

# **Unions and the gender wage gap in South Africa**

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## 1. Brief context

Literature on the wage effects of unions in South Africa:

Moll 1993, 1996; Fallon and Lucas 1998; Schultz and Mwabu 1998; Butcher and Rouse 2001; Hofmeyr and Lucas 2001; Rospabé 2001; Hofmeyr 2002; Hofmeyr 2002; Azam and Rospabé 2007.

Focus: African and white men.

Key findings:

- i) There is a substantial union effect (even given “ergo omnes” rules).
- ii) Unions compress the wage distribution among their members, thereby reducing racial inequality.

## **2. Our study**

### **Broad objective:**

To investigate gender wage inequality in union and non-union employment in South Africa, among African men and women.

Given studies from elsewhere (Doiron and Ridell 1994; Aidt and Tzannatos 2002), we would expect to find *lower* gender wage inequality in union employment.

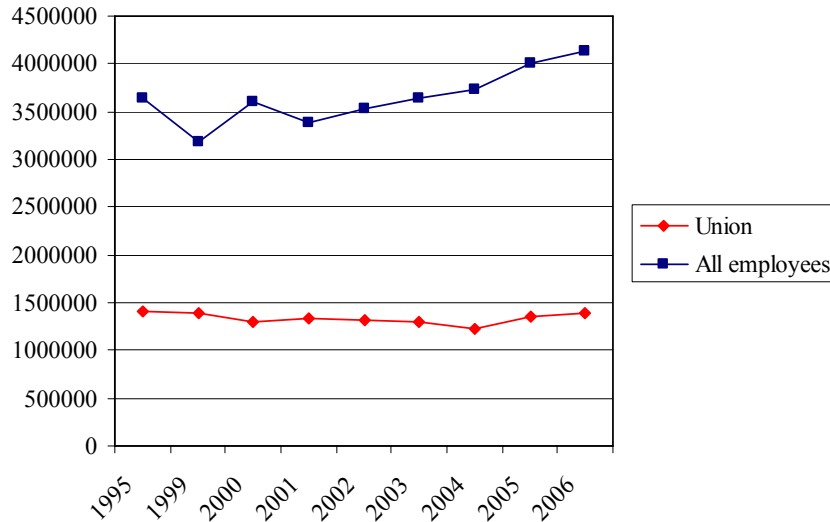
### **3. Data and descriptives**

Labour Force Surveys (LFS) 2000 – 2006. We can identify:

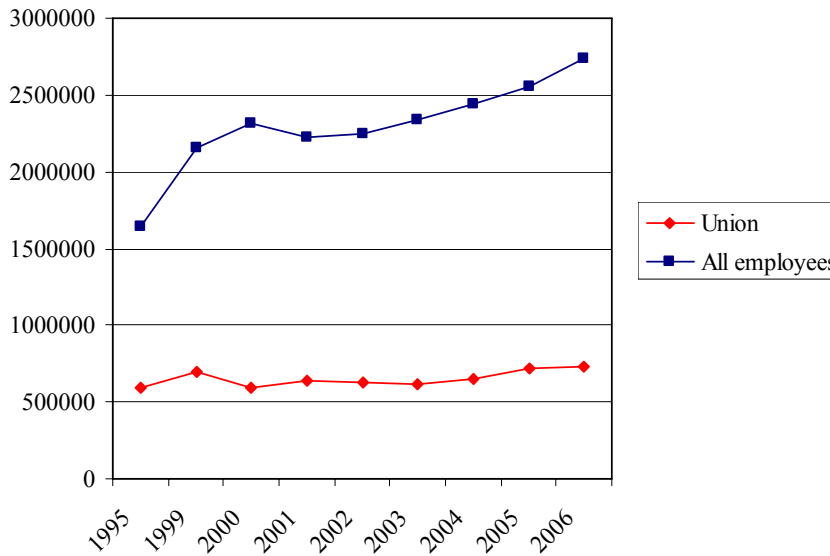
- Firm size
- Public and private sector employment
- Formal and informal sector employment
- Hours worked

October Household Surveys (OHS): 1995 – 1999

**Figure 1. Union membership among the wage employed:  
African MEN, 1995 - 2006**



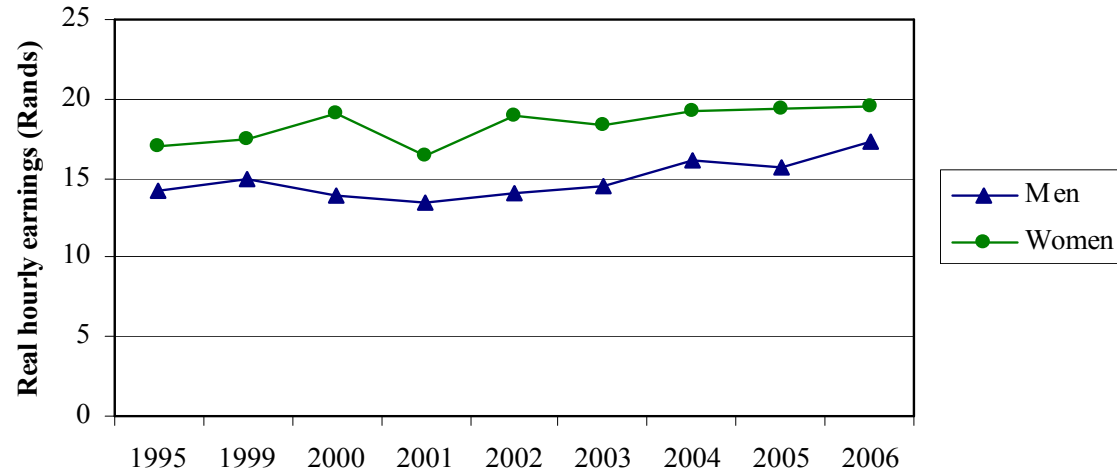
**Figure 2. Union membership among the wage employed:  
African WOMEN, 1995 - 2006**



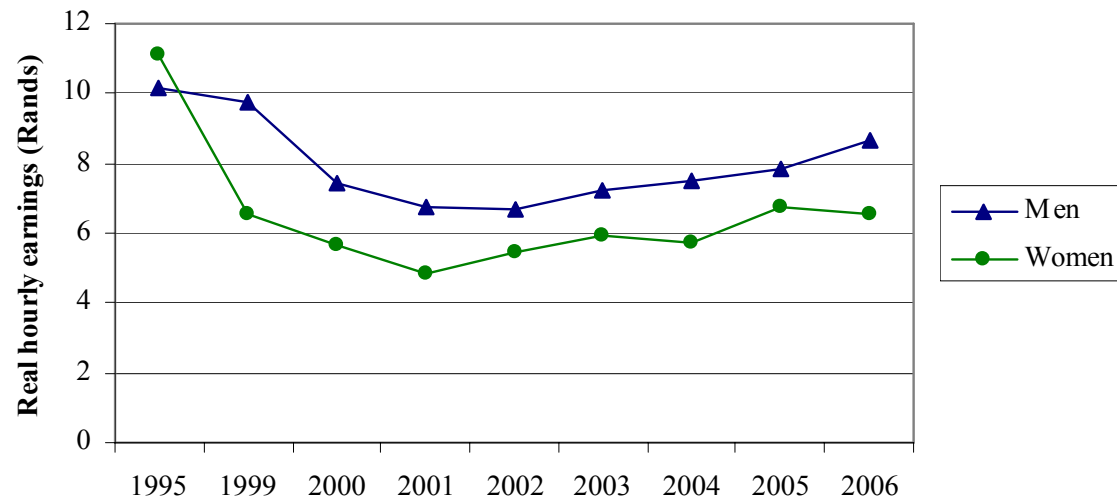
### Union density rates

	Men	Women
1995:	39%	36%
2006:	33%	26%

**Figure 3. Average real hourly wages among African UNION workers, 1995 - 2006**



**Figure 4. Average real hourly wages among African NON-UNION workers, 1995 - 2006**



**Table 1. Average characteristics of Africans in wage employment by union status and gender, 2003**

	Union		Non-union	
	Women	Men	Women	Men
<u>Individual characteristics</u>				
Age	40.62 (9.119)	40.65 (9.201)	38.12 (10.617)	36.57 (11.019)
<b>Years of schooling</b>	<b>11.161</b> (3.285)	<b>8.895</b> (3.926)	<b>7.842</b> (4.049)	<b>7.634</b> (4.083)
No schooling	0.022 (0.147)	0.065 (0.246)	0.106 (0.308)	0.115 (0.319)
Primary education	0.110 (0.313)	0.262 (0.440)	0.308 (0.462)	0.317 (0.465)
Incomplete secondary	0.199 (0.399)	0.297 (0.457)	0.328 (0.470)	0.326 (0.469)
<b>Matric (Grade 12)</b>	<b>0.208</b> (0.406)	<b>0.218</b> (0.413)	<b>0.175</b> (0.380)	<b>0.186</b> (0.389)
<b>Post-matric</b>	<b>0.455</b> (0.498)	<b>0.154</b> (0.361)	<b>0.075</b> (0.263)	<b>0.049</b> (0.216)
Urban	0.761 (0.427)	0.628 (0.483)	0.586 (0.493)	0.521 (0.500)
<u>Job characteristics</u>				
Large firm (>50 employees)	0.360 (0.480)	0.597 (0.491)	0.146 (0.353)	0.244 (0.430)
<b>Public sector</b>	<b>0.656</b> (0.475)	<b>0.332</b> (0.471)	<b>0.082</b> (0.275)	<b>0.079</b> (0.270)
Formal sector	0.961 (0.193)	0.985 (0.123)	0.498 (0.500)	0.780 (0.414)
Written contract	0.822 (0.383)	0.857 (0.350)	0.433 (0.496)	0.550 (0.498)
Paid leave	0.882 (0.332)	0.909 (0.288)	0.317 (0.465)	0.365 (0.481)
Medical aid benefits	0.615 (0.487)	0.519 (0.500)	0.092 (0.290)	0.118 (0.323)
Pension benefits	0.890 (0.313)	0.896 (0.306)	0.234 (0.424)	0.309 (0.462)
N	1401	2730	3752	4304

Note: Standard deviations in parentheses

**Table 2. Occupational distribution in African wage employment, by union status and gender 2003**

	Union		Non-union	
	Women	Men	Women	Men
Legislative/managerial	0.016 (0.124)	0.019 (0.138)	0.009 (0.095)	0.017 (0.131)
<b>Professional</b>	<b>0.091</b> (0.288)	<b>0.034</b> (0.180)	<b>0.016</b> (0.124)	<b>0.016</b> (0.127)
<b>Technical/associate professional</b>	<b>0.378</b> (0.485)	<b>0.103</b> (0.303)	<b>0.050</b> (0.219)	<b>0.033</b> (0.177)
Clerks	0.128 (0.334)	0.082 (0.275)	0.085 (0.279)	0.045 (0.208)
Service/sales	0.086 (0.281)	0.125 (0.331)	0.110 (0.313)	0.117 (0.322)
Skilled agriculture/fishery	0.002 (0.046)	0.001 (0.038)	0.006 (0.076)	0.014 (0.117)
Craft and related trades	0.027 (0.163)	0.184 (0.387)	0.028 (0.166)	0.172 (0.378)
Plant/machine operators	0.047 (0.212)	0.286 (0.452)	0.027 (0.161)	0.194 (0.396)
Elementary occupations	0.199 (0.399)	0.164 (0.371)	0.219 (0.414)	0.374 (0.484)
Domestic workers	0.025 (0.156)	0.001 (0.027)	0.450 (0.498)	0.017 (0.130)
	1.0	1.0	1.0	1.0

Note: Standard deviations in parentheses

## 4. Estimation

**Expect:** The gender wage gap to be lower in union employment than in non-union employment

$$\ln(W_i)^U = \gamma^U M_i + \beta^U X_i + \varepsilon_i^U \quad (1)$$

$$\ln(W_i)^N = \gamma^N M_i + \beta^N X_i + \varepsilon_i^N \quad (2)$$

$$\ln(W_{ij})^U = \varphi_j^U X_{ij} + \varepsilon_{ij}^U \quad (j=M,F) \quad (3)$$

$$\ln(W_{ij})^N = \varphi_j^N X_{ij} + \varepsilon_{ij}^N \quad (j=M,F) \quad (4)$$

Dependent variable=log of hourly earnings	UNION (raw differential = -0.192)			NON-UNION (raw differential = 0.269)		
	I	II	III	I	II	III
<b>Individual characteristics</b>						
Male	<b>-0.164***</b> (0.042)	<b>0.134***</b> (0.032)	<b>0.152***</b> (0.029)	<b>0.262***</b> (0.025)	<b>0.287***</b> (0.021)	<b>0.148***</b> (0.022)
Age	0.099*** (0.012)	0.083*** (0.011)	0.034*** (0.009)	0.043*** (0.007)	0.039*** (0.006)	0.016*** (0.005)
Age <sup>2</sup>	-0.0012*** (0.0001)	-0.0008*** (0.0001)	-0.0003*** (0.0001)	-0.0005*** (0.0001)	-0.0003 (0.0001)***	-0.0002*** (0.0001)
Urban	0.296*** (0.035)	0.139*** (0.035)	0.107*** (0.029)	0.0471*** (0.025)	0.265*** (0.024)	0.196*** (0.021)
<b>Education</b>						
Primary education		0.061 (0.057)	0.065 (0.049)		0.192*** (0.032)	0.133*** (0.026)
Some secondary		0.262*** (0.057)	0.235*** (0.049)		0.434*** (0.034)	0.271*** (0.029)
Matric		0.746*** (0.062)	0.536*** (0.056)		0.819*** (0.042)	0.426*** (0.036)
Post-matric		1.392*** (0.064)	0.827*** (0.069)		1.923*** (0.060)	0.983*** (0.062)
<b>Job characteristics</b>						
Public Sector			0.338*** (0.047)			0.303*** (0.046)
Formal sector			0.218** (0.103)			0.283*** (0.029)
Large firm			0.067*** (0.025)			0.171*** (0.024)
Permanent			0.445*** (0.069)			0.198*** (0.018)
Tenure			0.022*** (0.004)			0.023*** (0.003)
Tenure <sup>2</sup>			-0.0004*** (0.00009)			-0.0004*** (0.0001)
Part-time			0.465*** (0.069)			0.485*** (0.031)
Occupation and Industry controls	No	No	Yes	No	No	Yes
R <sup>2</sup>	0.097	0.420	0.552	0.219	0.434	0.602
N	4131	4131	4131	8056	8056	8056

Note: All regressions also control for marital status, whether the individual is the household head, and for province of residence.

Dependent variable=log of hourly earnings	UNION		NON-UNION	
	Women	Men	Women	Men
Gender earnings differential ( $\varphi_m - \varphi_f$ ) $X_f$	<b>0.143</b> (0.032)		<b>0.082</b> (0.029)	
<b>Individual characteristics</b>				
Age	0.037** (0.015)	0.033*** (0.011)	0.024*** (0.007)	0.009 (0.007)
Age <sup>2</sup>	-0.0004** (0.0004)	-0.0003** (0.0001)	-0.0003*** (0.00009)	-0.00009 (0.00008)
Urban	0.219*** (0.045)	0.051 (0.036)	0.220*** (0.028)	0.175*** (0.030)
<b>Education</b>				
Primary education	-0.119 (0.137)	0.091* (0.051)	0.137*** (0.038)	0.120*** (0.036)
Incomplete secondary	-0.010 (0.136)	0.271*** (0.052)	0.239*** (0.041)	0.281*** (0.041)
Matric	0.203 (0.146)	0.585*** (0.060)	0.423*** (0.051)	0.406*** (0.051)
Post-matric	0.427*** (0.150)	0.936*** (0.085)	0.951*** (0.092)	0.958*** (0.083)
<b>Job characteristics</b>				
Public Sector	0.388*** (0.077)	0.318*** (0.058)	0.244*** (0.069)	0.360*** (0.061)
Formal sector	0.124 (0.117)	0.224* (0.133)	0.299*** (0.053)	0.276*** (0.034)
Large firm	0.052 (0.039)	0.082*** (0.030)	0.159*** (0.042)	0.181*** (0.029)
Permanent	0.381*** (0.104)	0.460*** (0.091)	0.163*** (0.027)	0.226*** (0.024)
Tenure	0.023*** (0.007)	0.021*** (0.004)	0.031*** (0.004)	0.018*** (0.003)
Tenure <sup>2</sup>	-0.0004** (0.0002)	-0.0004*** (0.0001)	-0.0006*** (0.0001)	-0.00002*** (0.00008)
Part-time	0.407*** (0.084)	0.528*** (0.105)	0.485*** (0.039)	0.486*** (0.053)
R <sup>2</sup>	0.624	0.525	0.610	0.595
Number of observations	1401	2730	3752	4304

Note: All regressions also control for marital status, whether the individual is the household head, occupation, industry and province of residence

## Separate earnings regimes, by gender and sector:

The average gender wage gap is considerably larger in union than in non-union employment.

- Far larger returns to education (and particularly higher education) for men than women in union employment.
- → Education-earnings profile compressed particularly among women in union employment.

$$\ln(W_{ig})^M = \gamma_g^M U_{ig} + \beta_g^M X_{ig} + \varepsilon_{ig}^M \quad (g = 1, 2, 3) \quad (5)$$

$$\ln(W_{ig})^F = \gamma_g^F U_{ig} + \beta_g^F X_{ig} + \varepsilon_{ig}^F \quad (g = 1, 2, 3) \quad (6)$$

1 ~ at most primary education

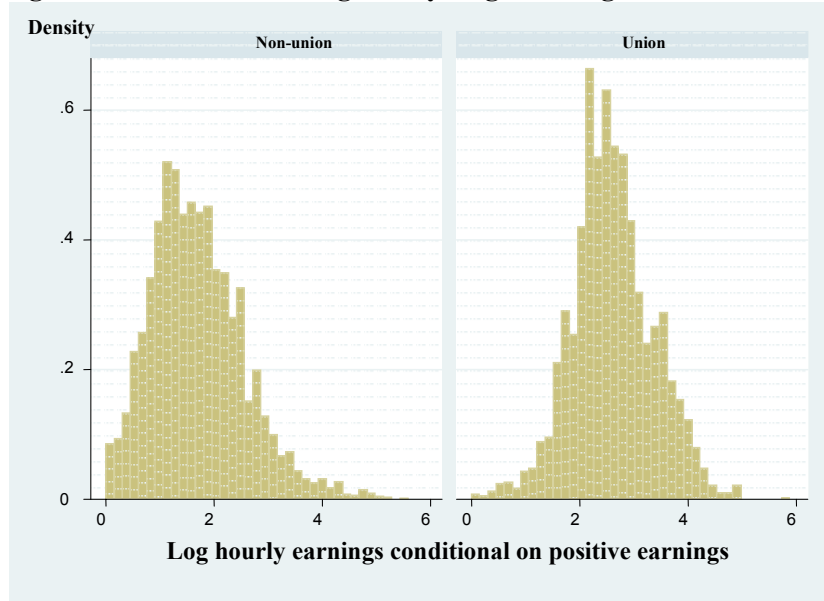
2 ~ incomplete secondary

3 ~ matric or higher

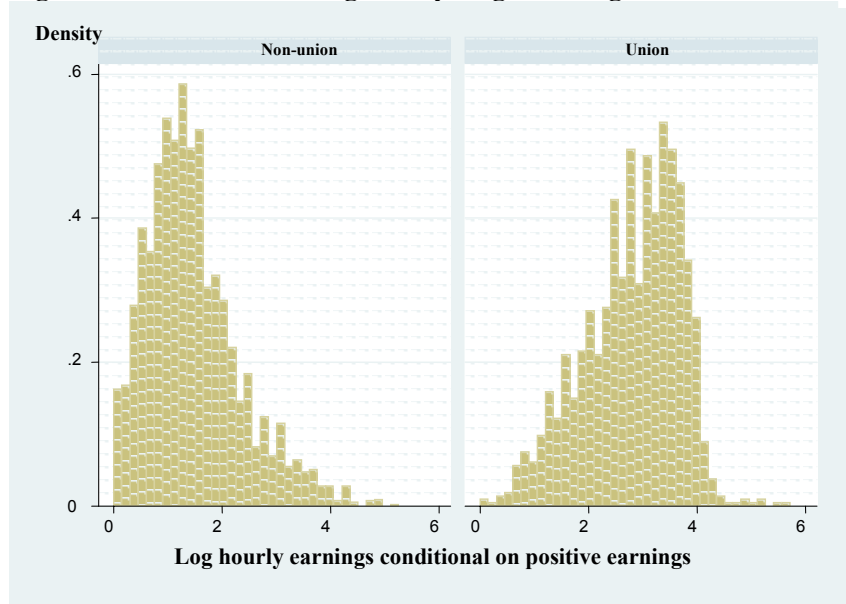
**Table 5. Union differential for men and women by education and quantile, 2003**

<b>OLS with union dummy</b>	<b>Women</b>		<b>Men</b>	
	Coefficient	No. of observations	Coefficient	No. of observations
At most primary education	0.380*** (0.067)	1741	0.241*** (0.040)	2752
Incomplete secondary	0.288*** (0.047)	1511	0.171*** (0.036)	2214
Matric/Diploma/Degree	0.095** (0.046)	1865	0.137*** (0.043)	2028
<b>Quantile regressions with union dummy</b>				
Quantile 0.2	0.254*** (0.029)	5153	0.207*** (0.034)	7034
Quantile 0.5	0.203*** (0.028)	5153	0.199*** (0.023)	7034
Quantile 0.8	0.136*** (0.025)	5153	0.155*** (0.013)	7034

**Figure 5. Distribution of log hourly wages among African male employees**



**Figure 6. Distribution of log hourly wages among African female employees**



Types of jobs into which women are crowded in union employment:

- Almost half of all women in union employment are in professional or associate professional occupations; compared to ten percent of men.
- Among women in these occupations, 86 percent are nurses or teachers.

→ Less opportunity for plant-level bargaining?

Also possible: results are biased by endogeneity in union status.

## 5. Selection and the gender wage gap

The gender wage gap will be over-estimated in the union sector (and under-estimated in non-union employment) if there is stronger positive selection (or weaker negative selection) among men than among women into union jobs.

i) **Two-stage models** (Moll 1993; Hofmeyr and Lucas 2001; Rospabé 2001; Hofmeyr 2002; Azam and Rospabé 2007)

- Treatment effects
- Endogenous switching

Typical exclusion restrictions:

- Lives with other union members (\*)
- Dependency ratio
- Unemployed household members

**Table 6. Characteristics of union members by co-residence with other union members, 2003**

<b>Individuals</b>	<b>Lives with other union members</b>	<b>Does not live with other union members</b>
Hourly earnings	25.66 (0.955)	17.75 (0.360)
Age	38.50 (0.372)	40.04 (0.224)
Years of schooling	11.48 (0.112)	9.276 (0.101)
Matric	0.310 (0.021)	0.221 (0.010)
Degree/diploma	0.400 (0.021)	0.211 (0.010)
Married	0.759 (0.017)	0.626 (0.011)
N	846	3 265

## ii) Household fixed effects (Butcher and Rouse 2001)

“[o]ther techniques for controlling for selection bias, such as the model suggested by Heckman (1979), are inappropriate here, as we do not have information that predicts union membership and that could plausibly be excluded from the wage equation” (Butcher and Rouse 2001:362).

Identifying variation:

Households must contain at least two workers in wage employment + a mix of both union and non-union workers.

Of 10 877 (unweighted) African households with at least one wage worker:

- 84 households contain both union and non-union male workers
- 74 households contain both union and non-union female workers.

### **iii) Panel data models**

LFS Panel (2001-2004):

- 6 waves
- 20 percent rotation in each six monthly wave
- Panel of individuals (no household information yet released)

Measurement error in union status → attenuation bias (Freeman 1984, Robinson 1989)?

**Table 7. Union differential estimates for African men and women without and with selection**

	<b>Women</b>	<b>Men</b>
<b>NO SELECTION CORRECTION</b>		
OLS with union dummy	0.216 (0.032)	0.183 (0.024)
OLS on separate earnings regimes <sup>a</sup>	0.199 (0.039)	0.179 (0.029)
Pooled OLS using LFS panel	0.282 (0.013)	0.221 (0.011)
<b>SELECTION CORRECTION</b>		
Treatment effects <sup>b</sup>	0.488 (0.067)	0.504 (0.061)
Endogenous switching <sup>c</sup>	0.787 (0.145)	0.598 (0.112)
Household fixed effects	0.151 (0.106)	0.267 (0.079)
Individual fixed effects	0.083 (0.016)	0.082 (0.014)

<sup>a</sup> Estimated using union characteristics.

<sup>b</sup> Selection coefficient is significant in both the male and female regressions.

<sup>c</sup> Estimated using union characteristics with the selection term set to its mean value. The selection coefficient is significant in the female and male union and non-union samples.

## **Concluding comments**

Gender wage gap is higher (or not lower) in union employment than in non-union employment.

The wage distribution among union members is more compressed, but particularly so amongst unionised women (who are more educated than unionised men).

Selection bias? If there is stronger positive (or weaker negative) selection among men than among women into union employment, then the size of the gender gap will be over-estimated in the union sector relative to the non-union sector.