Collective Bargaining and the GenderWage Gap: A Quantile Regression Approach[*]

by

Florentino Felgueroso[**]
María José Pérez-Villadóniga[***]
Juan Prieto[****]

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****** University of Oviedo, FEDEA and CEPR (ffelgue@uniovi.es)
*** University of Oviedo (mjpvilla@uniovi.es)
**** University of Oviedo (jprietor@uniovi.es)

Abstract

Several studies have found that in those countries where the wage structure is more egalitarian, the gender wage gap is lower. Also, a negative relationship between the level of collective bargaining centralization and the degree of wage inequality has been found: more centralised bargaining seems to lead to lower wage gaps. In this paper we study how the gender wage gap changes throughout the distribution of wages as a function of the level of collective bargaining by which workers are covered, using quantile regression estimation methods. Our main results indicate that women at the bottom of the wage distribution are subject to less discrimination when they are covered by sectoral (national or regional) agreements, while, at the upper part of the distribution, women under firm agreements suffer less discrimination. These results are consistent with the Median Voter Theorem: at the sectoral level, agreed wages are only minimum wages and unions seem to be more concerned about workers at the bottom of the distribution, so wage compression is more effective there. Hence, wage is close to agreed tariffs, resulting in a smaller wage differential and lower discriminatory component. On the other hand, when bargaining is conducted at the firm level, unions have a greater control over the contracts signed and the reduction in wage dispersion is more effective over the whole distribution. Therefore, differences in the discriminatory component are not so important.

JEL classification: J71, J51
Key Words: Gender wage gap, collective bargaining, minimum wages, quantile regression.

Resumen

Diversos estudios han mostrado que los países en los que la estructura salarial es más comprimida, la brecha salarial por sexos es más reducida. Además, también existen evidencias acerca de una relación negativa entre el grado de centralización de la negociación colectiva y el grado de desigualdad: una mayor centralización parece acompañarse de menores brechas salariales. En este trabajo, estudiamos cómo cambia dicha brecha a lo largo de la distribución salarial en función del ámbito de cobertura de la negociación, utilizando métodos de regresión cuantílica. Los principales resultados obtenidos indican que las mujeres experimentan una menor discriminación salarial en la parte baja de la distribución salarial cuando están cubiertas por convenios colectivos sectoriales (nacionales o provinciales). En la parte alta de la distribución salarial, es en los convenios de empresas en los que la discriminación es menor. Estos resultados son consistentes con las implicaciones del Teorema del Votante Mediano: en el ámbito sectorial, los salarios negociados son salarios mínimos y los sindicatos parecen más preocupados con los trabajadores que se sitúan en la parte baja de la distribución. En esta parte, las tarifas negociadas son vinculantes y la compresión es efectiva, resultando en un menor componente discriminatorio. Por otra parte, cuando la negociación se desarrolla en el ámbito de las empresas, los sindicatos tienen un mayor control y supervisión de los contratos, por lo que la reducción de la dispersión salarial es más efectiva y el componente discriminatorio es menos importante a lo largo de toda la distribución salarial.

Clasificación JEL : J71, J51
Palabras clave: Brecha salarial por sexos, negociación colectiva, salarios mínimos, regresion cuantílica.

1. Introduction

The role of institutions is especially relevant in the labour market, making equilibrium wages differ from the competitive outcome and affecting the gender wage gap. Among the most important labour market institutions are trade unions and collective bargaining systems. In Anglo-Saxon economies, where bargaining takes place mainly at the firm level and there is a relevant nonunion sector, trade unions have a significant effect on wages and on the gender wage differential. In this context, the effect of unions on the average gender wage gap can be decomposed into two components. On the one hand, there are differences in unionization rates between men and women. Given that unions raise unionized workers' wages, if women are less likely to belong to a union, this effect will tend to increase the gender wage gap. On the other hand, unions may affect nonunion workers' wages, although this effect is ambiguous. While an increase in wages in the union sector will reduce employment in this sector and depress non-union sector wages, employers in the nonunion sector may simultaneously offer higher wages in order to prevent workers from organizing. These theoretical arguments have been used to explain the empirical evidence relating to the United States, Canada and Great Britain that differences in unionization rates between men and women may explain about 10% of the total gender wage gap[1]. Moreover, the differential effect of unions on male and female wages, once the unionization rate is controlled for, is ambiguous[2].

With regard to continental Europe, we can expect more important effects of trade unions and the bargaining system on the gender wage gap since bargaining systems are much more complex and can take place simultaneously at different levels (national or regional and sectoral or firm levels). However, little attention has been paid to this issue in these economies due, in part, to the fact that there is not a relevant uncovered sector. Some exceptions are Dolado *et al*. (1997), who study the effects of minimum bargained wages in Spain, Hartog *et al*. (2002) who analyze the effect of collective bargaining coverage on the gender wage gap in the Netherlands and Meng and Meurs (2005), who compare the effects of firm wage policies on the gender earnings gap in France and Australia, taking into account differences between the bargaining regimes in both countries. The aim of this paper is to study how the wage gap varies depending on the bargaining level on which workers are covered.

Gender wage gap estimation has been traditionally evaluated at the mean of the wage distribution. This implies the assumption that the wage differential

[1] See Antos *et al*. (1980), Even and Macpherson (1993) and Doiron and Riddell (1994).
[2] Main and Reilly (1992), Doiron and Riddell (1994) and Metcalf *et al.* (2000) find evidence of a reduction in the gender wage gap in the union sector. The opposite is found in Antos *et al*. (1980), and Maki and Ng (1990).

and the discriminatory component remain constant throughout the wage distribution. However, it has been shown that the gender wage gap in several countries increases as we move up to higher wage levels, which is known as the glass ceiling. In line with most recent papers that use quantile regression to evaluate gender wage gaps in different countries[3], we focus on the wage gap at different points of the wage distribution for the Spanish labour market.

The structure of the paper is as follows. In section 2 we summarize the effects of collective bargaining on wage dispersion which, in turn, affects the wage gap. Then we describe the main features of the Spanish bargaining system as well as the expected effects on the wage differential. In section 3 we describe the data. In section 4 we describe the quantile regression model and how to decompose the wage gap. In section 5 we present the results of the estimation of wage regressions at different quantiles and compute the discriminatory component. Section 6 concludes.

2. Collective bargaining and the gender wage gap

Most research on the gender wage gap focuses on what Blau and Kahn (1999 and 2003) call "gender specific" factors, namely differences in human capital between both groups and differences in the treatment of equally productive men and women (discrimination). However, they point out that there is a third determinant of the gender wage gap which is the overall wage structure, that is, the array of prices for various labour market skills (measured and unmeasured) and the rents received for employment in certain sectors. This is a fundamental element through which labour market institutions, such as collective bargaining, can influence the wage gap. Blau and Kahn (1996a and 2003) point out three reasons why centralized bargaining systems may result in a lower wage gap. Firstly, if women tend to be concentrated in the lower paid sectors, centralized bargaining, which reduces wage differences among sectors and firms, will increase the relative wages of females[4]. Secondly, given that the female wage distribution is always below that of males, centralized systems of collective bargaining, which raise wages of less skilled workers regardless of gender, will reduce the wage gap. Finally, equal opportunities policies can be more easily implemented at higher degrees of centralization, lowering the wage gap. In particular, Blau and Kahn (1996a) associate the greater size of the wage gap in the United States relative to other industrialized countries to the higher level of wage dispersion and conclude that the more decentralized system of

[3] Albrecht *et al.* (2003, 2004) evaluate the gender wage gap in Sweden and in the Netherlands. Newell and Reilly (2001) analyse it in several ex-communist countries. Also, Garcia *et al.* (2001), Gardeazabal and Ugidos (2003) and De la Rica *et al*. (2006) examined gender wage discrimination in Spain

[4] It seems that in the United States an important portion of the gender wage gap is due to wage differences across industries and firms resulting from relatively decentralized bargaining (Groshen, 1991).

collective bargaining in America probably leads to this greater inequality. Furthermore, Blau and Kahn (2003) find a similar result for 22 countries in the OECD for the 1985-94 period: higher bargaining centralization is related to lower wage gaps.

2.1 Collective bargaining in Spain

With regard to the main features of collective bargaining in Spain[5], Spanish legislation establishes that all clauses of a collective agreement be enforced at the level at which bargaining takes place, regardless of the union status of workers and firms. This automatic extension mechanism explains the high coverage rate in Spain (around 85%)[6]and generates a disincentive for workers to assume the costs of joining a union, resulting in a low unionization rate (about 15%). This high gap between unionization and coverage rates is also present in other European countries such as France, Austria, Germany and the Netherlands, in contrast with Canada, the United States and Great Britain which are characterized by much lower coverage rates and a small difference between both rates. The difference between both groups of countries lies in the level at which bargaining is conducted. In most continental European countries bargaining is relatively centralized and there are mechanisms to extend negotiated wages to nonunion workers. However, Anglo-Saxon countries' agreements are often bargained at the firm level and affect only union workers. As a consequence, a distintion should be made between unionized and nonunionized workers when analysing Anglo-Saxon countries but this distintion is not relevant for the Spanish labour market due to its high coverage rate and its small nonunion sector[7].

Moreover, there are three levels at which bargaining can be conducted in Spain. More than 60% of covered workers have their wages set by regional agreements. National level bargaining currently affects nearly 30% of covered workers and firm level bargaining covers less than 10% of workers. Hence, there is a clear predominance of sectoral bargaining, where minimum wages are set by occupational category.

There are several reasons that explain why the gender wage gap can vary by bargaining levels. For instance, when bargaining is conducted at the firm level, the wages set are binding so that the wage drift, defined as the difference between the agreed and perceived wage, will be close to zero. In contrast, under higher level agreements, given that the wages set are minima that can be

[5] For a more extensive analysis of the characteristics of collective bargaining in Spain see Abellan *et al*. (1997) and Felgueroso (1999).

[6] Most of the non-covered workers are highly qualified and bargain directly with the employer, using the collective agreement clauses as minimum conditions for their contracts.

[7] This makes it difficult to work out the wage structure that would prevail in the absence of collective bargaining.

subsequently improved, it is more likely that the wage drift will be positive[8]. This positive wage drift would increase inequality, so we expect that the decline in the gender wage gap within firms will be less effective under sectoral or national bargaining. In effect, Canal and Rodriguez (2004) find that wage dispersion is lower within firms negotiating their own agreement. However, the relatively small wage dispersion within these firms does not prevent high wage inequality between firms. As a result, the total wage dispersion (within plus between) for workers covered by firm level agreements could be higher than total wage inequality for those with sectoral or national agreements. In fact, Izquierdo *et al*. (2003) find lower wage inequality for sectoral than for firm level agreements. Also, Abellan *et al*. (1997) have shown that lower wage dispersion is achieved under regional agreements than with national agreements, due both to higher wage floors for low skilled workers and lower wages for more skilled workers. This result is consistent with the Median Voter Theorem to the extent that unions negotiating at a regional level are closer to their voters. Again, we expect lower average gender wage gaps at more local bargaining levels.

It is also likely that the wage gap will change along the income distribution for each level of agreement. More precisely, we expect lower wage gaps at the bottom than at the top of the distribution under regional or national agreements, but a flatter, or even decreasing pattern, for firm agreements. This would be consistent with the Median Voter Theorem to the extent that if unions are more concerned about workers at the bottom of the distribution (median voter), they will try to increase wage compression in this part of the wage distribution. Hence, the wage received would be close to the agreed one, resulting in smaller wage differentials. However, in their attempt to compress wages, unions may negotiate relatively low wages for highly qualified workers. Thus, firms under sectoral level agreements could establish wages above the agreed ones, yielding greater wage gaps at the top of the distribution. On the other hand, when bargaining is conducted at the firm level, unions can exert greater control over the employer, ensuring that he complies with the agreed wages and therefore that the reduction in wage dispersion will be more effective over the whole distribution.

An alternative explanation may be given by statistical discrimination theories when there are on-the-job training programmes (De la Rica *et al.*, 2007). As women have a higher propensity to quit their jobs, employers may pay them lower wages at the early stage of their career, resulting in a higher gender wage gap at the bottom of the distribution. As women acquire tenure at the firm, lowering the probability of quitting, their wages will increase and approach those of males and hence the gender wage gap will be reduced at the

[8] In other words, company level agreements mainly fix within-firm wage inequality; however, higher level agreements can only partially determine between-firm wage dipersion.

upper part of the distribution. In order for this compensation system to work, there must be a mechanism ensuring that the employer complies with this implicit contract. In firms with strong union presence this mechanism can be more easily implemented, as unions constitute a guarantee for women not to be dismissed. This is the case at large firms, where bargaining is generally conducted at the company level. Conversely, at smaller firms, with more centralized pay determination and much weaker union presence, women are less protected from employers' decisions, increasing their probability of being fired and leading to a higher gender wage as we move to the upper part of the distribution.

3. The data

To carry out the empirical analysis we have used data from the Wage Structure Survey, 2002. This survey is carried out by the National Statistics Institute and includes data on 144,739 salary workers in establishments employing more than 10 people. The survey provides information about the personal characteristics of the employees, their wages and the firm where they work.

The distribution of workers by bargaining level is reflected in Table 1, where we compare coverage rates from the Collective Agreements Survey[9] (CON) with the figures obtained from the Wage Structure Survey (WSS).

Table 1: Coverage rate by level of agreement

Bargaining level	CON (2002)	WSS (2002)
National	33.25	36.84
Regional	55.75	48.52
Firm	9.95	14.64

Workers covered by firm level and economy-wide agreements are over-represented in the sample, while those covered by regional agreements are under-represented. This is due to the fact that the survey only interviews firms with 10 or more employees, and it is mainly large firms that have their own agreements. As a result, the smallest firms, mainly covered by regional agreements, are excluded from the sample.

[9] This survey is carried out by the Ministry of Labour and provides information on the number of collective agreements in force, the number of workers affected by these agreements and information on both quantitative and qualitative issues subject to negotiation.

In Table 2 we show the observed log wages at different points of the wage distribution (10th, 50th and 90th percentiles) together with the sample mean, for men and women, both in the whole sample and by bargaining level. In the last panel we show the difference between the log wages of males and females.

Table 2: Wage (in logs) distribution by gender and bargaining level and the gender wage gap

Male wages

	Mean	P10	P50	P90	P90-P10	P50-P10	P90-P50
Total	1.99	1.48	1.91	2.62	1.14	0.43	0.71
Nacional	2.00	1.45	1.89	2.68	1.23	0.44	0.79
Regional	1.89	1.43	1.79	2.44	1.01	0.36	0.65
Firm	2.28	1.74	2.24	2.82	1.08	0.50	0.58

Female wages

	Mean	P10	P50	P90	P90-P10	P50-P10	P90-P50
Total	1.73	1.28	1.63	2.32	1.04	0.35	0.69
National	1.75	1.25	1.64	2.37	1.12	0.39	0.73
Regional	1.64	1.25	1.57	2.09	0.84	0.32	0.52
Firm	1.98	1.34	1.94	2.59	1.25	0.60	0.65

Gender wage gap

	Mean	P10	P50	P90
Total	0.26	0.20	0.28	0.30
National	0.25	0.20	0.25	0.31
Regional	0.25	0.18	0.22	0.35
Firm	0.30	0.40	0.30	0.23

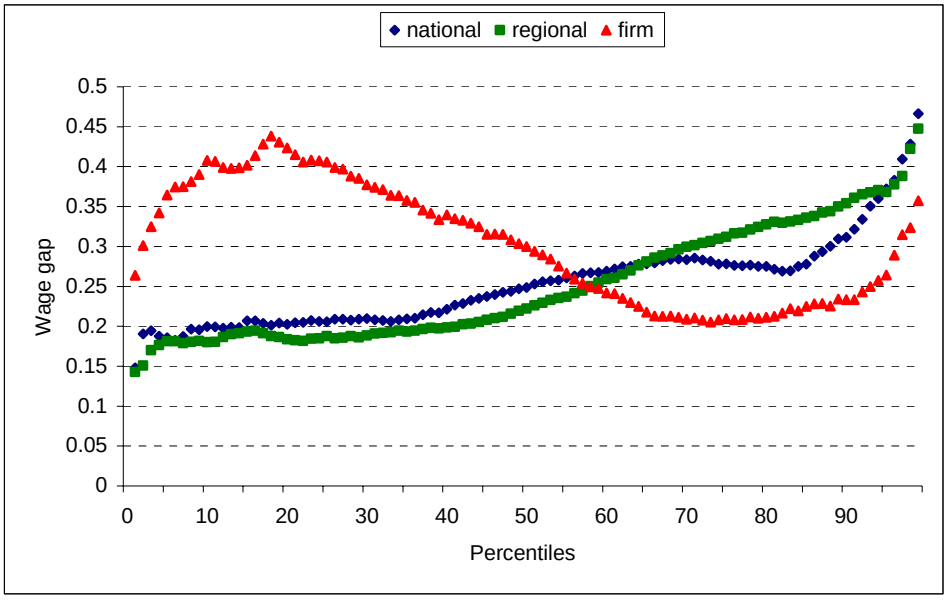
The average gender wage gap is around 25% for workers covered by national and regional agreements, while this gap is higher for firm level agreements (30%). However, it is more informative to take into account the whole wage distribution.

If we measure wage inequality as the male 90-10 percentile log wage differential, we find that dispersion is higher for national agreements (1.23), followed by firm level (1.08) and regional agreements (1.01). However, inequality does not remain constant at all points of the distribution. We observe greater wage compression at the bottom of the distribution (P50-P10) for regional and national agreements and a lower gender wage gap relative to firm agreements. In contrast, the P90-P50 wage differential is lower for firm level agreements, resulting in smaller gender wage differentials.

In summary, the average wage gap is the result of very different processes depending on the negotiation level, which calls for the analysis of such differences taking into account the position of workers over the wage distribution.

In Figure 1 we extend the former information by showing, for each type of agreement, the observed wage differential between men and women at each percentile of the wage distribution. The gender wage gap for workers covered by national or regional agreements follows a similar trend: it is relatively low and stable at the bottom of the wage distribution around 20% until percentile 40, and then it increases (with some eventual drops), reaching values above 40% at the very top of the distribution. The pattern exhibited by the wage gap under firm level agreements is very different: it is increasing at the bottom of the distribution and then decreases continuously until percentile 65. Thereafter, it remains constant at about 20% and increases slightly in the last percentiles.

Figure 1: Distribution of the observed gender wage gap by bargaining level



In summary for higher level agreements, the average wage gap is mainly due to differences in the upper half of the distribution, while this pattern does not hold for firm level agreements. These results suggest the existence of a glass ceiling for women covered by national or regional agreements, while this evidence is not so clear in the case of firm level agreements except at the bottom and the top of the wage distribution.

This seems to indicate that women in the lowest positions and up to the median are better off under higher level bargaining in the sense that they generate smaller wage differences with respect to men. In contrast, those women

whose salary is above the median are better off if they are covered by firm level agreements.

This result is consistent with the evidence found in other countries. For example, in Scandinavian countries, with a very centralized bargaining system, the existence of a glass ceiling has been documented. However, in the United States, where collective agreements are mainly negotiated at the firm level, no evidence of an increasing tendency of the wage gap has been found (Albrecht *et al.*, 2003).

However, the fact that the gender wage gap is higher under a certain type of bargaining or at a certain segment of the wage distribution does not necessarily imply that women are subject to greater discrimination. At least part of the wage gap may be due to the fact that women have characteristics that make them less productive than the men they are compared with. Hence, we now analyze the discriminatory component of the wage differential. As the wage gap is not constant over the wage distribution, it is likely that the discriminatory component also depends on the position of workers at the distribution. To check this we use quantile regression analysis, which allows us to obtain the returns to productive characteristics at different points of the wage distribution.

4. Quantile regression approach

In this section we describe the quantile regression estimation method, together with the methodology used to compute the discriminatory component.

4.1 Quantile regressions

The quantile regression estimation process, developed by Koenker and Basset (1978) and Buchinsky (1994) consists in estimating wage regressions at several quantiles of the distribution of wages.

If the log of wages is a random variable that follows an F distribution and X is a $K \times 1$ vector of explanatory variables, the θth quantile, $0 < \theta < 1$, of the log wage conditional on the vector of characteristics X, $Q_\theta(\ln w \mid X)$, indicates the wage of that individual with characteristics X that leave behind a fraction θ of workers with the same characteristics.

Koenker and Basset (1978) set up a linear quantile regression model, that specifies the wage of individual i:

$$\ln w_i = X_i' \beta_\theta + u_{\theta i} \qquad (1)$$

where $Q_\theta(\ln w_i \mid X_i) = X_i'\beta_\theta$, and the distribution function of the error term is left unspecified, with the only assumption being that $Q_\theta(u_\theta \mid X) = 0$.

The estimated coefficients, β_θ, represent the marginal change in the θth quantile conditional wage induced by a marginal change in one of the explanatory variables included in vector X [10]. Therefore, this method allows the effect of the different explanatory variables to vary depending on the position held by workers in the wage distribution.

The vector of coefficients is obtained as the solution to the following minimization problem:

$$\min_{\beta_\theta} \frac{1}{n}\left\{ \sum_{i:\ln w_i \geq X_i\beta_\theta} \theta\left|\ln w_i - X_i\beta_\theta\right| + \sum_{i:\ln w_i < X_i\beta_\theta} (1-\theta)\left|\ln w_i - X_i\beta_\theta\right| \right\} \qquad (2)$$

That is, we minimize the sum of the absolute value of weighted errors[11].

4.2 Decomposition of the wage gap

The Oaxaca-Blinder method is based on the ordinary least squares property that the mean wage conditional on the average characteristics of the sample is equal to the unconditional mean wage. Therefore we can obtain an exact decomposition of the average wage gap between both groups of workers. However, in the context of quantile regression no similar property exists. If we assume the expectation of equation (2) conditional on the log wage is equal to the unconditional θth quantile, $\ln w_i = \ln w_{i\theta}$, we obtain:

$$\ln w_{i\theta} = E\left[X \mid \ln w_i = \ln w_{i\theta}\right]' \beta_\theta + E\left[u_{i\theta} \mid \ln w_i = \ln w_{i\theta}\right] \qquad (3)$$

Thus, the unconditional θth quantile wage is equal to its θth quantile wage conditional on the vector of average characteristics of individuals at that percentile plus the mean of those individuals' error terms. This error term is not zero, so we cannot perform an exact decomposition of the wage differential at different quantiles.

The first step to compute the discriminatory component is to define what will be considered as the non-discriminatory wage structure. Traditionally,

[10] Note that this does not imply that a person who is in the θth quantile of the conditional distribution will be in the same quantile once his characteristics X have changed.

[11] We must take into account the fact that when quantile regressions are estimated at several points of the conditional distribution, these regressions are correlated given that we use the same data with different weights (Buchinsky, 1998).

researchers have applied male returns to female characteristics to evaluate women nondiscriminatory salary, assuming that male returns capture labour productivity. However, this could be done applying female returns to male characteristics where in this case the female wage structure is the non-discriminatory one and we assume nepotism in favour of men. Indeed, it could be assumed that any linear combination of both wage equations represents the wage structure in the absence of discrimination (Oaxaca and Ransom, 1994 and Neumark,1988). There are some examples of quantile regression papers that have assumed the male wage structure as non-discriminatory but they differ according to the method used to evaluate the discriminatory component[12]. We use the method proposed by Albrecht *et al*. (2003), based on Machado and Mata (2005), which can be summarized as follows.

In order to decompose the gender wage gap we calculate two counterfactual distributions: (i) the female log wage density that would arise if they were given men's characteristics but were paid as women and (ii) the density that would arise if women retained their own characteristics but were paid as men[13]. The process to obtain the first counterfactual density is as follows:

1. Using the female data set, estimate the regression coefficients at all quantiles, from 1 to 99.
2. For each vector of coefficients $\hat{\beta}_{f\theta}$, draw from the male dataset a random sample with replacement of 100 individuals.
3. The counterfactual density function is generated as $\ln_i = X_{im}\hat{\beta}_{f\theta}$.

We would then have created a sample of 9900 observations (99 random draws of 100 individuals each). The approach to estimating the second density function is analogous, inverting the roles of males and females.

The decomposition of the difference between the male and female wage densities is:

$$Q_\theta(\ln w_m) - Q_\theta(\ln w_f) = \left[Q_\theta(X'_{im}\hat{\beta}_{m\theta}) - Q_\theta(X'_{if})\hat{\beta}_{m\theta}\right] + \\ + \left[Q_\theta(X'_{if}\hat{\beta}_{m\theta}) - Q_\theta(X'_{if})\hat{\beta}_{f\theta}\right] + \textit{residual} \qquad (4)$$

[12] For example, Garcia *et al*. (2001) compare predicted wages at different quantiles conditional on the mean characteristics of the total sample. Also, Cavalcanti and Guimaraes (2001) extend the Oaxaca coefficient based on quantile regression. Gardeazabal and Ugidos (2005) propose an exact decomposition of the wage gap that consists of evaluating conditional quantiles at a point that yields the unconditional ones. De la Rica *et al*. (2006) use Albrecht *et al*'s method with some modifications.

[13] Albrecht *et al*. (2004) show that this method results in consistent and asymptotically normal estimators of the quantiles of the counterfactual distribution that it is simulating.

The first term of the decomposition measures the contribution of the differences in characteristics in explaining the wage gap at quantile θ. The second term represents the portion that is due to differences in coefficients, and is often attributed to discrimination. Finally, there is a residual, as the sample has been generated randomly, but this should disappear asymptotically.

5. Results

In this section we first present the main results of the estimation of the quantile regressions and then we calculate the discriminatory component of the gender wage gap at different percentiles.

5.1 Quantile regression estimation

We have estimated, for the three levels of collective bargaining, wage regressions at all percentiles of the wage distribution, from 1 to 99, for men and women.

The dependent variable is the log hourly wage, calculated as indicated in the Appendix.

With respect to the independent variables, we have included human capital variables, that measure workers' productivity. Specifically, we have included age and tenure at the firm, as a measure of specific training that the worker acquires at the firm. We expect a positive and concave relationship of both variables with respect to income. We also control for education, through which we measure workers' generic training. Secondly, we have considered variables that refer to the contract. We control whether the individual works part-time and whether he has a temporary contract. We have also included dummies to control for occupation. Thirdly, we have considered variables related to the firm including sector of activity, market in which the firm sells its products, size and region in which the firm is located[14].

The variance-covariance matrix has been calculated by bootstrapping with 100 replications.

The first step to check if there is a significant wage gap is to estimate pooled regressions, i.e. a female dummy variable is added as an explanatory variable. On doing so, we have found significant negative coefficients regardless of the bargaining level and the wage quantile. Estimated coefficients range

[14] We have also estimated the wage equations using alternative sets of control variables and found that results are robust to different specifications. These estimations are available on request.

between -0.14 and -0.29, showing an increasing estimated gap under regional and national agreements, but remain quite stable, at around -0.20, for firm level bargaining. This can be considered as initial evidence of the existence of a gender wage gap that differs according to the bargaining level[15]. However, this approach assumes that observed characteristics yield the same returns for men and women and this is often considered a restrictive assumption. In order to relax it we have estimated quantile wage regressions for men and women separately.

In general, all coefficients have the expected sign. Wages increase with seniority at the firm and in most cases this effect is concave. The effect of seniority is slightly increasing for workers under national and regional agreements and decreasing for firm bargaining. Under the three bargaining regimes, returns to seniority are higher for men in the lower half of the distribution, while the opposite pattern is observed at higher quantiles. Age also has a positive and concave effect on wages. In general, this effect is higher for high wage workers, especially for those under firm level agreement.

On the other hand, higher levels of education are associated with higher wages and in general this positive effect is more important as we move up through the wage distribution. For workers covered by national agreements, returns to education are, in most cases, higher for women than for men, especially for university graduates. In the case of regional and firm agreements, the effect of education is greater for men.

Having a temporary contract has a negative effect on wages. Part-time work affects wages negatively in the lower half of the distribution. For high wage workers it turns significantly positive in many cases. Moreover, less skilled jobs pay less and this penalty is greater at the highest percentiles, especially for those covered by firm agreements.

Firms that sell their products in national or international markets pay higher wages than those that operate in a local or regional market, and in general wages rise with the size of the firm. Finally, coefficients referring to the sector of activity and region vary widely across quantiles, gender and bargaining level.

5.2 Decomposition of the wage gap

In this section we analyze how the discriminatory component of the wage gap varies through the distribution of wages.

[15] These results are available on request.

Following Machado and Mata (2005), to calculate the discriminatory component of the wage gap we have to compare the estimated density of wages with the counterfactual one. Based on the Oaxaca-Blinder decomposition, we can give two measures of the discriminatory component.

The first measure is based on the comparison of the female wage distribution and the one that would be obtained if women kept their characteristics but were paid like men i.e., assuming that the male wage structure is the non-discriminatory one. For each percentile we have:

$$\hat{D}_\theta = Q_\theta(X_{if}\hat{\beta}_{m\theta}) - Q_\theta(X_{if}\hat{\beta}_{f\theta}) \qquad (5)$$

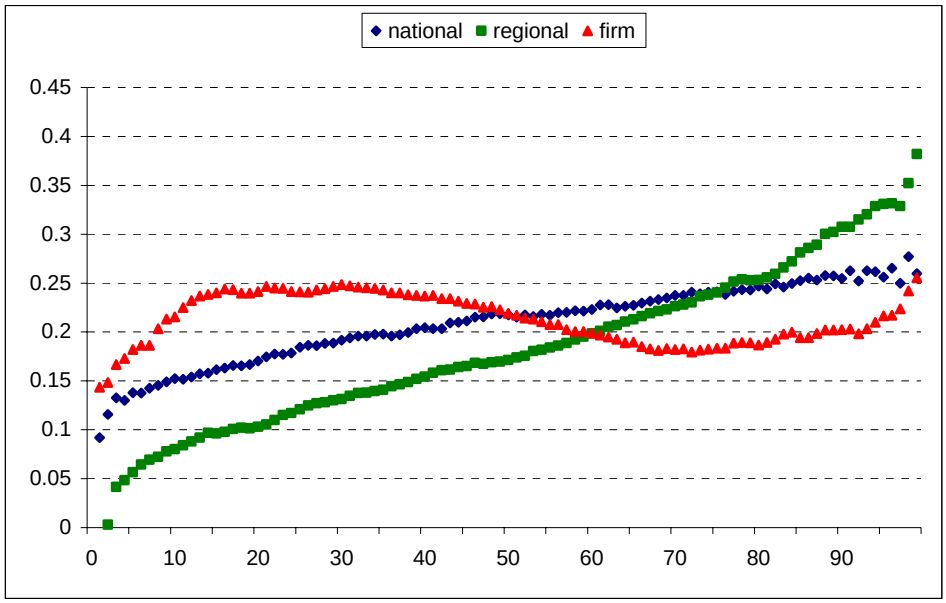
Alternatively, we can compare the wage distribution of men with the one that would arise if women had men's characteristics but were paid like women. The measure of discrimination would be:

$$\hat{D}_\theta = Q_\theta(X_{im}\hat{\beta}_{m\theta}) - Q_\theta(X_{im}\hat{\beta}_{f\theta}) \qquad (6)$$

Both measures yield similar results, so we will focus on the first definition of the coefficient of discrimination. In Figure 2 we show the evolution of the discriminatory component throughout the distribution of wages for the three bargaining regimes. In all cases the discriminatory component lies below the observed wage gap, as part of this gap is due to differences in characteristics. Under national agreements, most of the wage differential can be attributed to discrimination. It is only at the highest quantiles that differences in skills account for a larger portion of the wage gap. In this case, the discriminatory component increases very slowly over the wage distribution, going from 10% to 25% at the 80th percentile and then remaining rather stable over the rest of the distribution. For workers covered by regional agreements, differences in characteristics explain a larger proportion of the wage gap, especially at the very bottom of the distribution. The discriminatory component under this regime follows a more pronounced shape and increases over the whole distribution of wages, ranging from 10-15% at the lowest quantiles to 35% at the highest quantiles. The discriminatory component is lower under regional than under national agreements for low wage workers but the opposite pattern is observed at the top quantiles.

Figure 2: Distribution of the discriminatory component by bargainig level

$$\hat{D} = \hat{\beta}_m X_f - \hat{\beta}_f X_f$$



The most remarkable result is that for firm level agreements, where controlling by differences in characteristics considerably flattens the trend followed by the observed wage gap, with a variation ranging between 25% and 18%. As expected, unions seem to exert greater control over the whole distribution, and wage dispersion is therefore similar in both halves of the distribution and we do not observe a glass ceiling.

In summary, the discriminatory component of the wage gap follows an upward trend under more centralized bargaining, but not under firm level negotiation. Females at the bottom of the distribution are subject to lower wage discrimination when they are covered by national or regional agreements. On the contrary, women in the upper half of the wage distribution benefit more under firm level agreements.

6. Conclusions

In this paper we study the effect of collective bargaining on the gender wage gap in Spain. Given that bargaining can take place at three different levels, we analyze the evolution of the wage gap by negotiating level, using data from the Spanish Wage Structure Survey. Our main results can be summarised as follows:

1. Under national and regional agreements, the observed wage differential is greater for high salary workers but this is not the case under firm bargaining. This suggests the existence of a glass ceiling for women under more centralized wage setting. However, these wage differentials can be due, at least in part, to the fact that women are less productive than men. We thus control for differences in characteristics between both genders and analyze the discriminatory component of the wage gap at different points of the distribution.
2. Changes of the discriminatory component over the wage distribution resemble those observed for the unconditional wage gap, although they are smoother. For more centralized agreements the portion of the wage gap that is not explained by differences in characteristics follows an upward trend but it is more stable throughout the distribution under firm agreements.
3. It seems that women at the bottom of the wage distribution are subject to less discrimination when they are covered by national or regional agreements, while at the upper part of the distribution it is women under firm agreements that suffer less discrimination.

These results are consistent with the Median Voter Theorem: unions seem to be more concerned about workers at the bottom of the distribution (median voter), so wage compression is more effective there. Hence, the wage received is close to the agreed one, resulting in a smaller wage differential and lower discriminatory component. Conversely, the wage drift for high wage workers is more important, yielding greater wage gaps at the top of the distribution. On the other hand, when bargaining is conducted at the firm level unions have a greater control over the contracts signed and the reduction in wage dispersion is more effective over the whole distribution. Therefore, differences in the discriminatory component are not so important.

Statistical discrimination theories may provide an alternative explanation. As women have a higher propensity to quit their jobs, employers may pay them lower wages at the early stage of their career when this probability is even higher. This would result in larger wage gaps at the bottom of the distribution. As women acquire tenure at the firm, lowering the probability of quitting, their wages will increase and approach those of males and, hence, the gender wage gap will be reduced at the upper part of the distribution.

In order for this compensation system to work, there must be a mechanism ensuring that the employer complies with the contract. In firms with a strong union presence this mechanism can be more easily implemented, as unions constitute a guarantee for women not to be dismissed. This is the case of large firms, where bargaining is generally conducted at the company level. However,

at smaller firms, with more centralized pay determination and much weaker union presence, women are less protected from employers' decisions and this payment scheme is more difficult to implement.

Appendix

The Data

The Spanish Wage Structure Survey of 2002 provides information about 144739 salaried workers, 67% of which are men, which were employed on the 31st of October 2002. The survey gathers information on a number of workers' and firms' characteristics.

With respect to personal characteristics there is information on age, education, tenure and type of contract, which explain part of the process of wage formation. Variables referring to the firm, which may affect wages of all workers in a firm include sector of activity, geographical situation, scope of the market, size, ownership and type of collective agreement.

One of the main limitations of the survey is that it is restricted to firms that employ 10 or more workers, which represent about 12% of firms with salaried workers. Finally, due to anonymity requirements sector of activity of the firm is highly aggregated.

We have discarded individuals that reported zero base wage and those with the level of bargaining denominated "other".

The dependent variable is the monthly hourly wage (in logs), which is calculated by dividing the monthly wage by the number of hours worked in October. The guaranteed monthly wage is obtained as the sum of the base wage, payments for extraordinary hours and wage complements, which include seniority payments, pluses for activity, productivity, attendance, incentives, languages and qualifications, from which we deduct complements for shift work, work at the weekend or on holidays, and night work.

Descriptive statistics are shown in Tables 3a and b. As can be seen, most employees work full time, have an indefinite contract and work in the manufacturing sector. Only 30% are females and on average they are younger and have less tenure than men. However, the educational profile does not differ substantially between both groups of workers. The mean wage gap is 26% in favour of men.

From this brief description, we can perceive the existence of a certain segregation of women in Spain, both by sector of activity and by occupation, as manifested by their greater presence in the trade and services sectors. Furthermore, they have a higher propensity to work part time and to have temporary contracts. All this leads to women getting, on average, lower wages than men.

Table 3.a Descriptive Statisitcs-Women

	National Agreement		Regional Agreement		Firm Agreement	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Log hourly wage	1.736	0.455	1.627	0.363	1.961	0.491
Age	34.747	9.623	35.240	10.367	36.387	10.133
Human Capital						
Seniority	5.687	7.990	4.091	6.445	9.479	10.792
Education						
Primary	0.295	0.456	0.321	0.467	0.267	0.442
Secondary	0.145	0.352	0.110	0.313	0.125	0.331
FP1	0.063	0.244	0.065	0.247	0.087	0.282
FP2	0.081	0.272	0.075	0.263	0.110	0.313
3-year college	0.067	0.250	0.050	0.218	0.066	0.248
5-year college	0.127	0.334	0.058	0.234	0.144	0.351
Occupation						
Professional	0.047	0.212	0.030	0.170	0.102	0.303
Technician	0.193	0.395	0.115	0.319	0.248	0.432
Clerical workers	0.240	0.427	0.182	0.386	0.151	0.358
Service workers	0.083	0.275	0.214	0.410	0.133	0.340
Skilled 1	0.090	0.286	0.052	0.221	0.054	0.226
Skilled 2	0.228	0.420	0.120	0.326	0.236	0.425
Unskilled	0.105	0.306	0.280	0.449	0.059	0.236
Temporary	0.244	0.430	0.302	0.459	0.157	0.363
Part-time	0.158	0.365	0.243	0.429	0.082	0.275
Firm characteristics						
National market	0.654	0.476	0.382	0.486	0.647	0.478
EU market	0.140	0.347	0.162	0.369	0.269	0.444
Size of the firm						
20-49 workers	0.211	0.408	0.243	0.429	0.032	0.175
50-99 workers	0.124	0.330	0.127	0.333	0.069	0.253
100-199 workers	0.128	0.334	0.123	0.329	0.125	0.330
>200 workers	0.344	0.475	0.307	0.461	0.761	0.427
Sector of activity						
Construction	0.006	0.079	0.037	0.188	0.003	0.052
Trade	0.115	0.320	0.188	0.391	0.156	0.363
Hotels	0.022	0.147	0.187	0.390	0.025	0.155
Transportation	0.013	0.111	0.030	0.172	0.064	0.244
Financial services	0.123	0.329	0.000	0.021	0.040	0.196
Other services	0.134	0.340	0.187	0.390	0.046	0.209
No. of observations	15851		17664		4062	

Table 3.b Descriptive Statistics-Men

	National Agreement		Regional Agreement		Firm Agreement	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Log hourly wage	1.988	0.510	1.877	0.433	2.265	0.447
Age	38.049	10.862	37.169	11.142	41.768	11.168
Human Capital						
Seniority	7.851	9.310	5.449	7.993	13.734	11.478
Education						
Primary	0.328	0.469	0.336	0.472	0.215	0.411
Secondary	0.121	0.327	0.072	0.258	0.082	0.275
FP1	0.054	0.225	0.059	0.235	0.107	0.309
FP2	0.079	0.270	0.088	0.284	0.181	0.385
3-year college	0.057	0.232	0.041	0.198	0.063	0.242
5-year college	0.097	0.296	0.041	0.199	0.090	0.286
Occupation						
Professional	0.054	0.226	0.041	0.197	0.090	0.287
Technician	0.174	0.379	0.094	0.292	0.167	0.373
Clerical workers	0.097	0.295	0.053	0.225	0.056	0.229
Service workers	0.055	0.228	0.064	0.245	0.027	0.162
Skilled 1	0.192	0.394	0.364	0.476	0.198	0.398
Skilled 2	0.291	0.454	0.267	0.442	0.399	0.490
Unskilled	0.092	0.289	0.118	0.323	0.040	0.195
Temporary	0.172	0.378	0.321	0.467	0.097	0.296
Part-time	0.032	0.176	0.026	0.158	0.019	0.137
Firm characteristics						
National market	0.577	0.494	0.405	0.491	0.526	0.499
EU market	0.147	0.354	0.137	0.344	0.389	0.488
Size of the firm						
20-49 workers	0.248	0.432	0.302	0.459	0.042	0.201
50-99 workers	0.146	0.353	0.167	0.373	0.089	0.285
100-199 workers	0.129	0.335	0.119	0.324	0.159	0.366
>200 workers	0.270	0.444	0.164	0.370	0.695	0.460
Sector of activity						
Construction	0.047	0.211	0.196	0.397	0.006	0.074
Trade	0.066	0.249	0.093	0.290	0.028	0.164
Hotels	0.012	0.111	0.060	0.237	0.006	0.076
Transportation	0.014	0.118	0.054	0.227	0.072	0.259
Financial services	0.126	0.331	0.000	0.016	0.013	0.113
Other services	0.084	0.278	0.035	0.185	0.021	0.142
No. of observations	30540		45543		14763	

Table 4. Quantile Wage Regressions by gender for National Agreements

	10th percentile		25th percentile		50th percentile		75th percentile		90th percentile	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Age	0.016	0.015	0.014	0.012	0.012	0.013	0.013	0.017	0.018	0.018
	(8.66)	(5.54)	(9.62)	(5.97)	(8.37)	(6.12)	(6.99)	(7.97)	(5.88)	(6.74)
Age square	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(6.56)	(4.38)	(6.87)	(4.55)	(4.77)	(4.70)	(2.48)	(5.82)	(2.21)	(4.64)
Seniority	0.018	0.015	0.019	0.017	0.022	0.016	0.022	0.023	0.022	0.026
	(16.27)	(10.10)	(20.22)	(13.05)	(27.14)	(10.93)	(18.53)	(12.70)	(10.97)	(11.04)
Seniority	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.001	-0.001
square	(7.14)	(4.59)	(10.79)	(5.89)	(15.96)	(4.73)	(13.65)	(7.07)	(7.48)	(6.64)
Primary	0.015	0.032	0.009	0.030	0.000	0.030	0.000	0.020	-0.005	0.021
	(2.11)	(3.83)	(2.17)	(4.52)	(0.02)	(4.92)	(0.05)	(2.52)	(0.49)	(2.13)
Secondary	0.079	0.086	0.083	0.082	0.096	0.107	0.145	0.136	0.155	0.144
	(8.44)	(7.19)	(8.16)	(8.04)	(12.67)	(9.22)	(11.99)	(11.15)	(8.33)	(9.30)
FP1	0.074	0.058	0.077	0.068	0.084	0.084	0.101	0.091	0.089	0.076
	(6.88)	(3.11)	(8.38)	(4.58)	(9.30)	(7.39)	(10.14)	(5.22)	(4.93)	(4.16)
FP2	0.096	0.101	0.104	0.095	0.099	0.115	0.132	0.131	0.112	0.124
	(8.86)	(6.31)	(13.59)	(7.47)	(10.41)	(8.58)	(10.42)	(8.84)	(6.97)	(5.90)
3-year	0.091	0.124	0.125	0.124	0.147	0.151	0.178	0.221	0.151	0.249
college	(5.45)	(6.76)	(7.64)	(8.86)	(9.23)	(10.06)	(10.53)	(10.18)	(7.01)	(10.91)
5-year	0.142	0.205	0.182	0.210	0.262	0.256	0.325	0.347	0.346	0.423
college	(7.82)	(11.83)	(11.26)	(14.58)	(17.40)	(16.15)	(17.84)	(16.43)	(16.67)	(14.17)
Temporary	-0.044	-0.060	-0.046	-0.043	-0.036	-0.053	-0.051	-0.057	-0.044	-0.073
	(5.78)	(5.43)	(7.08)	(6.31)	(6.16)	(8.18)	(7.55)	(7.18)	(3.78)	(7.19)
Part-time	-0.157	0.003	-0.092	0.013	-0.008	0.019	0.107	0.040	0.171	0.070
	(9.63)	(0.29)	(5.41)	(1.62)	(0.35)	(2.28)	(4.26)	(3.22)	(5.38)	(3.75)
National	0.019	0.031	0.023	0.028	0.026	0.037	0.039	0.057	0.038	0.060
market	(2.60)	(3.08)	(3.96)	(3.87)	(4.60)	(6.33)	(5.15)	(6.79)	(4.15)	(4.56)
UE market	0.067	0.062	0.061	0.070	0.043	0.084	0.052	0.102	0.042	0.101
	(6.73)	(3.97)	(8.38)	(6.81)	(5.82)	(10.06)	(5.07)	(8.31)	(2.90)	(6.54)
Professional	-0.102	-0.164	-0.101	-0.228	-0.176	-0.323	-0.280	-0.392	-0.275	-0.469
	(4.02)	(3.06)	(3.88)	(4.69)	(8.47)	(5.44)	(11.94)	(8.26)	(10.28)	(4.89)
Technician	-0.326	-0.358	-0.346	-0.431	-0.400	-0.563	-0.458	-0.584	-0.446	-0.593
	(17.94)	(7.48)	(19.03)	(9.70)	(25.35)	(9.59)	(21.46)	(13.02)	(22.46)	(6.73)
Clerical	-0.479	-0.506	-0.520	-0.604	-0.630	-0.763	-0.722	-0.822	-0.759	-0.847
workers	(25.26)	(10.58)	(28.99)	(13.76)	(36.63)	(13.15)	(33.57)	(18.55)	(32.33)	(9.81)
Services	-0.458	-0.528	-0.506	-0.638	-0.640	-0.733	-0.741	-0.617	-0.754	-0.668
	(20.38)	(10.65)	(25.14)	(14.46)	(27.57)	(12.41)	(25.70)	(12.48)	(20.96)	(7.62)
Skilled 1	-0.476	-0.587	-0.528	-0.705	-0.665	-0.838	-0.787	-0.887	-0.833	-0.929
	(25.96)	(11.92)	(26.10)	(16.10)	(36.89)	(14.18)	(34.88)	(19.16)	(36.39)	(10.86)
Skilled 2	-0.498	-0.578	-0.553	-0.723	-0.686	-0.875	-0.828	-0.913	-0.904	-0.970
	(26.13)	(11.74)	(27.95)	(16.49)	(39.97)	(14.95)	(37.25)	(19.79)	(40.30)	(11.31)
Unskilled	-0.567	-0.630	-0.614	-0.712	-0.739	-0.838	-0.876	-0.889	-0.967	-0.918
	(26.49)	(12.27)	(29.93)	(16.19)	(36.94)	(14.00)	(38.86)	(19.18)	(42.07)	(10.83)
20-49	0.032	0.025	0.036	0.024	0.040	0.024	0.043	0.026	0.049	0.032
workers	(3.90)	(2.61)	(7.15)	(3.05)	(7.39)	(3.45)	(6.33)	(3.03)	(4.07)	(2.36)
50-99	0.079	0.065	0.078	0.070	0.090	0.074	0.098	0.092	0.099	0.113
workers	(8.17)	(5.23)	(11.91)	(6.84)	(11.72)	(8.62)	(12.11)	(9.23)	(7.24)	(7.13)
100-199	0.135	0.084	0.134	0.087	0.155	0.090	0.159	0.096	0.156	0.120
workers	(12.88)	(7.77)	(17.96)	(7.90)	(20.06)	(10.42)	(16.57)	(7.28)	(10.45)	(8.41)
>200	0.146	0.101	0.154	0.133	0.192	0.154	0.189	0.191	0.174	0.199
workers	(14.35)	(7.63)	(19.05)	(13.05)	(25.24)	(16.44)	(19.92)	(16.97)	(12.42)	(13.08)
Constant	1.410	1.380	1.639	1.648	1.897	1.871	2.149	1.926	2.274	2.098
	(40.24)	(20.06)	(43.38)	(29.77)	(53.22)	(25.45)	(53.65)	(29.52)	(35.37)	(22.08)
Observations	30540	15851	30540	15851	30540	15851	30540	15851	30540	15851
Pseudo R^2	0.26	0.22	0.30	0.27	0.36	0.33	0.39	0.38	0.39	0.39

Note: Standard errors are in parenthesis. Dummy variables for region and sector are also included.

Table 5. Quantile Wage Regressions by gender for Regional Agreements

	10th percentile		25th percentile		50th percentile		75th percentile		90th percentile	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Age	0.015	0.016	0.012	0.013	0.012	0.012	0.018	0.012	0.023	0.011
	(10.72)	(6.81)	(13.30)	(10.29)	(13.54)	(10.64)	(17.10)	(7.89)	(12.09)	(3.91)
Age square	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(8.23)	(6.04)	(9.41)	(9.38)	(8.80)	(9.89)	(11.67)	(6.47)	(7.66)	(2.80)
Seniority	0.014	0.010	0.015	0.012	0.018	0.015	0.019	0.019	0.016	0.022
	(15.65)	(5.43)	(22.19)	(11.13)	(22.90)	(16.01)	(19.05)	(15.56)	(9.92)	(8.08)
Seniority	-0.000	0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
square	(5.90)	(0.29)	(8.92)	(0.36)	(11.09)	(3.60)	(10.73)	(5.10)	(5.49)	(4.68)
Primary	0.011	-0.016	0.017	-0.015	0.006	0.006	0.003	0.005	-0.003	0.001
	(2.40)	(2.00)	(6.23)	(2.63)	(1.89)	(1.28)	(0.65)	(0.97)	(0.43)	(0.08)
Secondary	0.031	0.024	0.042	0.037	0.064	0.066	0.115	0.080	0.159	0.079
	(3.99)	(2.10)	(7.76)	(4.33)	(8.08)	(8.79)	(9.07)	(7.10)	(10.34)	(4.68)
FP1	0.048	0.024	0.054	0.041	0.063	0.049	0.057	0.043	0.037	0.034
	(5.46)	(1.39)	(8.89)	(3.45)	(9.57)	(5.11)	(8.26)	(4.23)	(2.91)	(1.67)
FP2	0.084	0.033	0.084	0.052	0.088	0.068	0.093	0.068	0.098	0.062
	(10.85)	(2.22)	(14.37)	(4.95)	(12.94)	(6.37)	(11.03)	(6.79)	(7.46)	(2.39)
3-year	0.053	0.054	0.058	0.060	0.101	0.096	0.155	0.079	0.181	0.079
collage	(3.28)	(2.42)	(3.98)	(4.74)	(5.96)	(8.22)	(8.21)	(5.39)	(7.33)	(2.95)
5-year	0.122	0.087	0.142	0.106	0.214	0.159	0.296	0.209	0.370	0.306
collage	(8.31)	(3.56)	(8.41)	(7.85)	(9.99)	(7.92)	(12.13)	(10.12)	(13.69)	(6.75)
Temporary	-0.028	-0.027	-0.020	-0.015	-0.018	-0.010	-0.024	-0.011	-0.044	-0.024
	(5.36)	(3.59)	(5.35)	(3.36)	(4.49)	(2.05)	(4.45)	(1.92)	(4.86)	(2.36)
Part-time	-0.146	-0.021	-0.095	-0.002	-0.075	0.006	-0.039	0.016	0.042	0.063
	(7.85)	(2.30)	(8.57)	(0.44)	(8.02)	(1.03)	(3.00)	(2.49)	(1.35)	(4.63)
National	0.030	0.026	0.025	0.035	0.023	0.055	0.031	0.077	0.053	0.124
market	(6.54)	(2.83)	(7.06)	(6.78)	(6.34)	(9.79)	(6.22)	(11.08)	(6.77)	(11.80)
UE market	0.092	0.132	0.089	0.153	0.079	0.173	0.082	0.177	0.064	0.195
	(13.82)	(10.63)	(17.64)	(17.84)	(11.79)	(23.16)	(10.89)	(18.41)	(5.13)	(14.09)
Professional	-0.155	-0.041	-0.183	-0.064	-0.282	-0.132	-0.349	-0.156	-0.397	-0.270
	(4.64)	(0.74)	(7.22)	(0.87)	(8.67)	(2.51)	(11.04)	(2.33)	(10.82)	(3.26)
Technician	-0.359	-0.228	-0.432	-0.269	-0.505	-0.378	-0.511	-0.456	-0.497	-0.478
	(12.67)	(4.46)	(17.07)	(3.82)	(16.02)	(7.20)	(15.78)	(7.22)	(14.59)	(5.60)
Clerical	-0.515	-0.384	-0.625	-0.444	-0.771	-0.585	-0.857	-0.730	-0.888	-0.826
workers	(19.14)	(7.72)	(24.79)	(6.24)	(24.18)	(11.39)	(25.49)	(11.82)	(23.71)	(10.06)
Services	-0.540	-0.421	-0.633	-0.477	-0.791	-0.610	-0.852	-0.763	-0.838	-0.866
	(19.82)	(8.24)	(23.67)	(6.64)	(23.55)	(11.81)	(26.00)	(12.23)	(20.91)	(10.36)
Skilled 1	-0.462	-0.438	-0.580	-0.483	-0.733	-0.597	-0.821	-0.767	-0.852	-0.910
	(16.80)	(8.57)	(23.69)	(6.70)	(22.73)	(11.21)	(24.78)	(12.20)	(23.69)	(11.08)
Skilled 2	-0.489	-0.412	-0.601	-0.466	-0.760	-0.615	-0.854	-0.769	-0.896	-0.916
	(18.19)	(8.03)	(24.55)	(6.72)	(23.27)	(11.51)	(25.97)	(12.14)	(24.90)	(11.02)
Unskilled	-0.591	-0.460	-0.683	-0.505	-0.831	-0.656	-0.944	-0.837	-1.023	-0.988
	(20.99)	(9.07)	(25.95)	(7.08)	(25.21)	(12.64)	(27.99)	(13.49)	(26.84)	(12.10)
20-49	0.016	0.016	0.026	0.009	0.037	0.019	0.051	0.021	0.061	0.039
workers	(3.22)	(1.75)	(7.20)	(1.28)	(10.39)	(3.48)	(10.68)	(3.21)	(7.27)	(2.86)
50-99	0.055	0.030	0.064	0.019	0.093	0.039	0.132	0.065	0.157	0.083
workers	(9.21)	(2.69)	(14.39)	(2.11)	(19.43)	(5.31)	(17.88)	(7.26)	(13.96)	(6.09)
100-199	0.095	0.076	0.105	0.058	0.127	0.050	0.161	0.067	0.180	0.090
workers	(13.93)	(6.28)	(19.44)	(7.51)	(23.57)	(6.27)	(16.95)	(6.94)	(14.19)	(6.11)
>200	0.108	0.030	0.123	0.030	0.159	0.036	0.185	0.059	0.202	0.089
workers	(15.31)	(2.68)	(20.58)	(3.95)	(28.65)	(4.91)	(21.75)	(6.56)	(17.86)	(5.47)
Constant	1.470	1.272	1.762	1.489	2.029	1.755	2.128	2.022	2.238	2.273
	(38.76)	(20.00)	(54.53)	(19.53)	(52.84)	(30.23)	(53.38)	(28.60)	(41.13)	(21.86)
Observations	45543	17664	45543	17664	45543	17664	45543	17664	45543	17664
Pseudo R^2	0.20	0.17	0.24	0.21	0.29	0.26	0.32	0.31	0.34	0.32

Note: Standard errors are in parenthesis. Dummy variables for region and sector are also included.

Table 6. Quantile Wage Regressions by gender for Firm Agreements

	10th percentile		25th percentile		50th percentile		75th percentile		90th percentile	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Age	0.017	0.011	0.018	0.012	0.021	0.017	0.023	0.033	0.028	0.020
	(6.39)	(2.08)	(6.13)	(2.36)	(9.72)	(3.27)	(8.55)	(5.93)	(7.62)	(2.61)
Age square	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(4.84)	(1.42)	(4.14)	(1.68)	(6.62)	(2.05)	(5.74)	(4.44)	(5.32)	(1.41)
Seniority	0.026	0.031	0.022	0.026	0.021	0.025	0.017	0.024	0.016	0.023
	(16.04)	(10.57)	(15.37)	(9.19)	(15.36)	(8.25)	(10.60)	(8.57)	(8.13)	(6.12)
Seniority	-0.001	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
square	(11.50)	(5.97)	(10.12)	(4.52)	(11.77)	(5.35)	(7.57)	(5.34)	(5.62)	(4.14)
Primary	0.059	0.042	0.052	0.011	0.053	-0.006	0.038	-0.020	0.031	0.009
	(5.56)	(1.65)	(5.36)	(0.52)	(6.41)	(0.31)	(4.13)	(1.06)	(2.24)	(0.36)
Secondary	0.105	0.125	0.098	0.099	0.108	0.086	0.102	0.056	0.116	0.097
	(6.87)	(3.97)	(7.43)	(3.80)	(9.71)	(3.00)	(6.57)	(2.32)	(5.53)	(3.34)
FP1	0.097	0.059	0.105	0.066	0.109	0.040	0.105	0.045	0.094	0.082
	(8.03)	(1.54)	(10.11)	(2.21)	(9.93)	(1.73)	(9.02)	(1.43)	(5.49)	(2.58)
FP2	0.129	0.132	0.142	0.097	0.141	0.106	0.125	0.119	0.127	0.143
	(10.55)	(4.27)	(13.21)	(3.53)	(16.82)	(3.76)	(12.12)	(3.93)	(8.19)	(4.18)
3-year	0.160	0.139	0.204	0.113	0.193	0.153	0.171	0.178	0.202	0.219
college	(6.73)	(2.87)	(10.15)	(3.11)	(10.69)	(3.93)	(8.17)	(5.46)	(6.44)	(3.94)
5-year	0.225	0.257	0.270	0.239	0.319	0.246	0.331	0.267	0.383	0.267
college	(8.41)	(4.70)	(13.26)	(7.61)	(15.59)	(6.00)	(13.93)	(6.80)	(12.23)	(4.74)
Temporary	-0.073	-0.017	-0.062	-0.055	-0.039	-0.064	-0.028	-0.037	-0.028	-0.070
	(4.07)	(0.85)	(4.48)	(3.16)	(3.42)	(3.74)	(2.34)	(1.63)	(1.72)	(2.38)
Part-time	-0.177	-0.099	-0.166	-0.107	0.010	-0.085	0.066	-0.029	0.169	0.023
	(4.38)	(3.73)	(4.05)	(4.86)	(0.29)	(3.51)	(1.78)	(0.94)	(4.17)	(0.58)
National	0.178	0.143	0.105	0.166	0.063	0.070	0.003	0.049	0.009	0.034
market	(5.98)	(2.15)	(5.62)	(5.20)	(3.14)	(2.14)	(0.13)	(1.30)	(0.42)	(0.85)
UE market	0.241	0.236	0.147	0.261	0.079	0.133	0.013	0.069	0.035	0.061
	(7.61)	(3.54)	(7.19)	(7.72)	(3.77)	(3.74)	(0.64)	(1.73)	(1.59)	(1.61)
Professional	-0.176	-0.231	-0.244	-0.240	-0.331	-0.267	-0.335	-0.220	-0.420	-0.501
	(5.92)	(2.23)	(6.59)	(5.04)	(12.13)	(3.35)	(8.81)	(2.04)	(9.39)	(3.98)
Technician	-0.380	-0.492	-0.426	-0.474	-0.513	-0.488	-0.537	-0.478	-0.609	-0.759
	(13.55)	(5.25)	(11.85)	(10.90)	(17.25)	(6.06)	(13.20)	(4.48)	(13.86)	(5.98)
Clerical	-0.550	-0.644	-0.619	-0.676	-0.751	-0.718	-0.811	-0.673	-0.911	-0.938
workers	(16.25)	(7.02)	(15.25)	(14.90)	(25.51)	(8.88)	(18.48)	(6.30)	(17.81)	(7.08)
Services	-0.594	-0.614	-0.680	-0.656	-0.794	-0.689	-0.840	-0.686	-0.890	-1.076
	(14.31)	(6.35)	(16.34)	(13.02)	(19.70)	(8.68)	(15.46)	(5.98)	(13.39)	(7.48)
Skilled 1	-0.506	-0.791	-0.577	-0.746	-0.706	-0.733	-0.794	-0.759	-0.893	-1.024
	(17.01)	(7.19)	(15.48)	(14.80)	(24.17)	(9.12)	(19.24)	(6.41)	(18.79)	(8.06)
Skilled 2	-0.577	-0.741	-0.618	-0.752	-0.729	-0.733	-0.806	-0.717	-0.896	-1.002
	(19.54)	(7.86)	(16.12)	(17.26)	(24.64)	(9.11)	(19.12)	(6.53)	(18.96)	(7.58)
Unskilled	-0.720	-0.810	-0.706	-0.765	-0.834	-0.791	-0.916	-0.759	-1.013	-1.027
	(17.19)	(8.31)	(16.57)	(15.00)	(27.84)	(9.47)	(21.11)	(7.02)	(20.69)	(7.78)
20-49	0.161	-0.077	0.149	0.002	0.040	-0.020	0.005	-0.042	-0.012	0.041
workers	(2.07)	(0.61)	(3.84)	(0.02)	(1.05)	(0.28)	(0.08)	(0.66)	(0.28)	(0.50)
50-99	0.286	0.069	0.209	0.025	0.097	0.031	0.051	0.053	0.007	0.142
workers	(4.10)	(0.74)	(5.80)	(0.40)	(2.69)	(0.52)	(0.77)	(0.88)	(0.16)	(2.12)
100-199	0.272	0.051	0.198	0.034	0.099	0.053	0.042	0.067	-0.033	0.177
workers	(3.83)	(0.57)	(5.37)	(0.53)	(2.64)	(0.91)	(0.65)	(1.18)	(0.89)	(2.46)
>200	0.366	0.173	0.285	0.108	0.171	0.139	0.101	0.147	0.012	0.232
workers	(5.24)	(1.93)	(7.83)	(1.67)	(4.66)	(2.57)	(1.55)	(2.63)	(0.36)	(3.59)
Constant	1.194	1.398	1.505	1.597	1.878	1.744	2.199	1.660	2.469	2.204
	(14.97)	(8.26)	(20.09)	(11.99)	(27.22)	(13.18)	(24.36)	(11.36)	(26.66)	(10.85)
Observations	14763	4062	14763	4062	14763	4062	14763	4062	14763	4062
Pseudo R^2	0.33	0.36	0.31	0.40	0.32	0.41	0.34	0.39	0.37	0.39

Note: Standard errors are in parenthesis. Dummy variables for region and sector are also included.

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