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THE GENDER WAGE GAP IN AUSTRALIA

ACCOUNTING FOR LINKED EMPLOYER–EMPLOYEE DATA FROM THE 1995 AUSTRALIAN WORKPLACE INDUSTRIAL RELATIONS SURVEY

Cornelis Reiman

Discussion Paper no. 54
March 2001

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Abstract

To assess the extent of any remaining gender wage gap in Australia, this paper uses unit record data from the extensive 1995 Australian Workplace Industrial Relations Survey (AWIRS95) commissioned by the Department of Employment, Workplace Relations and Small Business.

Among other things, AWIRS95 identifies earnings data that provide the opportunity to clearly assess any gender wage gap. Specifically, econometric analysis and human capital theory are partnered in determining characteristics of the Australian labour force when split by gender. A random effects model is used to overcome the possible bias of linked employer–employee data. The associated gender wage gap is decomposed into components deemed to be explainable or unexplainable in relation to the model specifications.

Results indicate that the gender gap, as well as its unexplainable component, continues to be an integral aspect of the Australian wage determination process. The unexplainable difference is expressed in monetary terms to show the low pre-tax financial impact of potential gender bias in the Australian labour market.

Author note

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General caveat

NATSEM research findings are generally based on estimated characteristics of the population. Such estimates are usually derived from the application of microsimulation modelling techniques to microdata based on sample surveys.

These estimates may be different from the actual characteristics of the population because of sampling and nonsampling errors in the microdata and because of the assumptions underlying the modelling techniques.

The microdata do not contain any information that enables identification of the individuals or families to which they refer.

Contents

1 Introduction

This paper determines whether there is an observable gender wage gap in the Australian labour market by using microdata to secure a more accurate result — through considering influential employee characteristics — than is possible using aggregated data (see Borland 1999 and Gregory 1999). The potential for bias in results due to hierarchical employee data is dealt with in this paper by way of random effects regression. The final result — adjusted gender wage gap — is then presented in a monetary pre-tax context to provide a practical perspective of this topical issue.

Certainly, the phenomenon of a gender wage gap is widely observed and has been identified in Australia (Borland 1999; Department of Industrial Relations 1995, 1996; Gregory 1999; Gregory and Daly 1991; Hall and Fruin 1994; Human Rights and Equal Opportunity Commission 1996; Kidd and Meng 1995; Miller 1994; Pocock 1995; Spilsbury and Kidd 1997; Stephen 1995; Whitehouse 1992; Women's Equity Bureau 1997; Wooden 1996). Past research results (table 1) indicate a persistent gap.

Table 1 **Estimates of the actual and adjusted wage gaps in Australia, 1973–89**

Study	Year of data	Actual wage differential	Adjusted wage differential
		%	%
Haig (1982)	1973	46.0	32.5
Jones (1983)	1976	34.8	21.4
Chapman and Miller (1983)	1976	21.7	8.8
Gregory and Ho (1985)	1981	23.3	nr
Gregory, Daly and Ho (1986)	1981	20.7	nr
Chapman and Mulvey (1986)	1982	15.4	11.8
Kidd and Viney (1991)	1982	20.9	14.3
Kidd (1993)	1982	19.3	17.0
Rummery (1992)	1984	15.5	10.3
Miller and Rummery (1989)	1985	17.8	13.6
Vella (1993)	1985	8.2	7.0
Rimmer (1991)	1986	3.0	nr
Bradbury, Ross and Doyle (1991)	1986	nr	18.1
Drago (1989)	1988	16.5	7.8
Miller (1994)	1989	14.4	13.0

nr Not reported.

Note: The studies differ in terms of dependent and independent variables used.

Sources: Whitfield and Ross (1996); see Rummery (1992) for more on the first four entries.

Even so, the relatively recent availability of labour market survey details in microdata form allows an assessment to be made about whether a gender wage gap existed more recently.

Essentially, the prime hypothesis of this paper is that, other things being equal, the Australian wage determination process provides a higher wage rate for males than when compared for female counterparts. To determine the validity of the hypothesis, tests are conducted between paired female and male datasets. Specifically, regression analysis is applied to workplace and employee microdata to assess the effects of selected variables on gender wage equations. The composition of any observable gender wage gap is also analysed in terms of how much can be justified by identifiable characteristics.

It should be noted that the characteristics of employees might be linked to those of their workplace. So a random effects model is used to deal with such data hierarchy.

2 The data, model specification and research methodology

2.1 The data

The unit record data used in this paper to estimate wage equations are from the 1995 Australian Workplace Industrial Relations Survey (AWIRS95). This survey involved a sample of 2001 workplaces and 19 155 employees (Department of Workplace Relations and Small Business 1997; Hawke and Wooden 1997; Morehead et al. 1997). Although some observations were lost due to missing values or were removed to tidy up the data, this paper deals with an overall employee sample of 16 057.

The AWIRS95 data include considerable information about the characteristics of employees and workplaces.[1] Among the hundreds of variables arising from the survey, only a subset is used in this analysis.

2.2 The basic model

Through widespread use of the human capital model, it is generally accepted that individual wage determination is significantly affected by working hours, schooling, the general labour market, firm-specific work experience, workplace training and family background (Becker 1957; Gregory, Anstie, Daly and Ho 1989; Gregory and Daly 1991; Hawke 1993; Kidd and Meng 1995; Meng 1992; Miller 1994; Mincer 1958, 1962, 1970, 1976). Essentially, the basic human capital model can be represented as follows:

$$ln(hinc) = a + b_1 ft + b_2 sch + b_3 exp + b_4 sexp + b_5 tw + b_6 stw + b_7 train + b_8 aust + b_9 engl + b_{10} dum + u$$

where:

hinc is hourly pay;

ft is a dummy for full-time employment;

sch is years of schooling;

exp is years of total experience;

sexp is total experience squared;

tw is firm-specific tenure (years at workplace);

stw is firm-specific tenure squared;

train is a dummy for workplace training;

aust is a dummy for the country of birth;

engl is a dummy for language spoken at home;

dum is a vector of family background dummies; and

u is the error term.

1 As the responses are from a voluntary survey, self-selection biases exist. For a more detailed description of AWIRS95, see Hawke and Wooden (1997).

It should be noted that *ln(hinc)* — the natural logarithm of the hourly wage rate — is the dependent variable, which is generally the norm in this field of research (Blinder 1973).

Whether a worker is employed on a full-time basis is an important consideration. More specifically, hourly wages in Australia — in contrast to other national labour markets — are affected negatively if an employee works full-time (at least 35 hours a week) rather than part-time. Basically, part-time employees receive loadings to compensate for non-pay benefits, such as sick leave, annual leave and long service leave (see Hawke 1993). A dummy variable for full-time is therefore included to capture such differences (Johnson and Solon 1986; Oaxaca 1973).

Years of schooling are also included under the assumption that additional education is likely to enhance natural or acquired vocational skills, thereby increasing a person's marginal product of labour and thus their earnings capability. In this regard, AWIRS95 yields an educational attainment level that is converted to a continuous variable.

Improving a worker's marginal product of labour would also improve their value to the employer, thus increasing wages. Increased work experience, therefore, would be expected to enhance earnings, as would the length of time at the workplace through which additional and more specific experience could be gained. These experience variables are also squared to account for the later decline of earnings profiles over an employee's working life. It should be noted that the derived experience variable might be overstated as breaks in continuous employment are not recorded in the data. The aggregated time of such breaks may be more for females due to child bearing and rearing. This may depress regressor coefficients for females, with those for males being biased upward (Chapman and Mulvey 1986; Mincer and Polachek 1974; Rummery 1992). From the available data, total potential work experience, j, is derived by adapting Mercer's well-accepted formula (Blinder 1976; Gregory et al. 1989; Hawke 1993; Meng 1992; Miller 1994; Oaxaca 1973):

$$j = A - S - 5$$

where A is age, S is the years of schooling and 5 is the age at which schooling commences. Firm-specific tenure is directly available from the AWIRS95 data.

Another factor that could affect a worker's productivity is training received. This would positively enhance earnings capability (Blinder 1973; Mincer 1962, 1970, 1976). Consequently, a dummy variable for training received at the current workplace is included.

A dummy variable is also included for a worker's country of birth, in addition to whether a worker speaks primarily English. Essentially, migration is a form of investment in human capital and should be expected to have some effect on income, just as any language barrier will impede career progress, productivity and earnings growth rate (Abbott and Beach 1993; Chiswick and Mincer 1972; Kossoudji 1988; Meng 1992; Miller 1994; Oaxaca 1973). The issue of the races or nationalities of workers has long been considered influential in determining earnings (Arrow 1972, 1973; Becker 1957; Kosters and Welch 1972; Meng 1992; Mincer 1958, 1976; Sorensen 1989). The proven view is that those who are migrants generally do not do as well as local workers familiar with higher income opportunities, as well as accepted work practices and business culture. Similarly, those from English-speaking backgrounds fare better than those from non-English-speaking backgrounds (Chapman and Mulvey 1986; Miller 1994; Preston 1997).

With regard to family structure, the presence of dependent children is generally shown to have a negative impact on weekly earnings, especially for females who are unable to work full-time or cannot gain the advantages of higher paid overtime due to parental commitments (Daly 1990; Gregory et al. 1989; Hawke 1993; Johnson and Solon 1986; Oaxaca 1973). However, when considering hourly wage rates, part-time employment is expected to provide higher hourly rates than full-time work does. The different age ranges of dependent children may have different effects, with the presence of teenaged dependent children possibly placing less of a demand on working parents.[2] This important issue can be addressed by way of the responses to three associated AWIRS95 questions for which dummy variables are created. These indicate whether there are:

- any dependent children aged 0–4 years;

[2] The lack of household level data does not allow for any analysis of who is actually responsible for any dependent children.

- any dependent children aged 5–12 years; and
- any dependent children aged 13 years or over.

2.3 The extended model

The basic human capital model described above, however, can be extended to incorporate other variables deemed relevant to the analysis in this paper. An extension is now considered.

It is generally held that males earn more than females, meaning that the gender variable is an imperative in the analysis here (Arrow 1973; Becker 1957; Blinder 1973; Gregory et al. 1989; Hawke 1993; Johnson and Solon 1986; Kidd and Meng 1995; Mincer 1976; Oaxaca 1973; Stephen 1995). Such a gender wage differential may be due to an assortment of contributing factors, such as gender bias shown by employers, or supply preferences by employees. In an attempt to capture the interplay of such forces, gender is represented in the model.

Although the above-mentioned inclusions are generally related to employees, it may also be instructive to note whether particular employer characteristics also have any effect on hourly wages (Becker 1957). The larger the firm size, for example, the greater may be the chances of better wages for those employed within it (Miller 1994; Miller and Mulvey 1996; Morissette 1993; Oosterbeek and van Praag 1995; Schmidt and Zimmermann 1991; Tan and Batra 1997; Winter-Ebmer 1995). Generally, workplace size is used to show firm size by way of a continuous proxy variable using the number of employees within each firm. Furthermore, increased profitability of the workplace could well improve wages (Cable and Wilson 1989, 1990; Kruse 1992; Lesieur 1984; Weitzman and Kruse 1990), just as a loss-making workplace might need to reduce labour costs in order to continue as a going concern. Profitability dummies are, thus, added to the wage equation model.

Research by Groshen (1991) indicates that the gender composition of the workplace can affect the gender wage differential. As a consequence, the model also takes into account, for each employee, the proportion of the workplace that is female.

Dummies are included for degrees of competition intensity. Simplistically, pay differentials may depend on the availability of monopoly rents; furthermore, these may not be shared equally between males and females because of different levels of bargaining ability.

Given the potential for regional variability in wage determination processes through different employer and employee preferences (Becker 1957; Blinder 1973, 1976; Gregory et al. 1989; Hawke 1993; Johnson and Solon 1986; Meng 1992; Mincer 1976; Oaxaca 1973), location variables are included to allow for state differences; a comparison of metropolitan and non-metropolitan localities is also included.[3] The relatively high level of economic activity in New South Wales, for illustration, may result in higher wages in that State than, say, in Tasmania where the economy is much less dynamic. By the same token, it is likely that workers in the metropolitan areas of Australia are in better paid employment than those in regions further afield, if only due to the increased competitiveness of the urban labour market (also see Gregory and Daly 1991 and Rummery 1992), although some do receive loadings for working in remote areas.

To gain a fresh understanding of Australian workplaces and workers, additional dummy variables are added to the model to reflect that businesses in the private sector may pay better than those who do not necessarily have as strong a profit motive and an aligned interest in productive workers, and that foreign ownership of workplaces can have a positive wage effect (Aitken, Harrison and Lipsey 1996; Globerman, Ries and Vertinsky 1994). Also, the degree to which firms deal with the export or domestic market is considered, with exporters tending to pay higher wages (Bernard and Jensen 1997; Gaston and Trefler 1994).

Having taken into account the various variables deemed to be relevant to the analysis in this paper, with due consideration given to human capital theory, as well as related research and the inclusion of new regressors, the extended version of the basic regression model is:

$$\begin{aligned} ln(hinc) = {} & a + b_1 ft + b_2 exp + b_3 sexp + b_4 tw + b_5 stw + b_6 train + b_7 gender \\ & + b_8 sch + b_9 ch4 + b_{10} ch512 + b_{11} ch13 + b_{12} aust + b_{13} engl \\ & + b_{14} total + b_{15} fem + b_{16} domestic + b_{17} domexp + b_{18} private \end{aligned}$$

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3 State and metropolitan and non-metropolitan variables were not originally provided in AWIRS95 data and were supplied to the author under a non-disclosure contract with the Commonwealth of Australia. Metropolitan data relate to all capital cities except Darwin, and do not include regional centres.

$$+ b_{19}profit + b_{20}even + b_{21}aus100 + b_{22}aus51 + b_{23}ausfor$$
$$+ b_{24}for51 + b_{25}intense + b_{26}strong + b_{27}moderate + b_{28}some$$
$$+ b_{29}NSW + b_{30}Vic + b_{31}SA + b_{32}WA + b_{33}Tas + b_{34}NT$$
$$+ b_{35}ACT + b_{36}metrop + u$$

where *hinc* is hourly pay. Descriptions of the independent variable names are presented in table 2. For the sake of simplicity, and clear presentation, these variables are grouped into four broad categories — employee, personal, employer and location.

To facilitate the analysis and subsequent discussion, it should be noted that the omitted categories are exporters, firms that previously reported an end-of-year loss and those employers that are 100 per cent foreign-owned, and face limited competition. For the location variables, Queensland is omitted, as are non-metropolitan areas.

Table 2 **Variable definitions for the extended model**

Variable name	Description
Employee	
ft	Dummy for full-time employment (≥ 35 hours a week)
exp	Years of work experience
sexp	Years of work experience squared
tw	Length of time at this workplace
stw	Length of time at this workplace squared
train	Dummy for training at work in the past year
Personal	
gender	Value of zero for females and 1 for males.
sch	Years of schooling
ch4	Dummy for presence of dependent children aged 0–4 years
ch512	Dummy for presence of dependent children aged 5–12 years
ch13	Dummy for presence of dependent children aged 13 years or more
aust	Dummy for Australian by birth
engl	Dummy for English primarily spoken at home
Employer	
fem	Proportion of the workplace that is female[a]
total	Firm size using number of employees as a proxy[b]
domestic	Dummy for domestic market only
domexp	Dummy for domestic and export markets
private	Dummy for private sector
profit	Dummy for profit reported last year
even	Dummy for break-even reported last year
aus100	Dummy for wholly Australian owned
aus51	Dummy for predominantly Australian owned
ausfor	Dummy for equally Australian and foreign owned
for51	Dummy for predominantly foreign owned
intense	Dummy for intense competition in the marketplace
strong	Dummy for strong competition in the marketplace
moderate	Dummy for moderate competition in the marketplace
some	Dummy for some competition in the marketplace
Location	
NSW	Dummy for New South Wales
Vic	Dummy for Victoria
SA	Dummy for South Australia
WA	Dummy for Western Australia
Tas	Dummy for Tasmania
NT	Dummy for the Northern Territory
ACT	Dummy for the Australian Capital Territory
metrop	Dummy for metropolitan area

[a] The proportion of females in the workplace was determined by way of the following: *fem* = permanent full-time females + (0.5 permanent part-time females) + (0.25 casual full-time females) + (0.1 casual part-time females)/ (all employees – as per total). [b] *total* = permanent full-time + (0.5 permanent part-time) + (0.25 casual full-time) + (0.1 casual part-time). Sensitivity tests indicated that adjustments to the ratio between each category of employee made insignificant difference.

2.4 Research methodology

The data are subjected to regression analysis in determining the wage equations as for the extended model. Recent international literature in this area of labour econometrics has indicated an increasing interest in linked employer–employee data, as well as an acceptance of alternative estimation procedures when working with them. Results show the strong effects of firms on employee earnings (Bayard et al. 1998; Bronars and Famulari 1997; Groshen 1991; Hægeland and Klette 1998; Meng and Meurs 1999; Salvanes, Burgess and Lane 1998; Stephan 1998; Wooden and Bora 1998). Accordingly, random effects regression is used to counter the potential bias of employees in a workplace sharing common unobserved characteristics and any associated intragroup error correlation (Dickens 1990; Moulton 1986).

The wage equations for males and females are decomposed in accordance with the method devised by Cotton (1988), which extends the work of Blinder (1973) and Oaxaca (1973) by accounting for the proportion of males and females in the workplace regression results. The raw gender wage gap is subsequently amended to account for variability within the extended regression model in order to derive an adjusted gender wage gap.

3 Empirical results

- The section provides empirical results for all employees and for female and male employees after applying the specified model to the datasets under review.

3.1 Empirical results for all employees

The regression model specified in the previous section was applied to data for all employees (see table 3), and explains just over 31 per cent of the variation in hourly earnings. In this subsection, attention is paid to significant aspects of the resultant wage equations (z-statistic ≥ 2).

Table 3 Regression results for all employees when the dependent variable is the natural log of hourly pay

Variable	Coefficient	z-statistic
Constant	1.5999	49.69
Employee		
ft	-0.0973	-13.23
exp	0.0261	30.52
sexp	-0.0004	-23.41
tw	0.0098	10.37
stw	-0.0002	-5.09
train	0.0286	5.64
Personal		
gender	0.0756	13.12
sch	0.0593	45.67
ch4	0.0436	7.13
ch512	-0.0125	-1.95
ch13	-0.0311	-5.11
aust	0.0198	3.26
engl	0.0740	7.29
Employer		
total	9.24E-05	6.33
fem	-0.1634	-9.75
domestic	-0.0725	-6.26
domexp	-0.0525	-3.78
private	-0.0033	-2.48
profit	0.0099	0.87
even	-0.0113	-0.58
aus100	-0.0595	-3.96
aus51	-0.0160	-0.86
ausfor	0.0648	1.66
for51	0.0247	1.03
intense	-0.0110	-0.71
strong	-0.0078	-0.51
moderate	-0.0318	-1.65
some	-0.0074	-0.24
Location		
NSW	0.0455	3.76
Vic	0.0099	0.77
SA	-0.0146	-0.82
WA	0.0103	0.62
Tas	-0.0027	-0.10
NT	0.1231	1.95
ACT	0.0397	1.27
metrop	0.0450	4.90

Note: n = 16 057, Overall R^2 = 0.3127. The coefficient value for the 'total' variable is 9 at the fifth decimal place.

Source: Author's own calculations.

The basic human capital variables are discussed first. In accordance with a priori reasoning, full-time employment yields a reduction in hourly earnings when compared with part-time or casual employment.

Furthermore, work experience and workplace tenure show an expected positive sign. The associated squared terms indicate that earnings profiles will fall away slightly over the longer term, as is also expected. Training at the workplace shows itself to be a positive contributor to earnings when compared with workers not receiving training.

Of particular interest to this paper is the gender coefficient which, when all else is held constant, indicates that males earn considerably more than females do — by a margin of over 7 per cent.[4] This suggests that, other things being equal, the mean hourly wage of males exceeds that of females, thus indicating that a gender wage gap exists. Among the other personal characteristics, schooling shows a positive result, with each additional year of education yielding an increase in hourly earnings of almost 6 per cent. When the presence of dependent children is considered, those under four years of age have a positive earnings effect, although older children are seen to have a negative impact. This may be due to there being a link between higher hourly rates of part-time employment for those who have parental obligations and no opportunity for full-time work. Australian birth and familiarity with the English language (as expressed by the language spoken at home) also support the earlier hypothesis, with the latter coefficient showing a marked gain in earnings of almost 7 per cent compared with those who speak mostly a language other than English at home.

An assessment of employer characteristics suggest an increase in the proportion of females in the workplace has a negative pay effect, while an increase in firm size yields a positive sign.[5] Interestingly, when using

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4 Throughout this paper the gender variable value is 0 for females and 1 for males.

5 This same result arose from sensitivity testing of firm size. Firm size, represented by the number of employees, was initially an aggregate of permanent full time + (0.5 permanent part time) + (0.25 casual full-time) + (0.1 casual part-time). The part-time and casual contributions were altered without effect, as was the result when firm size was only permanent full-time or permanent full-time and part-time employees.

the AWIRS95-derived variable for firm size[6], large employing organisations unexpectedly paid a lower hourly wage than others did, contrary to a priori thought and what is caught by existing research.

Further, workplaces concentrating entirely or partly on the domestic market have a negative effect on hourly wage rates when compared with the omitted category of exporters. When firm ownership is considered, with the omitted group being 100 per cent foreign-owned employers, employers with 100 per cent Australian ownership pay less per hour.

In keeping with the rationale provided for including state dummies, when compared with the omitted State of Queensland, New South Wales shows a positive effect on earnings. The metropolitan dummy also follows a priori reasoning in having a positive sign in comparison with non-metropolitan workers.

Having determined that the human capital theory is applicable to the AWIRS95 dataset, with additional variables also providing interesting characteristics affecting earnings, it was necessary to undertake a further review in addressing the focus of this paper. Given the notable impact of the gender variable in this subsection, it was vital to analyse the data in greater detail. The following subsection splits the data analysed by gender.

3.2 Empirical results for female and male employees

The magnitude and significance of the gender coefficient in the previous subsection strongly suggest that there is an income determination bias in favour of males. Now the gender perspective of earning determination is analysed. To do so, it is necessary to ascertain first whether the two datasets are statistically different. When the data are subjected to a structural test for all variables in the regression, it confirms that there is a

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6 The derived variable for firm size included the number of workplaces of an employer and the number of employees within the employer organisation.

marked and significant difference between the male and female wage determination processes.[7]

Given that the two datasets differ in structure, the extended regression model is applied to each separately. Significant results are represented in table 4, which contains the results of an additional regression test using gender interaction terms which, consequently, reports the product of the gender effect and the effect of each selected variable. This clearly identifies which explanatory variables within the model support significant differences (z-statistic ≥ 2) between the datasets. For the sake of simplicity, less significant differences are not discussed, even though the full specification was estimated here and elsewhere within this paper.[8]

Table 4 **Significant differences in regression results for females and males when the dependent variable is the natural log of hourly pay, when using gender-based interaction terms**

Variable	Coefficient	z-statistic
Employee		
ft	-0.087	-5.61
Personal		
ch4	-0.077	-6.12
Employer		
aus51	0.070	2.87
some	0.093	2.28
Location		
SA	0.051	2.21
metrop	-0.026	-2.10

Note: n = 16057, Overall R^2 = 0.323.
Source: Author's own calculations.

In the first instance, full-time employment can be seen to have a negative effect on the hourly earnings of males, when compared with those of females. Interestingly, the presence of dependent children aged four years or less provides males with a negative result.

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7 All F-test results accompanying the sensitivity testing in this paper proved structural differences.

8 All regression results are available from the author upon request.

The results for ownership status of the employer show that workplaces with predominantly Australian ownership pay males more than they do females, although this does not apply to workplaces wholly Australian owned. The presence of some competition in the employer's marketplace is also shown to favour males.

A review of location variables indicates that, when compared with females, males have an earnings advantage in South Australia, although males generally receive lower hourly wage rates in the Australian metropolitan areas.

3.3 Summary

Appropriate regression analysis of the AWIRS95 data indicates that some of the selected explanatory variables used in this analysis vary considerably in their effect on the wage determination processes of the paired datasets under review.

The significant differences between female and male wage equations suggest that a gender wage gap exists. While such points of contrast and interest have been identified, the analysis in this section is not yet conclusive in indicating that any gender wage is entirely justifiable. Such analysis, based on the work reported above, is undertaken in the following section.

4 Decomposing the gender wage gap

The Cotton (1988) methodology is used in conjunction with the AWIRS95 data regression analysis of section 3 to analyse the gender wage gap, doing so by accounting for variability in the intercept terms and coefficients of the male and female wage equations. The pertinent results are presented in table 5.

The raw gender wage gap for all employees — 13.4 per cent — is the difference between the mean value of the natural logarithm of the hourly wage rate for males and females. This gap (R), however, is comprised of two parts: that explained by variability within the extended model (E) and the unexplained remainder (U).

As can be seen in table 5, about 39 per cent of the raw gender wage gap can be explained by activity within the model. Almost 61 per cent, therefore, is unexplained and consequently yields an adjusted wage gap of just over 8 per cent. Although Blinder (1973) and Oaxaca (1973) used the term 'discrimination' in describing this remainder, it is something of a misnomer as the value also captures the impact of model mis-specification, excluded variables, mismeasurement, as well as other errors of calculation. In comparison with previous research (see table 1), the results of this paper suggest that the raw and adjusted wage gaps remain an observable phenomenon in the Australian labour market. Certainly, a narrowing of the raw gap is evident in table 1, although the adjusted gap shows fluctuations. It must be noted that different datasets and methodologies were used in the studies noted in table 1, thereby making direct comparisons difficult.

To put the adjusted gender wage gap of 8 per cent in perspective, table 6 applies that gap to the average hourly rate of earnings for males, as derived from the AWIRS95 dataset.

Table 6 **Significance of the random effects research results**

Male average hourly rate		$15.05
x Raw gap (per table 5)		0.134
= Raw gap (pre-tax $/hour)		$2.02
Less Justified component (per table 5)	x 0.392 =	$0.79
Adjusted gap (pre-tax $/hour)		$1.23

Source: Author's own calculations.

Table 5 **Summary of random effects results on the gender wage gap**

Paired datasets	Raw gender wage gap (R)	Proportion explained (E)	Proportion unexplained (U)	Adjusted gender wage gap (A)
Males–females	0.134	0.392	0.608	0.081

Note: E + U = 1; R x U = A.
Source: Author's own calculations, using Cotton method and random effects regression.

As indicated by the calculations in table 6, the adjusted gender wage gap expressed as a pre-tax gross hourly earnings differential is $1.23. Interestingly, this result, as well as others contained in this section that were provided by way of random effects regression, do not vary markedly from those derived by way of ordinary least squares. This suggests that the anticipated linked employer–employee data effect is minimal in this instance. Sensitivity testing of the research result — by excluding workplace variables from the regression model — also produced a minimal difference. Consequently, the adjusted gender wage gap of 8 per cent is deemed to be robust.

5 Summary and conclusions

The analysis undertaken in this paper indicates that the proposed regression model is a fair predictor of hourly earnings, explaining up to 32 per cent of variations. The paper also supports the proposed hypothesis that, other things being equal, the Australian wage determination process provides a higher wage rate for males than for female counterparts. Essentially, this paper identifies the magnitude and components of the gender wage gap, doing so by using microdata and a random effects model that accounts for possible bias due to hierarchical data.

Specifically, the proportion of the gender wage gap attributable to unjustified differences is about 61 per cent. This reduces the raw gender wage gap from about 13 per cent to almost 8 per cent. Sensitivity testing had a minimal impact on the final result.

Further, when the results were expressed in a financial context, the pre-tax impact of the adjusted gender wage gap was only $1.23 an hour in favour of males. Even so, the difference arises from wage determination factors within the Australian labour market that do not seem to treat males and females equally. For example, factors such as full-time work status, the presence of dependent children under 5 years of age, certain employer characteristics, as well as the location of employment, had significantly different influences on males when compared with the influences on females.

Although the policy implications of the results in this paper suggest the need to reduce gender differences in the labour market, there are limitations in basing policy formulation on this analysis, especially when the result — before tax — is quite low. Firstly, the adjusted gender wage gap is derived by way of accounting for variability within the model; it does not account for excluded and unobservable factors.

Secondly — and, perhaps, more importantly — policy should not be based solely on analysis of the population as a whole. Specifically, the gender wage gap is supported, to varying degrees, by an assortment of important factors. In the regression model used in the research reported in this paper, full-time status and location show significant differences when the datasets for males and females are compared, with employer characteristics also being influential. This suggests the need for further analysis, by way of segmenting employee microdata through the use of particular variables to seek a clearer view of the gender wage gap issue, such as in relation to low paid workers (see Gregory 1999). It is possible that the raw and adjusted gender wage gaps would have different magnitudes in more focused datasets. This suggests that further research is required, particularly to determine the after-tax effect of any observable adjusted gender wage gap for employees at low levels of income.

Nevertheless, the work reported in this paper shows that there are raw and adjusted gender wage gaps within the Australian labour market. That is, the Australian labour market determines different wage rates for males and females.

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