

Submission to the Government of Western Australia Ministerial Review of the State Industrial Relations System

Professor Alison Preston

UWA Business School

The University of Western Australia

November 2017

* Any correspondence in relation to this submission should be directed to Professor Alison:

Professor Alison Preston, Economics, UWA Business School, The University of Western Australia, 35 Stirling Highway, Crawley, Western Australia 6009. Email

Alison.Preston@uwa.edu.au. ORCID: <http://orcid.org/0000-0002-8326-8197>

Introduction

I commend the Government's decision to open a Ministerial Review of the State Industrial Relations System and I note the terms of reference for this review. Given my research interests I note the following terms of reference in particular:

#3: Consider the inclusion of an equal remuneration provision in the Industrial Relations Act 1979 with the objective of facilitating the conduct of equal remuneration cases and other initiatives in the Western Australian Industrial Relations Commission.

#4: Review the definition of "employee" in the *Industrial Relations Act 1979* and the *Minimum Conditions of Employment Act 1993* with the objective of ensuring comprehensive coverage for all employees.

#5: Review the minimum conditions of employment in the *Minimum Conditions of Employment Act 1993*, the *Long Service Leave Act 1958* and the *Termination, Change and Redundancy General Order* of the Western Australian Industrial Relations Commission to consider whether:

- (a) The minimum conditions should be updated; and
- (b) There should be a process for statutory minimum conditions to be periodically updated by the Western Australian Industrial Relations Commission without the need for legislative change.

#6: Devise a process for the updating of State awards for private sector employers and employees...

#7: Review statutory compliance and enforcement mechanisms with the objectives of:

- (a) Ensuring that employees are paid their correct entitlements
- (b) Providing effective deterrents to non-compliance with all State industrial laws and instruments; and
- (c) Updating industrial inspectors' powers and tools of enforcement to ensure they are able to effectively perform their statutory functions

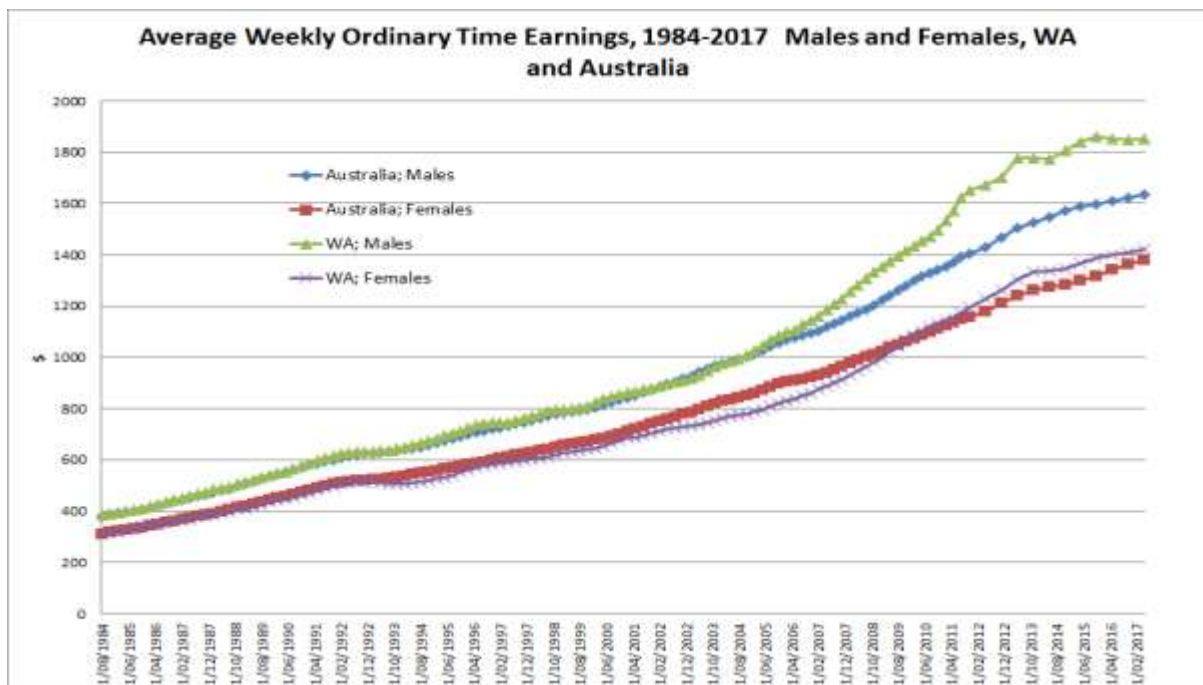
This submission draws on recent jointly authored research examining gender pay gaps within Western Australia and for other Australian States. A copy of the unpublished manuscript (working paper) is attached at Appendix A. The views expressed in this submission are, however, my own – as are any errors.

WA Earnings and The Gender Pay Ratio – ABS Data

I begin this submission by presenting two figures comparing earnings in Western Australia for full-time adult employees. The data are drawn from the Australian Bureau of Statistics (ABS) Average Weekly Earnings Series (6302). Prior to May 2012 they were released on a quarterly basis and since 2012 are now released twice per year. The graphs below have been constructed from three data series back to 1983. They have been smoothed using a four quarter moving average (and a two period average from 2012). Figure 1 shows growth in the annual average ordinary time earnings of full-time adults in Western Australia and the nation as a whole. Figure 2 plots the gender wage ratios (the common ratio of female earnings to male earnings).

Figure 1 shows that up until around 1992 the annual average weekly ordinary time earnings (AWOTE) of women in full-time work in WA were comparable to those of their counterparts nationally. Post 1992 they began to diverge with women nationally experiencing relatively faster wage growth until 2009 when the pattern was reversed. The data similarly show that amongst men AWOTE at the WA level closely mirrored that at the national level until 2004 when they began to diverge. At May 2017 the AWOTE difference in the full-time labour market between WA males and Australian males as a group was \$220 per week. The corresponding amount for WA women and Australian women was \$44 per week.¹

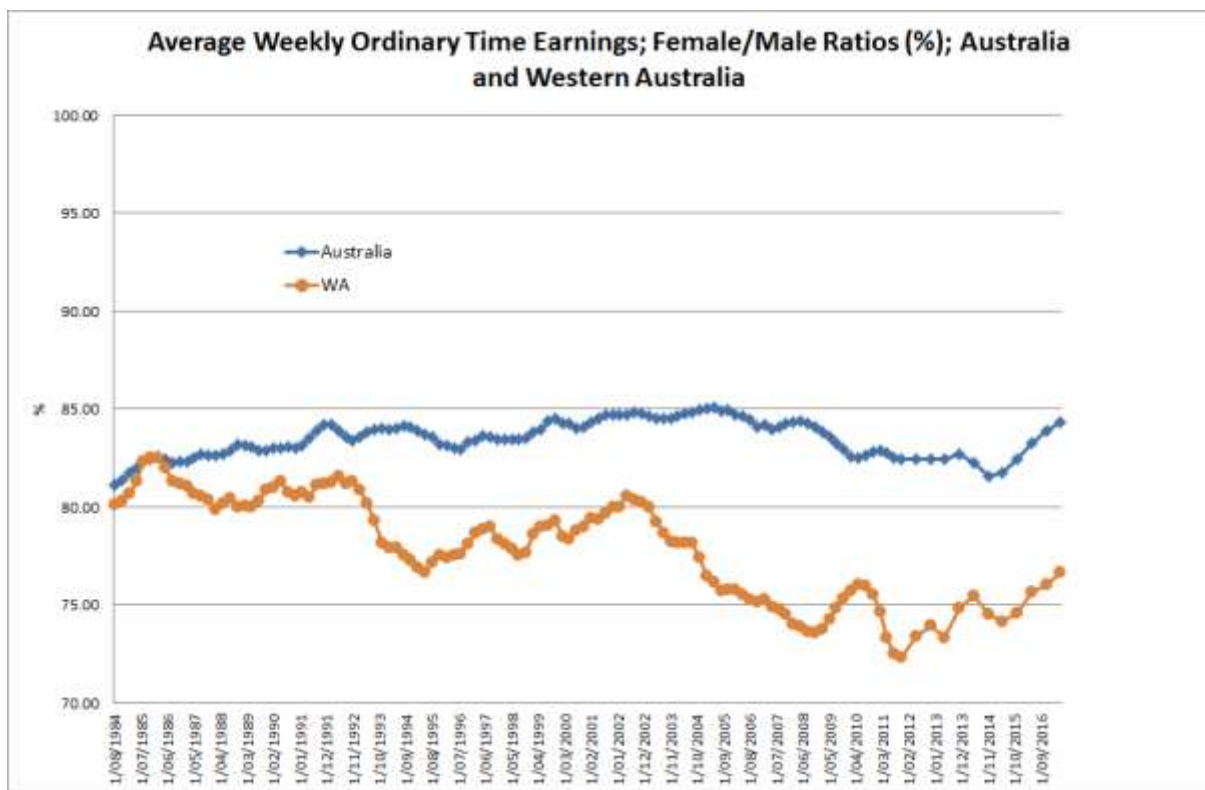
Figure 1



¹ Note, these data have been smoothed applying a four quarter moving average through to 2012 and thereafter taking an average of the two data points.

Figure 2 shows what economists call the ‘raw’ or ‘unadjusted’ gender wage ratios using the AWOTE data. The computations are for full-time adult employees. It can be seen from this diagram that prior to 1992 the WA gender wage ratio was on par with that observed nationally. Post 1992 it deteriorated and during the mining boom it widened further. In this post-boom era it has converged again, partly as a result of the earnings gains that women have been making (as observed in Figure 1 above). At May 2017 the gender wage ratio in WA was 76.7 per cent (or a gap of 23.3 per cent). Nationally it was 84.3 per cent (or a gap of 15.7 per cent).

Figure 2



Adjusted Wage Gap

The average wage data such as those reported above are useful for portraying broad patterns and trends, however, they do have their limitations. One notable limitation is that they cannot take into account compositional changes in the workforce. For example, it may be that the earnings growth amongst women observed since 2009 is because there has been a growth in highly skilled women in Western Australia and they have been able to attract higher returns.

To overcome these limitations economists use econometric techniques to control for factors such as skill levels, qualifications, experience etc. The working paper in the appendix outlines the methods used.

Table 1 below is taken from unpublished research with colleagues at UWA (see attached paper in the appendix). It summarises the adjusted wage gaps for 2001, 2007 and 2014. The gaps were estimated using the 2001, 2007 and 2014 waves of the Household Income Labour Dynamics Australia (HILDA) survey.

The adjusted wage gaps in Table 1 take into consideration a set of factors which are known to affect earnings. These include qualifications, labour market experience, marital status, children, migrant status, contract status (fixed, permanent, casual), whether or not they work full-time, whether or not they have a second job, union membership and workplace size. The terms 'basic' and 'expanded' are terms we have used to describe the different sets of controls used to estimate the adjusted wage gaps. By basic we are referring to a specification which controls the set of variables mentioned above. The 'expanded' models control for the same set of variables but also include controls for occupation and industry.

The data show that whilst WA 'raw' wage gaps have been above those of other Australian's states, once they have been adjusted to take into account factors such as those identified above, the adjusted wage gaps in WA have generally been below those of Australia. The exception is 2007 which was at the peak of the mining boom.

Table 2 shows the equivalent adjusted earnings gaps but this time they have been estimated across the distribution (Table 1 shows averages). If we focus on the 2014 data we can see that, for much of the wage distribution (up to the 60th percentile) the WA adjusted gaps are smaller than those observed at the national level. At the top end the gaps are wider. The gaps at the top end are generally considered as being indicative of a 'glass ceiling' effect and/or discrimination

Table 1: Adjusted Wage Gaps: All Workers; WA and Other States; 2001, 2007 and 2014

	Raw Wage Gap(a) (i)	Difference in Constants (ii)	Explained Portion (iii)	Unexplained Portion (iv)	% Explained (v)	Adjusted Gender Wage Gap(b) (vi)
WA						
2001	0.149	-0.155	0.071	0.233	0.475	0.078
2007	0.195	-0.047	0.071	0.171	0.365	0.124
2014	0.173	-0.049	0.069	0.152	0.400	0.103
ALL OTHER STATES						
Base – 2001	0.101	-0.037	-0.008	0.146	-0.084	0.109
Base – 2007	0.101	0.015	-0.023	0.108	-0.224	0.123
Base – 2014	0.115	-0.032	-0.019	0.166	-0.165	0.134

Source: Table 5 in the appendix

NB: (a) the gap measures the percentage difference in the hourly earnings of employees; (b) The sum of the values in columns (ii) and (iv) provide the total unexplained earnings gap which is the same as the estimated adjusted wage gap (column vi); (c) A negative sign on the explained proportion of the gap suggests that when accounting for differences in the characteristics of men and women the raw wage gap actually widens. In other words, if women had the same characteristics (eg qualifications) as men they would be worse off.

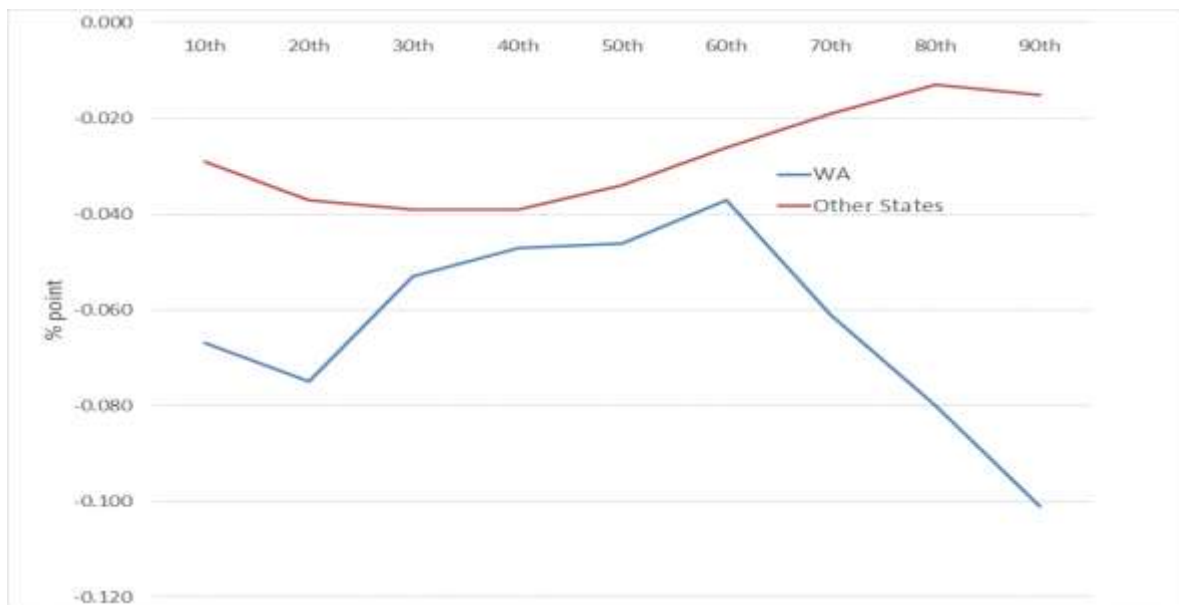
Table 2: Adjusted Gender Earnings Gaps by Percentile; All Workers; WA and Other States; 2001-2014

Percentile	Western Australia				Other States			
	2001	2007	2014	%-point Change 2001-2014	2001	2007	2014	%-point Change 2001-2014
10 th	0.031	-0.061	-0.036	-0.067	-0.004	-0.027	-0.033	-0.029
20 th	0.012	-0.099	-0.063	-0.075	-0.033	-0.064	-0.070	-0.037
30 th	-0.025	-0.127	-0.078	-0.053	-0.061	-0.093	-0.100	-0.039
40 th	-0.058	-0.155	-0.105	-0.047	-0.083	-0.116	-0.122	-0.039
50 th	-0.086	-0.172	-0.132	-0.046	-0.105	-0.135	-0.139	-0.034
60 th	-0.111	-0.190	-0.148	-0.037	-0.126	-0.149	-0.152	-0.026
70 th	-0.123	-0.195	-0.184	-0.061	-0.147	-0.159	-0.166	-0.019
80 th	-0.119	-0.238	-0.199	-0.080	-0.175	-0.171	-0.188	-0.013
90 th	-0.106	-0.275	-0.207	-0.101	-0.213	-0.203	-0.228	-0.015

Source: Table 7 in the appendix.

The results for the 2001-2014 change in Table 2 are presented graphically in Figure 3. We can see from these data that, when compared to the other Australian states, the WA adjusted gender wage gap has widened at a faster rate across the wage distribution. At the 20th percentile, for example, the WA gender wage gap grew by 6.3 percentage points between 2001 and 2014. In the other Australian states it grew by 3.7 per cent.

Figure 3: Percentage Point Change in Adjusted Earnings Gaps; 2001-2014; All Workers; WA and Other Australian States



Without further research it isn't possible to explain why the WA gender wage gap amongst the low paid has deteriorated faster than elsewhere in Australia. Indeed it is noted that between 2001 and 2006 the adult minimum wage in WA was equal to that of the Federal jurisdiction and, since 2007, has been slightly higher than the minimum rate awarded by the Fair Work Commission (see Table 3 below). It may be that, within WA, proportionately more women than men are dependent on the minimum rates (Federal and State) and that the minimum rates have had less 'bite' for women than they do elsewhere in Australia.

Table 3: WA and Federal Jurisdiction Adult Minimum Wage Decisions; 2001-2017

Year	WA State Order	FWC Order
2017	\$708.9	\$694.9
2016	\$692.9	\$672.7
2015	\$679.9	\$656.9
2014	\$665.9	\$640.9
2013	\$640.9	\$622.2
2012	\$622.2	\$606.4
2011	\$601.7	\$589.3
2010	\$587.2	\$569.0
2009	\$569.7	\$543.8
2008	\$557.4	\$543.8
2007	\$528.4	\$522.1
2006	\$504.4	\$511.9
2005	\$484.4	\$484.4
2004	\$467.4	\$467.4
2003	\$448.4	\$448.4
2002	\$431.4	\$431.4
2001	\$413.4	\$413.4

Source: FWC decisions have been sourced from <http://workplaceinfo.com.au/payroll/wages-and-salaries/history-of-national-increases>. The WA orders (for the Minimum Conditions of Employment Act 1993) have been sourced from various decisions of the WA Industrial Relations Commission.

What do these select research findings mean for the review?

The Industrial Relations system plays an important role in protecting the earnings and conditions of employment of employees, particularly those in occupations and industries where the capacity to bargain is limited.

Historically Australia (and WA) has had a highly centralised system of wage determination and this has significantly benefited women. There is a sizeable literature showing that the more compressed the wage structure the lower the wage inequality and the lower the gender pay gaps.

Women in Australia benefited in particular from the equal pay decisions of the federal tribunal in 1969 and 1972². Bob Gregory and Ann Daly from the ANU showed clearly the beneficial effect of the tribunal decisions on women's wages.³ They showed that if Australian women were rewarded for their 'productivity characteristics' according to the US wage structure they would have been significantly worse off. This led them to conclude that the equal pay decisions of 1969 and 1972 had significantly benefited women.

Since the early 1990s Australia has gradually decentralised its methods of wage fixing and deregulated the labour market. Western Australia has been one of the leaders in this regard and the opening up of the gender wage gap in the early 1990s has been attributed to the Minimum Conditions of Employment Act 1993 that was introduced around that time.⁴ The state reforms at that time included the option of non-union individual agreements and saw the introduction of a weaker set of minimum conditions when compared to the federal jurisdiction.

Industrial Tribunals continue to have an important role in affecting contemporary wage outcomes. This is particularly so for those who are award dependent and for those who depend on the minimum wage. Whilst there may be little that the tribunals can do to arrest the rising pay inequities at the upper ends of the pay distribution, they do have an important role to play at the lower end.

² In 1969 the Commonwealth Conciliation and Arbitration Commission ratified the principle of 'equal pay for equal work' (EPEW), ruling that sex was not to be used as a basis for fixing wages. Unfortunately the principle only applied in cases where males and females performed similar work or worked under the same award. In 1972 the Federal tribunal extended the principle to that of Equal Pay for Work of Equal Value (EPWEV). In adopting this principle the Commission agreed to determine female rates on the basis of work value comparisons.

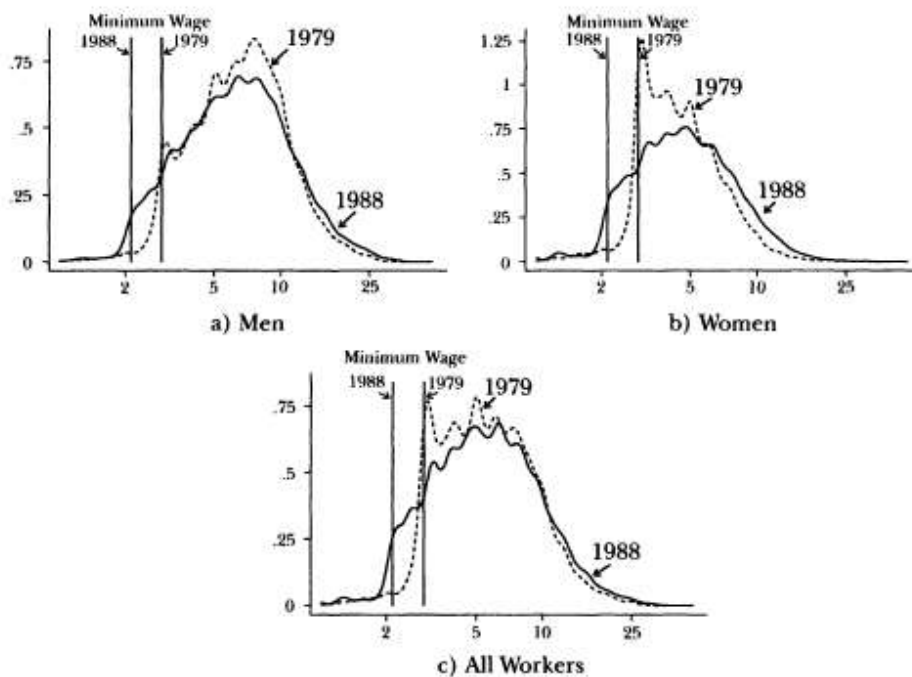
³ Gregory, R.G and Daly, A. (1992) Who Gets What? Institutions, Human Capital and Black Boxes as Determinants of Relative Wages in Australia and the US, *proceedings of the 9th World Congress International Industrial Relations Association*, 5, pp.79-106

⁴ Preston, A.C. and Crockett GV (Preston, AC and Crockett GV (1999) Equal Pay: Is the Pendulum Swinging Back, *Journal of Industrial Relations*, 41(4): 651-674.

This point was convincingly made by Fortin and Lemieux in their 1979 paper (for the USA)⁵. Figure 1 in their paper (copied below as Figure 4) shows how the distribution of hourly wages is affected by the level of the minimum wage. This is particularly evident in panel (b) for women. It shows that in 1979 women's wages were largely clustered at the minimum rate (indeed this was the mode pay). By 1988 the minimum wage had deteriorated in real value leaving a number of workers worse off. Clearly institutions play an important role in supporting the lower end of the wage distribution and in off-setting forces that otherwise generated increased inequality.

Figure 4

Figure 1
Distributions of Hourly Wages in Constant 1979 Dollars
(logarithmic scale used on the horizontal axis)



Source: Fortin and Lemieux (1997: p.83)

In terms of the Ministerial Review, the following comments are offered:

⁵ Fortin N.M. and Lemieux, T. (1997) Institutional Change and Rising Wage Inequality: Is There a Link? *Journal of Economic Perspectives* 11(2): 75-96. Available from <http://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.11.2.75>

#5: Minimum Conditions of Employment Act 1993

Clearly, based on the evidence above, it is important that the minimum conditions of employment remain relevant and updated. These conditions provide important support to those at the bottom of the wage structure and in setting community norms which flow through to other awards and agreements. Maintaining a strong and robust floor should be an important objective of any industrial tribunal.

In this vein, strong support is given for a proposal which would see the minimum conditions periodically updated by the WA Industrial Relations Commission without the need for legislative change.

#6: Devise a process to update State awards to ensure comprehensive coverage etc.

Again this initiative is strongly supported. Maintaining a relevant framework of industrial awards is an important way through which those with weak or little bargaining power can be protected in contemporary labour markets.

#7: Review statutory compliance and enforcement mechanisms with the objective of ensuring that employees are paid their correct entitlements etc.

This initiative is similarly supported. Earlier this year the Federal Treasury launched a new Black Economy Taskforce to combat the black economy (also known as the cash economy). Anecdotal evidence shows that the cash economy is on the rise and aside from undermining the integrity of the tax and welfare system it also puts further pressure on vulnerable workers and undermines their entitlement to appropriate compensation. Updating inspector's powers and tools of enforcement and ensuring that employees are paid correct entitlements is an important way of combating the black economy.

#3: Inclusion of an Equal Remuneration Provision in the Industrial Relations Act 1979

In 2004 Trish Todd and Joan Eveline were commissioned by the then Minister for Consumer and Employment Protection to undertake an independent review of the WA Gender Pay Gap.⁶ They made a number of valuable recommendations in their report (which I recommend that this Ministerial Review revisits and considers). Amongst their key recommendations was that the IR Act 1979 be amended to incorporate an Equal Remuneration Provision. This recommendation remains as valuable today as it was then.

⁶ Todd, T and Eveline, J (2004) *Report on the Review of the Gender Pay Gap in Western Australia*, available from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.620.1538&rep=rep1&type=pdf> (Accessed 16/11/17)

The recent Social and Community Services Case in the Federal Jurisdiction shows how gender has contributed to the undervaluation of their work and contributed to pay inequity and shows the value of having equal remuneration provisions to address it.⁷

In the 2009 *Making It Fair* report from the then Federal Labor Parliamentary Inquiry into Pay Equity calls were also made for the introduction of equal remuneration principles within Australian tribunals.⁸

The labour market is highly gendered and highly segmented and there is growing acceptance that intervention is required to help narrow the disadvantage that women experience in the labour market.

In a recent Economic Society of Australia (ESA) Monash Forum poll 82% of the economists who responded agreed with the proposition that "...breaking down gender segregation in the labour market can only be achieved with some degree of government intervention."⁹ The market alone will not bring about the necessary adjustments. Equal remuneration principles provide an important avenue through which such inequities can be prosecuted. I strongly support the inclusion of such a provision in the WA IR Act 1979.

⁷ Parliament of the Commonwealth of Australia (2009) *Making it Fair Pay equity and Associated Issues Related to Increasing Female Participation in the Workforce*, House of Representatives Standing Committee on Employment and Workplace Relations, Canberra. Available from: https://www.aph.gov.au/Parliamentary_Business/Committees/House_of_Representatives_Committees?url=ewr/payequity/report.htm (Accessed 16/11/17)

⁸ Fair Work Australia (2012) Decision: Equal Remuneration Case, Australian Municipal, Administrative, Clerical and Services Union and others (FWAFB 5184). Available at: www.fwc.gov.au/documents/decisionsigned/html/2012fwafb5184.htm (Accessed 16/11/17)

⁹ Preston, AC (2017) Gender diversity in the workplace - role of government: Overview of Poll Results, The Economic Society of Australia Monash Forum. Available from: <https://www.monash.edu/business/economics-forum/polls/gender-diversity-in-the-workplace-role-of-government> (Accessed 16/11/17)

**Australia's Gender Wage Gaps Revisited:
A Comparison of WA and Other States, 2001-2014**

**WORKING PAPER
November 2017**

[DRAFT]

**Elisa Birch, Vivek Karia, and Alison Preston
The University of Western Australia**

Abstract: This paper uses HILDA data and OLS and quantile regression analysis to examine the determinants of earnings and computed adjusted gender wage gaps for Western Australia (WA) and other Australian States and Territories. The results show that the determinants of earnings in WA differ from elsewhere in Australia. The findings also lend support to the argument that the relatively high gender wage gaps observed for WA were driven, in part, by the mining boom. In the post-boom world the WA gender wage gaps have narrowed and in a number of instances are now lower than those observed for elsewhere in Australia. Overall the paper shows rising gender wage gaps across the earnings distribution. This is a worrying trend given that Australia already has a relatively high gender wage gap when compared internationally.

Keywords: equal remuneration, gender pay gap, wage determination

Corresponding author:

Professor Alison Preston, Economics, UWA Business School, The University of Western Australia, 35 Stirling Highway, Crawley, Western Australia 6009. Email Alison.Preston@uwa.edu.au. ORCID: <http://orcid.org/0000-0002-8326-8197>

Acknowledgements: This paper uses unit record data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The HILDA Project was initiated and is funded by the Australian Government Department of Social Services (DSS), and is managed by the Melbourne Institute of Applied Economic and Social Research (Melbourne Institute). The findings and views reported in this paper, however, are those of the author and should not be attributed to either DSS or the Melbourne Institute.

Introduction

At May 2017 the common ratio of female to male annual average weekly ordinary time earnings in the full-time Australian labour market was 84.3 per cent. This translates to a national gender wage gap of 15.7 per cent. Across Australia there was considerable variation in the size of the observed gender wage gaps, from 10.4 per cent in South Australia to 23.3 per cent in Western Australia (ABS 2017).

In its recent *Overview of Australia* the OECD commented on gender pay inequality in Australia noting that, within the OECD, Australia's gender wage gap is larger than many (OECD, 2017, p.9). They also noted that recent economic development within Australia had been strongly skill based and that it had contributed to a widening of the wage distribution and a widening in inequality. In their recommendations they advised that Australia should adopt policies to foster more inclusive growth otherwise inequality would worsen (OECD, 2017).

Since the turn of this century there have been a number of inquiries examining pay inequity for women in Australia. In 2009, for example, the Federal Government undertook an extensive parliamentary inquiry. In its report (*Making it Fair*) Sharryn Jackson (the Committee Chair) noted that, notwithstanding equal pay decisions of previous tribunals "... the gender pay gap in Australia has grown, especially since 1992" (Parliament of the Commonwealth of Australia, 2009, p.xii).

Similar inquiries have also been conducted at the state level. Within Western Australia (WA), for example, Trish Todd and Joan Eveline undertook a detailed review of the WA gender wage gap in 2004 (Todd and Eveline, 2004). More recently Fitzsimmons and Callen (2015) have also examined gender inequities and gender pay gaps in WA and through their research they have identified "... a highly masculine corporate and social culture in Perth that differs significantly from the east coast of Australia" (ibid., p.8). Furthermore they formed the view that the WA gender pay gap was "... predominately caused by male dominance in higher paid industries such as the mining sector; male dominance in higher paid operational roles and their predominance in senior roles" (Fitzsimmons and Callen, 2015, p.9).

Notwithstanding the numerous reports, inquiries and recommendations pay inequity remains an ongoing problem. It seems that part of the problem lies in the fact that many well researched policy recommendations are not being adopted or implemented. In their 2004 report Todd and Eveline, for example, recommended that the *WA Industrial Relations Act 1979* be amended to include an equal remuneration provision. This did not happen, although it is noteworthy that a Ministerial Review of the WA State Industrial Relations System has recently been announced (September 2017) and that consideration of an equal remuneration provision is included in the terms of reference.

In this paper we use data from the Household Income Labour Dynamics Australia (HILDA) survey to provide a detailed and updated account of the determinants of earnings within WA and for all other Australian States and Territories (hereon after referred to as other States). Our aim is to examine the effect of the mining boom on the WA gender wage gap and also construct a series of adjusted gender wage gaps¹⁰ (ie. gaps that take into consideration differences in the human capital characteristics of males and females) to inform debates and policy formulation. It has been nearly twenty years since adjusted gender wage gaps were estimated for WA and other Australian States (see Preston and Crockett, 1999). In the light of the economic developments that have taken place since then, and the ongoing wage disadvantage experienced by women, it seems appropriate that new estimates are obtained.

The remainder of the paper is organised as follows. It begins with an analysis of the raw or unadjusted gender earnings gap for Australian States using data from the Australian Bureau of Statistics (ABS). Thereafter we explain the decomposition techniques employed in the paper and summarise the findings from previous studies. We estimate a series of models but only report detailed results for the ‘base’ model (where we drop the industry and occupation controls). Using quantile regression techniques we also report adjusted earnings gaps across the earnings distribution. These results show that, consistent with the OECD’s observation of rising inequality, gender wage gaps are *rising* across the earnings distribution.

We also note concerning penalties associated with migrant status (with those born in non-English speaking countries subject to wage penalties) and varied effects for casual and part-time employment. We conclude by reiterating calls for greater transparency around wage agreements and for policies that address the undervaluation of women’s work. In the absence of these initiatives inequality will continue to increase and so will the gender wage gaps.

Raw Gender Wage Gaps

By way of some background we begin this paper with a presentation of the annual average gender wage ratios for Australia covering the period 1984 to 2017. The data are for adults employed full-time. We acknowledge the limitations of these data, noting that movements in average earnings can be affected by compositional changes in the workforce, such as changes in industry and occupational distributions and changes in human capital characteristics. Nevertheless the data provide a useful starting point and a striking visual of the WA gender wage gap in the full-time labour market vis a vis other Australian States.

Table 1 summarises the data for select years while Figure 1 summarises graphically the gender earnings ratios. The latter shows that the WA gender wage gap peaked in 2011 at

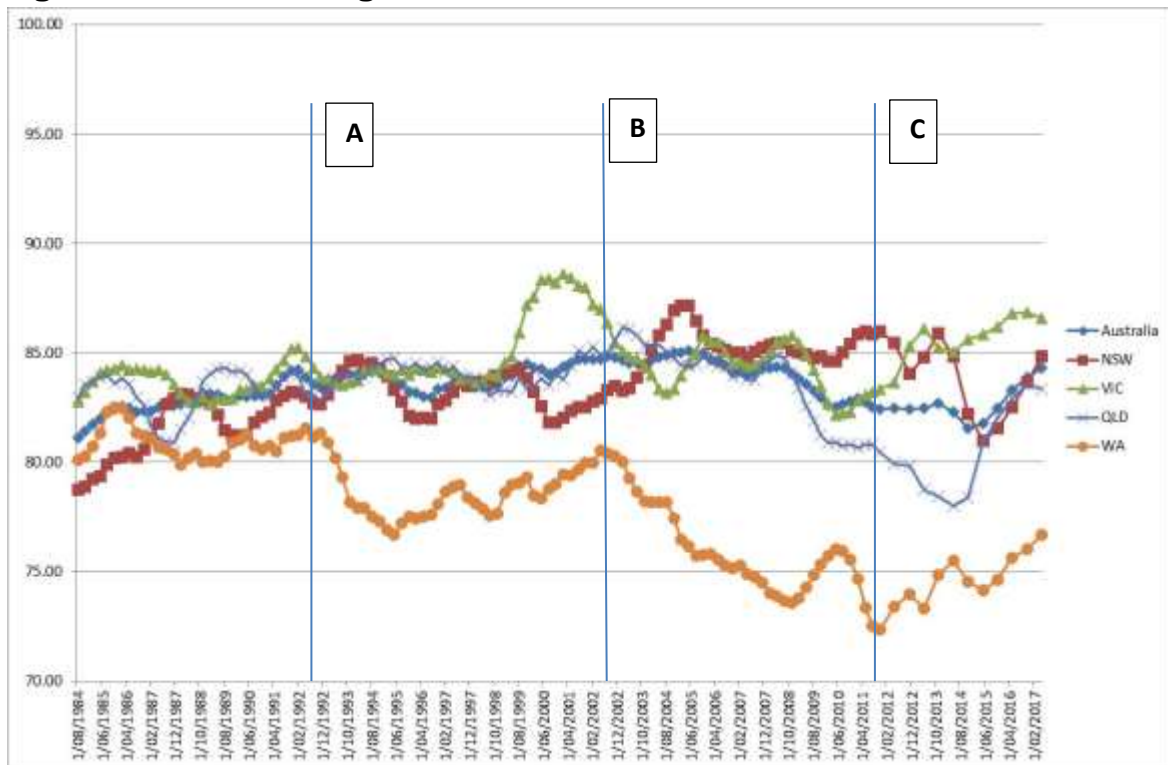
¹⁰ Throughout this paper we use the terms gender pay gaps, gender wage gaps and gender earnings gaps interchangeably.

27.7 per cent. By May 2017 the gap had narrowed or converged and was equal to 23.3 per cent. Nationally the corresponding gap was 15.7 per cent. In dollar terms, the May 2017 WA gap means that, in the full-time labour market, WA women’s average annual ordinary time earnings are around \$22,495 less per annum than that of males. Across Australia this gender earnings disadvantage is equal to \$13,322 per annum.

Figure 1 shows that, when it comes to gender pay inequity, WA has not always been such a poor performer. Key turning points are illustrated in Figure 1 at ‘A’, ‘B’ and ‘C’. The first (A) major and significant decline occurred over the early 1990s (between the end of 1992 and the middle of 1995), where the WA gender wage ratio opened up by 4.6 percentage points (from 81.3 per cent to 76.7 per cent). This period coincided with a series of State (WA) based industrial relations reforms introduced from December 1993. The reforms included the option of non-union individual agreements and a weaker set of minimum conditions when compared to the Federal jurisdiction. Research conducted around that time attributed the widening gender wage inequality to these legislative changes (see Preston and Crockett, 1999).

The second period of major decline (illustrated by ‘B’ on the graph) commenced around 2002 and coincided with the start of the mining boom. It has been described by some as the biggest resources boom since the gold rush of the mid-1980s. The third period (C) is characterised by a period of gender wage convergence. This coincides with a period of global uncertainty (2011) (Government of Western Australia, 2012) and, shortly thereafter, the end of the resources boom.

Figure 1: Gender Earnings Ratios, Australia and States, 1984 to 2017



Source: see notes to Table 1; note the different ABS reporting from 2012 (moving from quarterly reporting to just reporting twice a year (May and November))

The long-term average gender wage ratios (covering the period 1984 to 2017) show that, for other Australian states, the gender wage ratio range is between 83.4 per cent and 86.9 per cent and that it is remarkably resistant to change.

Table 1: Gender Earnings Ratios; Adults; Employed Full-Time; Average Weekly Ordinary Time Earnings; Australia and States; 1990 to 2017 (%)

	Australia	NSW	VIC	QLD	SA	WA	TAS
1990	83.0	81.2	83.3	84.2	88.8	81.0	82.2
1995	83.9	83.9	84.1	84.7	88.2	76.9	84.6
2000	84.3	83.2	87.6	83.5	85.3	78.5	82.9
2005	85.0	87.2	84.0	84.4	91.7	76.4	84.9
2010	82.6	84.6	82.7	80.9	84.7	75.7	89.7
2015	81.8	81.0	85.9	80.9	87.9	74.2	87.8
May-17	84.3	84.8	86.6	83.4	89.6	76.7	88.2
Average 1984-2017	83.5	83.4	84.6	83.4	86.9	78.3	85.2
St.dev	0.91	1.80	1.44	1.63	2.36	2.61	2.51
%point Change 1990-2017	1.3	3.7	3.3	-0.8	0.9	-4.3	5.9

Source: ABS (6302), *Average Weekly Earnings*. Various Issues. Note the data have been constructed using average weekly ordinary time earnings for full-time employees. They have also been adjusted to provide an annual average measure. Prior to 2012 this was estimated over four quarters. Since 2012 the ABS has changed its collection and reporting methods and only two periods are now reported (May and November).

Adjusted Wage Gaps

There is a sizeable Australian and international literature seeking to explain observed gender wage gaps. Much of this research has been undertaken by economists using multivariate regression analysis.

There is debate within the literature as to what set of controls should be included in wage regressions. This is particularly the case for industry and occupation controls. Mincer (1974), for example, argues against the inclusion of occupation on the grounds that 'job level' (occupation) is a grouped variant of the dependent variable and will, therefore, generate misleading results. Shapiro and Stelcner (1981) suggest that inclusion (or not) of job level variables (such as occupation, industry and firm size) should be informed by the research question. They argue that if the objective is to examine unequal pay for equal work then such controls should be included. This they term a 'narrow view' of discrimination. If a more 'broader' view of discrimination is adopted (i.e. all forms of discrimination or unequal pay for equal productivity characteristics) then the job level variables should be dropped. In

dropping the job level variables the focus falls on gender differences in human capital (productivity) characteristics such as education and experience.

Similar arguments to those Shapiro and Stelcner have been advanced by Grimshaw and Rubery (2007), Austen et al (2013) and other feminist scholars.¹¹ They note that the labour market is highly segmented and that the sorting of women and men into particular occupations (eg women into nursing and clerical work) and industries (eg. men into mining and trade related occupations) is itself a gendered process. Furthermore, for women at least, a number of these occupations and industries have been historically undervalued. The controls also can't capture vertical segregation (see, also, Austen et al. 2013). In the analysis below we use a 'basic' specification and an 'extended' model. The extended model includes controls for industry and occupation whereas the basic does not. In other words the basic model may be thought of as capturing this broader form of discrimination. This is our preferred model and the one we report on.

Using wage equations, there are two commonly employed methods to arrive at an adjusted measure of the gender wage gap. One is to estimate an equation using a pooled sample of males and females and include an indicator or dummy variable for a person's sex (typically 1=female; 0=male). The other is to estimate separate male and female wage equations and then decompose the results into explained and unexplained components following a procedure first proposed by Blinder (1973) and Oaxaca (1973) and now commonly known as the Blinder-Oaxaca technique.¹² The explained component is the amount that can be accounted for by gender differences in characteristics such as levels of education and work experience (also referred to as 'productivity characteristic' in the literature). These explained differences are then deducted from the raw wage gap to arrive at an adjusted wage gap

The Blinder-Oaxaca decomposition may be written as follows:

$$\overline{lh}w_i^m - \overline{lh}w_i^f = \beta_i^m(\bar{X}_i^m - \bar{X}_i^f) + \bar{X}_i^f(\beta_i^m - \beta_i^f) + (\beta_0^m - \beta_0^f) \quad (1)$$

where m and f denote males and females respectively; lhw_i denotes the logarithm of an individual's hourly wages, \bar{X}_i denotes the means of the independent variables in the wage equation; β_0 is the constant term and β_i represents the estimated coefficients of the independent variables in the wage equation. In equation (1) the male wage structure is

¹¹ Feminist scholars also highlight other limitations associated with using economic models to examine gender pay inequity. Barbara Bergman (1986), for example, notes that controls such as qualifications do not reflect the effect of discriminatory structures and labour market practices on incentives for women to acquire and invest in human capital endowments such as additional qualifications in the first place.

¹² There are other approaches such as that of Brown, Moon and Zoloth (1980), Cotton (1988), and Neumark (1988) but these are less commonly employed in the literature.

taken as the non-discriminatory norm. This is a common approach in the literature and so will be followed here.¹³

The term on the left hand side (LHS) of the equation represents the raw gender wage gap. The first term on the right hand side (RHS) provides an estimate of the gap that can be explained by male-female differences in productivity characteristics such as education, work experience etc. (ie. gender differences in the set of controls included in the wage equation). The second term on the RHS provides an estimate of the gap as a result of male and female differences in rates of return to the various independent variables controlled for. The final (third) term measures differences in constants. Together the second and third terms account for the total unexplained portion and, in the literature, it is typically associated with a measure of gender discrimination (Coelli, 2014).

Table 2 below provides a summary of select Australian studies which have employed this form of decomposition. It shows that the share of the gap that can be explained varies across studies and models. As a generalization it equates to around one third of the explained gap. Clearly the inclusion of industry and occupational controls increases the share that can be explained and simultaneously reduces the unexplained portion and thus the size of the adjusted wage gap (eg. see Kidd and Shannon (1996) and also Coelli (2014) results in Table 2). Coelli's (2014) decomposition results also show that size of the gender wage gap is sensitive to the degree of occupational aggregation. When more detailed occupational controls are used the Coelli models the size of the explained portion of the gender wage gap increases.

The results in column (ii) of Table 2 also show considerably variability in the size of the adjusted gender wage gaps across the Australian studies reported. The nature of the dependent variable, sample composition, time period and set of controls all contribute to the variability observed. This makes it hard to compare estimates across studies.

¹³ Rather than taking the male wage structure as the non-discriminatory norm the decomposition could use the female wage structure or use an average of the male and female wage structures.

Table 2: Select Estimates of the Raw and Adjusted Wage Gaps, Australia

Study, Year of Data & Sample	Raw Wage Gap	Adjusted Wage Gap	Proportion of Gap Explained (%)	Proportion of Gap Unexplained (%)
	(i)	(ii)	(iii)	(iv)
<i>Kidd and Shannon (1996): 1989-1990 data</i>				
-Without Industry or Occupational controls	0.144	0.120	17.0	83.0
-Controlling for Industry and Occupation	0.144	0.099	30.0	70.0
-With imputed labour market experience and without industry or occupational controls.	0.144	0.081	43.0	57.0
-With imputed labour market experience and with industry and occupational controls	0.144	0.067	53.0	47.0
<i>Preston and Crockett (1999):1996 data</i>				
-New South Wales	0.183	0.133	27.3	72.7
-Victoria	0.176	0.135	23.3	76.7
-Queensland	0.214	0.151	29.4	70.6
-South Australia	0.172	0.159	7.6	92.4
-Western Australia	0.261	0.176	32.6	67.4
-Tasmania	0.178	0.171	3.9	96.1
<i>Preston (2001): 1996 data</i>				
-Public Sector	0.159	0.140	35.1	64.9
-Private Sector	0.216	0.145	8.7	91.3
<i>Eastough and Miller (2004): 1991 data</i>				
-Wage and salary earners	0.132	0.156	-18.6	118.6
-Self-employed workers	0.305	0.204	32.9	67.1
<i>Watson (2010): 2001-2008 data</i>				
-Full Time Managers	0.278	0.180	35.3	64.7
<i>Cobb-Clark and Tan (2011): 2001-2006 data</i>				
-Workers with non-cognitive skills	0.143	0.113	21.0	79.0
-Workers without non-cognitive skills	0.143	0.110	23.1	76.9
<i>Li and Miller (2012): 1999-2009 data</i>				
-University Graduates	0.100	0.051	46.3	53.7
<i>Coelli (2014): 2001-2009 data</i>				
-Without Industry controls using two digit occupations	0.118	0.061	48.6	51.4
-With Industry controls using two digit occupations	0.118	0.045	62.2	37.8
-Without Industry controls using four digit occupations	0.118	0.045	62.2	37.8
-With Industry controls using four digit occupations	0.118	0.035	70.7	29.3
<i>Preston and Yu (2015): 2010 data</i>				
-Men employed full time/woman employed part time	0.228	0.127	44.3	55.7
-Women employed full time/men employed part time	0.171	-0.014	108.2	-8.2

The Glass Ceiling Effect

Thus far we have been considering the wage gaps at the mean. There is a growing literature using quantile regression techniques to examine wage gaps across the wage distribution. Many studies report the existence large gender wage gaps at the top of the wage distribution (for example Kee 2006, Watson 2010, Barron and Cobb-Clark 2010 and BCEC-WGEA 2016). This is often associated with a ‘glass ceiling effect’, a metaphor for barriers to women’s career and earnings progression at the upper end of their career (Baxter and Wright 2010).

The use of the quantile regression technique allows for the estimation of the wage gap along the entire wage distribution (Kee 2006). It, therefore, allows for the analysis of the gender wage gap among high-paid and low-paid workers. Quantile regression can be estimated using a pooled sample of men and women which uses a dummy variable for gender (Duraisamy and Duraisamy 2016) or on separate samples of men and women and then can be decomposed using methods analogous to the Blinder-Oaxaca decomposition (Kee 2006).¹⁴

The results from the quantile regression models can be decomposed using a generalisation of the Blinder-Oaxaca decomposition known as the Machado-Mata (2004) decomposition. In our work below we follow Kee (2006) and use the Machado-Mata decomposition to decompose the results into two components: one that attributes differences in earnings due to observable labour market characteristics of men and women (as with the explained component in the Blinder-Oaxaca method); and a second that attributes the differences in rewards (or wages) that males and females receive for their respective labour market characteristics.¹⁵

¹⁴ Following Buchinsky (1998) the quantile regression model can be expressed below as:

$$lhw_i = X_i \beta_\theta + u_{\theta i}, \text{Quant}_\theta(lhw_i | X_i) = X_i \beta_\theta$$

Where lhw_i is the log of hourly wages; X_i is a k times 1 vector of explanatory variables on the determinants of wages. $\text{Quant}_\theta(lhw_i | X_i)$ refers to the conditional quantile of lhw_i conditional on X_i and $u_{\theta i}$ is the independent error term. It is assumed that θ lies between 0 and 1 and the β_θ coefficient at each θ^{th} quantile can be obtained by the solving the following minimisation equation.

$$\beta_\theta = \text{Min} \left[\sum_{(i:lhw_i > x_i \beta_\theta)} \theta |lhw_i - x_i \beta_\theta| + \sum_{(i:lhw_i < x_i \beta_\theta)} (1 - \theta) |lhw_i - x_i \beta_\theta| \right]$$

In the above minimization equation β_θ represents the estimated returns associated with wage determinants at θ^{th} quantile of the log of hourly wages wage distribution.

¹⁵ As explained in Kee (2006), the decomposition process uses a bootstrapping method to directly implement the decomposition of the gender wage gap at particular quantiles using three steps. First step one involves identifying a specific quantile for the decomposition. Step two estimates returns to wage determinants for men and women (ie: β_θ^m for males and β_θ^f for females). Step three sets male labour market characteristics to women, but evaluates the returns to wages so that men are paid like women. The difference between the male wage distribution in step two and the adjusted female wage distribution from step three identifies the adjusted wage gap at the specific quantile. This process is replicated 100 times to generate the standard errors of the gender wage gap.

Table 3 presents a summary of Australian studies that use quantile regression to analyse glass ceiling effects.

Table 3: Australian Studies Analysing the Glass Ceiling Effect Using Quantile Regression

Study , Year of Data and Sample	Key Findings
<i>Key (2006)</i> : 2001 data -Private and public sector	-In the private sector a reduction in the gender wage gap is seen at the top of the wage distribution. -In the public sector a widening of the gender wage gap is seen at the top of the wage distribution.
<i>Barron and Cobb-Clark (2010)</i> : 2001-2006 data -Private and public sector	-In the private and public sector the widening of the gender wage gap is seen at the top of the wage distribution. -Irrespective of the sector of employment the gender wage gap among low-paid workers is completely explained by productivity related differences.
<i>Chzhen et al. (2012)</i> : 2009 data -Private sector	-Gender wage gap tends to increase along the wage distribution.
<i>Miller (2005)</i> : 2001 data -Workers employed full-time	-Gender wage gap among high-paid workers was significantly larger than the gender wage gap among low-paid workers. -Glass ceiling effect has been linked to undervaluation of women’s skills.

Most of the studies summarised in Table 3 suggest that differences in earnings of males and females are greater at the upper-end of the wage distribution. For example, Miller (2005) found that the wage gap increased from 10 per cent between the 5th-35th percentiles to around 23 per cent at the 95th percentile of the wage distribution. Baron and Cobb-Clark (2010) found that the gender wage gap among high-paid workers in both the public and private sector was approximately 60 per cent. Barron and Cobb-Clark (2010) link the glass ceiling effect to occupational segregation within the private sector. Additionally, Miller (2005) also attributes the effect to women’s relatively low bargaining power and access to workplace agreements.

The finding of higher gender wage gaps at the upper end of the wage distribution is also consistent with the literature which shows larger gender wage gaps in more deregulated labour markets (and smaller gaps in more centralized / regulated systems). Rubery, for example, argues that “... women’s pay position is influenced more by the overall system of pay determination than by specific policies for gender equality” (Rubery, 1992, p.619). Where wage setting is highly unregulated (eg. secretive determination of loadings) gender wage inequity is likely to be higher (Bailey et al, 2016). These sorts of practices are typically more commonly found amongst higher paid employed; i.e. at the upper end of the wage distribution.

Model and Data

In the analysis below we use data from the 2001, 2007 and 2014 waves of the Household, Income and Labour Dynamics in Australia (HILDA) panel survey. The HILDA data set contains important information on individual earnings and education as well as job characteristics such as workplace size, industry, occupation, sector of employment, union membership, job contracts and schedule of work. It also provides information on demographic and socio-economic factors such as state of residence, migration, gender, number of children, marital status, birthplace and English speaking ability.

As noted, we use three waves: Wave One (2001), Wave Seven (2007) and Wave Fourteen (2014) of the HILDA survey. Wave One and Wave Seven have approximately 7,682 households and 19,914 individuals aged 15 years old and over. Wave Fourteen consists of 9,835 households and 25,391 individuals aged 15 years old and over.

The sample is restricted to the working age population between 18 to 64 years. This sample is also restricted to males and females who are employed and those whom report their weekly earnings and hours of work. This is a common approach used in studies of gender wage gaps in Australia.

We estimate a standard wage equation expressed as

$$lhw_i = \beta_0 + \beta_1 S_i + \beta_2 X_i + \beta_3 X_i^2 + \beta_4 Q_i + \varepsilon_i \quad (2)$$

Where lhw_i represents the logarithm of hourly earnings of an individual i , S_i represents the years of schooling or education, X_i represents the Mincer (1974) proxy for labour market experience which is derived from age minus years of schooling minus five, X_i^2 represents potential labour market experience squared, and Q_i is a vector which takes into account all the demographic characteristics, individual characteristics and job characteristics. β_0 is a constant and ε_i is the error term.

The dependent is the natural logarithm of hourly earnings. This is derived from weekly wages and salaries of employees and then divided by weekly hours worked. The model controls for qualifications (with five indicator variables controlling for highest qualification attained. The base group is those who did not complete the final year of high school). We also control for work experiencing using an estimate of potential labour market experience calculated as age minus years of schooling minus five. A series of variables capturing demographic characteristics such as marital status, presence of dependant children, birthplace and English speaking ability are also included. In other studies these demographic variables have been shown to affect earnings. In the case of women, for example, the presence of dependant children may capture wage effects associated with periods out of the labour market, constrained employment choices or simply discriminatory effects.

A series of geographic locational dummies and job characteristics are also included. The latter includes a control capturing whether or not they are employed in the public sector, whether or not they are a trade union member and nature of their employment contract (fixed term or casual, with the omitted group being permanent). We also control for whether or not they work regular days, whether or not they hold more than one job and whether or not they work part-time (which we define as less than 35 hours per week). A series of firm size dummies are also included. In the extended model we include all of the above variables as well as a series of one digit occupation and industry controls.¹⁶

Using ordinary least squares (OLS) we first estimate the equation separately for samples of men and women in WA and in all other Australian States for the years 2001, 2007 and 2014.^{17,18} As noted, a base model is estimated without controls for industry and occupation and an extended model is estimated with these controls. These specific years correspond to the three time frames of this analysis, before the mining boom, at the peak of the mining boom and the state of play post the mining boom. The results are then used to generate adjusted gender wage gaps using the Blinder-Oaxaca decomposition.

Regression Results

The results from the base model (or 'broader view' of discrimination) are summarised in Table 4 below. For convenience we have only reported the 2001 and 2014 data to show the changes across these years. The final row of the table shows the percentage growth in labour earnings of the sample groups. WA males experienced a 90.8 per cent growth earnings over the period, followed by WA women with an 86.6 per cent growth. The corresponding change for men and women in other Australian states was 67.4 per cent and 65.0 per cent.

Within both periods it can be seen that the determinants of earnings of West Australians differ from those in other states. In 2001, for example, the rates of return to qualifications in WA were lower than for other states. WA women degree holders, for example, received a 20 per cent premium relative to their unqualified counterparts in the state whilst their counterparts in other states received a 33.8 per cent premium. By 2014 the rates of return degree qualifications were comparable for women in WA and men and women other states. By 2014 WA men, on the other hand, received a 50 per cent premium over unqualified males if they held a degree and 62 per cent if they held postgraduate qualifications.

¹⁶ Summary statistics for these variables are available on request.

¹⁷ We considered the issue of sample selection bias and, following Heckman (1979) estimated a two-stage model, however, sample selection was not detected and the results reported within this paper have, therefore, not been corrected.

¹⁸ The 2001 model for men and women in Western Australia and all other states does not control for country of birth, only English speaking ability. This is due to a small sample size in Western Australia for this variable and collinearity of this variable with other variables.

The results for the presence and number of children are also worthy of comment. In the 2001 results these variables were mostly insignificant. By 2014 they were largely significant determinants of variations in earnings across individuals. WA men with children generally had a significant earnings advantage over those without, whereas for WA women there was no payoff, nor was there any significant penalty, associated with having children. This was not the case within the other states where males consistently had an earnings premium if they had children and women consistently had an earnings disadvantage if they had children. This 2014 pattern for the non-WA states also held in the extended model with controls for occupation and industry and when the sample was restricted to just full-time workers.¹⁹

Controls for sector of employment, union membership, casual employment, multiple job holding, part-time work and birthplace also reveal interesting differences for WA and the other Australian states. Focussing on the 2014 results we can see that working in the public sector is associated with a 10 per cent wage premium for non-WA women and a 17.6 per cent wage penalty for WA men. We can also see a positive effect from union membership, but only for non-WA men. Casual employment also results in mixed results, with WA women receiving 14.4% less than their non-casual state counterparts in 2014. They also received an additional penalty if they worked non-regular workdays. Multiple job holding is associated with a wage premium of 5 per cent for non-WA men. Part-time work has mixed effects with the premium positive and significant (4.9 per cent) amongst non-WA women; and negative and significant (-17.6 per cent) amongst WA men.

One relatively consistent finding across the four groups is the penalty that migrants face if they were born in a non-English speaking country. In 2014, within WA, the penalty is close to 20 per cent whereas elsewhere it is closer to 10 per cent. In the non-WA states those unable to speak English face a further penalty of between 4 and 6.5 per cent.

Table 5 summarises the Blinder-Oaxaca decompositions for the three time periods for WA and other states and for the two model specifications employed (base (or broad) and extended (or narrow)). As with previous studies (summarised in Table 1) we can see that when occupation and industry controls are included the size of the explained component increases and the size of the adjusted gender pay gap falls. We prefer to focus on the base models because of the difficulties associated with explaining wage variation when controlling for occupations and industries that may, themselves, be undervalued.

Focusing on these base models we can see that the adjusted gender wage gap in WA was around 12.4 per cent at the height of the mining boom. In the post-boom world this gender wage gap has declined to around 10.3 per cent. For the other Australian states the results

¹⁹ These results have not been reported in this paper but are available from the authors on request.

show that the adjusted wage gap has been increasing since 2001 and at 2014 was equal to 13.4 per cent (which is above that observed for WA). Based on these data it is possible to suggest that the mining boom did contribute to the WA gender wage gap, although clearly there were other contributory factors too.

The sizeable effects of the industry and occupational controls show that, even when other productivity bearing characteristics (such as education and experience) are held constant, there remains considerable variation in earnings across these groups (see Table 6 for the 2014 inter-industry wage structure). Whilst economic theory might explain these inter-industry differences (eg. compensatory wage premium or efficiency wage payments), previous analysis these as potential explanations for observed inter-industry differentials (Preston, 1997). The observed inter-industry differences, therefore, most likely capture industry capacity to pay and normative forces such as comparative wage pressures (norms of fairness), wage spillover effects and historical over/under valuation.

From Table 6 we can see that, in 2014, relative to the omitted group (Financial and Insurance), WA males earned a significant premium of 35.9 per cent if they worked in mining; 36.4 per cent in construction and 34.3 per cent in Professional, Scientific and Technical. Their male comparators in other states also had a significant earnings premium associated with mining (27.8 per cent) but for the other industries they experienced a significant wage penalty (relative to the omitted group). Women, in contrast, show no earnings premium associated with working in mining and, indeed, with the exception of one sector, all other wage differentials are negative when benchmarked to the Financial and Insurance sector.

Table 4 – Regression Results, Basic Model, 2001 and 2014

	2001				2014			
	Men-WA	Men-OStates	Women-WA	Women-OStates	Men-WA	Men-OStates	Women-WA	Women-OStates
<i>Postgraduate degree</i>	0.170	0.386***	0.310***	0.385***	0.620***	0.450***	0.294***	0.387***
<i>Degree</i>	0.369***	0.377***	0.201**	0.338***	0.500***	0.363***	0.354***	0.330***
<i>Diploma</i>	0.112	0.226***	0.066	0.209***	0.350***	0.241***	0.080	0.178***
<i>Certificate</i>	0.113	0.094***	0.141	0.040	0.172**	0.146***	-0.084	0.043**
<i>Year 12</i>	0.119	0.125***	0.054	0.082***	0.176**	0.125***	0.001	0.090***
<i>lmexp</i>	0.023***	0.026***	0.010	0.021***	0.014*	0.030***	0.016**	0.021***
<i>lmexp²</i>	0.000**	-0.001***	0.000	0.000***	0.000	0.000***	0.000	0.000***
<i>Born English Speaking Country</i>	Na	Na	na	Na	0.023	0.009	-0.110*	0.006
<i>Born Non-English Speaking Country</i>	Na	Na	na	Na	-0.196**	-0.112***	-0.091	-0.081***
<i>1 kid</i>	-0.079	-0.008	0.800	-0.061*	0.156**	0.048**	0.089	-0.029
<i>2 Kid</i>	-0.054	-0.020	-0.101	-0.055*	0.221***	0.061***	0.036	-0.034*
<i>3 Kid</i>	0.155*	0.016	0.015	-0.020	0.196**	0.057**	-0.031	-0.069***
<i>4 + Kid</i>	-0.106	-0.060	-0.053	-0.117***	-0.041	0.001**	-0.105	-0.088***
<i>Married</i>	0.246***	0.166***	0.211**	0.109***	0.119	0.010***	0.062	0.126***
<i>Defacto</i>	0.110	0.147***	0.091	0.077***	0.038	0.052***	-0.014	0.088***
<i>Widowed/Single/Divorced</i>	0.127	0.140***	0.215**	0.049	0.149	0.020	-0.001	0.073***
<i>Non-Urban</i>	0.024	-0.080***	0.061*	-0.073***	-0.077	-0.040**	-0.131**	-0.039***
<i>Rural</i>	0.044	-0.128***	-0.176	-0.078***	-0.112	-0.087***	-0.026	-0.060***
<i>No-English Speaking Ability</i>	-0.027	0.004	-0.086	-0.028	0.000	-0.065**	0.011	-0.040***
<i>Public</i>	-0.047	0.014	0.116*	0.053***	-0.176***	-0.025	0.034	0.101***
<i>Union</i>	0.054	0.068***	0.076	0.021	0.048	0.037**	0.001	-0.003
<i>Employed on Fixed Term Contract</i>	0.168*	0.007	0.011	-0.062**	0.025	0.042*	-0.064	-0.018
<i>Casual Employee</i>	-0.077	-0.040	-0.124*	-0.067***	-0.018	-0.016	-0.144**	-0.027
<i>Works Non-Regular Days</i>	0.065	-0.070***	-0.021	0.014	0.002	-0.002	-0.092*	-0.028
<i>Multi: Holds More than One Job</i>	0.034	0.034	0.077	0.047*	-0.010	0.050**	0.069	0.012
<i>Part-Time (< 35 Hours Per Week)</i>	-0.142	0.042	-0.073	0.082***	-0.176**	-0.011	0.06	0.042***

<i>Wp10-19</i>	0.083	0.059***	0.043	0.064***	-0.096	0.044**	0.069	0.034*
<i>Wp20-49</i>	0.126	0.114***	-0.056	-0.023	-0.041	0.049**	0.176***	0.049***
<i>Wp50-99</i>	0.104	0.178***	0.036	0.046	0.011	0.112***	0.169**	0.047**
<i>Wp100-199</i>	0.325***	0.196***	0.111	0.134***	0.294***	0.126***	0.051	0.083***
<i>Wp200+</i>	0.352***	0.230***	0.188*	0.117***	0.251***	0.279***	0.233***	0.180***
<i>Constant</i>	2.253***	2.332***	2.408***	2.369***	2.934***	2.757***	2.982***	2.789***
<i>Sample Size</i>	321	2902	294	2891	379	3692	380	4003
<i>Adjusted R²</i>	0.264	0.259	0.162	0.172	0.377	0.331	0.326	0.292
<i>F-Test</i>	4.96	35.89	2.96	21.7	8.37	64.24	6.91	54.35
<i>Mean of Dependent Variable (Log Hourly Wage)</i>	2.881	2.904	2.731	2.803	3.527	3.419	3.355	3.304
<i>Actual Mean Hourly Wage (\$)</i>	17.8	18.2	15.3	16.5	34.0	30.5	28.6	27.2
<i>% growth in actual mean hourly wage between 2001-2014</i>					90.8%	67.4%	86.6%	65.0%

Notes:

1. Dependent Variable: Natural log of hourly earnings.
2. The reference group is Australian born, speaks English, single, unqualified, no children, resides in city, has one job, works regular hours, holds a permanent job, works in the private sector, is not a union member, works full-time, and works in a work place with fewer than 10 persons.
3. The 2001 model for men and women in Western Australia and all other states does not control for country of birth, only English speaking ability. This is due to a small sample size in Western Australia for this variable and collinearity of this variable with other variables.
4. The significance level is indicated by *** (1%); ** (5%); * (10%).

Table 5: Blinder-Oaxaca Decomposition of the GWG; All Workers; WA and Other States; 2001, 2007 and 2014

	Raw Wage Gap (i)	Difference in Constants (ii)	Explained Portion (iii)	Unexplained Portion (iv)	% Explained (v)	Adjusted Gender Wage Gap (vi)
WA						
Base – 2001	0.149	-0.155	0.071	0.233	0.475	0.078
Extended – 2001	0.149	0.072	0.152	-0.075	1.016	-0.003
Base – 2007	0.195	-0.047	0.071	0.171	0.365	0.124
Extended – 2007	0.195	0.518	0.069	-0.393	0.356	0.125
Base – 2014	0.173	-0.049	0.069	0.152	0.400	0.103
Extended – 2014	0.173	-0.379	0.122	0.429	0.709	0.050
ALL OTHER STATES						
Base – 2001	0.101	-0.037	-0.008	0.146	-0.084	0.109
Extended – 2001	0.101	0.215	0.013	-0.128	0.132	0.087
Base – 2007	0.101	0.015	-0.023	0.108	-0.224	0.123
Extended – 2007	0.101	0.128	0.007	-0.034	0.067	0.094
Base – 2014	0.115	-0.032	-0.019	0.166	-0.165	0.134
Extended – 2014	0.115	0.000	0.029	0.086	0.251	0.086

NB: The sum of the values in columns (ii) and (iv) provide the total unexplained earnings gap which is the same as the estimated adjusted wage gap (column vi). A negative sign on the explained proportion of the gap suggests that when accounting for differences in the characteristics of men and women the raw wage gap actually widens. In other words, if women had the same characteristics (eg qualifications) as men they would be worse off.

Table 6: Inter-Industry Wage Premium and Penalties; All Workers; WA and Other States; 2014

	WA Males	Other States – Males	WA Women	Other States – Women
<i>Agriculture, Forestry & Fishing</i>	-0.253	-0.253***	-0.929***	-0.213***
<i>Mining</i>	0.359**	0.278***	0.044	0.028
<i>Manufacturing</i>	0.231	-0.164***	-0.300***	-0.085**
<i>Electricity, Gas, Waste & Water</i>	0.427	0.085	-0.107	0.066
<i>Construction</i>	0.364**	-0.041	-0.199	-0.045
<i>Wholesale Trade</i>	0.047	-0.141***	-0.365**	-0.092**
<i>Retail Trade</i>	-0.143	-0.345***	-0.353***	-0.206***
<i>Accommodation & Food</i>	-0.056	-0.371***	-0.286**	-0.262***
<i>Transport, Postal & Warehousing</i>	0.309*	-0.136***	0.331*	-0.148***
<i>Information Media & Communications</i>	0.046	-0.118**	-0.116	-0.091*
<i>Retail, Hiring & Real Estate</i>	0.034	-0.192***	-0.064	-0.130***
<i>Professional, Scientific & Technical</i>	0.343**	-0.088**	-0.044	-0.090**
<i>Administrative & Support</i>	-0.053	-0.234***	0.022	-0.111***
<i>Public Administrative & Safety</i>	0.162	-0.098**	0.033	-0.024
<i>Education & Training</i>	-0.057	-0.287***	-0.269**	-0.168***
<i>Health Care & Social Assistance</i>	-0.005	-0.315***	-0.137	-0.120***
<i>Arts & Recreation</i>	0.028	-0.346***	-0.666***	-0.271***
<i>Other Services</i>	0.132	-0.228***	0.02	-0.085**

Note: the omitted category is Financial and Insurance. Other variables in the model included the base specification (see Table 4) plus 1 digit controls for occupation. The significance level is indicated by *** (1%); ** (5%); * (10%).

Quantile Regressions and Adjusted Wage Gaps

We now turn to the quantile regressions. Table 7 summarises the results from the decomposition using the Machado-Mata method to estimate adjusted gender earnings gaps. The results show that at the top end of the earnings distribution the gender earnings gaps are larger. This is to be expected since there is greater scope for individualised bargaining and differentiated payments higher up the pay scale, particularly with regard to bonuses and above base remuneration packages. In the language of Bailey et al. (2015) there is 'high regulation distance' further up the pay scale.

This phenomenon of higher gender pay gaps at the upper end of the pay scale was noted in the BCEC-WGEA (2016, p.17) report and in a recent paper on academic pay by Bailey et al. (2016). The BCEC-WGEA report showed that, for full-time workers, the gender pay gap amongst 'key management personnel' was equal to 23.8 per cent for base salary and increased to 28.8 per cent when total remuneration was considered. In the Bailey et al. paper they found that discretionary loadings for academics were susceptible to gender influences.

At the peak of the mining boom in Western Australia, at the top end of the earnings distribution, there was a 27.5 per cent earnings difference between men and women. The 2014 results, which are post mining boom, show that the median gap is relatively similar between WA and the other states (at 13.2 per cent and 13.9 per cent respectively), however, the gaps fan out amongst higher income earners. In Western Australia those at the 70th, 80th and 90th percentile of the earnings distribution experience gender wage gaps equal to 18.4 per cent, 19.9 per cent and 20.7 per cent, respectively. The corresponding gaps within the other Australian states are 16.6 per cent, 18.8 per cent and 22.8 per cent.

These findings, therefore, confirm earlier studies that show smaller gender wage gaps where the wage structure is more compressed and larger gender wage gaps at the top of the wage distribution. The latter, as noted, may be indicative of a 'glass ceiling' effect and/or discriminatory remuneration practices.

Table 7: Adjusted Gender Earnings Gaps by Percentile; All Workers; WA and Other States; 2001-2014

Percentile	Western Australia				Other States			
	2001	2007	2014	%-point Change 2001-2014	2001	2007	2014	%-point Change 2001-2014
10 th	0.031	-0.061	-0.036	-0.067	-0.004	-0.027	-0.033	-0.029
20 th	0.012	-0.099	-0.063	-0.075	-0.033	-0.064	-0.070	-0.037
30 th	-0.025	-0.127	-0.078	-0.053	-0.061	-0.093	-0.100	-0.039
40 th	-0.058	-0.155	-0.105	-0.047	-0.083	-0.116	-0.122	-0.039
50 th	-0.086	-0.172	-0.132	-0.046	-0.105	-0.135	-0.139	-0.034
60 th	-0.111	-0.190	-0.148	-0.037	-0.126	-0.149	-0.152	-0.026
70 th	-0.123	-0.195	-0.184	-0.061	-0.147	-0.159	-0.166	-0.019
80 th	-0.119	-0.238	-0.199	-0.080	-0.175	-0.171	-0.188	-0.013
90 th	-0.106	-0.275	-0.207	-0.101	-0.213	-0.203	-0.228	-0.015

Notes: These estimates have been generated using the basic specification of the wage equation (see Table 4 for details on variables controlled for) and did not control for industry and occupation. With the exception of the 10th, 20th and 30th percentiles for WA in 2001 and the 10th percentile for all groups other than 'other states' 2007 and 2014, all other results are statistically significant.

Table 7 also reports on the percentage point change in the size of the adjusted gender wage gaps between 2001 and 2014. A negative sign illustrates a widening in the gender earnings gap. It is clear from these results that across all points of the wage distribution the gender pay gap has widened both within Western Australia and elsewhere in Australia.

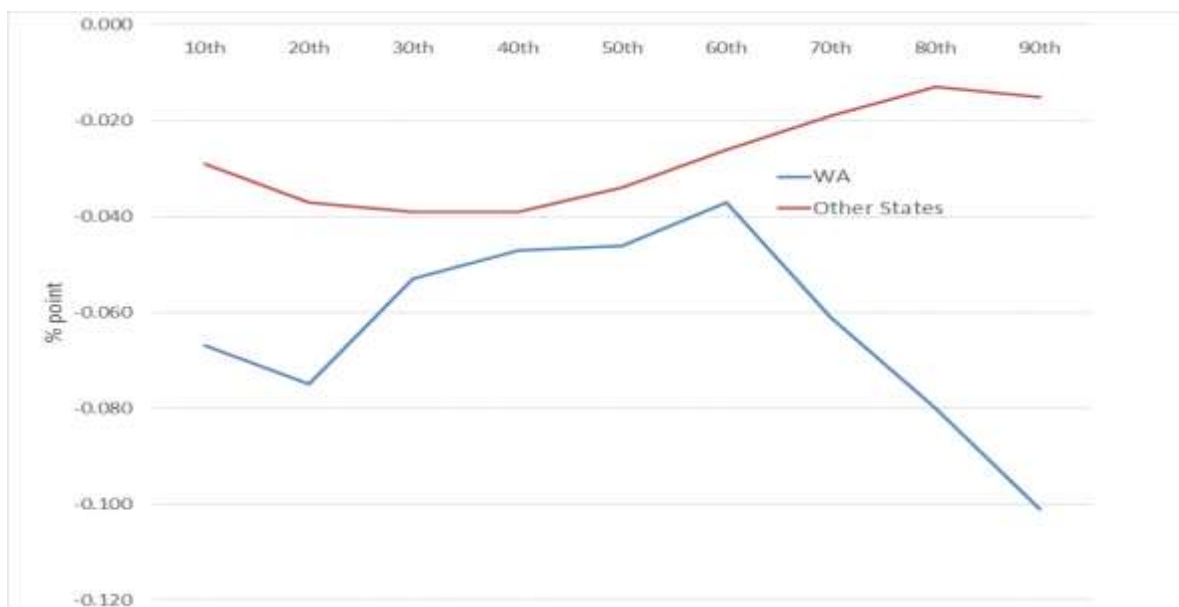
The results for the 2001-2014 change in Table 7 are presented graphically in Figure 2. We can see from these data that, when compared to the other Australian states, the WA adjusted gender wage gap has widened at a faster rate across the wage distribution. At the 20th percentile, for example, the WA gender wage gap grew by 6.3 percentage points between 2001 and 2014. In the other Australian states it grew by 3.7 per cent. It is beyond the scope of this paper to explain why the WA gender wage gap amongst the low paid has deteriorated faster than elsewhere in Australia. Indeed it is noted that between 2001 and 2006 the adult minimum wage in WA was equal to that of the Federal jurisdiction and, since 2007, has been slightly higher than the minimum rate awarded by the Fair Work Commission.²⁰ It may be that, within WA, proportionately more women than men are dependent on the minimum rates (Federal and State) and that the minimum rates have had less 'bite' for women than they may do elsewhere in Australia.

²⁰ The Fair Work Commission is responsible for setting the national minimum wage for those workers in the Federal jurisdiction. Minimum wage workers in the WA who are covered by the WA jurisdiction follow the wage schedule set out in the *WA Minimum Conditions of Employment Act 1993*. Minimum rates in this Act are determined by the WA Industrial Relations Commission.

At the top end of the pay distribution (70th, 80th and 90th percentiles) we can see evidence of significant widening in the gender wage gap in WA relative to other Australian states. Indeed, for the other Australian states the growth at the top end has actually been lower than the growth at the bottom end. A priori one would have predicted the opposite.

Returning to the WA results, whilst the top end gaps in 2014 are lower than those observed for WA in 2007 (during the mining boom) they, nevertheless, remain large. The large deterioration since 2001 may be reflective of changed pay setting practices (eg. the payment of loadings and bonuses to attract and retain staff) as a result of the mining boom. As Bailey et al. (2016, p.663) note a market loading system is likely to entrench itself. Bailey et al. also cite Rubery (1995) who argues that discrimination in the broader labour market will reinforce discrimination within organisations. This may have happened within WA and may explain the large deterioration observed across the WA pay distribution.

Figure 2: Percentage Point Change in Adjusted Earnings Gaps; 2001-2014; All Workers; WA and Other Australian States



The results in Figure 2 (especially for WA) also demonstrate the limitations of working with average or indeed median data when studying gender wage gaps.

Summary and Conclusion

In this paper we use data from the 2001, 2007 and 2014 waves of the HILDA survey to examine the determinants of male and female earnings and, in particular, to construct adjusted measures of the gender earnings gap. We selected these periods as we were

particularly interested in understanding what effect, if any, the mining boom had on the gender earnings gap in WA.

We find that the mining boom did contribute to a growth in the WA gender earnings gap. This was especially so at the top end of the pay distribution although, when compared to elsewhere in Australia, we believe it may also explain the relatively larger deterioration at the bottom end of the distribution too. It is possible that 'fair wage comparisons' and new 'market rates' for those in or close to the mining sector have flowed through to male rates in other sectors in WA.

Our analysis shows that the determinants of earnings differ for men and women and for WA and the other states. In the other states, for example, women with children face a significant earnings penalty whereas their male counterparts have an earnings premium where children are present. Union membership is also significantly and positively associated with earnings in the other Australian states but again only for men (with the wage premium equal to 3.7 per cent).

Our findings also show that women in WA face a number of wage penalties not experienced by the other groups. For example, in 2014, WA women earned 11 per cent less than their Australian born counterparts if they were born in a non-English speaking country, they also earned 14.4 per cent less than permanent employees if they were casual and faced a further 9.2 per cent penalty if they worked non-regular days.

Overall we note that, when comparisons are made using adjusted earnings data, the gender pay gaps in WA are slightly lower than those observed elsewhere in Australia.

The results from this study suggest that as wage inequality continues to grow we can expect to see larger gender earnings gaps across all parts of the wage distribution. From a social, political and equality perspective this is concerning since gender earnings differences have flow on effects. Differing returns to education, for example, impact on education investment decisions yet, at a policy level males and females are treated equally. There is, for example, no specific HECS discount for women notwithstanding differing rates of return on their investments.²¹ Differing gender earnings also impact on household decision making and workforce participation decisions and by implication have longer term effects on women's financial security and retirement savings.

From a policy perspective the results in this paper highlight the need to keep gender high on the radar and to continue to develop policies that assist women both at the bottom as well as the top of the wage distribution. The legislative requirement for non-public sector employers with 100 or more staff to report to the Workplace Gender Equality Agency on the base and total earnings of their staff is one way of ensuring transparency and reducing top end gender pay gaps.

²¹ HECS stands for the higher education contribution scheme which is an income contingent loan for university studies.

At the lower end of the wage distribution minimum wage decisions and equal remuneration provisions will remain important vehicles for prosecuting pay equity. These will continue to be particularly important for men and women whose rely on the award system for their remuneration determinations.

References

- Austen S, Jefferson T, and Preston AC (2013) Contrasting economic analyses of equal remuneration: The Social and Community Services (SACS) case. *Journal of Industrial Relations* 55(1): 60–79
- Australian Bureau of Statistics (ABS) (2017) Average Weekly Earnings Australia, 6302.
- Bailey J, Peetz D, Strachan G, Whitehouse G and Broadbent K (2016) Academic pay loadings and gender in Australian universities. *Journal of Industrial Relations* 58(5): 647-668.
- Baron, J and Cobb-Clark, D (2010), Occupational Segregation and the Gender Wage Gap in Private- and Public-Sector Employment: A Distributional Analysis, *Economic Record*, 86(273):227-246.
- Baxter, J and Wright, O (2000) The Glass Ceiling Hypothesis: Comparative Study of USA, Sweden and Australia, *Gender and Society*, 14(2):275-294.
- BCEC-WGEA (Bankwest Curtin Economic Centre and Workplace Gender Equality Agency) (2016) Gender Equity Insights 2016: Inside Australia's Gender Pay Gaps BCEC|WGEA Gender Equity Series. Available from: <http://bcec.edu.au/assets/084525-BCEC-WGEA-Gender-Pay-Equity-Insights-2016-Report-MR-LINKED.pdf> (Accessed 15/11/17)
- Bergmann, B (1989), Does the Labour Market for Women Need Fixing?', *Journal of Economic Perspectives*, 5(1):43-60
- Blinder, A (1973) Wage Discrimination: Reduced Form and Structural Estimates, *Journal of Human Resources*, 84(4): 436-455.
- Brown, RS, Moon, M and Zoloth, BS (1980) Incorporating Occupational Attainment in Studies of Male/Female Earnings Differentials, *Journal of Human Resources*, 15(1): 3-28.
- Buschinsky, M (1998) Recent Advances in Quantile Regression Models: A Practical Guideline for Empirical Research, *Journal of Human Resources*, 33(1): 88-126.
- Chezen, Y, Mumford, K and Nicodemo, C (2012) The Gender Pay Gap in Australian Private Sector: Is Selection Relevant Across the Wage Distribution?, *Economic Record*, 89(286):367-381.
- Cobb-Clark, D and Tan, M (2011) Non-cognitive skills, occupational attainment and relative wages, *Labour Economics*, 18(1): 1-13.
- Coelli, M (2014) Occupational Differences and the Australian Gender Wage Gap, *Australian Economic Review*, 47(1) 44-62.
- Cotton, J (1988) On the Decomposition of Wage Differentials, *Review of Economics and Statistics*, 70(2): 236-243.
- Duraisamy, M and Duraisamy, R (2016), Gender wage gap across the wage distribution in different segments of the Indian labour market, 1983-2012: exploring the glass ceiling or sticky floor phenomenon, *Applied Economics*, 29(1):1-14.
- Eastough, K and Miller, P (2004) The Gender Wage Gap in Paid- and Self-Employment in Australia, *Australian Economic Review*, 43(3): 257-276.

- Fitzsimmons TW and Callan VJ (2015) *Filling the Pool*. Perth: The Committee for Perth.
Available from: <https://www.committeeforperth.com.au/assets/documents/CFP-Filling-the-Pool-Report.pdf>
- Government of Western Australia (2012) *Economic and Fiscal Outlook: Budget Paper No. 3*, May 2012. Available from
http://www.ourstatebudget.wa.gov.au/uploadedFiles/State_Budget/Budget_2012_13/2012-13_budgetpaper3.pdf (Accessed 15/11/17)
- Grimshaw D and Rubery J (2007) Undervaluing Women's Work. European Work and Employment Research Centre, University of Manchester. Working paper series no. 53.
- Heckman, J (1979) Sample Selection Bias as a Specification Error, *Econometrica*, 47(1): 153-161.
- Kee, H (2006) Glass Ceiling or Sticky Floor? Exploring the Australian Gender Pay Gap, *The Economic Record*, 82(259): 408-427.
- Kidd, M and Shannon, M (1996) The Gender Wage Gap: A Comparison of Australia and Canada, *Industry of Labour Relations Review*, 49(4): 729-746.
- Li, I and Miller, P (2012), Gender discrimination in the Australian graduate labour market, *Australian Journal of Labour Economics*, 15(3): 167-199.
- Machado, J and Mata, J (2004) Counterfactual decompositions of changes in wage distributions using quantile regression, *Journal of Applied Econometrics*, 20(4): 445-465.
- Miller, P (2005) The Role of Gender Among Low-Paid and High-Paid Workers, *Australian Economic Review*, 38(4): 405-417.
- Mincer, J (1974) *Schooling, Experience and Earnings*, Columbia University Press, New York.
- Neumark, D (1988) Employers' Discriminatory Behavior and the Estimation of Wage Discrimination, *Journal of Human Resources*, 23(3):279-295.
- Oaxaca, R (1973) Male-Female Wage Differentials in Urban Labor Markets, *International Economic Review*, 14(3): 693-709.
- OECD (2017) *Australia: OECD Economic Surveys. March 2017 Overview*. Available from
<http://www.oecd.org/eco/surveys/Australia-2017-OECD-economic-survey-overview.pdf> (Accessed 15/11/17)
- Parliament of the Commonwealth of Australia (2009) *Making it Fair Pay equity and Associated Issues Related to Increasing Female Participation in the Workforce*, House of Representatives Standing Committee on Employment and Workplace Relations, Canberra. Available from:
https://www.aph.gov.au/Parliamentary_Business/Committees/House_of_Representatives_Committees?url=ewr/payequity/report.htm (Accessed 16/11/17)
- Preston, A (1997) Where are we now with Human Capital Theory in Australia?, *Economic Record*, 73(220): 51-78.
- Preston, A (2001), *The Structure and Determinants of Wage Relativities: Evidence from Australia*, Ashgate, Sydney.
- Preston, A and Crockett GV (1999) Equal Pay: Is the Pendulum Swinging Back, *Journal of Industrial Relations*, 41(4): 651-674.
- Preston, A and Yu, S (2015) Is there a part-time/full-time pay differential in Australia?, *Journal of Industrial Relations*, 57(1):24-47.
- Rubery, J (1992) Pay, Gender and the Social Dimension to Europe, *British Journal of Industrial Relations*, 30(4): 605-21.

- Rubery J (1995) Performance related pay and the prospects for gender pay equity. *Journal of Management Studies* 32(3): 637-654.
- Shapiro, D and Stelcner, M (1981) Male-Female Earnings Differentials and the Role of Language in Canada, Ontario and Quebec, 1970, *Canadian Journal of Economics*, 14(2): 341-348.
- Todd, T and Eveline, J (2004) *Report on the Review of the Gender Pay Gap in Western Australia*, available from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.620.1538&rep=rep1&type=pdf> (Accessed 16/11/17)
- Watson, I (2010) Decomposing the Gender Pay Gap in the Australian Managerial Labour Market, *Australian Journal of Labour Economics*, 13(1):49-79.