14	0.35
sa_cap	0.061	0.24	0.063	0.24	0.059	0.24
wa_cap	0.061	0.24	0.064	0.25	0.057	0.23
rest_oz	0.11	0.31	0.11	0.31	0.11	0.32
Sectors						
government	0.55	0.50	0.51	0.50	0.59	0.49
private	0.45	0.50	0.48	0.50	0.41	0.49
other sector	0.0025	0.050	0.0023	0.048	0.0027	0.051
Working Hours						
full-time	0.82	0.39	0.93	0.26	0.69	0.46
part-time	0.18	0.39	0.074	0.26	0.31	0.46
overtime_1	0.22	0.41	0.28	0.45	0.15	0.36

overtime_2	0.17	0.37	0.24	0.43	0.081	0.27
Occupations						
management	0.14	0.35	0.20	0.40	0.064	0.25
professional	0.69	0.46	0.64	0.48	0.75	0.43
associate prof.	0.060	0.24	0.061	0.24	0.058	0.23
trade prof.	0.0052	0.072	0.0075	0.086	0.0027	0.051
advanced serv.	0.0074	0.086	0.0018	0.043	0.024	0.12
I/mediate serv.	0.058	0.23	0.051	0.22	0.067	0.25
I/mediate prod.	0.0042	0.065	0.0075	0.086	0.00053	0.023
elementary	0.029	0.17	0.019	0.14	0.039	0.19
labour	0.0089	0.094	0.011	0.10	0.0069	0.083
Industries						
agricultural	0.0064	0.080	0.0088	0.094	0.0037	0.061
mining	0.0094	0.097	0.017	0.13	0.00053	0.023
manufacturing	0.060	0.24	0.087	0.28	0.030	0.17
power	0.011	0.11	0.019	0.14	0.0027	0.051
construction	0.011	0.11	0.018	0.13	0.0042	0.065
trade	0.056	0.23	0.064	0.25	0.046	0.21
accom. & food	0.014	0.12	0.016	0.12	0.012	0.11
transport & communication	0.025	0.16	0.034	0.18	0.015	0.12
business & fin.	0.14	0.34	0.18	0.39	0.088	0.28
public serv.	0.66	0.48	0.55	0.50	0.78	0.41
personal serv.	0.013	0.11	0.0088	0.094	0.017	0.13
observations		4032		2147		1885

Field of Study excludes those with no qualifications
Dummy variables might not add up to 1 due to 2-digit rounding

Table I.b. Sample Means - 1996

	Graduates		*Male Graduates*		*Female Graduates*	
Variables	**Mean**	**SD.**	**Mean**	**SD.**	**Mean**	**SD.**
logY	6.59	0.57	6.77	0.53	6.40	0.56
female	0.49	0.50				
male	0.51	0.50				
atsi	0.0044	0.066	0.0059	0.076	0.0028	0.053
nesb	0.056	0.23	0.058	0.23	0.055	0.23
experience	15.88	9.92	16.83	9.97	14.87	9.76
experience^2	350.67	373.28	382.77	391.37	316.83	350.09
married	0.57	0.50	0.62	0.49	0.52	0.50
Education						
education	6.59	0.57	6.77	0.53	6.40	0.56
years	12.54	2.15	15.77	0.87	15.83	0.91
obsch required	12.80	1.74	14.49	1.17	14.53	1.12
obsch surplus	0.61	1.07	1.29	1.41	1.31	1.39
obsch surplus^2	1.52	4.10	3.65	6.85	3.64	6.68
Qualificatio						
ns						
degree	0.13	0.34	0.73	0.44	0.74	0.44
postgrad dip.	0.029	0.17	0.16	0.37	0.12	0.32
higher degree	0.019	0.14	0.11	0.31	0.14	0.35
Fields of						
Study						
agriculture	0.011	0.10	0.013	0.11	0.020	0.14
business						
admin.	0.076	0.26	0.17	0.37	0.22	0.41
health	0.056	0.23	0.15	0.36	0.091	0.29
education	0.062	0.24	0.23	0.42	0.14	0.35
cultural studies	0.058	0.23	0.23	0.42	0.21	0.41
sciences	0.029	0.17	0.12	0.32	0.16	0.37
engineering	0.12	0.33	0.071	0.26	0.13	0.34
architecture	0.036	0.19	0.015	0.12	0.022	0.15
miscellaneous	0.026	0.16	0.0009	0.03	0.00059	0.024
Regions						
nsw	0.33	0.47	0.34	0.47	0.34	0.47
vic	0.25	0.43	0.27	0.44	0.27	0.44
qld	0.20	0.40	0.17	0.38	0.17	0.38
sa_cap	0.057	0.23	0.056	0.23	0.054	0.23
wa_cap	0.061	0.24	0.067	0.25	0.068	0.25
rest_oz	0.11	0.31	0.093	0.29	0.097	0.30

Sectors						
government	0.23	0.42	0.41	0.49	0.36	0.48
private	0.77	0.42	0.59	0.49	0.63	0.48
other sector	0.010	0.071	0.0027	0.052	0.0026	0.051
Working Hours						
full-time	0.76	0.43	0.81	0.40	0.91	0.29
part-time	0.24	0.43	0.19	0.40	0.091	0.29
overtime_1	0.19	0.39	0.24	0.43	0.29	0.45
overtime_2	0.16	0.36	0.22	0.42	0.32	0.47
Occupations						
management	0.092	0.29	0.14	0.35	0.20	0.40
professional	0.20	0.40	0.65	0.48	0.59	0.49
associate prof.	0.12	0.33	0.086	0.28	0.099	0.30
trade prof.	0.13	0.33	0.0069	0.083	0.010	0.100
advanced serv.	0.048	0.21	0.018	0.13	0.0082	0.090
I/mediate serv.	0.18	0.38	0.068	0.25	0.055	0.23
I/mediate prod.	0.085	0.28	0.0050	0.070	0.0076	0.087
elementary	0.075	0.26	0.022	0.15	0.021	0.14
labour	0.078	0.27	0.0047	0.068	0.0053	0.073
Industries						
agricultural	0.032	0.17	0.0077	0.087	0.0097	0.098
mining	0.014	0.12	0.010	0.100	0.016	0.12
manufacturing	0.12	0.33	0.055	0.23	0.075	0.26
power	0.0097	0.098	0.0072	0.085	0.011	0.110
construction	0.060	0.24	0.015	0.12	0.023	0.15
trade	0.18	0.38	0.067	0.25	0.078	0.27
accom. & food	0.041	0.20	0.014	0.12	0.013	0.11
transport & communication	0.068	0.25	0.029	0.17	0.036	0.19
business & fin.	0.15	0.35	0.20	0.40	0.27	0.44
public serv.	0.26	0.44	0.54	0.50	0.41	0.49
personal serv.	0.060	0.24	0.051	0.22	0.051	0.22
observations		36886		6631		3403

Field of Study excludes those with no qualifications
Dummy variables might not add up to 1 due to 2-digit rounding

Table II. Gross Weekly Income – 1991/6

1991	*GENERAL*	*MALE*	*FEMALE*	*GRADUATE*	*MALE*	*FEMALE*
management	$934.26	$994.94	$729.19	$1,157.14	$1,226.63	$906.14
professional	$718.64	$861.28	$605.27	$793.50	$921.61	$669.12
associate prof.	$677.21	$730.35	$538.19	$755.61	$858.41	$631.13
trade prof.	$541.31	$563.14	$345.26	$677.83	$729.88	$511.30
advanced serv.	$462.82	$740.11	$457.96	$613.80	$1,073.25	$543.12
I/mediate serv.	$511.50	$649.57	$431.98	$696.15	$871.23	$544.69
I/mediate prod.	$564.37	$587.07	$363.70	$705.00	$724.53	$392.50
elementary	$389.70	$493.10	$346.40	$408.85	$471.12	$374.35
labour	$382.12	$457.56	$286.33	$398.39	$455.98	$296.50
all	$571.12	$665.93	$453.74	$819.07	$961.04	$657.37
1996						
management	$900.34	$948.85	$759.06	$1,165.10	$1,235.10	$980.23
professional	$759.09	$900.38	$639.97	$816.37	$953.95	$694.22
associate prof.	$687.93	$782.73	$544.51	$875.19	$1,006.01	$684.89
trade prof.	$567.34	$590.68	$347.06	$632.83	$732.94	$349.17
advanced serv.	$515.77	$695.65	$490.73	$613.87	$684.29	$592.20
I/mediate serv.	$477.56	$627.54	$408.35	$572.07	$692.83	$486.20
I/mediate prod.	$557.88	$586.40	$361.81	$586.67	$650.00	$351.43
elementary	$393.16	$510.35	$330.40	$439.93	$544.43	$344.94
labour	$397.41	$457.42	$302.34	$534.84	$658.33	$363.85
all	$604.17	$698.83	$486.06	$838.70	$984.52	$684.98

Table III.a. Returns to Graduate Qualifications – 1991

	Graduate Males		*Graduate Females*	
Variables	**Coeff.**	**t-stat**	**Coeff.**	**t-stat**
obsch required	0.11*	5.27	0.13*	5.00
obsch surplus	0.032**	2.00	0.042***	1.82
obsch surplus^2	-0.0027	-0.49	-0.00025	-0.04
constant	4.88*	16.51	4.73*	11.73
atsi	-0.32	-1.34	-0.16**	-1.97
nesb	0.099	0.31	0.019	0.40
experience	0.041*	12.33	0.026*	7.38
experience^2	-0.00073*	-8.48	-0.00037*	-3.94
married	0.079*	4.35	-0.093*	-4.62
Fields of Study				
agriculture	-0.096***	-1.76	-0.51*	-3.48
business admin.	0.020	0.70	-0.29*	-2.74
health	0.13*	3.27	-0.31*	-2.98
education	-0.16*	-5.19	-0.44*	-4.35
cultural studies	-0.069**	-2.17	-0.44*	-4.30
sciences	-0.049***	-1.72	-0.35*	-3.30
architecture	-0.11**	-2.16	-0.29*	-2.01
miscellaneous	-0.21*	-6.15		
Regions				
vic	-0.031***	-1.73	-0.080*	-2.96
qld	-0.051**	-2.05	-0.065***	-1.77
sa_cap	-0.020	-0.71	-0.084***	-1.68
wa_cap	0.0052	0.15	-0.061	-1.31
rest_oz	-0.018	-0.72	-0.038	-1.20
Sectors				
government	0.078*	3.47	0.046***	1.73
other sector	-0.21	-1.28	0.22	1.36
Working Hours				
part-time	-0.33*	-6.24	-0.63*	-20.50
overtime_1	0.10*	6.27	0.11*	5.62
overtime_2	0.19*	10.54	0.11*	3.43
Industries				
agricultural	-0.23***	-1.67	-0.68	-1.59
mining	0.17*	3.85	0.23**	2.12
manufacturing	-0.026	-0.73	0.16***	1.79
power	-0.11	-1.54	0.031	0.25
construction	-0.043	-0.83	0.12	0.87
accom. & food	-0.25*	-2.73	0.041	0.32
transport &	-0.14**	-2.27	0.33*	3.66

communication				
business & fin.	-0.026	-0.74	0.14***	1.92
public serv.	-0.21*	-5.34	0.096	1.35
personal serv.	-0.28*	-2.86	0.14	1.24
observations		2147		1885
R^2		0.44		0.42

Omitted variables: *degree*, *engineering*, *nsw*, *private*, *full-time*, *trade*
* 1% level of significance
** 5% level of significance
*** 10% level of significance

Table III.b. Returns to Graduate Qualifications – 1996

	Graduate Males		*Graduate Females*	
Variables	**Coeff.**	**t-stat**	**Coeff.**	**t-stat**
obsch required	0.11*	8.58	0.13*	9.41
obsch surplus	0.041*	2.98	0.052*	3.50
obsch surplus^2	-0.00094	-0.25	-0.0063***	-1.73
constant	4.64*	23.65	4.46*	20.25
atsi	-0.062	-0.56	0.015	0.16
nesb	-0.068**	-2.24	-0.042	-1.45
experience	0.035*	11.38	0.024*	8.70
experience^2	-0.00063*	-8.23	-0.00039*	-4.99
married	0.13*	7.08	-0.052*	-3.34
Fields of Study				
agriculture	-0.039	-0.68	-0.15	-1.30
business admin.	0.039***	1.65	0.046	0.64
health	0.18*	5.63	-0.056	-0.78
education	-0.15*	-5.56	-0.14**	-2.02
cultural studies	-0.11*	-3.95	-0.071	-1.00
sciences	-0.037	-1.51	-0.064	-0.86
architecture	-0.072	-1.42	-0.16***	-1.69
miscellaneous	-0.65*	-10.29	-0.30	-1.01
Regions				
vic	-0.033***	-1.88	-0.059*	-3.03
qld	-0.010*	-4.53	-0.054**	-2.32
sa_cap	-0.037	-1.29	-0.13*	-3.76
wa_cap	-0.035	-1.25	-0.13*	-3.42
rest_oz	-0.040***	-1.68	-0.031	-1.12
Sectors				
government	0.088*	4.87	0.031***	1.76
other sector	0.011	0.07	-0.31	-1.21
Working Hours				
part-time	-0.39*	-10.31	-0.050*	-22.94
overtime_1	0.097*	5.94	0.10*	6.57
overtime_2	0.20*	11.23	0.16*	7.00
Industries				
agricultural	-0.54*	-3.54	-0.031	-0.34
mining	0.40*	9.07	-0.021	-0.16
manufacturing	0.14*	4.32	0.043	0.81
power	0.16*	2.97	0.15	1.53
construction	0.051	0.80	-0.11	-0.81
accom. & food	-0.068	-0.96	-0.24*	-2.76
transport &	0.18*	3.94	0.13***	1.74

communication				
business & fin.	0.099*	3.22	0.056	1.36
public serv.	-0.040	-1.24	-0.046	-1.18
personal serv.	-0.18*	-3.61	-0.15*	-2.73
observations		3403		3228
R^2		0.41		0.39

Omitted variables: *degree*, *engineering*, *nsw*, *private*, *full-time*, *trade*
* 1% level of significance
** 5% level of significance
*** 10% level of significance

Table IV. Decomposition of the graduate gender income gap 1991-1996

Specification	**D_{91} - D_{96}**	**Human Capital (1)**	**Observed Prices (2)**	**Gap Effect (3)**	**Unobserved Prices (4)**
Full Model	**0.056**	**0.020**	**-0.010**	**0.073**	**-0.028**
experience		-0.0071	0.011		
experience^2		0.0069	-0.0053		
Education					
obsch required		0.0045	-0.00087		
obsch surplus		-0.0027	0.00023		
obsch surplus^2		0.00023	0.00046		
Fields of Study					
agriculture		0.000022	-0.00082		
business admin.		-0.00026	-0.0020		
health		0.0029	0.0053		
education		0.00011	0.0013		
cultural studies		0.0028	-0.0024		
sciences		-0.00037	-0.0011		
architecture		0.00062	-0.00023		
total		*0.0058*	*0.000050*		
Industry					
agricultural		-0.00054	0.0016		
mining		0.0018	-0.0038		
manufacturing		0.0022	-0.0094		
power		0.0013	-0.0044		
construction		-0.00017	-0.0013		
accom. & food		-0.00042	-0.00067		
transport & communication		0.00038	-0.0058		
business & fin.		-0.0033	-0.012		
public serv.		-0.00061	0.039		
personal serv.		0.0018	0.00085		
total		*0.0024*	*0.0041*		

Figure I.a. – Incidences of Mismatch: General Males in 1991/6

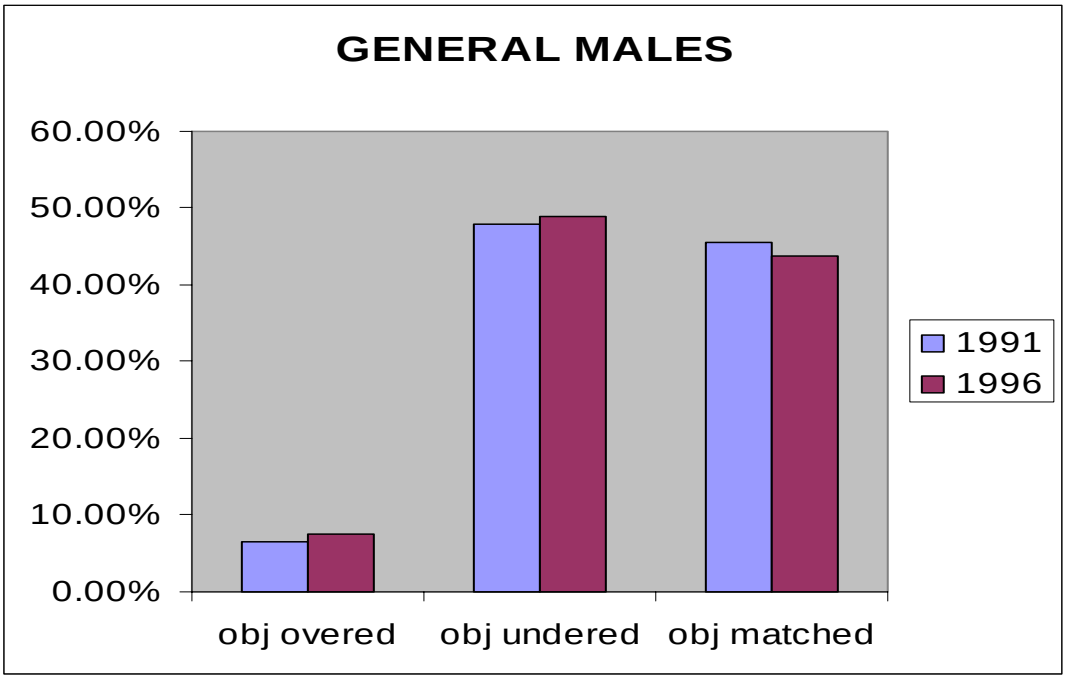

Figure I.b. – Incidences of Mismatch: General Females in 1991/6

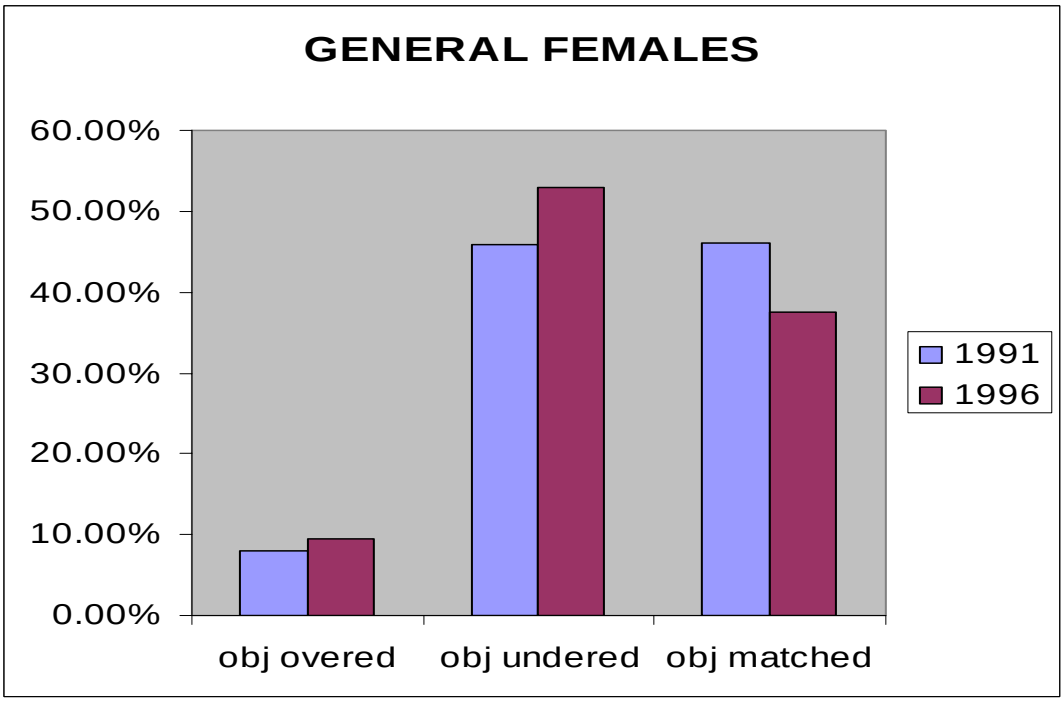

Figure II.a. – Incidences of Mismatch: Graduate Males in 1991/6

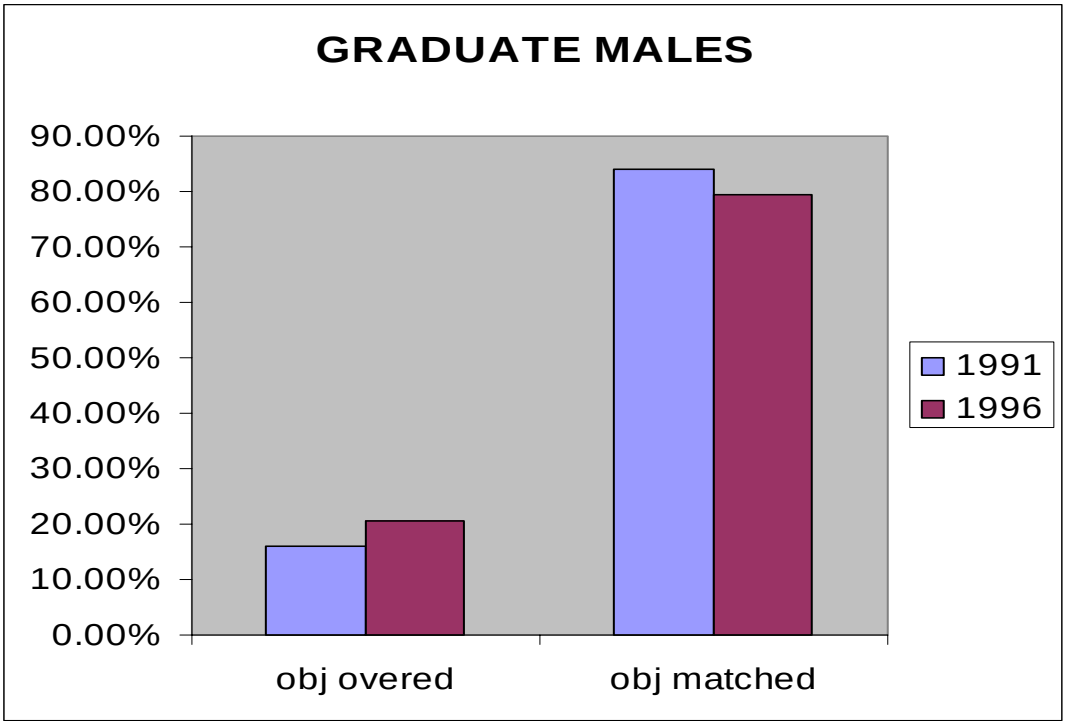

Figure II.b. – Incidences of Mismatch: Graduate Females in 1991/6

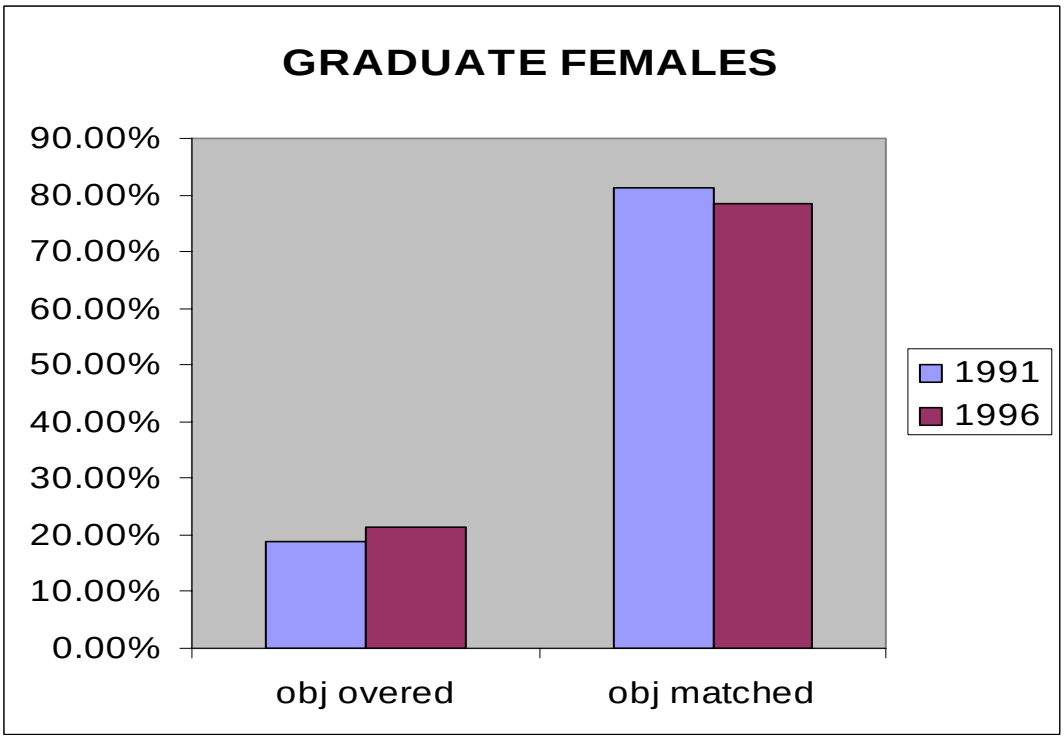

Figure III.a. Incidences of Male Graduate Overeducation by Age – 1991/6

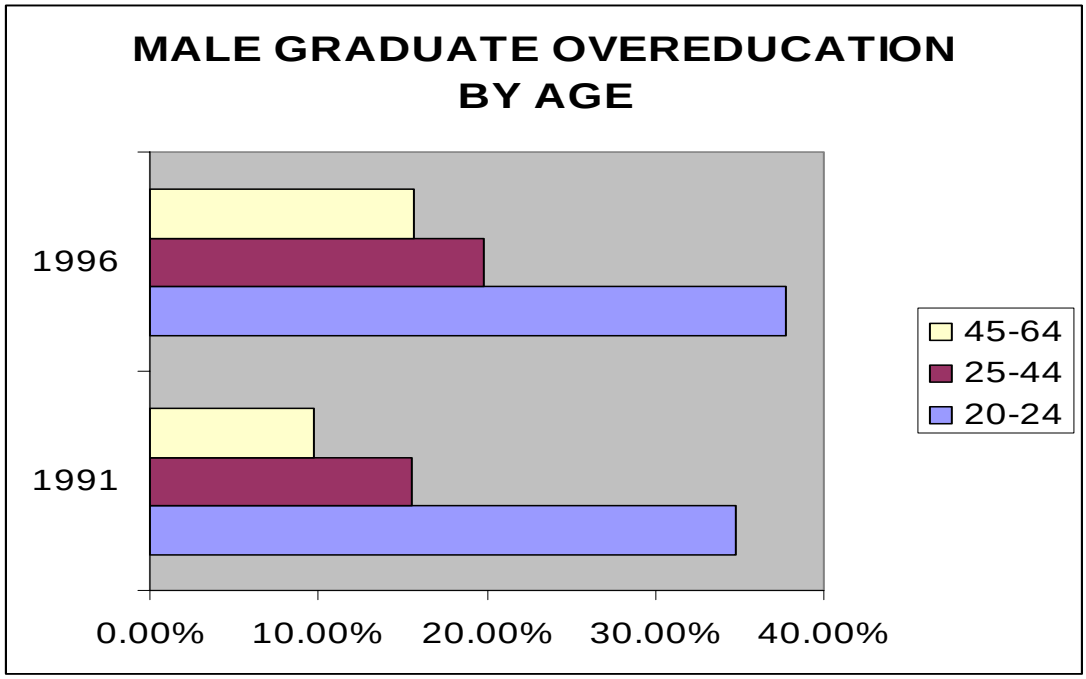

Figure III.b. Incidences of Female Graduate Overeducation by Age – 1991/6