
**Lancaster University Management School**
**Working Paper**
**2011/002**

# Gender wage gaps within a public sector: Evidence from personnel data

Steve Bradley, Colin Green and John Mangan

The Department of Economics
Lancaster University Management School
Lancaster LA1 4YX
UK

# Gender wage gaps within a public sector:

# Evidence from personnel data[1]

14th January 2011

Steve Bradley[i], Colin Green[i] and John Mangan[ii]

i Department of Economics, Lancaster University Management School, Lancaster University, Bailrigg, Lancaster, LA1 4YX, UK.

ii School of Economics, University of Queensland, Australia.

Address for correspondence: Steve Bradley email: s.bradley@lancaster.ac.uk

[1] The authors would like to thank the Queensland State Government for providing the data. All errors are the responsibility of the authors.

ABSTRACT: A standard finding in the literature on gender wage gaps is that the public sector exhibits much lower gaps than in the private sector. This finding is generally attributed to the existence of less gender discrimination in the public sector. In this paper we show that this conclusion is flawed because the standard finding for the public sector is biased by the dominating influence of large feminised occupational groups, such as those in nursing and teaching, both of which have relatively flat job hierarchies and hence low overall wage variance. However, when we examine other occupations within the public sector, there is evidence of sizeable wage gaps, much of which cannot be explained by observable or unobservable workplace or worker characteristics. This finding implies that gender discrimination is substantial in some occupations in the public sector.

Key words: Gender wage gap, public sector, discrimination

## 1. INTRODUCTION

A standard finding in the literature on gender wage gaps is that the public sector exhibits much lower gaps than in the private sector. This finding is generally attributed to the existence of less gender discrimination in the public sector, perhaps because government policies in general, and equal pay legislation in particular, are more forcibly applied. This paper analyses the magnitude and sources of gender wage differences within a public sector workforce using detailed longitudinal personnel data. We argue that due to the unique occupational structure of the public sector labour force, estimates of the public sector gender wage gap based on average male and female earnings obscure large variations in gender wage differences between occupations within the sector. This is because many public sectors are dominated by two large workforces, namely nurses and teachers, which are characterised by relatively flat hierarchies, and hence low wage variation, and high levels of feminisation. Therefore, for a large segment of the public sector labour market, gender wage differentials will be small by definition.

This paper uses administrative data covering an entire public sector workforce to address several issues related to public sector gender wage gaps. Our data is particularly advantageous as we can observe public sector workers in the same occupation in the same location, covered by the same wage determination process. This provides a much closer point of comparison for gender wage differentials in the public sector than has been previously

available in survey-based data. Using these data we demonstrate that the level of gender wage gap is sensitive to the inclusion of certain occupations, in particular nursing and teaching. This is evident in the raw data, but more so once wage equations are estimated. Second, our statistical models show that the degree of occupational feminisation is an important determinant of hourly wages. Third, we provide a range of evidence that suggests that the marked public sector wage gaps evident for other occupational groups are not due to differences in characteristics, as suggested by the literature. Rather, there is evidence that is suggestive of significant wage discrimination within the public sector labour force. Furthermore, we identify the existence of significant gender wage differentials between workers working in the same occupation, location and agency. These are most noticeable amongst managerial and professional jobs. These appear robust to attempts to control for individual time invariant unobservable characteristics. Together our results suggest that, unlike what has been previously suggested in the literature, many parts of the public sector labour force are very similar to the private sector in terms of gender wage differentials and discrimination.

The remainder of the paper is structured as follows. The next section provides an overview of the literature on the gender wage gaps, with particular emphasis on recent evidence for the public sector, and on occupational differences and the public sector. This is followed with background on our data and the public sector workforce it covers. Section 4 provides the empirical methodology, whilst section 5 covers the main econometric results. Section 5 concludes and provides suggestions for further research in the area.

## 2. LITERATURE

An extensive literature exists on the gender wage gap. Early research work on the gender wage gap was primarily concerned with the measurement of discrimination, based either upon the Blinder-Oaxaca decomposition approach or variants of this approach (Blau, 1992). These and other earlier studies are summarised in Blau (2000). Most of this early research focused on the gender wage gap in the private sector, although a literature also exists on the private versus public wage gap (Rosholm, 1996; Zweimuller and Winter Ebmer, 1994 and Borjas, 2002). A standard finding is that the public sector exhibits much lower levels of average gender wage differentials than in the private sector (Zweimuller and Winter-Ebmer, 1994). For instance, Arulampalam, Booth and Bryson (2005) and Booth (2009) report public

sector and private sector gender wage differentials for a number of European economies and show that the gender wage differential in the private sector is between 6 percent and 16 percent higher than it is in the public sector.[2] They also show that in both the private and the public sectors the gender wage gap is higher at the top of the unconditional wage distribution, suggesting a 'glass ceiling effect'.

The difference in the gender wage gap across sectors has been shown to be due to females having higher wages in the public sector. For instance, Mueller (2000) finds that for Canada female public servants gain a wage premia compared to females in the private sector. Similar evidence is presented by Poterba and Rueben (1994) for the US. This research leads to the implication that wage discrimination is less prevalent in the public sector. Indeed, Blackaby, Murphy and O'Leary (1999) in a study for the UK show that the private-public wage gap is determined largely by the 'superior' characteristics of workers in the private sector. Lucifora and Meurs (2006) provide a contrasting view for Italy, France and the UK insofar as low wage workers gain higher returns to characteristics in the public sector, when compared with their private sector counterparts. This advantage reverses for high pay workers. (See also Melly, 2005 who finds the same evidence for Germany.) In contrast, Zweimuller and Winter Ebner (1994) found that there was a significant degree of gender discrimination in the public sector, where females suffer from a 'career stop' in middle management positions. In a study focusing specifically on Australia, Baron and Cobb-Clark (2010) find that the gender pay gap is constant over the wage distribution in the public sector and increasing across the wages distribution only in the private sector.

Several studies have investigated the effect of gender segregation on the gender wage gap. Lewis (1996) is particularly relevant to our study insofar as it examines the effect of gender desegregation in the US civil service, and finds that as the proportion of males fall in an occupational group, mean wages for men and women decline. Macpherson and Hirsch (1995) look at the effect of the degree of feminisation and show that as feminisation increases in an occupational group log wages fall by 10% and 18% for males and females, respectively. Moreover, males are not penalised in wage terms so long as the magnitude of feminisation does not exceed 50% of the occupational group. This finding contrasts with the well known stylised facts, which suggest that the negative relationship between wages and feminisation is

[2] Exceptions are Denmark, Netherlands and Finland.

stronger among men than women. Jacobs (1989) and Sorensen (1989) also suggest that between 9-38% of the gender wage gap is due to occupational segregation.

In summary, the previous literature shows that gender wage differentials are higher in the private sector than in the public sector, and that any advantage that female public sector workers might have, when compared to their private sector counterparts, disappears at the upper end of the wage distribution. A clear finding is that the degree of feminisation also matters.

## 3. BACKGROUND AND DATA

The data used in this study are based on the administrative personnel records of the Queensland State Government. This data was collected in order to facilitate human resource management and for reporting on industrial relations issues to central government, and is known as the Minimum Obligatory Human Resources Information (MOHRI) database. The database is a quarterly data set that holds information on approximately 180,000 public sector workers per quarter. The extract of the data we use covers 2001 quarter 1 to quarter 3 2004. MOHRI covers all individuals working in the public sector in Queensland.

Employment in the Australian extended public sector accounted for 18.7% of total employment, slightly lower than the mean level of 20.5% (see OECD, 1997). The structure of Australia's public sector is similar to the US and Canadian systems, distributed across federal, state and local levels of government. State governments account for 65.8% of all public sector employees and have responsibility for core services, such as education, health, emergency services and law enforcement. The remaining public sector employees work in the federal government (23%) and local government (11.2%). The public-private sector wage ratio of 1.25 for the period 1994-97 for Australia is in the upper range of OECD estimates (OECD, 1997) and compares to an OECD average of 1.18.

Information included in MOHRI includes gender, ethnicity, indigenous status, age, tenure and importantly the hourly wage. A particular advantage of MOHRI is the detailed occupational data. Each individual has a 4 digit ASCO code recorded each quarter. By way of illustration, an ASCO code of 2 signifies a professional, 22 a teacher, 2215 a kindergarten teacher. A wide range of occupations are observed in the public sector, for instance 245 4

digit occupations are active in the Queensland public sector in 2002 quarter 1. One shortcoming of these data set is that educational qualifications are only collected by a subset of the government agencies. There are several reasons why the absence of education should not be a problem in our data. First, occupational status and educational qualifications are highly correlated and we include controls for occupation in our models. We also conduct a separate analysis by occupation. Second, we include an individual fixed effect in our models which captures the effect of unobservable characteristics, including education, on log hourly wages. Nevertheless, we do assess the robustness of our findings by estimating our models for the subset of workers for whom we do observe their educational qualifications. A further shortcoming of our data is that it does not record union membership or coverage. However, union membership has, in fact, been falling in recent years, from a rate of 54.7% in 1997 to a rate of 41.1% in 2007. Furthermore, union coverage is highly correlated with occupation. For instance, public sector health and education workers have very high rates of coverage. We therefore expect that much of the union wage effects will be captured by our highly disaggregated occupational controls.

Wages are recorded in MOHRI as hourly wages. A potential problem with previous studies of the gender wage gap is that they rely on hourly wages which do not reflect the total remuneration of the worker, which could lead to biased estimates of the gender gap. We are able to overcome this problem because overtime payments in the Queensland public sector are extremely rare. Furthermore, we observe all other hourly performance-related allowances, such as those for performing higher duties or working in remote/rural locations, which are also factored into the individual wages.

INSERT TABLE 1

Table 1 presents sample statistics for one representative quarter of MOHRI, 2002 quarter 1. The most important feature to note is the occupational structure. Some occupational groups are heavily feminised, such as nursing, teaching and intermediate clerical and sales occupations, whereas others are male dominated - managers, associate professionals and especially trades. Note also, that teaching and nursing accounts for almost 40 percent of all female workers, but only 25 percent for male workers.

Table 2 reports the log of real hourly wages for males and females, and their difference, over our study period, with and without workers in nursing and teaching. This Table demonstrates two points. First, there is a clear gender wage gap, which has remained relatively stable at

around 10 percent from 2002 (see column 4). Second, the depressing effect of the nursing and teaching workforce on the 'average' gender wage gap in the public sector is clearly demonstrated by the final column. Once these workers are excluded, the gender wage gap rises substantially, especially toward the end of the time period where it reaches around 18 per cent.[3]

In sum, there is a substantial gender wage gap within the public sector, however, it is important to account for the occupational structure when analysing this gap.

INSERT TABLE 2

Figure 1 shows occupational gender wage gaps in more detail and also compares them with private sector gender wage gaps for Queensland. Specifically, public sector wages are taken from a cross-section of our data that corresponds in time to the Australian census, that is, 2001. Note, however, that wages in the census are weekly wages, and hence we re-scale our hourly wage data to the weekly level for purposes of this comparison.[4] There are considerable variations in the gender wage gap between occupations in the public sector. Furthermore, although the gender wage gaps are systematically lower than the private sector equivalents, the pattern is clearly different. For less skilled workers in the public sector, such as labourers and production workers, the gender wage gap is much lower than for their private sector counterparts. They are, however, still positive which suggests that male public sector workers earn more than their female counterparts. At the other end of the skill distribution the gender wage gaps are more substantial and closer to the private sector wage gaps, the exception being teaching and nursing. In the managerial positions, for instance, women earn 13 to 14 per cent less than men per week. These findings appear to be consistent with the evidence regarding glass ceilings and sticky floors.

## 4. METHODOLOGY

Our initial starting point is a standard wage equation of the form:

$$\ln(W_i^g) = X_i^g + \varepsilon_i^g, g = m, f \qquad (1)$$

[3] The variation in the gender wage gap over the time period reflects the changing structure of employment in the public sector.

[4] Note that we have accurate data on hours of work which means that our re-scaling is unlikely to suffer from measurement error.

Where, $\ln(W_i)$ refers to the workers log real hourly wage and the *g* superscript denotes whether the worker is a man or a woman. $X_i$ is a vector of personal characteristics for worker *i*, such as health status, ethnic background, age and tenure, and is $\varepsilon$ a classical error term. Using equation (1), which is estimated separately by gender, a standard Oaxaca / Blinder wage decomposition can be conducted that attempts to identify the contributions of endowments and wage discrimination. Noting the standard index number problem, we use the generalisation suggested by Neumark (1988):

$$W_m - W_f = (X_m - X_f \beta^* + X_m(\beta_m - \beta^*) + X_f(\beta_m - \beta^*) \qquad (2)$$

The $\beta^*$ are the set of estimated non-discriminatory prices. $\beta^*$ is unobservable and a number of options for estimating it have been suggested. We adopt the approach outlined by Oaxaca and Ransom (1994) where $\beta^*$ is weighted such that[5]:

$$\beta^* = \Phi\beta_m + (1-\Phi)\beta_f \qquad (3)$$

The appropriate weighting matrix ($\Phi$) is determined by using the observed characteristics of the pooled and male sample $(X, X_m)$:

$$\Phi = (X'X)^{-1}(X'_m X_m) \qquad (4)$$

Together this provides a baseline estimate of gender wage discrimination in our setting. This, however, may miss a number of key determinants of wages that may bias upwards our estimated wage discrimination level. First, wages may vary by establishment due, for

[5] A further issue is that the measurement of wage discrimination may be influenced by the choice of base cases with respect to dummy variables (Oaxaca and Ransom, 1999). We investigated the robustness of our discrimination estimates by re-estimating our main models by varying the base cases and found only minor variations in the measured discrimination component.

instance, to promotion and other human resource policies, along with other unobserved elements of the wage determination process. In our context, the government 'agency' can be thought of as analogous to an establishment and one might expect wages to vary between men and women with identical characteristics between agencies. Furthermore, these agencies are multi-site and there may be unobservable variations in working environments for which workers need to be compensated. An advantage of our data is that we also observe location of employment. Hence, equation (1) can be extended to also include both agency ($A_i$) and location ($L_i$) fixed effects. As mentioned earlier, our data has very disaggregated occupational data. This allows us to further control closely for occupation which we do so by including controls for the 4 digit occupation ($O_i$). As a result, in estimating equation (5) we are confident that we are comparing workers doing very similar jobs, in the same location, subject to the same human resource management environment. This decreases the likelihood that any estimated gender wage discrimination is biased by unobserved factors.

$$\ln(W_{it}^{g}) = \alpha_i + X_{it}^{g} + A_i + L_i + O_i + \varepsilon_{it}^{g}, g = m, f \qquad (5)$$

We conduct two robustness checks. A weakness of our data is that there is no education information available for the full MOHRI. It seems unlikely that conditional on personal characteristics (such as age and tenure) and the detailed occupational controls that systematic gender differences in educational qualifications remain. Nonetheless, we investigate this utilising the sample of observations for which we have recorded educational qualifications. The Education department has always collected information on the educational qualifications whereas other agencies have begun to do so over time. Whilst the sample of workers with educational qualifications cannot be regarded as a random sample, there is nevertheless considerable overlap with respect to agencies covered, and the raw gender wage gap is very similar for workers with and without qualifications. Whilst this agency contains a large proportion of teachers, it also contains a large number of workers in non-teaching roles.

There is also the possibility, although again unlikely, that these workers when compared with their counterparts without qualification data in the same narrowly defined occupational groupsvary in terms of innate productivity. To investigate this we utilise the panel structure of MOHRI and incorporate worker fixed effects into variants of the models specified above.

## 5. RESULTS

### *5.1 Gender Wages*

INSERT TABLE 3

Table 3 presents the estimate of wage equations reported by gender, and these models increase in the number of controls as we go from left to right. The initial model (I) relates to equation (1) above. This provides a set of baseline estimates. In the lower panel of the table the corresponding predicted gender wage differential and the results from the decomposition are reported. The former reveals a gender differential of around 8%, with just over half of this (4.3%) being due to discrimination.

Model II adds controls for both agency and 2 digit occupational controls. These substantially improve the fit of the model, but do little to change the estimates of wage discrimination, in fact it increases marginally to 5%. The next column introduces location fixed effects, which again does not markedly change the estimates of wage discrimination. Hence, we can argue that from these estimates there is an unexplained 4-5% variation in wages that do not appear to be related to either variations in observed individual characteristic, agency human resource practices or workplace characteristics.

It may, however, be possible that our aggregated occupational controls are not sufficiently disaggregated to account for variations in jobs performed by men and women in given departments and locations. To investigate this, in the final column we replace the 2 digit occupation controls with fixed effects for 4 digit ASCO occupations.[6] These results, reported in the final columns of Table 3, reveal that if anything this leads a slight widening of the unaccounted proportion of the observed gender wage gap to approximately 6%.

Taken together these results suggest that there exists a robust 5-6% unexplained hourly wage difference between males and females. Specifically, this gap is robust to the inclusion of a wide variety of controls and suggests that women working in the same agency, location,

[6] In a small number of cases we aggregated these 4 digit Asco codes up to the corresponding 2 digit level as a result of small cell sizes.

occupation and with the same set of observable characteristics on average receive lower wages, in the order of 5-6% per hour.

INSERT TABLE 4

We consider two further tests of the robustness of our results. First we re-estimate our final model of Table 3 but include worker level fixed effects. Table 4 reports the corresponding decomposition. It is clear that the previously reported gender wage differences are not the result of unobserved differences in worker characteristics. If anything, these decomposition on Table 4 suggests that the unexplained component of the gender wage gap is even higher once these unobserved fixed effects are taken into account.[7]

INSERT TABLE 5

Our results to this point have not controlled for education as this was not collected across all of the agencies for our total sample period, although one could argue that the inclusion of worker fixed effects should control for this. Nevertheless, we re-estimate our model for the sub-set of the data where we observe educational qualifications, specifically any post-school qualifications. These are included in the list of controls in Table 5. Note that we also include in this model agency and occupational fixed effects. The first thing to note about the results in Table 5 is that the estimates for the education variables are as would be expected. Wage returns increase through basic post compulsory qualifications (vocational training and diplomas) to degree and higher qualifications. These returns are, on average, higher for males and provide some insight into the subsequent results of the decomposition analysis. Worth noting first is that the predicted gender wage gap for this sub-set of the data is essentially the same as for the full sample. However, the inclusion of controls for educational qualifications leads to a slight increase in the proportion of this gap that cannot be accounted for by characteristics. These results suggest a price effect of about 6.5 per cent, which confirms the findings for the full sample.

*5.2 Occupational Differences*

[7] To make the estimation more manageable (and to not swamp the state space), we exclude postcode and occupational fixed effects in this estimation. It is worth noting however that trial runs estimating models with different combinations of these controls suggests that this does not substantively affect our results.

Having established the existence of a robust unexplained gender wage gap, we now seek to examine how this varies across the occupational structure. The differences revealed in Table 3 suggest that the average level of gender wage discrimination revealed in the estimates so far may mask substantial occupational variation. However, as suggested earlier, the two main employers of women in the public sector, nursing and teaching, exhibit very low levels of wage dispersion as most pay progression is through seniority.

Table 6 reports the results from the decomposition analysis for seven broad occupational groups. There are several findings from Table 6 that are worth reporting. First, there is less evidence in these data that the estimated gender wage gap is higher the further up the occupational hierarchy one looks. For instance, compare managers (13%) with clerical workers (10%). Moreover, the estimated gender wage gap is much the same for teachers as it is for other professionals and even production, transport and manual labourers (hereafter manual workers), ranging from 5-7%. Second, nurses are a clear outlier – male nurses earn about 1% more than their female counterparts. Turning to the results of the decomposition analysis, a third and significant finding is that the average discrimination effect observed for all public sector workers is driven mainly by behaviour in managerial, clerical, manual and nursing occupations. When considered alongside the estimated gender wage gaps, this suggests the presence of both glass ceiling and sticky floor effects which may be driven primarily by discriminatory practices.

## CONCLUSION AND DISCUSSION

An extensive piece of research by Arulampalam, Booth and Bryan (2007) has demonstrated that for many European countries the gender wage gap in the public sector is much lower than in the private sector. The difference between the two sectors is somewhere between 6 and 16 per cent. This finding is generally attributed to the existence of less gender discrimination in the public sector, although evidence of a glass ceiling effect is also found in the literature at the upper end of the wage distribution.

In this paper we investigate the magnitude of the gender wage gap within a single public sector. We do this by using administrative personnel records of the Queensland State Government, which cover all employees in the public sector in the period 2001-2004. A

number of fixed effects panel models are estimated which allow for observed and unobserved worker and 'firm' differences. This allows us to see how the contribution of wage discrimination varies as we extend the model to incorporate alternative 'hypotheses' on the causes of gender wage differences.

The main findings of this paper are that there is substantial variation in the raw gender wage gap between occupations in the public sector that we study. The average for the public sector is around 8 per cent, and is robust to alternative specifications of the model. This is at the lower end of the range found by Arulampalam *et al* (2007) for various European countries. When we disaggregate by occupation we find quite wide variations in the gender wage gap from 13 per cent for mangers to 1 per cent for nurses, with teachers at the lower end at 6%. Thus, one of the major findings of this paper is that the lower overall average gender wage gap for the sector is biased by the dominating influence of large feminised occupational groups, such as those in nursing and teaching.

A further major finding of this paper is that there is evidence of discrimination, which also varies by occupation. The effect of discrimination on the gender wage gap is greatest in managerial, clerical and manual labouring occupations.

A question that arises is do public sector employers have a taste for discrimination, or are there factors that could explain gender wage differences that have not been picked up by our models? If so, it is also important that whatever additional factors are used to account for the estimates of discrimination, they must simultaneously account for the variation in discrimination that we observe for each occupational group. Arulampulam *et al* (2007) have suggested that public sector employers may be in a better position than private sector employers to engage in this activity. There are several ways in which this might occur.

First, the existence of hierarchies within organisations is clearly important, especially within the public sector which has considerable heterogeneity of the workforce. The existence of a relatively flat hierarchy in nursing and teaching is likely to offer some explanation for our findings. Second, women may suffer lower rates of promotion and may not be preferred for higher level jobs in say, management positions in the public sector. Landers, Rebitzer and Taylor (1996) show how certain promotion criteria, such as working long hours, work against women, and a similar phenomenon may exist in the public sector. Third, women may be promoted but not well paid (Booth, et al, 2003; Blackaby, Booth and Frank, 2005) and this

may vary by occupational group within the public sector. Fourth, men may be placed at a higher point on a pay grade than women, perhaps because of discrimination by employers, or because they have superior endowments, or because women do not negotiate as hard as men over pay (Booth, Francesconi and Frank, 2003). Fifth, Booth (2009) discusses the potential effect of personality differences, such as attitudes to competition as a determinant of the gender pay gap. She cites evidence from Manning and Swaffield (2008) which suggests that risk attitudes, competitiveness, self-esteem and career-orientation, for instance, explain an 'upper-bound' of 4.5 log points of an 8 per cent gender wage gap for workers aged 30. Finally, there may be occupational differences in access to family friendly employment practices within the public sector (Chatterji, Mumford and Smith, 2007).

It is difficult to assess which, if any, of these additional explanations of the gender wage gap might apply to our data. Further work is necessary, for instance, to assess whether women are, in fact, promoted but not well paid. Our data does permit this analysis but is beyond the scope of this paper. Most of the other hypotheses listed above we cannot assess, however, it is possible to reflect on the point about personality differences between men and women and how competitive they are in the wage bargaining process. Our data cover a time period in which individual wage contracting was introduced for managers, and it is possible that male managers have better negotiating skills than their female counterparts.

REFERENCES

Albrecht, J., Bjorklund, A and Vroman, S. (2003) "Is There a Glass Ceiling in Sweden?" *Journal of Labor Economics*, 21(1), pp. 145-177.

Arulampalam W, Booth AL, and Bryan ML. (2007). 'Is there a glass ceiling over Europe? Exploring the gender pay gap across the wages distribution.' *Industrial and Labor Relations Review* 60(2); 163-186.

Baron J, Cobb-Clark D. (2006) 'A distributional analysis of gender wage differences in Australia', *The Economic Record*, 86, 227-246.

Blackaby D, Booth AL, Frank J. 2005 Outside offers and the gender pay gap. *The Economic Journal* 115; F81-F107.

Blackaby, D., Murphy, P. And O'Leary, N.C. (1999) 'The payment of public sector workers in the UK: Reconciliation with North-American findings', *Economics Letters*, 65, 239-243.

Blau, F. and Kahn, L. (1992) 'The gender earnings gap: Learning from international comparisons', *American Economic Review*, May, 533-38.

Blau, F. and Kahn, L. (2000) 'Gender Differences in Pay', *Journal of Economic Perspectives*, 14(4), pp. 75-99.

Blinder, A. (1973) 'Wage discrimination: reduced form and structural estimates', *Journal of Human Resources*, 8, 436-55.

Booth AL, Francesconi M, Frank J. 2003. 'A sticky floors model of promotion, pay and gender'. *European Economic Review* 47(2); 295-322.

Borjas, G. (2003) Wage structures and the sorting of workers into the public sector, in Donahue, J. and Nye, J. (Eds) *For The People: Can we Fix Public Service?*, Brookings Institution Press, Washington.

Borland, J and Gregory, RG (1999) Recent Developments in Public Sector Labor Markets, In O.Ashenfelter and D.Card eds The Handbook of Labor Economics, volume III, Elsevier.

Jacobs, J (1989) *Revolving doors: Sex segregation and women's careers*, Stanford, CA: Stanford University Press.

Lewis, GB (1996) 'Gender integration of occupations in the federal civil service: Extent and effects on male-female earnings', *Industrial and Labor Relations Review*, 49, 472-483.

Lucifora, C. and Meurs, D. (2006) 'The public sector pay gap in France, Great Britain and Italy', *Review of Income and Wealth*, 52, 43-59.

Mangan, J. (2000) *Workers Without Traditional Employment: An International Study of Non-Standard Work*, Cheltenham: Edward Elgar.Melly (2005).

Manning, A, Swaffield J. (2008). 'The gender gap in early-career wage growth'. *The Economic Journal* 118; 983-1024.

Mueller, RE (2000) 'Public- and private-sector wage differentials in Canada revisited', *Industrial Relations*, 39, 375-400.

Oaxaca, R. (1973) 'Male female wage differentials in urban labour markets', *International Economic Review*, 14 (3), 693-709.

Oaxaca, R. and Ransom (1994) 'On discrimination and the decomposition of wage differentials', *Journal of Econometrics*, 61, 5-21.

Oaxaca, R. And Ransom (1999) Identification in detailed wage decompositions, *Review of Economics and Statistics*, 81, 154-157.

OECD (1997) *Trends in Public Sector Pay*, OECD (PUMA): Paris.

OECD (1999) *The Structure of Civil Service Employment in Seven OECD Countries*, OECD (PUMA): Paris.

Poterba, J and Reuben, K (1994) 'The distribution of public sector wage premia: New evidence using quantile regression methods', NBER Working Paper No. 4734.

Rosholm, M and Smith, N (1996) 'The Danish gender wage gap in the 1980s: A panel data study', *Oxford Economic Papers*, 48, 254-279.

Sorenson (1989) ‘’Measuring the effect of occupational, sex and racial composition in earnings’, in *Pay equity: Empirical inquiries*, National Academy press, Washington.

Zweimuller and Winter-Ebmer (1994) ‘Gender wage differentials in private and public sector jobs’, *Journal of Population Economics*.

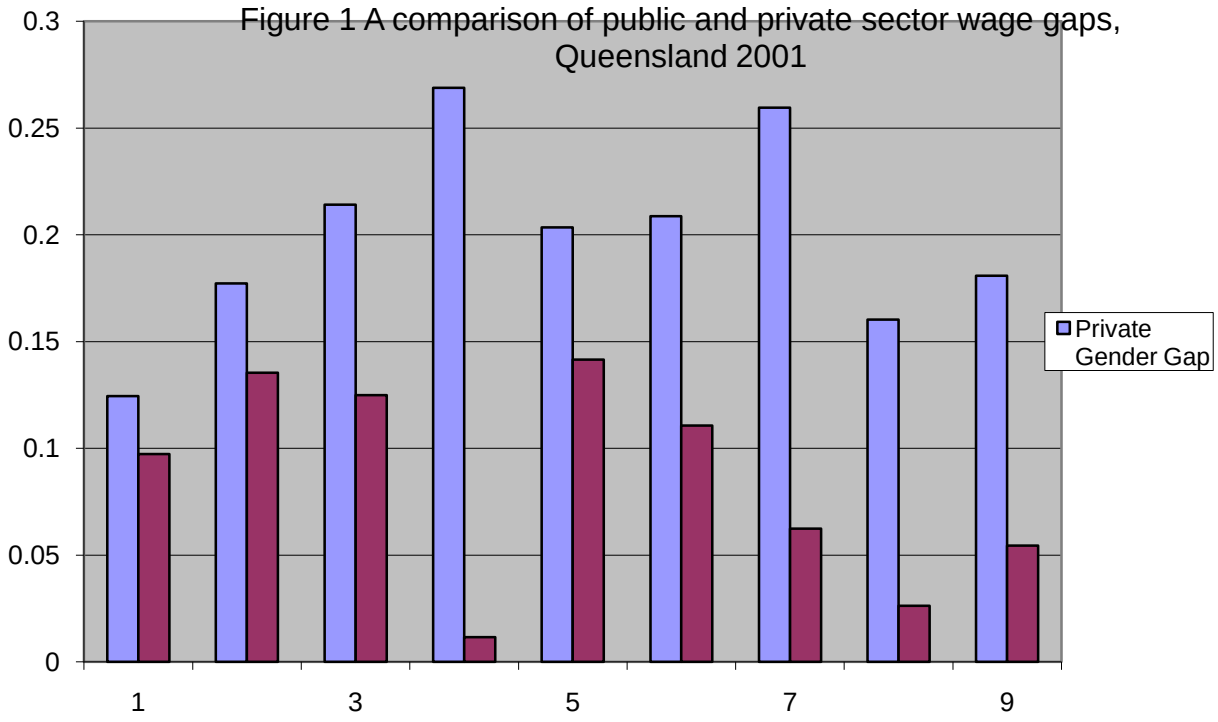


Table note: Occupation (ASCO) 1= Managers; 2=Other professionals; 3=Teaching; 4=Nursing; 5=Associate professionals; 6=Trades; 7=Advanced clerical & service; 8=Intermediate clerical & sales; 9= Intermediate production & transport; 10= Elementary clerical, sales & service; 11=Labourers.

**Table 1 Summary Statistics, Queensland Public Service 2002-2004, Full sample**

| | Males | Females |
|---|---|---|
| Ln(Hourly Wage, W) | 7.752 | 7.671 |
| Age | 41.604 | 40.304 |
| Tenure | 11.950 | 8.429 |
| Non-English speaking background | 0.035 | 0.087 |
| Aboriginal & Torres Straight Islander | 0.019 | 0.021 |
| Temporary contract | 0.113 | 0.137 |
| Casual contract | 0.068 | 0.105 |
| *Disability type:* | | |
| Sensory | 0.028 | 0.014 |
| Physical | 0.024 | 0.018 |
| Intellectual/learning | 0.007 | 0.006 |
| Other | 0.014 | 0.018 |
| Full-time equivalent staff | 0.926 | 0.843 |
| *Occupation type:* | | |
| 1. Manager | .051 | 0.014 |
| 2. Other professional | 0.210 | 0.115 |
| 3. Teacher | 0.168 | 0.272 |
| 4. Nurse | 0.030 | 0.115 |
| 5. Associate professional | 0.219 | 0.107 |
| 6. Tradespersons | 0.074 | 0.004 |
| 7. Advanced clerical & service workers | 0.012 | 0.016 |
| 8. Intermediate clerical, sales & service | 0.121 | 0.270 |
| 9. Intermediate production & transport | 0.020 | 0.002 |
| 10. Elementary clerical, sales & service | 0.021 | 0.031 |
| 11. Labourers & related | 0.072 | 0.054 |
| Number of observations | 196859 | 355620 |

**Table 2 Gender log hourly wage differences by quarter**

| | Full Sample | | | Exclude Nurses and Teachers | | |
|---|---|---|---|---|---|---|
| Quarter | Male | Female | Difference | Male | Female | Difference |
| 2001(1) | 7.667 | 7.592 | 0.074 | 7.626 | 7.484 | 0.142 |
| 2001(2) | 7.682 | 7.605 | 0.078 | 7.637 | 7.490 | 0.146 |
| 2001(3) | 7.703 | 7.629 | 0.074 | 7.653 | 7.503 | 0.149 |
| 2001(4) | 7.689 | 7.635 | 0.054 | 7.633 | 7.510 | 0.123 |
| 2002(1) | 7.699 | 7.642 | 0.056 | 7.642 | 7.517 | 0.126 |
| 2002(2) | 7.712 | 7.639 | 0.073 | 7.663 | 7.521 | 0.141 |
| 2002(3) | 7.761 | 7.660 | 0.101 | 7.713 | 7.534 | 0.179 |
| 2002(4) | 7.768 | 7.665 | 0.104 | 7.721 | 7.540 | 0.182 |
| 2003(1) | 7.787 | 7.682 | 0.105 | 7.745 | 7.565 | 0.180 |
| 2003(2) | 7.788 | 7.680 | 0.107 | 7.746 | 7.559 | 0.187 |
| 2003(3) | 7.788 | 7.680 | 0.109 | 7.747 | 7.561 | 0.187 |
| 2003(4) | 7.806 | 7.694 | 0.112 | 7.769 | 7.577 | 0.192 |
| 2004(1) | 7.822 | 7.713 | 0.109 | 7.787 | 7.600 | 0.187 |
| 2004(2) | 7.831 | 7.732 | 0.099 | 7.789 | 7.613 | 0.176 |
| 2004(3) | 7.832 | 7.735 | 0.098 | 7.791 | 7.617 | 0.174 |

**Table 3 Wage Estimates and Decompositions, MOHRI 2001-2004**

| | Model I | | | | Model II | | | |
|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Male | | Female | |
| | $\beta$ | s.e. | $\beta$ | s.e. | $\beta$ | s.e. | $\beta$ | s.e. |
| Age | 0.028 | 0.001 | 0.028 | 0.000 | 0.029 | 0.001 | 0.023 | 0.000 |
| $Age^2$ | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Tenure (years) | 0.009 | 0.000 | 0.012 | 0.000 | 0.009 | 0.000 | 0.011 | 0.000 |
| $Tenure^2$ | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| ATSI | -0.063 | 0.007 | -0.117 | 0.005 | -0.068 | 0.005 | -0.033 | 0.003 |
| NESB-Asian | 0.048 | 0.007 | 0.020 | 0.004 | 0.034 | 0.004 | 0.005 | 0.002 |
| NESB-Europe | 0.015 | 0.007 | 0.012 | 0.005 | 0.003 | 0.004 | -0.003 | 0.002 |
| NESB-Other | 0.001 | 0.005 | 0.042 | 0.004 | 0.003 | 0.003 | 0.013 | 0.002 |
| Sensory disability | -0.025 | 0.006 | -0.013 | 0.006 | -0.029 | 0.003 | -0.005 | 0.003 |
| Physical disability | -0.018 | 0.006 | 0.034 | 0.005 | -0.021 | 0.004 | 0.012 | 0.003 |
| Int / Learn Disability | -0.035 | 0.012 | 0.011 | 0.009 | -0.034 | 0.007 | -0.001 | 0.005 |
| Other disability | -0.017 | 0.008 | -0.011 | 0.005 | -0.015 | 0.005 | -0.010 | 0.003 |
| Temporary contract | -0.053 | 0.003 | -0.056 | 0.002 | -0.056 | 0.002 | -0.047 | 0.001 |
| Asco 2 | | | | | -0.165 | 0.004 | -0.101 | 0.005 |
| Asco 3 | | | | | -0.203 | 0.005 | -0.090 | 0.005 |
| Asco 4 | | | | | -0.368 | 0.004 | -0.235 | 0.005 |
| Asco 5 | | | | | -0.389 | 0.004 | -0.389 | 0.005 |
| Asco 6 | | | | | -0.630 | 0.004 | -0.575 | 0.009 |
| Asco 7 | | | | | -0.395 | 0.006 | -0.360 | 0.006 |
| Asco 8 | | | | | -0.576 | 0.004 | -0.556 | 0.005 |
| Asco 9 | | | | | -0.721 | 0.005 | -0.607 | 0.010 |
| Asco 10 | | | | | -0.753 | 0.005 | -0.713 | 0.006 |
| Asco 11 | | | | | -0.781 | 0.004 | -0.686 | 0.005 |
| Constant | 1.935 | 0.015 | 2.305 | 0.009 | 2.599 | 0.011 | 2.648 | 0.007 |
| $R^2$ | 0.180 | | 0.147 | | 0.657 | | 0.679 | |
| Observations | 904499 | | 1572803 | | 904499 | | | |
| Agency dummies | | | | | X | | X | |
| Location dummies | | | | | | | | |
| Occupation dummies | | | | | | | | |
| *Decomposition* | | | | | | | | |
| $\widehat{\overline{Gap}}$ | 0.079 | | | | 0.078 | | | |
| Endowments (%) | 0.036 (45.8) | | | | 0.028 (35.9) | | | |
| Discrimination (%) | 0.043 (54.2) | | | | 0.050 (64.1) | | | |

See Figure 1 for definitions of occupational (ASCO) codes.

**Table 3 Wage Estimates and Decompositions (continued, MOHRI 2001-2004**

| Msodel III | | | | Model IV | | | |
|---|---|---|---|---|---|---|---|
| Male | | Female | | Male | | Female | |
| $\beta$ | s.e. | $\beta$ | s.e. | $\beta$ | s.e. | $\beta$ | S.E |
| 0.029 | 0.001 | 0.023 | 0.000 | 0.026 | 0.000 | 0.020 | 0.000 |
| 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 0.009 | 0.000 | 0.011 | 0.000 | 0.009 | 0.001 | 0.011 | 0.000 |
| 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -0.063 | 0.005 | -0.031 | 0.003 | -0.035 | 0.004 | -0.018 | 0.003 |
| 0.031 | 0.004 | -0.002 | 0.002 | -0.007 | 0.003 | -0.011 | 0.002 |
| -0.001 | 0.004 | -0.007 | 0.002 | 0.005 | 0.003 | 0.001 | 0.002 |
| -0.002 | 0.003 | 0.009 | 0.002 | 0.000 | 0.002 | 0.012 | 0.002 |
| -0.029 | 0.003 | -0.007 | 0.003 | -0.015 | 0.003 | -0.003 | 0.002 |
| -0.023 | 0.004 | 0.010 | 0.003 | -0.018 | 0.003 | 0.010 | 0.002 |
| -0.031 | 0.006 | -0.003 | 0.005 | -0.021 | 0.005 | -0.001 | 0.004 |
| -0.018 | 0.005 | -0.010 | 0.003 | -0.013 | 0.003 | -0.005 | 0.002 |
| -0.057 | 0.002 | -0.049 | 0.001 | -0.072 | 0.002 | -0.048 | 0.001 |
| -0.160 | 0.004 | -0.087 | 0.005 | | | | |
| -0.181 | 0.005 | -0.065 | 0.005 | | | | |
| -0.359 | 0.004 | -0.214 | 0.005 | | | | |
| -0.377 | 0.004 | -0.372 | 0.005 | | | | |
| -0.619 | 0.004 | -0.541 | 0.009 | | | | |
| -0.382 | 0.006 | -0.357 | 0.006 | | | | |
| -0.569 | 0.004 | -0.535 | 0.005 | | | | |
| -0.695 | 0.005 | -0.563 | 0.010 | | | | |
| -0.751 | 0.005 | -0.688 | 0.006 | | | | |
| -0.762 | 0.004 | -0.657 | 0.005 | | | | |
| 2.617 | 0.039 | 2.670 | 0.034 | 2.315 | 0.024 | 2.479 | 0.026 |
| 0.667 | | 0.6890 | | 0.778 | | 0.782 | |
| X | | X | | X | | | |
| X | | X | | X | | | |
| | | | | X | | | |
| 0.078 | | | | 0.078 | | | |
| 0.027 (35.1) | | | | 0.020 (25.1) | | | |
| 0.051 (64.9) | | | | 0.059 (74.9) | | | |

**Table 4 Decomposition Results, Worker Fixed Effects, Model II**

| | |
|---|---|
| Gap (hat) | 0.079 |
| Endowments (%) | -0.017(-22.0) |
| Discrimination (%) | 0.096 (123.4) |

*Estimated models include all time varying work and individual characteristics from Table 3, along with agency and occupational dummies.*

**TABLE 5, Sample with controls for educational qualifications**

| | Male | | Female | |
|---|---|---|---|---|
| | $\beta$ | s.e. | $\beta$ | s.e. |
| *Vocational* | 0.028 | 0.007 | 0.025 | 0.005 |
| *Diploma* | 0.069 | 0.007 | 0.057 | 0.005 |
| *Degree* | 0.096 | 0.007 | 0.088 | 0.005 |
| *Graduate diploma* | 0.108 | 0.007 | 0.096 | 0.005 |
| *Higher degree* | 0.140 | 0.008 | 0.113 | 0.005 |
| *Age* | 0.020 | 0.001 | 0.020 | 0.000 |
| $Age^2$ | 0.000 | 0.000 | 0.000 | 0.000 |
| *Tenure* | 0.012 | 0.000 | 0.011 | 0.000 |
| $Tenure^2$ | 0.000 | 0.000 | 0.000 | 0.000 |
| *ATSI* | -0.009 | 0.007 | -0.004 | 0.007 |
| *NESB-Asian* | -0.019 | 0.005 | -0.018 | 0.004 |
| *NESB-Europe* | -0.014 | 0.005 | -0.008 | 0.003 |
| *NESB-Other* | -0.002 | 0.003 | 0.009 | 0.002 |
| *Sensory disability* | -0.013 | 0.004 | -0.003 | 0.003 |
| *Physical disability* | -0.012 | 0.004 | 0.006 | 0.002 |
| *dis_intlea~q* | -0.014 | 0.007 | -0.003 | 0.005 |
| *Other disability* | -0.019 | 0.005 | -0.013 | 0.003 |
| *Temporary contract* | -0.048 | 0.003 | -0.060 | 0.002 |
| *Constant* | 2.333 | 0.032 | 2.390 | 0.044 |
| $R^2$ | 0.723 | | 0.765 | |
| *Observations* | 217742 | | 466838 | |
| Agency dummies | X | | | |
| Occupational dummies | X | | | |

| *Decomposition* | |
|---|---|
| *Gap (hat)* | 0.083 |
| *Endowments (%)* | 0.020 (24.4) |
| *Discrimination (%)* | 0.065 (75.6) |

**TABLE 6 Occupational variations in the gender wage gap**

| | Managers | Other Professionals | Teachers | Nurses | Assoc Prof & Trades | Clerical | Production, Transport Labourers |
|---|---|---|---|---|---|---|---|
| No. of males | 45854 | 186901 | 143489 | 26991 | 269938 | 135849 | 76647 |
| Male $R^2$ | 0.4395 | 0.2964 | 0.485 | 0.2645 | 0.492 | 0.435 | 0.377 |
| No. of females | 21803 | 188126 | 396131 | 188656 | 164401 | 475664 | 74070 |
| Female R | 0.4969 | 0.3193 | 0.476 | 0.254 | 0.343 | 0.363 | 0.391 |
| Gap (hat) | 0.127 | 0.069 | 0.059 | 0.01 | 0.033 | 0.1 | 0.05 |
| Endowments (%) | 0.043 (33.5) | 0.044 (63.8) | 0.03 (50.6) | -0.03 (-36.8) | 0.023 (70.6) | 0.008 (8.3) | -0.006(-11.7) |
| Discrimination (%) | 0.085 (66.5) | 0.025 (36.2) | 0.029 (49.4) | 0.013 (136.8) | 0.011 (29.4) | 0.092(91.7) | 0.058 (111.7) |