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ABSTRACT

Probing the Effects of the Australian System of Minimum Wages on the Gender Wage Gap*

When wage setting is more regulated, the gender wage gap tends to decrease. We examine whether this holds for a complex system of occupation- and industry-specific minimum wages, which cover both low-pay and high-pay segments of the labour market. The system has the potential to close the gender wage gap by ensuring equal minimum pay for equal jobs, but it also has the potential to widen it by discriminating against jobs more commonly held by women. We carefully describe wage levels as well as returns to experience and their association with individual gender as well as the male employment share in the individual's field (industry or occupation) of work. We find that the gender wage gap among employees receiving a minimum wage is less than half the magnitude of the gap among other employees. Despite this, there is nonetheless evidence that, within the minimum-wage system, there is a wage penalty for employment in jobs more commonly held by women, although only for employees without university degrees. Our results suggest that, for university-educated women, the regulated setting of minimum wages helps to close the gender wage gap and counteracts the undervaluation of work typically undertaken by women. However, for less-educated women, who comprise approximately 82% of female minimum-wage employees, minimum wages could do more to close the gender wage gap if they were neutral with respect to the gender composition of jobs.

JEL Classification: J31, J16

Keywords: gender wage gap, minimum wages

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1 Introduction

Labour market institutions can have sizeable effects on earnings distributions, potentially affecting not only the overall dispersion of earnings, but also wage differentials across a number of dimensions, including educational attainment, work experience, occupation, industry and region. Because men and women differ markedly on many of these dimensions, perhaps most notably in the industry and occupation composition of their employment, these institutions can also impact on gender earnings differentials. In this article, we investigate the effects of a uniquely Australian labour market institution, its system of numerous minimum wages, on the gender wage gap in Australia.

To the extent that the gender wage gap is the result of differences in earnings at the bottom of the wage distribution, minimum wages will act to reduce the gender wage gap. Several international studies indeed present simulations or report evidence showing minimum wages reduce the gender wage gap by elevating the 'sticky floor' (Dex et al. 2000, Robinson 2005, Hallward-Driemeier et al. 2015, Boll et al. 2015). More generally, Kahn (2015) argues that labour market institutions that act to increase wage compression also, as a by-product, tend to reduce gender wage gaps. Comparing 31 OECD countries, he shows a strong positive correlation between male wage inequality and the median gender wage gap.

In Australia, minimum wages are binding for a large part of the labour market: in 2014, 24% of all employees were paid the applicable minimum wage. Based on the above studies, one would therefore expect minimum wages in Australia to reduce the gender wage gap substantially. However, somewhat unusually, the Australian labour market contains many different minimum wages arising from industry- and occupation-based 'awards' made by an industrial court. These awards specify legally binding minimum rates of pay, which vary considerably across occupations and industries, applying not only to the low-pay sector of the labour market, but to occupations of all levels, including high-skilled, high-paid jobs such as airline pilots, university professors and medical practitioners.[1] The effects of these many minimums will therefore depend, in quite complex ways, on how men and women are distributed across occupations and industries and how minimums are distributed across occupations and industries.

[1] These minimum wages are, however, less likely to be binding in high-paid occupations, where greater proportions of employees receive a salary that is above the applicable award rate.

The industrial court does not set different wages for men and women. However, it could, in principle, produce a gender wage gap by setting lower minimum wages in occupations and industries in which women are relatively more concentrated. A gender wage gap caused by legally set minimum wages could therefore be greater than or less than the gender wage gap created by market wages.

Indeed, the raw median gender wage gap among full-time employees in Australia is, at 18%, in the middle range of all OECD countries (Figure 1) [2], providing a hint that the minimum wage system does not reduce the gender wage gap as much as might be expected given the high proportion of employees that are paid the applicable minimum wage. This is reinforced by the finding that the raw *mean* gender wage gap among full-time employees is approximately 20% (and indeed the gap has persisted at this level since the early 1990s (ABS 2016), despite relative growth in female educational attainment and work experience).

We proceed by first separately examining gender differences in earnings of 'award-reliant' employees and gender differences in earnings of other employees. If we find that the gender wage gap inside the award system is smaller (larger) than outside it, this provides first indicative evidence that the award system mitigates (exacerbates) the gender wage gap, compared to the gap a market without minimum wages would create.

Of course, even if the award wage system acts to reduce the gender wage gap, a gender wage gap may nonetheless exist within the system. Such a wage gap could be caused by true gender-differences in productivity, and/or because the minimum wages set by the industrial court do not adequately reward 'typical female' work compared to 'typical male' work. To the extent that the first explanation applies, the award system has a neutral to positive effect on the gender wage gap. However, to the extent that the second potential explanation is true, the award system itself violates gender equity.

In a second step, we thus look for empirical evidence of whether any wage gap within the award system could plausibly be caused by discriminatory wage setting by the industrial court. To do so, we compare

[2] Note that the OECD estimates are not entirely comparable across all countries because of differences in the way the median gender gap is calculated. For example, the wages variable may be measured over an hourly, weekly, monthly or annual time-frame. Figure 1 nonetheless provides reasonable indicative information on where Australia fits relative to other OECD countries.

gender wage differences across occupations and across industries differentiated by their female share of employment—in particular, distinguishing 'female dominated', 'male dominated' and 'balanced' occupations and industries. If we find that employees in female-dominated occupations/industries earn less than those in male-dominated occupations/industries, discriminatory wage setting by the industrial court is at least one possible explanation (amongst others) for the gender wage gap in the award system. However, if we find that the wage-differential between male- and female-dominated industries/occupations is small, but a gender wage gap exists *within* them, wage setting by the industrial court is not a plausible culprit for this phenomenon.

Our analysis produces indicative rather than conclusive evidence. Precise estimation of causal impacts is not possible. But our careful descriptive analysis provides what we believe is quite compelling evidence on the role of the minimum wage system in affecting the wage distribution and in particular the gender wage gap. We find that, while the system of minimum wages in Australia works to mitigate the gender wage gap, it does not do so to the extent it would were it neutral with respect to the gender composition of jobs. Specifically, we find evidence that typical female work is rewarded less favourably than typical male work for employees with low and medium levels of education. However, we find that within given industries and within given occupations—be they male-dominated or female-dominated—male employees seem to advance to higher-ranking positions faster than do female employees. We therefore find no evidence that the lower returns to work experience received by female employees is caused by Australia's system of minimum wages.

The plan of the rest of this paper is as follows. In the next section we summarise the most relevant previous literature, while in Section 3 we provide a brief explanation of the Australian system of minimum wages. In Section 4 the data is described. Results are presented in Sections 5 to 8. In Section 5 we compare gender wage gaps within and outside the minimum-wage system, while in Section 6 we examine gender differences in the extent of minimum wage 'bite'. Sections 7 and 8 then investigate the sources of the gender wage gap among minimum-wage employees, respectively considering the role of gender differences in human capital and the role of job 'femaleness'. Section 9 concludes.

2 Previous literature

Gregory (1999) is one of the early studies to present evidence of the importance of labour market institutions in explaining the gender wage gap. He argues that differences in the gender wage gap across countries are not strongly related to differences in women's education and work experience across countries. In Gregory's framework, any difference in the average gender wage gap across countries can arise from two possible sources: first, the extent to which women disproportionately receive wages from the lower end of the male wage distribution; and second, the extent to which 'low-wage' men's wages are lower than higher-wage men's wages. Gregory shows that, although women in Australia, the U.S. and the U.K. occupy similar "ranks" in the male wage distribution, they are relatively better off in Australia, reflecting the greater compression of the male wage distribution in Australia. This suggests that labour market institutions that limit wage dispersion in Australia (such as the National Minimum Wage, the award wage system and collective bargaining) also have beneficial effects on gender pay equity.

More recently, Kahn (2015) similarly argues that cross-country comparisons of 31 OECD countries indicate that countries with labour market institutions that produce more compressed wage distributions overall also produce lower gender wage gaps. Kahn explicitly mentions minimum wages as one of the mechanisms affecting overall wage compression. Other mechanisms are legal and regulatory frameworks affecting union membership, collecting bargaining coverage and employment protections.[3]

Dex et al. (2000) and Boll et al. (2015) produce ex ante estimates of the effects of the introduction of a minimum wage on the gender wage gap in the UK and Germany, respectively. National Economic Council et al. (2014) similarly produces estimates of the effects of a prospective increase in the federal minimum wage on the gender wage gap in the US. All find the gender wage gap would be reduced.

That said, the scope for minimum wages to reduce the gender wage gap would seem to be limited, with a number of studies finding that wages of women and men at the lower end of the wage distribution are very similar to each other, while larger gaps appear among high-paid women and high-paid men. This

[3] Kahn also notes that minimum wages can reduce employment, which may disproportionately affect women, and so cause an increased gender *employment* gap.

"glass ceiling" phenomenon is found in many countries—see, for example, Albrecht et al. (2003) for an analysis of Sweden and Arulampalam et al. (2007) for a study of eleven countries in the European Union. In Australia, Barón and Cobb-Clark (2010) and Kee (2006) estimate the gender wage gap in a quantile regression framework, and both studies find that the wage gap is considerably larger at the top-end of the distribution, and that any gap the lower end is fully accounted for by gender-differences in characteristics. Significantly, both studies find the glass ceiling is largely restricted to the private sector, which is further indication that more centralised wage determination, as takes place in the public sector, can reduce the gender wage gap.

The importance of labour market institutions for pay equity, particularly among low-paid workers, is also corroborated by Eastough and Miller (2004), who find the gender wage gap to be much larger among self-employed individuals than among employees. Jefferson and Preston (2007) provide further evidence of the effects of institutions using a difference-in-differences approach. In one state of Australia, but not nationwide, policies that supported more individualised bargaining instead of institutional wage setting were introduced in 1993, revoked in 2001, and then reinstated in a similar form in 2006. Jefferson and Preston find that tighter labour market regulations decrease the average gender wage gap, primarily by improving the situation of low-paid women.

Whitehouse and Frino (2003) find, using data from 2000 and 2002, that collective agreements covering employers with predominately female workforces have less advantageous conditions (for example, lower pay, or less favourable conditions for paid over-time or non-standard working hours) than other collective agreements.

Miller (1994) found that occupational segregation explains part of the gender wage gap by reducing wages in predominantly female fields; this was confirmed by Wooden (1999), who also found this phenomenon to be stronger among employees in managerial positions compared to lower occupations. Coelli (2014) comes to the same conclusion in a more recent study.[4] These results raise the suspicion

[4] Lee and Miller (2004), Kee (2006) and Barón and Cobb-Clark (2010) obtained different results from the earlier studies by Miller (1994) and Wooden (1999), finding that occupational segregation did not contribute to the gender wage gap, and that in fact the wage gap would be even larger if it were not for the differential distribution of men's and women's occupational choices. However, Coelli (2014) shows that this result is true only for broad occupation

that a similar mechanism could disadvantage women in the award wage system, despite there being no explicit distinction made between men's and women's pay.

3 The award wage system in Australia

Minimum wages have been a feature of the Australian labour market since the early years of the 20th century (Bray, 2013). However, the national minimum wage has existed in its current form only since 1997 and, moreover, effectively applies to only a small minority of employees. Instead, most jobs have legally binding minimums specified in industrial 'awards'. Award wages date back to 1908 and have always been set by an independent legal or quasi-legal body, currently known as the Fair Work Commission.[5] The award system has resulted in numerous minimum wages existing simultaneously, with the minimum applicable to an employee depending on the industry and/or occupation of employment, which determine the applicable award, and also depending on the specific tasks and duties and the employee's age, skill level and/or experience level, which determine which of the minimum wages specified in the award applies. Currently, there are 122 distinct federal awards, each of which specifies a number of minimum wages.[6] For example, the Hospitality Industry (General) Award 2010 specifies different adult minimum wages for each of 16 types of hospitality workers depending on the specific tasks performed within each type,[7] and also specifies minimum rates for juniors and for

categories and that it does not hold when more disaggregated occupation categories are considered. That is, differences in men's and women's occupations *within* broader groups make a sizeable contribution to the gender wage gap.

[5] The body was known as the Commonwealth Court of Conciliation and Arbitration from 1904 to 1956, the Conciliation and Arbitration Commission from 1956 to 1988, the Australian Industrial Relations Commission from 1988 to 2009 and Fair Work Australia from 2009 to 2013. It has been known as the Fair Work Commission since 2013. The term 'award' derives from the legalistic framework adopted for the Australian industrial relations system in 1904, whereby rulings of the Court of Conciliation and Arbitration to settle disputes between employers and employees were called awards (in the same way as a court awards damages, compensation, and so on).

[6] As recently as 2008, there were 1,560 distinct federal awards. A move towards a national system of industry-based awards saw a reduction in the number of awards in 2008 and 2009 to the current 122. However, this was largely a process of eliminating unnecessary duplication, since it had little impact on the number of different minimum wages. All current awards, including specified minimum wages, can be accessed at www.fwc.gov.au.

[7] The award first specifies types of workers such as cooks, store persons, gardeners or food and beverage attendants. Within each such type, different pay grades are defined for specified sets of tasks. For example, The award includes the following definitions for food and beverage attendants: "Food and beverage attendant grade 1 means an employee who is engaged in any of the following: picking up glasses; emptying ashtrays; general assistance to food and beverage attendants of a higher grade not including service to customers; removing food plates; setting and/or wiping down tables; and cleaning and tidying of associated areas." as well as "Food and

apprentices as percentages of the adult rate, producing over 200 different possible minimum wages just for regular daytime weekday work in the hospitality industry. The award additionally specifies higher rates of pay for night-time and weekend work and for 'casual' employees (employees not usually entitled to paid sick leave or paid annual leave, and who—like employees on 'zero-hour contracts' in the UK—have potentially variable hours of work with no guaranteed minimum).

In almost all cases, award wages are higher than the national minimum wage, which in 2016 was $17.70 per hour for regular adult employees working weekday daytime hours. In many cases they are considerably higher. For example, the Air Pilots Award 2010 specifies a minimum annual wage as high as $165,842 (for a captain of a large aircraft), which is over four times the annualised national minimum wage of $35,000. However, the applicable minimum wage for an employee can also be considerably lower than the standard national minimum wage. Junior rates of pay, applying to employees under the age of 20, and trainee rates of pay, applicable to apprentices for up to four years and to other trainees, can be substantially less than (even below half) the national minimum wage.

Figure 2 provides an indication of the range of minimum wages actually received by employees, showing the distribution of hourly wages among award-reliant employees in 2014 (usng the data set described in Section 4). The national minimum wage at that time was $16.87, but 83% of all award-reliant employees received a wage higher than that, and at the 90th percentile, the hourly award wage was twice the national minimum wage.

The result of the plethora of minimum wages is that the proportion of employees paid exactly the minimum wage applicable to their job is quite high. Australian Bureau of Statistics (ABS) estimates based on an employer survey show that, in 2016, approximately 24% of all employees were paid exactly the applicable minimum (award) rate (ABS 2017).[8] Moreover, even employees who receive a

beverage attendant grade 2 means an employee who has not achieved the appropriate level of training and who is engaged in any of the following: supplying, dispensing or mixing of liquor including the sale of liquor from the bottle department; assisting in the cellar or bottle department; undertaking general waiting duties of both food and/or beverage including cleaning of table; receipt of monies; attending a snack bar; and engaged on delivery duties." "Food and beverage attendants grade 3" and "- grade 4" as well as for "Food and beverage supervisors" are specified with similar descriptions of sets of tasks and duties.

[8] The proportion of employees paid exactly the award rate has fluctuated over time. Comparable ABS data on award reliance, available back to 2000, show that award reliance was 24% in 2000 (ABS 2001) and steadily

(collectively or individually negotiated) wage above the award rate may be affected by the existence of the minimum wage: if a minimum wage is applicable to employees similar to themselves, this could affect negotiations about wages that exceed the minimum floor. Since awards are specified for all industries and occupations, almost all employees are subject to award wages, even when minimums are not binding. This implies the award system could have large effects on the distribution of wages—much larger than a single universal minimum wage—and has high potential to impact on the gender wage gap. However, the plethora of minimums also means that it is not straightforward to ascertain their impact on the Australian labour market.

4 Data

Our analysis uses Release 14 of the Household, Income and Labour Dynamics in Australia (HILDA) Survey, a nationally representative longitudinal household study that commenced in 2001. The topics covered include labour market and education activity, retirement intentions and behaviour, income, expenditure, health and disability, subjective wellbeing, and personal relationships. The survey is conducted annually by face-to-face interview with every household member aged 15 years and over, supplemented by a self-completion questionnaire, also administered to all household members aged 15 years and over (Summerfield et al., 2014).

Release 14 contains unit record data for the first 14 waves of the study, conducted over the 2001 to 2014 period. For the first wave, interviews were obtained with 13,969 individuals living in 7,682 households. A general sample 'top-up' of 4,009 individuals in 2,153 households was added in 2011. Annual re-interview rates (the proportion of respondents from one wave who are successfully interviewed the next) are high, rising from 87% in Wave 2 to over 95.5% from Wave 5 onwards.

declined over the subsequent 10 years, to be 16% in 2010 (ABS 2011a). Award reliance subsequently increased over the next six years, reaching 24% in 2016. While comparable data does not exist prior to 2000, Wooden (2000) argues that award reliance was considerably higher in the 1980s, and began declining in the early 1990s, reflecting a gradual move away from centralised wage setting (via awards) towards enterprise-based bargaining.

Information on whether an employee is paid exactly the award rate was first included in Wave 8 of the study.[9] Consequently, we use data from Waves 8 to 14 of the HILDA Survey, which were conducted from 2008 to 2014. We restrict our analysis to prime-age employees, which we define to be employees aged 25 to 54. Self-employed workers, employers, employees of own businesses and unpaid family workers, for whom minimum award wages are not applicable, are excluded. The resulting analysis sample comprises 37,036 observations on 9,766 individuals.

The earnings measure used in this article is the hourly wage in the employee's main job, which is derived from reported usual weekly earnings and reported usual weekly working hours.[10] Working hours are top-coded at 50 hours per week, so that the wage of an employee reporting usual hours in the main job in excess of 50 is equal to usual weekly earnings divided by 50.[11] Approximately 25% of employees in Australia are employed on a 'casual' basis. Casual employees are not entitled to paid sick leave or annual leave, which means that their total pay package for a given job is lower than that for a non-casual employee who receives, on paper, the same wage. We therefore deflate casual employees' wages by 20% to make them comparable to wages of other employees.[12] All wages have further been deflated to

[9] HILDA collects self-reported information on whether a respondent is paid exactly the award rate, or whether their wage is set by collective agreement, individual agreement, a mix of those two, or any other method. Wilkins and Wooden (2011) assessed the quality of that information by comparing HILDA data with results from an employer survey conducted by the Australian Bureau of Statistics. They find that respondents' information appears to be reliable for private sector employees, but that a significant proportion of public sector employees report being paid exactly the award wage. ABS data for the 2008 to 2014 period shows that few public sector employees are award reliant, with most covered by enterprise agreements (negotiated between unions and relevant levels of government). Recent changes in ABS data (ABS, 2017) suggest some ambiguity over whether certain state public sector employees should be classified as award reliant or covered by an enterprise agreement—specifically, in its 2016 data the ABS reclassified approximately 350,000 state public sector workers as award-reliant, despite no changes in wage setting methods for these workers. We avoid this issue by relying on self-reported method of setting pay for the private sector, and classifying public sector employees as not award-reliant. That is, we restrict our focus to *private sector* award-reliant employees.

[10] The hourly wage measured in HILDA thus includes compensation for over-time or non-standard working hours (if such payments form part of the respondent's usual weekly earnings), and can be different from a contractual hourly wage (if employees' usual weekly working hours differ from their contractual weekly working hours).

[11] This affected 14.4% of all men and 4.9% of all women in the sample. Because men are more likely to report long working hours than women, topcoding may affect our estimates. We thus repeated the estimation with working hours being topcoded at 60 hours per week (affecting 4.1% of male and 1.0% of female observations) and 70 hours per week (affecting 1.8% of male and 0.3% of female observations). While this somewhat reduces our estimates of the overall gender wage gap, it does not change the estimates that describe the award wage system's *effect on* the gender wage gap. Detailed results are available on request.

[12] A casual loading in lieu of paid leave entitlements is also legally mandated in most awards. Up until 2010, the loading was usually 20%, but subsequent adjustments to awards by the Fair Work Commission have meant that, since 2014, the loading has been 25% for most casual jobs.

2008 levels, where deflation is based on mean nominal wage growth in the sample between 2008 and the year of the wage observation.

5 The size of the gender wage gap outside and within the award system

Table 1 presents descriptive statistics for the 2008 to 2014 period on hourly wages, educational attainment, work experience and method of setting pay of employees, disaggregated by gender and whether the employees are award reliant. Among employees paid above the award rate, men averaged $32.26 per hour and women averaged $26.18 per hour. The raw mean gender wage gap outside the award system is thus 19% in our observation period. Wages within the award system are, unsurprisingly, substantially lower than wages of other ("non-award") employees: the average wage among non-award-reliant employees equals approximately the 90th percentile of wages in the award system, and is about 50% higher than the average award wage. The distribution of wages received by award-reliant employees is also considerably less dispersed, but nonetheless exhibits a reasonable degree of variation, with the 90th percentile approximately 2.5 times the 10th percentile for both men and women (compared with approximately 3.5 times among other employees). Comparing mean wages of award-reliant men and women shows there is indeed a gender pay gap among award-reliant employees, although it is considerably smaller than among non-award-reliant employees. The mean wage is $20.74 for men and $18.63 for women, corresponding to a mean gender pay gap of approximately 10%, compared to 19% among non-award employees.

Figure 3 shows the full distribution of log hourly wages disaggregated by gender. Confirming the findings from Table 1, the female density is to the left of the male density and exhibits less dispersion for both award-reliant employees and for employees who do not receive an award wage. At the same time, men's and women's wages are substantially more similar to each other among the award-reliant population, than they are outside the award system – a first indication that the award wage system contributes to closing the gender wage gap.

6 Gender differences in minimum wage 'bite'

One measure of the effective 'bite' of minimum wages is the number of employees for whom they are binding. Table 2 shows the probability of receiving an award wage for male and female employees with different characteristics. Overall, female employees are much more likely than men to be paid an award wage (18.5% compared with 12.4%). This suggests that the award wage system functions as a safety net that prevents women's wages from falling even further behind those of men.

This is further corroborated by the fact that that the female population of award-reliant recipients is considerably better educated than the award-reliant male population, and more likely to have had medium work experience of 5 to 20 years as opposed to very low work experience of 5 years or less; see the second and third panels of Table 1. Similarly, examining the probability of receiving an award wage for men and women of different education levels and experience levels (Table 2), we see that at every level of education and experience (except for employees in their very first year of work), women's probability of being award-reliant is higher than men's. Women might be 'pushed' on to award wages whereas comparable men are more likely to receive an individually or collectively negotiated (and higher) wage.

Another measure of the minimum wage bite is the Kaitz Index, the ratio of the nominal minimum wage to the average wage. The higher the Kaitz Index, the higher the potential impact of the wage floor.[13] Given the Australian system of a multitude of minimum wages, we calculate the ratio of the *mean* minimum wage to the mean overall wage. This ratio is reported in the right-hand columns of Table 2, which show that, overall, the Kaitz-Index is 0.70 for women and 0.63 for men, indicating that the award wage system has a higher potential impact on female employees than male employees. This result holds for all education levels —albeit less pronounced at the lower end of the education distribution— and increases with years of experience.

[13] Minimum wages could have a positive or negative impact on total earnings, depending on whether any increases in wages received by employees are outweighed by any reductions in employment. However, in this paper, we focus solely on the wage impact.

It therefore appears that women are more affected by the award wage system than are men, suggesting that the award system functions as a safety net, which is another indication that it acts to close the gender wage gap, which would be even larger in the absence of the system. This effect is not equal for men and women with different levels of human capital: the gender difference in minimum wage bite is increasing in both level of education and level of experience. Among less experienced employees and those with lower levels of education, the minimum wage bite is more similar for men and women, and the award system is thus less likely to act to close the gender wage gap.

7 The role of gender differences in human capital within the award system

While the gender wage gap is smaller within the award system than it is outside of it, a substantial gap of 10% remains. Can the remaining gap be explained by differences in human capital for award-reliant men and women? In the next step, we assess the gender wage gap conditional on level of human capital. We estimate a Mincer-type wage regression with log wages a function of education and work experience. The results are shown in Table 3. The predicted log-wage for award-reliant employees who have not completed high school and have no experience is 2.700 for men, and lower by 0.091 for women, which implies an hourly wage of $14.88 for men and $13.59 for women. The gap of 0.091 in log wages after controlling education and experience is nearly identical to the average gap of 10% in the raw data, suggesting that these human capital endowments explain at best a very small part of the average gender wage gap within the award-reliant population.

Looking at the entire wage distributions for award-reliant men and women after controlling for education and work experience—that is, the difference between observed wages and predicted wages, based on education and experience—confirms that this is the case not only at the middle of the wage distribution, but across its entire spectrum; see the left panel of Figure 4. The distributions for both men and women are nearly identical to the distribution of actual wages (bottom panel of Figure 3), at both the upper and lower tail and in the middle section of the distribution. Differences in male and female wages appear to be unrelated to differences in education and experience.

To explore the extent to which different *returns* to human capital are related to the gender wage gap, we repeat the Mincer-type regression separately for men and women. The middle and right columns of Table 3 show the results, while the last column reports the results of a t-test on the equality of men's and women's coefficients.

If we take such gender-specific differences in returns to education and experience into account, a large part of the gender wage gap can be explained. Among employees with no work experience and who have not completed high school, women's and men's wages differ by only a small degree: for employees with those characteristics, we find women's hourly wages to be 5% higher than those of comparable men in the award system. However, this gender difference is not statistically different from zero.

Returns to a bachelor degree are higher for award-reliant women than for award-reliant men, but returns to all other educational qualifications are higher for award-reliant men. These gender differences in returns to education are jointly significant at the 5%-level, and the difference in male and female returns to holding a trade certificate is individually significant at the 10% level also. Award-reliant men also have much higher returns to experience—in the first year of their working life, men's wages increase by 2.04%, compared to a 1.06% increase for women. Award-reliant men's returns to experience diminish at a faster rate than award-reliant women's returns do, so that parity will be reached eventually. However, our estimates imply that men's and women's return to another year of experience are equal only after 62 years of work experience, which is well beyond what is observed in our data. Gender differences in returns to experience are jointly significant at the 5%-level.

The right panel of Figure 4 shows that the distribution of wage residuals is less dispersed for women, but it is centred on the same value as for men. Women are more heavily represented at medium levels of log-wage residuals, while the male distribution shows a higher density at both low and high wage residuals. Assuming that men and women should in principle have the same returns to education and experience, the gender wage gap in the award system is not explained by differences in male and female employment biographies (left panel of Figure 4). Differences in returns to investments in human capital can, however, explain a large part of the gender pay gap (right panel of Figure 4).

To summarise the results so far, the gender wage gap within the award system is substantially smaller than outside of it, providing some evidence that this labour market institution serves to reduce the gap. The award wage system is also more binding for women than it is for men, suggesting that it serves as a safety net that partially closes the gender wage gap, particularly at higher levels of education and experience. However, this result is far from conclusive. Moreover, a non-negligible gap within the award system remains. Gender differences in human capital stocks do not explain the gender pay gap, but gender-specific *returns* to human capital go a long way to doing so. Gender differences in returns to human capital are particularly pronounced for employees with medium levels of education—those who hold a diploma or trade certificate, but no university degree. An important part of the answer to the question of whether the award wage system contributes to or alleviates the gender wage gap thus seems to lie in the source of these gender-differences in returns to human capital.

8 The role of job 'femaleness' within the award wage system

In general, any gender wage gap could reflect that men and women typically perform different tasks which are rewarded differently, or that men and women are rewarded differently for identical tasks. For employees who are paid the correct award wage (that is, assuming legal compliance on the part of employers), the latter is not possible: the award system specifies one minimum wage for employees who perform quite well-defined jobs or sets of tasks, regardless of the employee's personal characteristics. By its nature, the award system thus ensures that men and women within the award system are rewarded identically for identical sets of tasks.

Given this neutrality of minimum wages with respect to an individual's gender, it follows that there are two main ways the gender differences in returns to experience within the award system could arise. The first is that women move to more specialised or high-skilled tasks at a slower pace than men. For example, any two employees paid according to the Nursing Award, regardless of whether they are male or female, will receive the same wage increase if they move from an entrance level job as a registered nurse to clinical nursing and on to managing a team. However, differences in returns to experience for male and female nurses can still occur if male nurses move up the career ladder faster (and/or further).

The second possible explanation for gender-differences in returns to experience within the award system is that lower wage increases could be attached to career progression in 'typical female' careers than in 'typical male' careers. For example, male and female IT technicians who are paid an award wage may be rewarded equally for moving from help desk technician to network administrator and later to IT security specialist, just as male and female nurses who are paid an award wage are rewarded equally for career progression in nursing. But if the award wage difference between a help desk technician and an IT security specialist is greater than the award wage difference between an entrance-level registered nurse and a clinical nurse, gender differences in returns to experience may still occur, given that more women take up nursing and more men enter a career as an IT technician.[14]

We examine the extent to which the above explanations are at play by estimating Mincer-type earnings functions with added controls for the 'femaleness' of an employee's field of employment (operationalised as explained below) alongside the employee's own gender. This allows us to compare returns to human capital for award-reliant employees along two dimensions: the employee's own gender, and the 'femaleness' or 'maleness' of their field of employment. If we find that male employees have higher returns to human capital than female employees, even when we hold constant whether they

[14] Similarly, there are two main ways that gender differences in returns to *education* within the award system could arise. If we interpret educational degrees as "entrance tickets" to given sets of career paths, in the same way as applies to returns to experience, women could have lower returns to education than men because: a) they are less likely to be able to use their degree to enter a financially rewarding career; or b) the award wages set for career paths opened by degrees that are typically held by women are lower than those opened by degrees typically held by men.
For example, two employees might both hold a trade certificate in commercial cookery, but one of them is able to pursue a career in that field, while the other one may be unable to work non-standard hours due to family constraints and thus be forced to work in an unrelated field, unable to reap the (full) benefits of the qualification. It is also possible that, while this individual is able to work in the field, she cannot (or prefers not to) work nights or weekends, which attract 'penalty' rates of pay. If these cases are more common for women than for men, again a gender difference in returns to education may occur. In such scenarios, the gender difference will be associated with an employee's own gender, regardless of whether an individual man or woman holds a qualification in a male-dominated field or a female-dominated field.
Alternatively, one employee might hold a trade certificate in early childhood education and care, and another might hold a certificate in carpentry. It is possible that the award system sets systematically lower wage premiums, relative to the benchmark of an unskilled worker, in careers that follow typical female certificates (early child care) than typical male certificates (carpentry). In that scenario, an individual in a female-dominated field will earn a lower wage than an individual in a male-dominated field, regardless of their own gender. On average, the result is a gender difference in returns to a trade certificate.

work in a male-dominated or a female-dominated field, we will interpret that as evidence that the pace of individual career progression is a driver of the gender-difference in returns to experience, or that, on an individual level, men are better able to put their educational qualifications to use. Such a scenario may be the result of differences between men and women in preferences or skills acquisition through on-the-job-learning, or due to employer discrimination, inequitable distribution of responsibilities in the home, or any number of other factors—but in all such scenarios, the award system itself would reduce gender differences in returns to experience and education (if the minimums are binding) or leave them unchanged (if the minimums are non-binding).

If we find that employees have higher returns to human capital when they work in male-dominated fields than when they work in female-dominated fields, even when holding their own gender constant, this implies that the award system grants higher rewards in typical male fields than it does in typical female fields, or that the award system grants a higher wage premium to skilled work relative to unskilled work if the skills required to do the work are more typically acquired by men. In such a scenario, the award wage system could be one of the drivers behind the gender difference in returns to experience and education, and thereby increase the gender wage gap whenever its specified minimums are binding.[15]

'Fields' covered by an award are not clearly defined. An award may cover an industry, and define wage increases for steps up the occupational ladder within that industry. For example, an employee in the hospitality industry might start their career as a receptionist before becoming a clerical employee and eventually part of the managerial staff. Other awards cover an occupation and define wage increases over a career within that occupation. For example, the Medical Practitioners' Award defines both wage increases when duties are extended (such as managerial responsibilities), as well as regular annual increases. However, most awards apply to industries. We thus examine the gender wage gap for subsets of employees in male-dominated versus female-dominated *industries* and, as a robustness check, examine the gap for subsets of employees in male-dominated versus female-dominated *occupations*.

[15] The award system may of course reward typical male work more highly only for a particular skill level or subset of skill levels (for example, for a specific level of educational attainment). Our analysis allows for this possibility.

Results using an industry-based measure of femaleness of a 'field' are reported in the main part of this paper, and results using the occupation-based measure are included in the Appendix.

We determine male-dominated and female-dominated industries using census data from the Australian Bureau of Statistics from 2006 and 2011 (ABS 2006c and ABS 2011b). We rank all industries by the average male share of employment across the two census years.[16] Weighted by the total number of individuals employed in each industry, we then determine the third of industries with the highest male shares, and the third of industries with the lowest male shares. Those in the first group are 'male-dominated' and those in the second group are 'female-dominated'.

The three most male-dominated industries are Building Installation Services, Residential Building Construction and Road Freight Transport, while the three most female-dominated industries are Supermarkets and Grocery Stores, Hospitals and School Education. The simple average of the male share of employment is 80% in male-dominated industries and 30% in female-dominated industries. We classify award-reliant employees in the HILDA Survey sample according to whether they are employed in male-dominated industries, female-dominated industries, or other industries.

8.1 Wages and human capital by industry type

Table 4 shows hourly wages, education and work experience of award-reliant employees disaggregated by gender and by whether employed in a male-dominated industry or a female-dominated industry.[17] It appears that, on average, the gender wage gap within industry groups is nearly identical to that across all industries: the gender wage gap is $2.10 in male-dominated industries and $2.22 in female-dominated industries, compared to $2.10 over all industries. However, there is considerable variation across the wage distribution. At the 10th percentile, the wage gap across all industries is $0.80 (see Table 1), while it is $0.47 in male-dominated industries, and only $0.02 in female-dominated industries. This is a first

[16] Industries are classified according to the Australian and New Zealand Standard Industrial Classification 2006 Revision 1.0 at the three-digit level. There are 214 industries distinguished at the three-digit level. See ABS (2006b) for details.

[17] Employees not working in a male-dominated or female-dominated industry are excluded from the table.

indication that the award wage system does not *on average* reward work differently depending on the industry's gender composition, but that it does do so at the lower end of the wage distribution.

Table 4 also shows that, although the sample sizes are small for award-reliant men who work in female-dominated industries and award-reliant women who work in male-dominated industries, there is still sufficient variation in education and experience within these two groups to estimate the effects of education and experience on wages. Employees in a field that is dominated by the opposite gender are somewhat more likely than employees in fields dominated by their own gender to have low levels of work experience. This could be caused by 'generational change', with younger cohorts being more likely to cross gender barriers in their occupational choices. However, it is also possible that working in a field dominated by the opposite gender is more likely early in one's career—for example, it may be experienced as a negative job aspect that increases the employee's probability of changing careers after some time.

Whether male or female, award-reliant employees in male-dominated industries have lower levels of education than award-reliant employees in female-dominated industries. In particular, the proportion of award-reliant employees who have not completed high school is very large in male-dominated industries—approximately 38% for both men and women. By contrast, only 25% of award-reliant men and 24% of award-reliant women working in female-dominated industries have not completed high school. This finding is consistent with employees working in female-dominated industries being 'penalised', by not having their pay raised above the award wage level even when they are highly qualified. That is, employees with higher educational qualifications may be more likely to be paid the minimum wage if they are employed in female-dominated fields.

8.2 *Estimations jointly controlling for femaleness of industry and the employee's own gender*

Panel (1) of Table 5 presents estimates from Mincer-type wage regressions on the full set of award-reliant employees working in all industries, simultaneously controlling for an employee's own gender and the gender that dominates the field they work in. We include education, experience and experience squared, as well as interactions between the education and experience variables and: a) a person's

gender; and b) an indicator of whether their industry is male-dominated, female-dominated or neither ("balanced industries"). We also estimate specifications in which we do not use a rigid definition for an industry as being male-dominated, female-dominated or balanced. Instead, we use the share of male employees in the industry as a continuous measure. The results are very similar and shown in Panel (2) of Table 5.

The large number of interaction terms complicates interpretation of the coefficients shown in Table 5. For ease of interpretation, Table 6 presents predicted wage deviations (penalties or premiums), from a baseline population of male employees in male-dominated industries, associated with an employee being female and with being employed in a female-dominated industry, evaluated at different levels of education and experience. The table also presents the predicted male wage in male-dominated industries for each education-experience combination.

For men working in male-dominated industries who have not completed high school and have five or fewer years of work experience, the predicted log wage is 2.736, or $15.43. Higher levels of education are associated with higher hourly wages, and within each education level, experience further increases men's predicted earnings in male-dominated industries. Looking at the wage difference between male and female employees, we find a wage penalty associated with being female for many combinations of education and experience. This pay gap attached to an employee's own sex is insignificant for employees with a bachelor degree, and generally lower at lower levels of experience. However, it is found consistently for employees with ten years of experience or more and without university education, and is in most cases highly significant. The female wage penalty tends to increase with an employee's work experience.

In terms of femaleness of the industry, we find that for unskilled workers with no experience, there is a hefty penalty associated with working in a female-dominated industry compared with working in a male-dominated industry. However, this penalty decreases with experience, and is only present for employees without university education, because returns to university education are much higher in female-dominated industries than in male-dominated industries (also shown by the coefficients on the

interactions between the education variables and the female-dominated industry indicator variable in Table 5). Returns to experience, while differing strongly by individual gender (see interactions with "female" in Table 5), do not differ by femaleness of the industry.

To summarise, it appears that there is indeed a strong penalty associated with working in an industry that is typically female. This penalty is found for male and female employees alike, and suggests that the award system sets systematically lower minimums the more heavily an industry employs women. However, due to the higher returns to university education in such industries, this effect applies only to less educated employees.[18] Moreover, we do not find any evidence that the award wage system rewards experience in female industries any less well than it does in male industries. Instead, we find strong differences in returns to experience by individual gender: individual career progression is faster for men than it is for women, rather than being faster in male-dominated industries than in female-dominated ones. Since the award system has no way of tailoring wages to an individual's gender, this cannot plausibly be caused by the award system.

8.3 Which jobs have a femaleness penalty?

For award-reliant employees, there is a penalty for working in a female-dominated field compared with working in a male-dominated field, but only for those with medium or lower levels of educational attainment. However, because award wages are less likely to be binding the more highly skilled is the employee, a large percentage of award-reliant employees has low education levels. In our sample, 31.9% of all male award-reliant employees and 29.2% of all female award-reliant employees were in our lowest educational attainment category (had not completed high school).

[18] This finding contrasts with the large penalties found by Miller (1994), Wooden (1999) and Coelli (2014) for university-educated (as well as less-educated) employees working in female-dominated fields in the private sector. To further verify our results, we repeated the estimations shown in Table 5 for employees who do *not* receive an award wage. In line with the cited studies, we find a substantial wage penalty for typical female work *outside* of the award system: wages increase strongly and significantly when the share of men employed in the industry/occupation increases. Our results do not contradict the earlier studies, but rather supplement them: while a penalty for female-dominated occupations/industries is present in our data, we show that within the award system, it only exists for lower-educated workers. Detailed results of additional estimations on non-award-reliant employees are available on request.

To illustrate the type of workers affected by this penalty, Table 7 shows the 10 largest industries and 10 largest occupations in which award-reliant employees without university degree qualifications work. The 10 most common occupations account for 44.9% of these employees and the 10 most common industries account for 52.7%. The table reports, for award-reliant employees without university-level qualifications, HILDA Survey estimates of the female employment share, average hourly wage and employment share of each industry and occupation. Also reported in the table is whether, based on the census data, the industry or occupation is classified as male-dominated, female-dominated or gender-balanced.[19]

The 10 most common industries in which award-reliant employees without university-level qualifications are employed comprise four female-dominated, two male-dominated and four gender-balanced industries. The male-dominated industries are 'construction services' and 'road transport', which pay relatively high wages to award-reliant employees without university qualifications; the hourly wage averages $22.58 in construction services and $20.43 in road transport. The female-dominated industries comprise 'other store-based retailing', 'accommodation', 'social assistance services' and 'residential care services'. Three of these female-dominated industries pay relatively low wages for award-reliant employees without university qualifications, all having average hourly wages of between $15.72 and $17.53, while 'residential care services' pays a substantially higher average wage of $19.32.

Important occupations for non-university-qualified award-reliant employees, as shown in the lower panel of Table 9, broadly reflect the major industry categories. The 10 most common occupations include three female-dominated ones: hospitality workers, who are commonly employed in the accommodation industry; personal carers and assistants, who are commonly employed in the residential care services industry; and child carers, who are commonly employed in the social assistance services industry. The average hourly wages of award-reliant non-university-qualified employees in these occupations are quite low for hospitality workers and child carers, at $15.97 and $15.69, respectively, and somewhat higher for personal carers and assistants, at $19.13. Four of the 10 most common

[19] The classification of occupations as male-dominated, female-dominated or gender-balanced based on Census data follows the same principle as the classification for industries. Details are reported in the Appendix.

occupations are male-dominated: truck drivers, mobile plant operators, and miscellaneous labourers. Employers in 'road transport' are likely to employ many of the employees working as truck drivers and a sizable number of store persons; while the 'construction services' industry commonly employs mobile plant operators and miscellaneous labourers. All four of these occupations are relatively well-paid, with the average hourly wage ranging from $19.33 to $21.65.

Overall, the femaleness penalty for low-educated, award-reliant workers seems to stem to a large degree from lower wages in retail, hospitality and personal care compared to workers in construction and road transport. There are many potential reasons for this disparity. To the degree that the minimum wage level set by the industrial court is informed (however indirectly) by 'typical' wages in the industry or a general perception of an "appropriate" wage level, male-dominated fields might have benefited from a long history of strong unionisation that led to higher average wages—a history not shared by service jobs—which may contribute to female-dominated fields falling behind.

It is also possible that minimum wages include compensation for certain non-monetary job characteristics, such as the dirtiness or dangerousness of a job. If these job characteristics are correlated with the share of women working in an occupation, a spurious correlation of hourly wages with the femaleness of an occupation or industry could be the result. For example, the $4.08 hourly wage premium for mobile plant operators relative to child carers might be compensation for higher rates of work accidents, noisy environments, the requirement to perform outdoor work in often unfavourable weather conditions, or other non-monetary job characteristics. However, this argument seems less compelling in a comparison of, for example, the average wage for truck drivers ($21.65) with that of hospitality workers ($15.97), where the latter group of employees would often perform physically demanding work in hot and/or loud environments.

9 Conclusions

In this paper, we investigate the impact of the Australian award wage system on the gender pay gap. In the Australian award system, an industrial court sets a multitude of different minimum wages for

different occupations and industries. If these minimum wages are binding, they act to reduce wage dispersion within the occupation and/or industry to which they apply.

This system should reduce overall wage dispersion in the labour market. Previous evidence, such as by Gregory (1999) and Kahn (2015), shows that a more compressed wage distribution tends to go hand-in-hand with a lower gender pay gap by setting an equal minimum standard for both women and men. However, with a multitude of minimum wages, it is ex ante unclear whether the same effect occurs: since men and women are not distributed equally across industries and occupation, the minimum standard applicable to men can on average differ from the minimum standard applicable to women. If industries and/or occupations that are predominantly female have systematically lower minimum wages, the award system could in principle create a gender pay gap larger than that created by a market without intervention.

We find that the gender pay gap is substantially lower within the award system, but the system nonetheless does contain a penalty to working in typical female jobs for those with low to medium levels of educational attainment. Previous studies by Miller (1994), Wooden (1999) and Coelli (2014), examining all (award-reliant and non-award-reliant) employees, also found a substantial penalty for working in female-dominated fields. Our analysis shows that this penalty is not entirely driven by employees paid above minimum wages.

It is not immediately clear whether this job-femaleness penalty in the low-skill sector of the labour market can be interpreted as discrimination against women, and this paper does not attempt to determine conclusively whether the minimum wages as set by the Fair Work Commission are "justified" or not. In principle, the job-femaleness penalty could result from the Commission taking into account factors other than the required skill level, such as 'dirtiness' and 'danger', in determining the minimum wage of a job. If true, and typical male jobs tend to have less desirable traits than typical female jobs, the observed job-femaleness penalty would result.

There is in fact little evidence that such non-skill factors are considered in Fair Work Commission decisions; there is certainly no transparent, data-driven process for the setting of minimum wages in

place that could establish a direct link between the job-femaleness penalty and objective job characteristics. We therefore doubt that the observed job-femaleness penalty is actually derived from compensating differentials determined by the Fair Work Commission. Rather, what seems more likely is that the award-wage decisions have been influenced by observed "typical" wages in industries and occupations, and male-dominated fields have benefited from a long history of strong unionisation that led to higher average wages.

In any case, irrespective of whether non-skill-related differences in award wages are justified by other job characteristics, what is clear is that the gender wage gap among minimum-wage employees is greater than it would be were award wages neutral with respect to the gender composition of jobs. Indeed, the gender wage gap within the award system would probably be negative if minimum wages depended only on the skill requirements of jobs, since the observed human capital of female minimum-wage employees is on average greater than the observed human capital of male minimum-wage employees.

While we have found a job-femaleness penalty for low- and medium-educated employees, we do not find such a penalty for (the relatively small group of) employees with university degree qualifications. Moreover, while female minimum-wage employees have lower returns to experience than male minimum-wage employees, career progression is not rewarded less in female-dominated fields than it is in male-dominated fields. Consequently, differences in individual career progression is the only plausible explanation for gender-differences in returns to experience among award-reliant employees.

Differences in individual career progression may be caused by any number of factors, some being related to discrimination and others not; this analysis does not attempt to further explain the mechanism underlying this phenomenon. It is possible that social norms and thus social pressure lead to an inequitable distribution of the workload at home, which leaves women with less time to invest in the accumulation of skills that are relevant to their paid work. Gender differences in individual preferences for home production could lead to the same empirical phenomenon.[20] Employer prejudice could also

[20] In theory, gender differences in preferences for non-monetary job attributes, such as dirtiness and dangerousness, could also play a role. If on average men have lower disutility from danger or dirt than women, the equilibrium

hold women back, which in turn could further reduce their human capital investments as returns to investments drop, and again produce the same pattern in the data. A mix of all those factors could be at play. However, disentangling those mechanisms is beyond the scope of this study, which has only set out to examine the role of the award wage system itself.

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outcome is for a greater proportion of men to work in dirty and dangerous jobs, associated with which would be an overall gender gap in pay. However, while this argument is often used to explain gender differences in career choices, it is more problematic as an explanation of why women advance more slowly than men when they have chosen the same career path. This could play a role if such undesirable job attributes became more prevalent as one progressed to higher-ranked positions, but this does not seem likely.

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11 Tables and Figures

Table 1: Descriptive statistics by gender and method of setting pay

	Other method of setting pay		Paid exactly the award rate	
	Men	Women	Men	Women
Hourly wage in main job (2008 A$)				
Mean	32.26	26.18	20.74	18.63
10th percentile	15.16	13.32	12.01	11.21
25th percentile	19.94	17.37	15.00	14.05
50th percentile	27.60	23.38	17.84	16.72
75th percentile	38.94	31.88	23.66	20.92
90th percentile	54.69	41.67	31.68	27.26
Highest educational attainment (%)				
Postgraduate qualification	15.70	18.25	4.13	5.69
Bachelor degree	19.99	26.60	9.04	12.19
Diploma	9.66	12.37	7.75	10.55
Trade certificate III or IV	29.05	15.88	31.18	26.13
High school completion	13.10	12.98	15.98	16.23
Less than high school completion	12.50	13.93	31.92	29.20
Experience (%)				
None	1.50	0.99	3.18	1.08
Up to 5 years	4.64	5.81	6.88	8.53
5 to 10 years	16.86	19.53	19.05	20.37
10 to 20 years	31.35	34.80	28.04	37.47
20 to 30 years	28.76	29.49	26.72	23.94
More than 30 years	16.86	9.38	16.13	8.61
Method of setting pay (%)				
Paid exactly the award rate	–	–	100.00	100.00
Collective agreement	41.74	53.62	–	–
Individual agreement	50.94	40.65	–	–
Combination of collective and individual agreement, or other method	7.34	5.73	–	–
Number of observations	16,440	15,116	2,107	3,373

Source: HILDA Survey, Waves 8 to 14. *Notes*: Results are weighted using cross-sectional population weights designed to ensure representativeness of the Australian population. See Summerfield et al. (2014) for details. *Experience* measures total years of employment since (first) leaving full-time education. *Method of Setting Pay* presents the wage setting arrangement as self-reported for private sector employees. All public sector employees are covered by collective agreements and are accordingly classified as having 'other method of setting pay'.

Table 2: Measures of minimum wage 'bite' by gender, education and experience

	Probability of being award-reliant		Kaitz Index	
	Men	Women	Men	Women
All employees	12.4%	18.5%	0.630	0.700
By highest educational attainment				
Postgraduate qualification	3.6%	6.6%	0.524	0.673
Bachelor degree	6.0%	9.4%	0.585	0.697
Diploma	10.2%	16.2%	0.608	0.777
Trade certificate III or IV	13.2%	27.2%	0.709	0.828
High school completion	14.7%	22.2%	0.675	0.774
Less than high school completion	26.5%	32.3%	0.828	0.847
By Experience				
None	23.0%	19.9%	0.822	0.674
Up to 5 years	17.3%	25.0%	0.778	0.784
5 to 10 years	13.8%	19.2%	0.714	0.753
10 to 20 years	11.2%	19.7%	0.620	0.718
20 to 30 years	11.6%	15.6%	0.635	0.679
More than 30 years	11.9%	17.3%	0.623	0.708
Number of observations	18,547	18,489	18,547	18,489

Source: HILDA Survey, Waves 8 to 14. *Notes*: See Table 1. The Kaitz Index shows the ratio of the average minimum wage to the average overall wage, separately for men and women and by level of education/experience.

Table 3: Regressions of log hourly wages on education and work experience–Award-reliant employees

	All		Men		Women		Male-female difference
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	p-value
Highest educational attainment (Reference category: Less than high school completion)							
Postgraduate qualification	0.369***	0.039	0.418***	0.067	0.354***	0.047	0.435
Bachelor degree	0.268***	0.026	0.215***	0.045	0.288***	0.030	0.181
Diploma	0.152***	0.024	0.177***	0.049	0.138***	0.027	0.484
Trade certificate III or IV	0.072***	0.014	0.116***	0.025	0.037*	0.017	0.009
High school completion	0.066***	0.018	0.100**	0.031	0.048*	0.022	0.171
Experience (in 10-year units)							
Linear	0.143***	0.025	0.205***	0.041	0.106***	0.032	0.059
Squared	-0.021***	0.006	-0.032**	0.010	-0.016	0.008	0.221
Female	-0.091***	0.013					
Constant	2.700***	0.025	2.614***	0.039	2.664***	0.030	0.313
Number of observations	5,480		2,107		3,373		5,480
Joint significance of all coeff. on education (p-value)	0.000		0.000		0.000		0.031
Joint significance of all coeff. on experience (p-value)	0.000		0.000		0.000		0.011
R-squared	0.094		0.079		0.098		–

Source: HILDA Survey, Waves 8 to 14. *Notes*: See Table 1. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. *Coeff.*—Coefficient estimate; *Std. Err.*—Standard error. The last column shows the result of a t-test on the Null-hypothesis that men's and women's coefficients are equal. It is derived from a fully-interacted model on the full sample and tests the interaction of education/experience with a dummy indicating whether an employee is female. Reported is the p-value.

Table 3: Wages, education and experience of award-reliant men and women in male-dominated industries and in female-dominated industries

	Male-dominated industries		Female-dominated industries	
	Men	Women	Men	Women
Hourly wage in main job ($)				
Mean	22.26	20.16	21.26	19.04
10th percentile	13.56	13.09	11.08	11.06
25th percentile	16.10	14.93	15.26	14.03
50th percentile	19.36	17.90	17.50	17.11
75th percentile	25.53	23.15	23.68	21.32
90th percentile	35.47	26.60	31.92	29.62
Highest educational attainment (%)				
Postgraduate qualification	1.98	3.11	8.82	7.88
Bachelor degree	3.97	11.09	15.92	14.54
Diploma	4.63	12.88	12.23	11.80
Trade certificate III or IV	36.02	20.13	23.67	26.62
High school completion	14.95	14.60	13.95	14.93
Less than high school completion	38.81	38.19	25.41	24.23
Experience (%)				
None	4.20	1.33	2.15	0.95
Up to 5 years	4.82	10.14	8.46	8.67
5 to 10 years	16.69	17.97	22.13	20.17
10 to 20 years	29.69	36.99	24.34	36.56
20 to 30 years	36.99	23.66	27.19	24.09
More than 30 years	17.93	9.91	15.74	9.57
Number of observations	975	238	353	1,911

Source: HILDA Survey, Waves 8 to 14. *Notes*: See Table 1. The sample is restricted to individuals who receive an award wage and who work in male-dominated or female-dominated industries. Industries are classified according to the ANZISC 3-digit-level (ABS, 2006b). Industries are ranked by male employee share using Census data for 2006 and 2011. Weighted by total number of employees, the third of industries with the highest male share of employees are 'male-dominated'; the third with the lowest male share are 'female-dominated'. The middle tercile is not used for this part of the analysis.

Table 4: Regressions of log hourly wages on education and work experience among award-reliant employees, interacted with gender and femaleness of industry

	(1)		(2)	
	Coeff.	Std. Err.	Coeff.	Std. Err.
Constant	2.703***	0.051	2.699***	0.059
Female	0.132*	0.058	0.126*	0.059
Industry: balanced	-0.157*	0.067		
Industry: female-dominated	-0.174*	0.073		
Share of female employees in industry			-0.257*	0.126
Years of experience (Exp)	0.136*	0.056	0.138*	0.063
Years of experience squared (Exp^2)	-0.016	0.013	-0.014	0.015
Exp · Female	-0.159**	0.060	-0.157*	0.061
Exp^2 · Female	0.031*	0.015	0.032*	0.015
Exp · Industry: balanced	0.094	0.068		
Exp^2 · Industry: balanced	-0.023	0.017		
Exp · Industry: female-dominated	0.143	0.076		
Exp^2 · Industry: female-dominated	-0.035	0.019		
Exp · Share of female employees in industry			0.185	0.130
Exp^2 · Share of female employees in industry			-0.051	0.033
Postgraduate qualification (PG)	0.164	0.101	0.016	0.142
Bachelor degree (BD)	0.164*	0.066	0.058	0.067
Diploma (Dip)	0.243**	0.090	0.110	0.078
Trade certificate III/IV (Cert)	0.124***	0.032	0.099**	0.035
High school completion (HS)	0.120**	0.042	0.109*	0.048
PG · Female	-0.193*	0.082	-0.186*	0.087
BD · Female	-0.030	0.061	-0.011	0.061
Dip · Female	-0.109	0.056	-0.103	0.058
Cert · Female	-0.107**	0.035	-0.105**	0.035
HS · Female	-0.051	0.041	-0.052	0.040
PG · Industry: balanced	0.146	0.135		
BD · Industry: balanced	0.000	0.078		
Dip · Industry: balanced	-0.097	0.089		
Cert · Industry: balanced	0.001	0.040		
HS · Industry: balanced	-0.022	0.048		
PG · Industry: female-dominated	0.446***	0.107		
BD · Industry: female-dominated	0.211**	0.081		
Dip · Industry: female-dominated	0.034	0.088		
Cert ·Industry: female-dominated	0.024	0.043		
HS · Industry: female-dominated	-0.025	0.052		
PG · Share of female employees in industry			0.796***	0.233
BD · Share of female employees in industry			0.373**	0.125
Dip · Share of female employees in industry			0.218	0.117
Cert · Share of female employees in industry			0.079	0.072
HS · Share of female employees in industry			-0.011	0.092
Number of observations	5,345		5,345	
R-squared	0.121		0.107	

Source: HILDA Survey, Waves 8 to 14. *Notes*: See Table 1 and Table 3. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. *Coeff.*—Coefficient estimate; *Std. Err.*—Standard error. The sample is restricted to individuals who receive an award wage. Because of missing industry information, 131 observations were removed from the sample.

Table 5: Predicted wages—Variation with own sex and femaleness of industry, by education level and experience

	Sample size	Predicted wage of men in male-dominated industries	Penalty/ Premium attached to being female (own sex)		Penalty/ Premium attached to working in female-dominated industry	
			Estimate	p-value	Estimate	p-value
Less than high school completion and…						
0-5 years experience	107	2.736	0.094**	0.018	-0.119**	0.021
>5-10 years experience	270	2.795	0.030	0.319	-0.074**	0.042
>10-20 years experience	532	2.870	-0.037	0.211	-0.035	0.271
>20-30 years experience	551	2.942	-0.073***	0.008	-0.036	0.210
>30 years experience	293	2.981	-0.047	0.162	-0.099**	0.045
High school completion and…						
0-5 years experience	76	2.856	0.029	0.499	-0.145***	0.009
>5-10 years experience	205	2.916	-0.031	0.337	-0.100**	0.015
>10-20 years experience	327	2.990	-0.095***	0.001	-0.061*	0.093
>20-30 years experience	184	3.062	-0.129***	0.000	-0.063*	0.082
>30 years experience	48	3.101	-0.106**	0.036	-0.126**	0.012
Trade certificate III/IV and…						
0-5 years experience	105	2.859	-0.008**	0.036	-0.107**	0.032
>5-10 years experience	335	2.919	-0.069**	0.024	-0.062*	0.084
>10-20 years experience	546	2.994	-0.133**	0.022	-0.023	0.504
>20-30 years experience	422	3.065	-0.167**	0.023	-0.025	0.460
>30 years experience	187	3.105	-0.144**	0.041	-0.087*	0.063
Diploma and…						
0-5 years experience	26	2.979	-0.022	0.609	-0.061	0.346
>5-10 years experience	117	3.038	-0.082**	0.026	-0.016	0.767
>10-20 years experience	192	3.113	-0.146***	0.000	0.022	0.682
>20-30 years experience	125	3.185	-0.181***	0.000	0.021	0.709
>30 years experience	49	3.224	-0.157***	0.000	-0.042	0.546
Bachelor degree and…						
0-5 years experience	71	2.900	0.072	0.181	0.022	0.771
>5-10 years experience	145	2.959	0.011	0.816	0.067	0.311
>10-20 years experience	166	3.034	-0.052	0.301	0.105	0.107
>20-30 years experience	118	3.106	-0.087	0.109	0.104	0.115
>30 years experience	30	3.145	-0.063	0.315	0.041	0.572
Postgraduate degree and…						
0-5 years experience	34	2.899	-0.098	0.131	0.192**	0.045
>5-10 years experience	37	2.959	-0.159**	0.014	0.237***	0.008
>10-20 years experience	80	3.034	-0.223***	0.001	0.276***	0.002
>20-30 years experience	74	3.105	-0.257***	0.000	0.274***	0.002
>30 years experience	28	3.145	-0.233***	0.001	0.211**	0.027

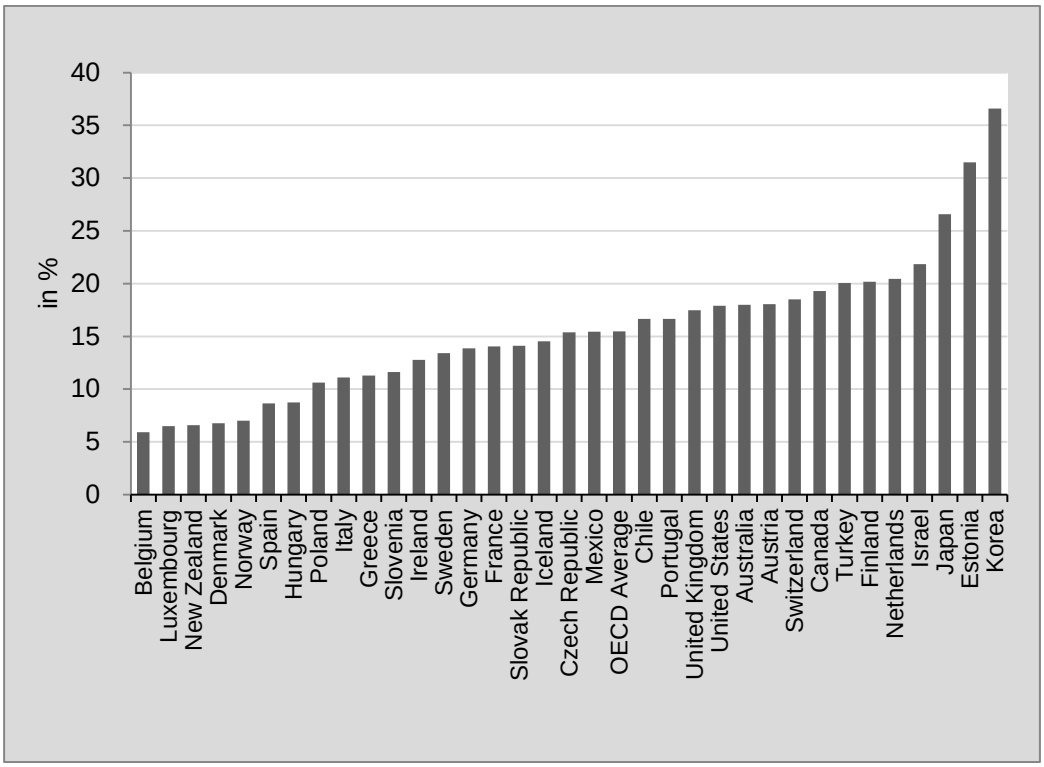
Source: HILDA Survey, Waves 8 to 14. *Notes*: See Table 1 and 5. Column (1) reports the number of observations in the sample for whom a certain combination of experience and education is observed. Column (2) shows predicted wages if every observation in the sample is assumed to be a male employee in a male-dominated industry, with education set to the specified value, and experience set to the mid-point of the specified range of experience (35 years for experience >30 years). Columns (3) and (5) report the additional wage premium/ the wage penalty attached to individual sex and to femaleness of the industry. Columns (4) and (6) show the result of a t-test on the Null-hypothesis that no such premiums/penalties exist. Standard errors for the test are bootstrapped with 100 repetitions. Reported is the p-value. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 6: Most common industries and occupations of award-reliant employees without university degree qualifications

	Award-reliant employees without university qualifications			All employees
	Female employment share (%)	Average Hourly Wage ($2008)	Industry/occupation employment share (%)	Dominant gender (Census)
Industries				
Other store-based retailing	79	16.61	8.8	Balanced
Food and beverage services	67	15.69	8.6	Balanced
Social assistance services	84	18.23	7.3	Female
Food retailing	52	16.91	6.2	Balanced
Residential care services	90	19.82	5.5	Female
Construction services	9	22.58	4.1	Male
Food Product Manufacturing	52	18.81	3.7	Balanced
Building cleaning, pest control and gardening	50	16.62	2.9	Balanced
Road transport	5	20.43	2.9	Male
Accommodation	82	15.67	2.9	Balanced
Occupations				
Sales assistants and salespersons	80	16.30	10.1	Balanced
Cleaners and laundry workers	64	16.71	6.4	Balanced
Personal carers and assistants	92	19.13	5.5	Female
Hospitality workers	77	15.97	4.8	Female
Truck drivers	0	21.65	3.1	Male
Child carers	95	15.69	3.0	Female
Miscellaneous labourers	23	19.74	2.8	Male
Packers and product assemblers	58	13.59	2.8	Balanced
Store persons	34	19.33	2.6	Male
Mobile plant operators	3	19.77	2.5	Male

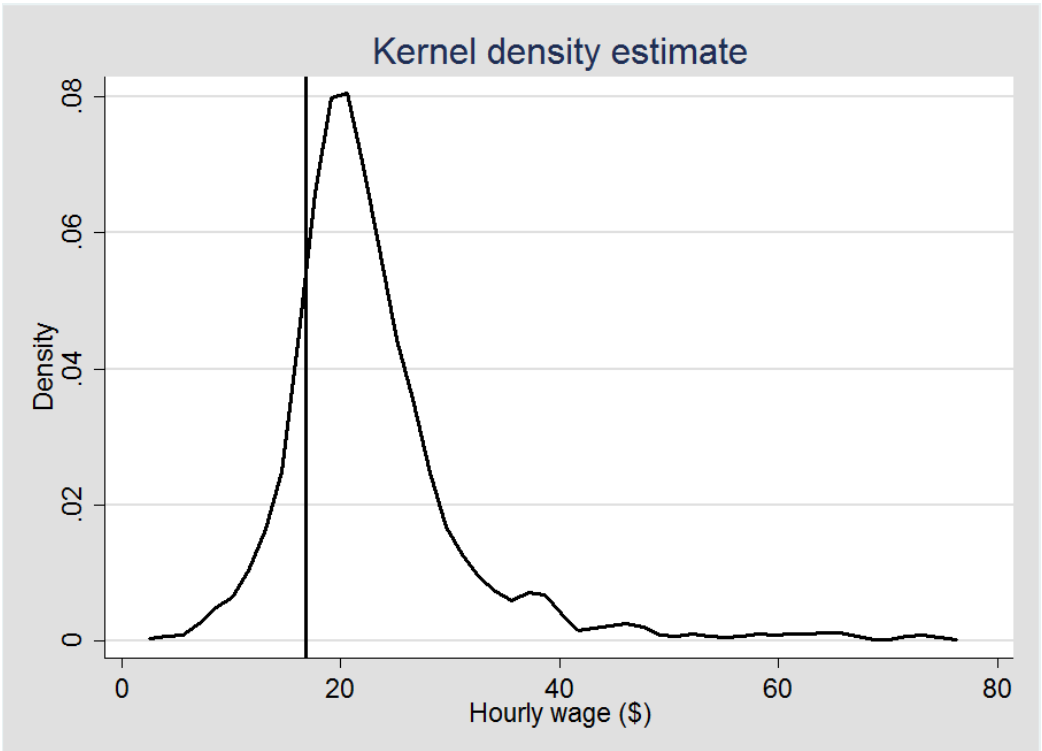
Sources: HILDA Survey, Waves 8 to 14 (columns 1 to 3); Census, 2006 and 2011 Table Builder (column 4). *Notes*: The table lists the 10 most common industries at the Australian and New Zealand Standard Industrial Classification (ANZSIC) 2006 2-digit level, and the 10 most occupations at the Australian and New Zealand Standard Classification of Occupations (ANZSCO) 2006 3-digit level, among award-reliant employees without university degree qualifications. There are 86 industries at the ANZSIC 2-digit level and 97 occupations at the ANZSCO 3-digit level. See Australian Bureau of Statistics (2006a, 2006b) for details. Dominant gender (right-hand column) is determined from census data by sorting industries/occupations by the female share of employment and categorising the top third as female-dominated, the middle third as balanced and the bottom third as male dominated. HILDA Survey estimates are weighted using cross-sectional population weights designed to ensure representativeness of the Australian population. See Summerfield et al. (2014) for details.

Figure 1: Median gender wage gap in the OECD (2014)



Source: OECD Employment Database 2014.

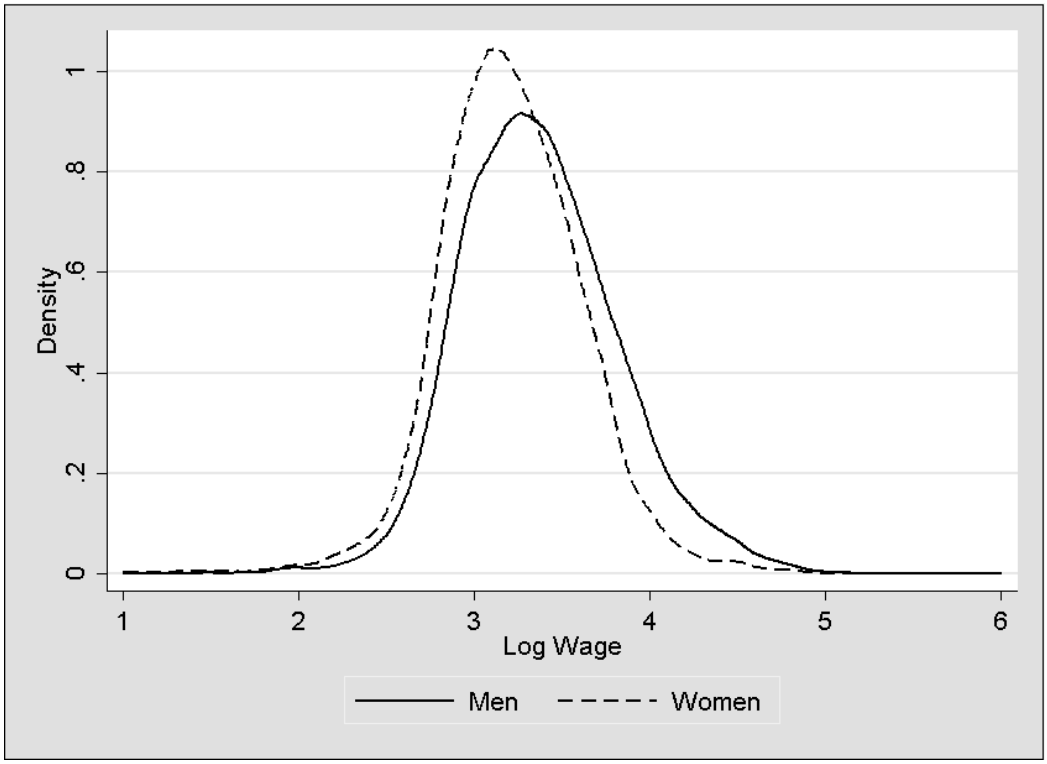
Figure 2: Distribution of nominal hourly wages among employees who receive an award wage, 2014



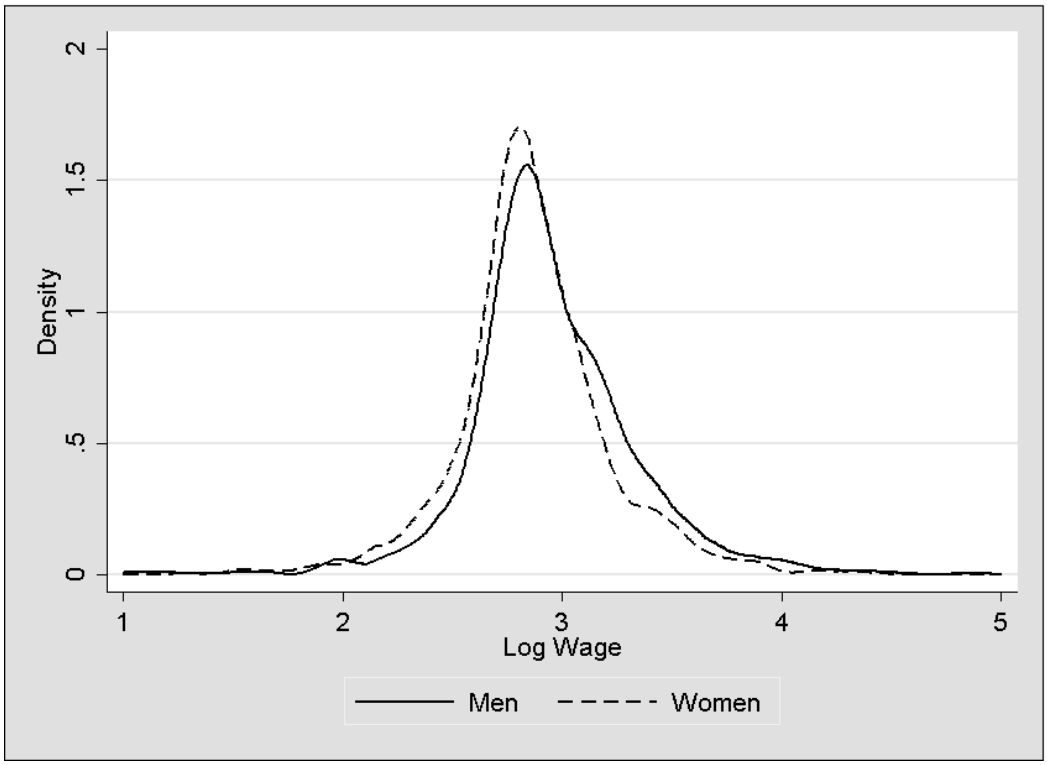
Source: HILDA Survey, Wave 14. *Notes*: The vertical line shows the national minimum wage of $16.78 in 2014. The sample is restricted to individuals who receive an award wage. Results are weighted using cross-sectional population weights designed to ensure representativeness of the Australian population. See Summerfield et al. (2014) for details.

Figure 3: Distribution of employees' log hourly wages by gender (kernel densities)

(a) Employees who do not receive an award wage



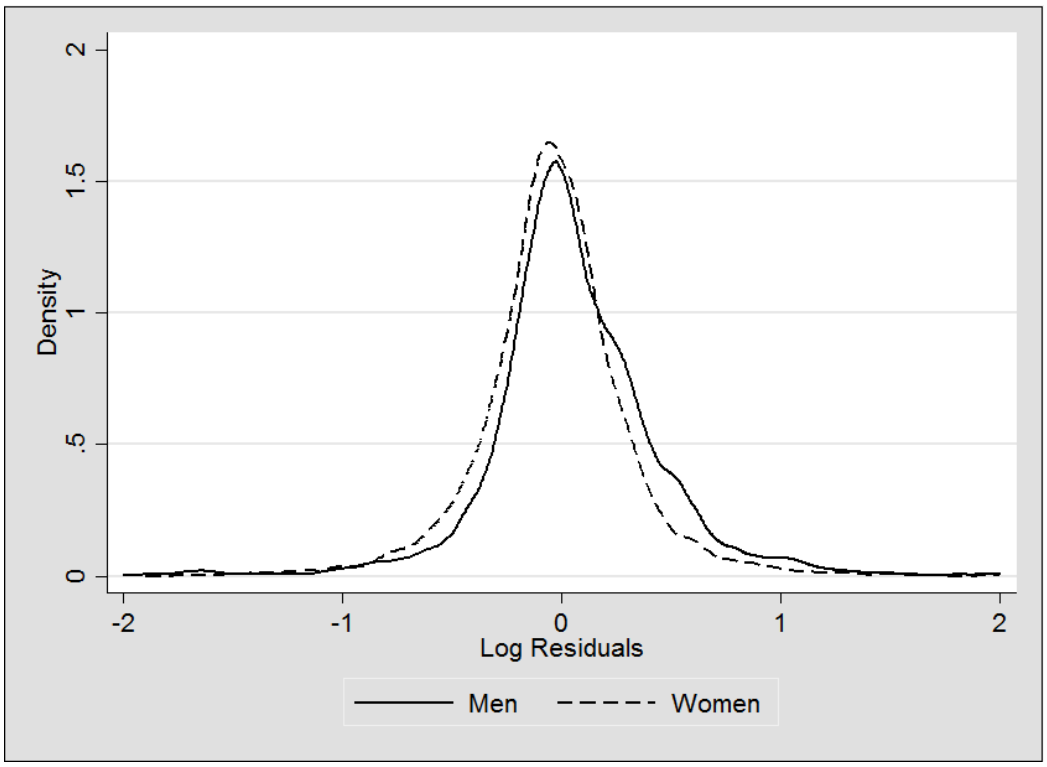
(b) Award-reliant employees



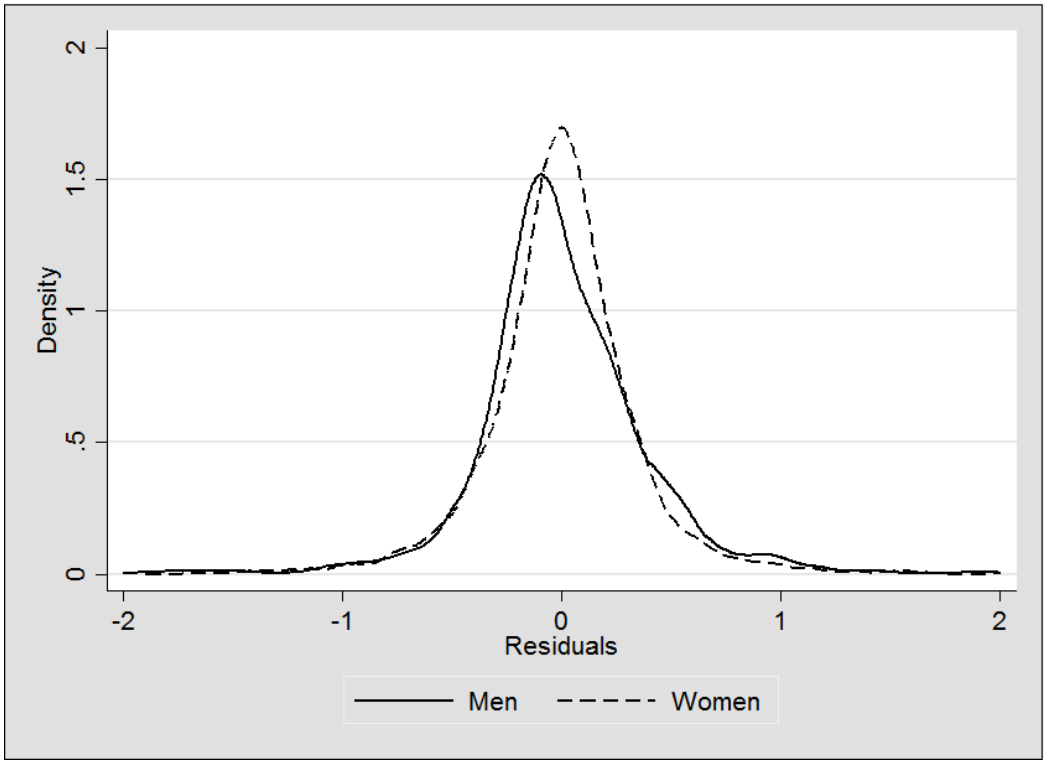
Source: HILDA Survey, Waves 8 to 14. *Notes*: Log hourly wages are corrected for nominal wage growth over time as observed in the sample, and expressed in 2008 real log wages. The sample is split into individuals who do *not* receive an award wage (panel (a)) and award-reliant employees (panel (b)). Results are weighted using cross-sectional weights (see notes to Table 1).

Figure 4: Distribution of log hourly wage residuals of award-reliant employees by gender (kernel densities)

(a) Joint estimation - same returns to education/experience for men and women



(b) Separate Estimation - different returns to education/experience for men and women



Source: HILDA Survey, Waves 8 to 14. *Notes*: See Figure 3. Residuals are the difference between log wages (see Figure 3) and expected log wages conditional on education and experience. Expected log wages are calculated based on individuals' education and experience, as well as two different estimated returns to education and experience: in the left panel, returns to education and experience were estimated jointly for men and women (see right-hand column of Table 2); in the right panel, they were estimated separately (see Table 3). Predictions are weighted using cross-sectional weights (see notes to Table 1).

12 Appendix

We repeat the analysis defining typical male fields and typical female fields defined by employment shares in occupations rather than industries. To do so, the same procedure is employed as before, again based on Census data from 2006 and 2011 (ABS 2006c and ABS 2011b). Occupations are classified according to the Australian and New Zealand Standard Classification of Occupations at the three-digit level, which distinguishes 97 occupations (see ABS 2006a for details). Weighted by the total number of employees, we then determine the third of occupations with the highest male employment shares, and the third of occupations with the lowest male employment shares. The three most male-dominated occupations are: Specialist Managers in Construction, Distribution and Production; Farmers and Farm Managers; and Truck Drivers. The three most female-dominated occupations are: School Teachers; Midwifery and Nursing Professionals; and General Clerks. The simple average of the male share of employment is 85% across all male-dominated occupations and 25% across all female-dominated occupations. Tables A1 and A2 show the equivalent of Tables 5 and 6, using the occupation-based measure of a 'field' instead of the industry-based measure. The coefficients of the model controlling own sex and femaleness of an occupation are very similar to those controlling own sex and femaleness of the industry. The resulting marginal effects evaluated at different combinations of education an experience frequently lose statistical significance, but are very similar in size and direction to those obtained using the industry-based measure of a field of work.

Table A1: Regressions of log hourly wages on education and work experience among award-reliant employees, interacted with gender and femaleness of occupation

	(1)		(2)	
	Coeff.	Std. Err.	Coeff.	Std. Err.
Constant	2.661***	0.049	2.667***	0.051
Female	0.141*	0.055	0.127*	0.057
Industry: balanced	-0.104	0.062		
Industry: female-dominated	-0.165*	0.071		
Share of female employees in industry			-0.200*	0.101
Years of experience (Exp)	0.164**	0.053	0.167**	0.054
Years of experience squared (Exp^2)	-0.021	0.013	-0.023	0.013
Exp · Female	-0.191**	0.062	-0.156*	0.064
Exp^2 · Female	0.039*	0.017	0.030	0.017
Exp · Industry: balanced	0.077	0.067		
Exp^2 · Industry: balanced	-0.024	0.017		
Exp · Industry: female-dominated	0.188*	0.080		
Exp^2 · Industry: female-dominated	-0.044*	0.021		
Exp · Share of female employees in industry			0.139	0.111
Exp^2 · Share of female employees in industry			-0.034	0.029
Postgraduate qualification (PG)	0.309**	0.105	0.326**	0.118
Bachelor degree (BD)	0.196**	0.061	0.163*	0.064
Diploma (Dip)	0.155*	0.075	0.120	0.072
Trade certificate III/IV (Cert)	0.104***	0.030	0.109***	0.030
High school completion (HS)	0.086*	0.041	0.091*	0.042
PG · Female	-0.185*	0.089	-0.136	0.091
BD · Female	0.007	0.059	0.022	0.063
Dip · Female	-0.105*	0.052	-0.106	0.055
Cert · Female	-0.106**	0.036	-0.086*	0.039
HS · Female	-0.071	0.042	-0.071	0.044
PG · Industry: balanced	0.098	0.120		
BD · Industry: balanced	0.016	0.071		
Dip · Industry: balanced	0.033	0.074		
Cert · Industry: balanced	0.044	0.038		
HS · Industry: balanced	0.049	0.048		
PG · Industry: female-dominated	0.253*	0.115		
BD · Industry: female-dominated	0.109	0.074		
Dip · Industry: female-dominated	0.105	0.076		
Cert · Industry: female-dominated	0.025	0.046		
HS · Industry: female-dominated	0.014	0.055		
PG · Share of female employees in industry			0.240	0.182
BD · Share of female employees in industry			0.158	0.117
Dip · Share of female employees in industry			0.187	0.103
Cert · Share of female employees in industry			0.031	0.064
HS · Share of female employees in industry			0.047	0.079
Number of observations	5,476		5,345	
R-squared	0.111		0.107	

Source: HILDA Survey, Waves 8 to 14. *Notes*: See Table 1 and Table 3. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. *Coeff.*—Coefficient estimate; *Std. Err.*—Standard error. The sample is restricted to individuals who receive an award wage.

Table A2 Predicted wages—Variation with own sex and femaleness of occupation, by education level and experience

	Sample size	Predicted wage of men in male-dominated occupations	Penalty/ Premium attached to being female (own sex)		Penalty/ Premium attached to working in female-dominated occupation	
			Estimate	p-value	Estimate	p-value
Less than high school completion and…						
0-5 years experience	107	2.701	0.096**	0.017	-0.122**	0.012
>5-10 years experience	270	2.772	0.020	0.484	-0.050	0.120
>10-20 years experience	532	2.860	-0.059**	0.030	0.016	0.618
>20-30 years experience	551	2.940	-0.095***	0.000	0.027	0.398
>30 years experience	293	2.979	-0.055	0.132	-0.051	0.283
High-school completion and…						
0-5 years experience	76	2.787	0.024	0.577	-0.108*	0.061
>5-10 years experience	205	2.858	-0.052	0.117	-0.036	0.419
>10-20 years experience	327	2.946	-0.130***	0.000	0.030	0.487
>20-30 years experience	184	3.027	-0.167***	0.000	0.041	0.360
>30 years experience	48	3.065	-0.127**	0.016	-0.037	0.538
Trade certificate III/IV and…						
0-5 years experience	105	2.805	-0.001	0.801	-0.096*	0.061
>5-10 years experience	335	2.876	-0.086***	0.001	-0.024	0.508
>10-20 years experience	546	2.964	-0.164***	0.000	0.042	0.237
>20-30 years experience	422	3.044	-0.201***	0.000	0.052	0.107
>30 years experience	187	3.083	-0.162***	0.000	-0.025	0.663
Diploma and…						
0-5 years experience	26	2.856	-0.009	0.843	-0.016	0.771
>5-10 years experience	117	2.927	-0.085**	0.031	0.055	0.250
>10-20 years experience	192	3.015	-0.164***	0.000	0.121**	0.019
>20-30 years experience	125	3.096	-0.201***	0.000	0.132**	0.014
>30 years experience	49	3.134	-0.161**	0.011	0.055	0.383
Bachelor degree and…						
0-5 years experience	71	2.897	0.103*	0.065	-0.012	0.864
>5-10 years experience	145	2.968	0.027	0.550	0.059	0.342
>10-20 years experience	166	3.056	-0.051	0.247	0.125*	0.059
>20-30 years experience	118	3.136	-0.088*	0.075	0.136*	0.059
>30 years experience	30	3.175	-0.048	0.478	0.059	0.481
Postgraduate degree and…						
0-5 years experience	34	3.009	-0.089	0.212	0.132	0.220
>5-10 years experience	37	3.081	-0.165**	0.019	0.203*	0.060
>10-20 years experience	80	3.169	-0.244***	0.001	0.269	0.017
>20-30 years experience	74	3.249	-0.281***	0.000	0.280	0.013
>30 years experience	28	3.288	-0.241***	0.002	0.203	0.074

Source: HILDA Survey, Waves 8 to 14. *Notes*: See Table 1 and 5. Column (1) reports the number of observations in the sample for whom a certain combination of experience and education is observed. Column (2) shows predicted wages if every observation in the sample is assumed to be a male employee in a male-dominated occupation, with education set to the specified value, and experience set to the mid-point of the specified range of experience (35 years for experience >30 years). Columns (3) and (5) report the additional wage premium/ the wage penalty attached to individual sex and to femaleness of the occupation. Columns (4) and (6) show the result of a t-test on the Null-hypothesis that no such premiums/penalties exist. Standard errors for the test are bootstrapped with 100 repetitions. Reported is the p-value. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.