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ABSTRACT

Differential Patterns between Private and Public Sector Wages in Spain*

This paper studies the wage differentials between the public and private sectors in Spain, as well as its distribution across different educational levels and by gender. To do so, the well-known Oaxaca-Blinder decomposition of mincerian wage regressions is applied for both sectors, breaking down the (public-private) wage gap into a component explained by differences in characteristics and another one capturing differences in returns to those characteristics. Data is drawn from the Wage Structure Survey by INE for 2010, 2014 and 2018. The main findings are: (i) strong wage compression by skills for all workers, and (ii) a female wage premium in the private sector. Both empirical results are rationalised by means of a monopoly-union wage model with monopsonistic features and female statistical discrimination.

JEL Classification: J31, J38, J42, J45

Keywords: public sector, private sector, public-private wage gap, monopsony, unions

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1. INTRODUCTION

Public sector employees represent between 15% and 20% of overall salaried employment in most high-income economies. This makes the public sector the largest employer in most countries, playing a very influential role in their labour markets. Public jobs differ from jobs in the private sector both by the nature of the work performed (since the public sector is the only provider of certain goods and services), and by its working conditions. Hence, the public sector enjoys a position of monopolist in the market for some goods and services and in turn often becomes a bilateral monopsony in a segment of the labour market with a strong union establishment. As a result, the public sector has its own wage-setting mechanisms and recruitment/ staff selection procedures for its employees.

Public employees exhibit very heterogeneous characteristics, which contrast with the distribution of employees in the private sector. Some highly relevant factors are related to their gender, age or the educational attainments. The wage distribution in the public sector also differs from the corresponding distribution in the private sector. A stylized fact in most developed countries is that public sector wages are compressed across different levels of education. In effect, wages of less-skilled employees are relatively higher than in the private sector while the opposite holds among high-skilled employees. This implies that the wage gap between the public and private sectors is not homogeneous across all workers, being rather differently distributed according to their level of human capital.

The goal of this paper is to estimate the wage differential between the public and private sectors in Spain (hereafter, the public-private wage gap), which is left unexplained after controlling for differences in workers´ observable characteristics. In addition, as a by-product of our analysis, we also look at how wage- gap patterns by education differ by gender. This is an interesting issue since, while the presence of an unfavourable pay gap for women in the private sector is a well-documented phenomenon, the prevailing regulations in the public sector often imply equality in pay and similar conditions to access vacant positions for men and women.[1]

Our main findings can be summarised as follows. We document (i) a wage gap of about 6 points on average in favour of the public sector which is not explained by differences in productivity, (ii) wage compression, with a positive (resp. negative) gap for public employees with less (resp. higher) qualifications, and (iii) a wage premium for women working in the public sector.

The rest of the paper is organized as follows. Section 2 reviews the existing literature on the differences in employment and wages between both sectors. Section 3 is devoted to describe some of the main statistics on public-sector employment in Spain and the data source on wages by sector used in the empirical sections. Section 4 presents the empirical strategy. Section 5 reports the main results. Sections 6 rationalizes the main findings on the basis of a monopoly union model with monopsonistic features. Finally, Section 5 concludes.

2. RELATED LITERATURE

As it is conventional, standard models under perfect competition have addressed the determination of the level of employment and wages as the result of equilibrium between labour supply and demand. In this context, the "wage equals the marginal productivity of workers" is an optimal market allocation mechanism. However, the behaviour of the

[1] See Amuedo-Dorantes and De la Rica (2006) for a review of the literature focusing on Spain.

public sector does not conform to these assumptions. On the one hand, in many economic activities in which the public sector participates, it turns out to be the only employer in the market, moving closer to a situation of monopsony, offset by a strong union presence. Indeed, as the Public Administrations (*Administraciones Públicas* or A.A.P.P in short) is the one that decides how much public employment is offered and at what level wages are set, these outcomes are no longer the result of a competitive equilibrium. On the other hand, unlike what happens under perfect competition, most of the goods and services produced by the public sector are not sold in competitive markets, making the measurement the real marginal productivity of public workers difficult. Moreover, a large part of public employment does not adjust to business cycle fluctuations. The reason is that, in many instances, changes in the level of employment and public wages tend to respond to political reasons, rather than economic ones, therefore differing quite a lot from the remaining spending expenditure items of the A.A.P.P. Consequently, the literature on this topic often agrees that the public sector has its own wage adjustment mechanism that generally does not respond to the cyclical phases and to market equilibrium forces in such situations.

Public and private wages may differ for multiple reasons, among which differences in workers´ socioeconomic characteristics in each of the two sectors stand out. In effect, factors such as education, experience, gender or age of the workers differ between the two sectors, thus generating a high degree of heterogeneity.

A stylized fact that has been studied extensively in previous economic research is the compression of public wages along the wage and the skill / qualification distributions. As regards low-wage jobs, usually held by less-skilled individuals, the public-private wage gap is found to be positive in most countries. On the contrary, a negative wage gap (i.e. higher salaries in the private sector) is observed among the best-paid positions in the public sector, generally held by workers with higher education. Borjas (2002) examines the difference in the trends of the public-private wage gap for workers with different skills in the U.S. during 1960-2000. He estimates the wage gap by means of the coefficient of an indicator variable of whether the individual works in the public sector. By finding a growing compression of public wages from the 1970s onwards and a persistent change in the flows of workers between sectors, this study documents the increasing difficulty of the U.S. public sector to attract and retain most-qualified workers. As regards the European Union (EU) countries, Campos and Centeno (2012) also conclude that the public-private wage gap narrows along the distribution of skills over the period prior to the adoption of the euro. They claim that the public sector attracts the best-qualified individuals for jobs at the bottom of the wage distribution (over-education), but fails to retain the most skilled workers in the best-paying jobs. Using a similar approach, Giordano et al. (2011) argue that the public-private wage gap is greater in countries such as Spain, Italy, Greece, Portugal or Ireland compared to Germany, Austria, France or Belgium. In other studies--, such as Depalo, Giordano and Papapetrou (2015), Castro, Salto and Steiner (2013) or Christofides and Michael (2013),-- standard Oaxaca-Blinder decomposition methods are used to quantify the public-private wage differential in several European countries. The common conclusion reached by these studies is that the public-private wage gap varies significantly among countries: while in the Nordic countries the gap is either very low or even negative, southern European countries (such as Spain, Portugal or Italy) exhibit much higher differences.

Another salient feature reported in the previous literature is the high representation of women in the public sector. In this vein, Garibaldi and Gomes (2020) and Garibaldi, Gomes and Sopreseuth (2021) analyse the heterogeneity of public employment in different EU countries and U.S. states, concluding that the share of women in the public sector in 20 OECD countries is higher than their corresponding share in total employment. Furthermore, in most of the countries under consideration, more than half of public employees are women. Despite the high weight of female employment in the public sector, there are not many studies trying to explain this fact. In one of them, De la Rica, Dolado and Llorens (2007) argue that unemployed or inactive women are much more likely to seek public jobs than men in the same situation, given their stronger expectations of being discriminated against in the private sector because of their greater job instability, especially when they are in fertility age. Gomes and Kuehn (2019) try to explain the overrepresentation of women in the public sector through a search and matching model. They argue that this phenomenon in the public sector is not due to a high demand for women by the A.A.P.P, but rather to a greater supply of women who choose to work in the public sector compared to men. These authors conclude that women value more the compensation offered by the public sector in the form of reconciling personal and professional lives, in addition to proving more protection against discrimination. In the case of men, they value more the job stability provided by public jobs, since their opportunity cost of not working is usually higher than that of women due to the "social norms" that give the latter a preponderant role in household chores.

Note that the existence of a positive public-private wage gap goes against the theory of compensatory differentials, which predicts that, *ceteris paribus*, jobs with higher risk or fewer comforts should be compensated with higher pay. The available evidence has shown that public jobs are more stable than jobs in the private sector, where there is a higher risk of dismissal. Fontaine, Gálvez-Iniesta, Gomes, Vila-Martín (2020) study the labour market flows between the public and private sectors for the U.S, U.K., Spain and France. These authors report the existence of lower turnover (between 30% and 50% less) in the public sector, a higher probability (three times higher) of dismissal in the private sector and a lower probability (2-3%) that the unemployed find jobs in the public sector than in the private sector (20%). Gomes (2014) suggests that, due to greater job security in the public sector and its lower rate of job destruction, the wage differential should be approximately 2.5% higher in the private sector.

Some authors have analysed the role that public wages play as a decision variable to maximize political support. For example, Alesina, Baqir and Easterly (2000) argue that governments may ignore efficiency criteria for determining public wages and employment and instead often choose to divert them towards influential minorities and political groups. In the same vein, Borjas (1980, 1984) claims that wage increases in federal agencies are between 2% and 3% higher in election years. In sum, the most important takeaway from this strand of the literature is that wage gaps in favour of the public sector could be explained by resorting to variables that measure the political power of state agencies. In particular, employees of agencies with small, well-organized interest groups, and with bureaucracies that apparently share common interests, tend to receive higher pay.

3. DATA SOURCES

First, a brief summary of the main statistics on the public sector available in Spain is provided to understand its employment structure. First, we use the data provided by the Spanish Labour Force Survey (*Encuesta de Población Activa*- EPA) for the first quarter (Q1) of 2021 to illustrate its current characteristics. Its sample size is 3,822 census tracts, which represents approximately 65,000 dwellings and covers 160,000 people.[2] Public employees in Spain represent 17.7% (rep. 21.1%) of total (resp. salaried) employment. During the last decade, the highest percentage has been 18% in 2012, while the lowest was 15.9% in 2017.[3]

The first relevant feature to notice is the overrepresentation of women in the public sector. As shown in Figure 1, while women only represent 46% of total employment, the percentage of women employed by the public sector reaches 58%. As mentioned earlier, this stylised fact could be explained by the stronger preferences of women for jobs that facilitates reconciliation of their private and professional lives. In addition, the existing gender wage gap in the private sector can also be a relevant driver that pushes women to opt for public-sector jobs more often. The absence of statistical discrimination or prejudice in public selection processes may be behind women´s preferences for these positions since, as argued before, there is ample evidence in favour of female discrimination in the private sector, especially among women in fertility ages.

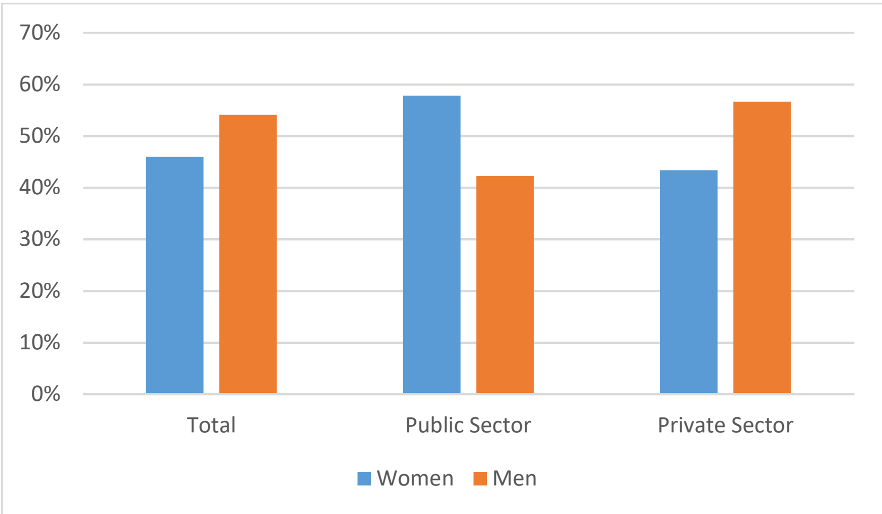
Another salient characteristic of the public sector is the overrepresentation of high-skilled individuals vis-á-vis the private sector. As shown in Figure 2, 61% of public sector employees in Spain have a higher education degree (defined as having completed

[2] The EPA defines employed workers as individuals over 16 years of age who. during the reference week, have worked for at least one hour in exchange for some type of remuneration. In turn, the employed are divided into self-employed and salaried workers/employees (public or private).

[3] During the pandemic, public employment has increased by 230 thousand. Yet, its share of salaried employment fell to 20.6% by 2021-Q3, following the recovery of private-sector employment thanks to the implementation of furlough/ short-time work (ERTE) schemes.

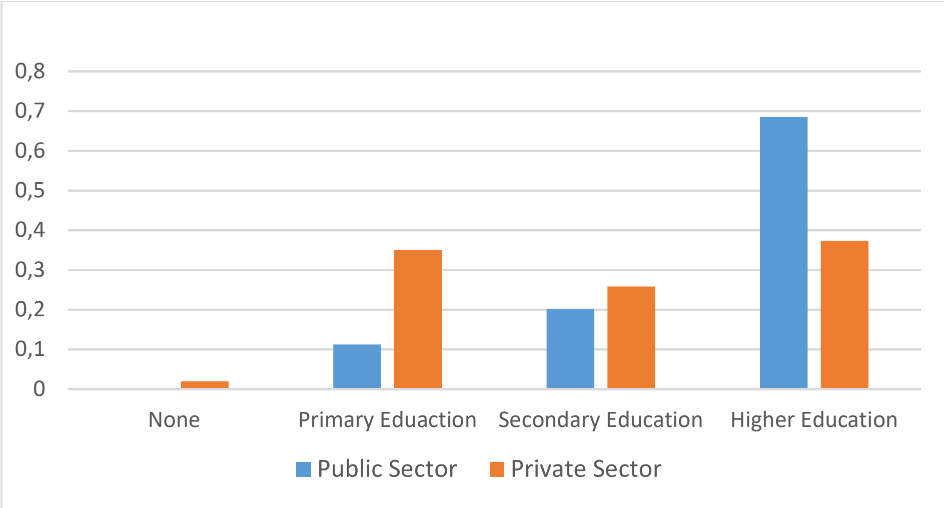
a college or higher degree) compared to 30% in the private sector. Those with secondary education represent 20% of all public employees, while individuals without any training barely reach 1%. Garibaldi, Gomes, and Sopraseuth (2019) offer three possible explanations for why public employment is skewed towards high- skilled workers. The first one is that governments establish high minimum training requirements because they seek to hire better inputs for the production of public goods and services. The second reason is that, in a setup where public wages are compressed along the distribution of education, the government will prefer to hire more qualified individuals since they are relatively cheaper. This is due to the fact that, if the wages of low-skilled public jobs are relatively high, then there will be many more qualified individuals willing to apply for these jobs in countries where there is overqualification.

Figure 1. Employment distribution by gender: aggregate, public and private sectors.



Note: Source: EPA (Q-I)

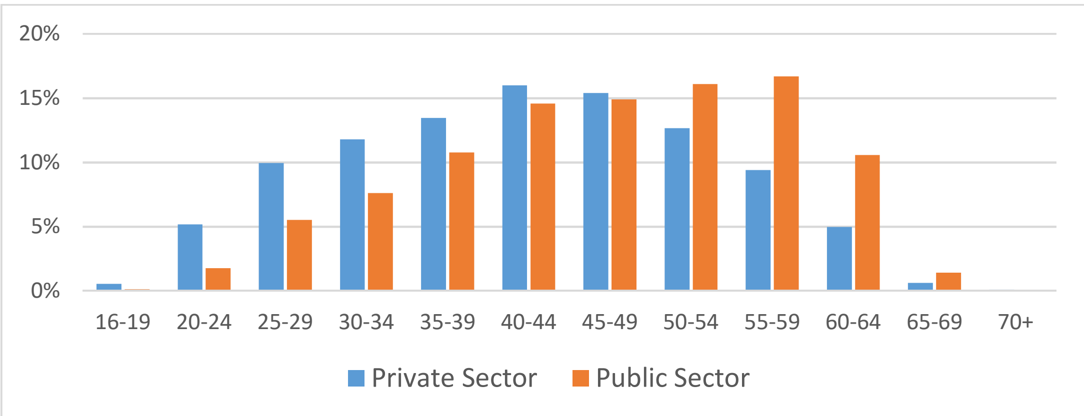
Figure 2. Workers´ distribution by educational attainment in private and public sectors.



Note: Source: EPA (Q-I)

Regarding age, significant differences between its distributions in both sectors are also found. As shown in Figure 3, the mode for the ages of public-sector employees is between 40 and 44 years old, which contrasts with the corresponding mode for public sector employees which is between 55 and 59 years old. This age difference could be explained by the greater job stability in public jobs, as a result of which individuals tend to develop longer professional careers than in the private sector.

Figure 3. Workers´ distribution by age in private and public sectors.



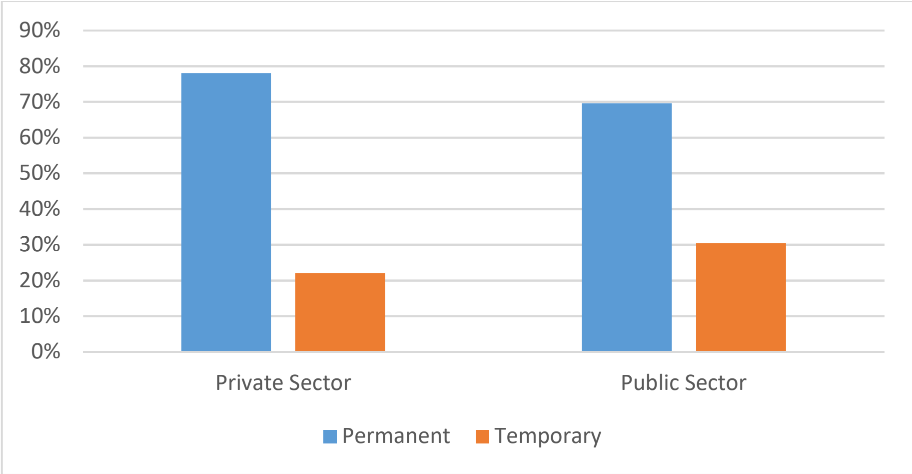
Note: Source: EPA (Q-I)

Another dimension of the heterogeneity of public employment is its high rate of temporary employment. As displayed in Figure 4, about 30% of the contracts signed by the public sector are temporary (especially in the education and health sectors), compared to 22% in the private sector. This makes it one of the public sectors in the EU with the highest rate of temporary work. Nonetheless, despite its high rate of fixed-term jobs, the public sector is more stable than the private sector, with much lower outflows to unemployment and inactivity than in the private sector (Fontaine et al. 2020).

To estimate the public-private wage gap in Spain, we make use of the Spanish Wage Surrvey (*Encuesta de Estructura Salarial*, or EES in short) carried out by the National Institute of Statistics. This survey provides data on the distribution of wages based on a large number of demographics, such as sex, occupation, seniority, company sector, etc. The information is obtained from files of the Social Security and the Tax Agency together with a specific questionnaire. In particular, we use three EES waves corresponding to the years 2010, 2014 and 2018. As the goal of this study is to compare the wage gap between the public and private sectors, military personnel (Q0) and individuals under 19 years of age and over 59 have been excluded to homogenize the sample for both sectors.

For 2010, the EES has 216,769 observations while for 2014 and 2018 the number of observations is 209,436 and 216,726, respectively. The main descriptive statistics of the relevant variables in the three selected waves are presented in Table A.1 of the Appendix.

Figure 4. Workers´ distribution by type of contract in private and public sectors.



Note: Source: EPA (Q-I)

4. EMPIRICAL STRATEGY

As regards the dependent variable in all regressions, we use the (logged) hourly wage, computed from the EES by means of the following information:

- *Monthly wage*: calculated as the sum of the base salary, monthly extraordinary pay, overtime payments and salary supplements.
- *Monthly working hours*: defined as,

$$Monthly\ working\ hours = \frac{WWDH+WWDM}{60} * 4.35 + ExtraH, \text{ where:}$$

$$WWDH \equiv Agreed\ weekly\ working\ days\ (in\ hours)$$

$$WWDM \equiv Agreed\ weekly\ working\ days\ (in\ minutes)$$

$$ExtraH = \ Overtime\ working\ hours$$

As is conventional in the literature on this topic, the first step towards estimating the public-private wage gap relies on the estimation of *a mincerian* linear regression where the (logged) hourly wage of individual $i, \ln(w_i)$, is regressed on a vector of sociodemographic characteristics $\boldsymbol{X}_i$, adding a dummy variable that takes value 1 for being a public-sector employee, PUS_i. Moreover, to estimate the gender-differential effect of working in the public sector, a double interaction variable between the public sector and female dummies, $PUS_i * Fem_i$, is also added. Therefore, the equation to be estimated by OLS in the cross-sectional sample ($i = 1, 2, \ldots, N$) becomes:

$$\ln(w_i) = \beta_0 + \beta_1 PUS_i + \beta_2 PUS_i * Fem_i + \beta_3' \boldsymbol{X}_i + \varepsilon_i, \qquad (1)$$

where ε_i is a zero- mean, uncorrelated and homoscedastic error term. In line with the traditional specification of a *mincerian* wage equation, the following controls are included in $\boldsymbol{X}_i$: region of residence (6 dummies), Fem_i, occupation type according to the categories determined by the National Classification of Occupations CNO-11 (15 dummies), educational attainment (6 dummies), part-time work (1 dummy), age (3 dummies), years of tenure and its square.[4]

This linear approximation provides the simplest way to estimate the wage premium. Yet, it is not free of limitations, such as assuming that the effect occurs exclusively through the PUS dummy and not through the remaining controls. Therefore, a well-known alternative to compute the public-private wage gap is to estimate the hourly wage regressions separately for each of the two sectors, to then compute wage differentials broken down into two terms: one *explained* by disparity in observed characteristics for given returns and another stemming from *differences in returns* for given characteristics. This is the well-known Oaxaca-Blinder (OB) decomposition which has been massively used in the literature on wage gaps, including the public-private gap, as in Christofides and Michael (2013) and Castro, Salto and Steiner (2013).

[4] Note that choice of occupations could be arguably endogenous. Nonetheless, as an accounting exercise, it is useful to know the extent to which the wage gap can be explained by them since they also affect productivity.

Accordingly, the two OLS regressions considered in the OB decomposition are as follows:

$$\ln(w_{Gi}) = \beta_i X_{Gi} + \varepsilon_{Gi}$$

$$\ln(w_{Pj}) = \beta_j X_{Pj} + \varepsilon_{Pj}$$

where w_{Gi} y w_{Pj} are the hourly wages of an individual i (resp. j) belonging to the public/government (resp. private) sector, while X_{Gi} and X_{Pi} are their observable characteristics. A constant term is included in both equations, so that the mean of the estimated OLS residuals is equal to zero. Next, as is conventional, the difference between the means of both equations is calculated as,

$$\Delta = \mathbb{E}(X_G)\beta_G + \mathbb{E}(\varepsilon_G) - \mathbb{E}(X_P)\beta_P + \mathbb{E}(\varepsilon_P),$$

$$\overline{\ln(w_G)} - \overline{\ln(w_P)} = (\overline{x_G} - \overline{x_P})\widehat{\beta_G} + \overline{x_P}(\widehat{\beta_G} - \widehat{\beta_P})$$

where $\overline{x_G}\ y\ \overline{x_P}$ are the sample averages of workers´ observed characteristics within each group of employees, whereas the terms $(\overline{x_G} - \overline{x_P})\widehat{\beta_G}$ and $\overline{x_P}(\widehat{\beta_G} - \widehat{\beta_P})$ represent the gap components attributed to differences in characteristics (for given returns) and to differences in returns (for given characteristics), respectively.

We first perform the O-B decomposition of the wage gap wages using the whole sample for each of the three EES waves, where the above-mentioned set of controls is added. Next, following the methodology proposed by Christofides and Michael (2013), we run separate regressions distinguishing by workers´ educational attainments. The first subsample includes individuals with completed college education, while the second one pertains to those with lower educational levels. Lastly, to study whether the observed wage gap features by education remain or change across genders, the sample is also broken down by sex. In sum, we estimate the O-B decomposition for the following four subsamples: men and women with college education, and men and women with lower educational attainments.

5. ESTIMATION RESULTS

Table 1 displays the results obtained from estimating the hourly wage regression (1) by OLS.

Table 1. OLS estimated coefficients in the mincerian wage regression (EES 2010, 2014, 2018)

	2010	**2014**	**2018**
PUS	0.069 (0.003)	0.025 (0.003)	0.021 (0.003)
Fem	-0.197 (0.002)	-0.179 (0.002)	-0.183 (0.002)
PUS*Fem	0.071 (0.004)	0.051 (0.004)	0.090 (0.003)
$\overline{\boldsymbol{R}^2}$	0.503	0.475	0,4764
No. Obs.	216,769	209,436	216,726

Note: The set of controls includes region, occupation, education, contract type, a quadratic in job tenure and age. Standard dev. in parentheses. All the reported estimated coefficients are statistically significant at 1 percent.

As can be observed, the estimated coefficient on the public sector dummy, PUS, is positive and highly significant in each of the three waves of EES (2010, 2014 and 2018). Thus, working for the public sector is associated with higher wages of between 2 and 7 logarithmic points (lp. hereafter) than in the private sector. As regards the female dummy, Fem, its estimated coefficient ranges between -0.179 and -0.197, implying that women suffer a wage penalty of around 18-19 lp. relative to men. Moreover, the estimated coefficient of the interaction term of both characteristics ($Fem * PUS$) is positive in each of the three samples. This means that, while the overall gender gap turns out to be around 18-20 lp., working in the public sector has an offsetting effect for women of between 5 and 9 lp. In other words, the gender gap among public-sector employees (11 lp.) is almost halved. In sum, these results confirm that, for the entire sample, the public-private wage gap is positive in favour of the public sector, especially for women.

Table 2. Oaxaca-Blinder decomposition for the whole sample (EES 2010, 2014, 2018)

	2010	**2014**	**2018**
Public sector	2.577 (0.002)	2.583 (0.002)	2.673 (0.002)
Private sector	2.302 (0.001)	2.344 (0.001)	2.382 (0.001)
Wage gap	0.275 (0.002)	0.239 (0.002)	0.291 (0.002)
Unexpl. gap	0.093 (0.003)	0.037 (0.004)	0.048 (0.004)
Nº Obs.	216,769	209,436	216,726

Note: OLS estimation. The set of controls includes region, occupation, education, contract type, job tenure and age. Standard dev. in parentheses. All the reported estimated coefficients are statistically significant at 1 percent.

When the O-B decomposition for the whole sample is performed separately by sector in Table 2, the public-private wage gap becomes 29.1 lp. in 2018, out of which only 4.8 lp. correspond to that part of the differential which is not explained by the characteristics. [5]This differential is also positive for each of the three EES waves under consideration, allowing us to conclude that the public-private wage gap is positive (Table

[5] The first two rows in Table 2 report logged hourly wages in each EES wave. Therefore, the wage gap is the difference between the figures presented in those two rows, e.g., 0.275= 2.577-2.302.

4.2). As can be inspected, this gap is greater in 2010 than in subsequent years, a result which probably obeys to the wage cuts experienced by the private sector, much higher than those in the public sector, during the Great Recession.

To observe how this unexplained gap varies across educational levels, the O-B decomposition is once more performed more using this time the sub-samples of college and non-college individuals. Table 3 reports the results of this exercise. As regards less-skilled individuals, the unexplained public-private wage gap is found to be positive for the three waves (14.5 lp. in 2010, 9.0 lp. in 2014 and 10.4 lp.in 2018). Therefore, lower-educated workers enjoy a higher hourly wage in the public sector than in the private sector. On the contrary, for college workers, the unexplained wage gap is negative (-1.9 lp. in 2014 and -0.1 lp. in 2018) except for 2010 when it was positive, reaching 2.3 lp. This last result is possibly due to the impact of Great Recession on the Spanish economy, when internal devaluation to enhance exports meant much higher wage and earnings cuts in the private than in the public sector (see Almunia et al., 2021) Thus, these findings confirm the stylized fact investigated at length in the previous literature that the wage distribution in the public sector is compressed for different levels of education. In sum, the public sector pays relatively higher wages to workers with lower levels of qualifications while it pays less to individuals with higher levels of education.

Table 3.Oaxaca-Blinder decomposition by education levels (EES 2010, 2014, 2018)

	College			Non-college		
	2010	**2014**	**2018**	**2010**	**2014**	**2018**
Public sector	2.789 (0.003)	2.771 (0.003)	2.862 (0.003)	2.396 (0.003)	2.410 (0.003)	2.478 (0.002)
Private sector	2.652 (0.002)	2.673 (0.002)	2.727 (0.003)	2.192 (0.001)	2.227 (0.001)	2.266 (0.001)
Wage Gap	0.137 (0.004)	0.097 (0.004)	0.135 (0.004)	0.204 (0.002)	0.184 (0.003)	0.211 (0.002)
Unexpl. diff.	0.023 (0.005)	-0.019 (0.005)	-0.001 (0.005)	0.145 (0.004)	0.089 (0.004)	0.103 (0.004)
No. obs.	60,101	62,158	63,527	156,668	147,278	153,199

Note: OLS estimation. The set of controls includes region, occupation, education, contract type,and a quadratic in job tenure and age. Standard dev. in parenthesis. All the reported estimated coefficients are statistically significant at 1 percent.

Next, to analyse whether the public-private wage gap behaves similarly for both genders, the sample is split into men and women distinguishing between lower (Table 4) and higher (Table 5) educational attainments.

In line with the results in Table 3, Table 4 shows that the unexplained part of the public-private wage gap is always positive for both genders in the case of less-educated individuals, with a public-sector premium in 2018 of 11.8 lp. and 7.5 lp. for men and women, respectively. However, as shown in Table 5, where the focus is on men and women with higher education, the results differ by gender. Women with a college degree enjoy a public-sector wage premium (7.9 lp. in 2010, 2.5 in 2014 and 7.0 in 2018) unlike men, for whom the unexplained gap is always negative (-2.8 lp. in 2010, -5.6 in 2014 and -7.2 in 2018). These results support the hypotheses previously raised, namely, the presence of an unfavorable gender pay gap for women in the private sector, so that regulations aimed at improving quality of working conditions in the public sector translates into a female wage premium. Note that this is contrast with the theory of compensating differentials in a competitive framework which would predict lower wages, unless better working regulations improve productivity, as with efficiency wages. As discussed above, the insight is that females experience statistical discrimination in the private sector due to their lower job stability (see Dolado, García-Peñalosa and De la Rica, 2013)

Table 4. Oaxaca-Blinder decomposition by gender for non-college workers.

	Females			Males		
	2010	**2014**	**2018**	**2010**	**2014**	**2018**
Public sector	2.304 (0.003)	2.315 (0.003)	2.390 (0.003)	2.481 (0.004)	2.494 (0.004)	2.562 (0.004)
Private sector	2.031 (0.002)	2.084 (0.001)	2.130 (0.001)	2.294 (0.001)	2.315 (0.001)	2.351 (0.001)
Wage gap	0.273 (0.003)	0.230 (0.003)	0.259 (0.003)	0.187 (0.004)	0.179 (0.004)	0.210 (0.004)
Unexpl. Diff.	0.164 (0.007)	0.079 (0.007)	0.118 (0.007)	0.127 (0.005)	0.085 (0.006)	0.075 (0.006)
No. Obs.	62,798	57,979	60,649	93,870	89,299	92,550

Note: OLS estimates of mincerian (logged) hourly wage regressions for each of the two sectors. Standard errors in parentheses.

Table 5. Oaxaca-Blinder decomposition by gender for college workers.

	Females			Males		
	2010	**2014**	**2018**	**2010**	**2014**	**2018**
Public sector	2.731 (0.004)	2.716 (0.003)	2.817 (0.003)	2.873 (0.006)	2.854 (0.005)	2.934 (0.005)
Private sector	2.477 (0.003)	2.519 (0.003)	2.580 (0.003)	2.807 (0.004)	2.812 (0.003)	2.870 (0.003)
Wage gap	0.254 (0.005)	0.196 (0.005)	0.237 (0.005)	0.066 (0.006)	0.042 (0.006)	0.064 (0.006)
Unexp. diff	0.079 (0.004)	0.025 (0.006)	0.070 (0.007)	-0.028 (0.008)	-0.056 (0.008)	-0.072 (0.008)
No. Obs.	30,314	31,514	33,519	29,787	30,644	30,008

Note: OLS estimates of a mincerian (logged) hourly wage regressions for each of the two sectors. Standard errors in parentheses. All estimated coefficients are statistically significant at 1 percent. *All estimated coefficients are statistically significant at 1 percent.*

To wrap up all the previous evidence, Table 6 summarises the hourly wage gaps between the two sectors for all the above-mentioned specifications. One possible explanation for why more skilled workers are relatively worse paid than their less skilled peers in the public sector is that, in some economic activities, the state acts as a monopsony since it is the only employer in the economy. Highly educated individuals have a higher reservation wage than those with lower educational attainments, and so their labour supply elasticity is smaller than the corresponding elasticity of the less-skilled. The insight for this difference is that the more (less) complicated the skills and the longer (shorter) to achieve the required qualifications, the more (less) inelastic the labour supply (Borjas, 2020). In such a case, as explained in Section 5 and further expanded in the following Section 6, higher relative monopsonistic power would imply that, relative to a competitive equilibrium, the public sector reduces the wages of its most qualified employees by more than the wages of the less qualified oness. In addition, there is the issue that the objective of the unions in the wage bargaining is to compress the wage distribution since typically their median voter is a public employee with a low or medium level of qualification.

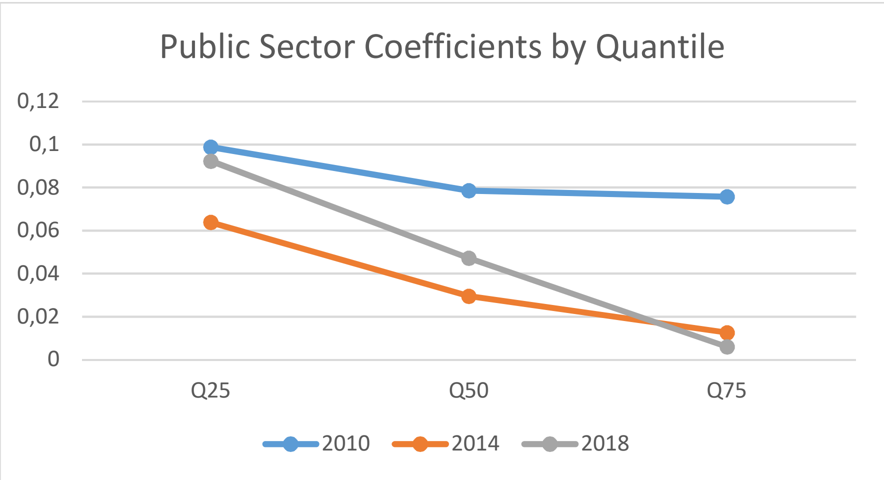
Table 4. Public-Private sector wage gap for the overall sample and subsamples by education and gender.

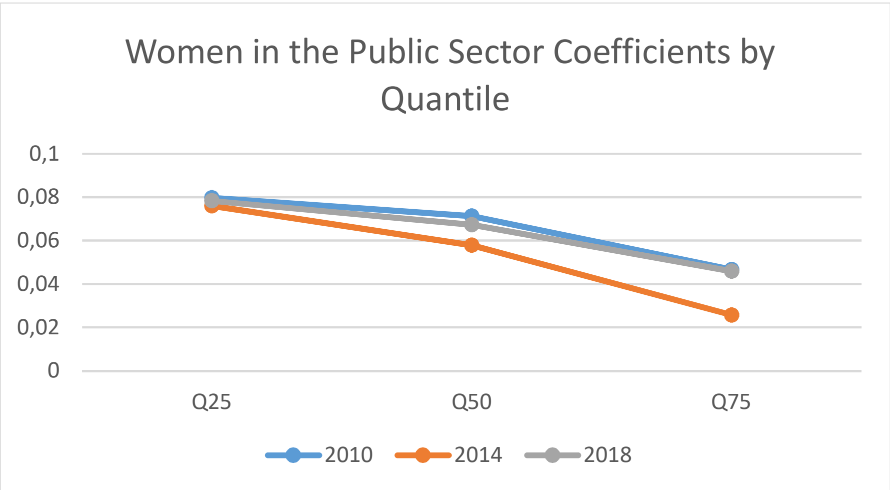
	2010	2014	2018
Total sample	0.094	0.038	0.094
Total sample (college)	0.021	-0.019	-0.023
Total sample (non-college)	0.145	0.090	0.145
Men (college)	-0.028	-0.057	-0.028
Women (college)	0.079	0.026	0.079
Men (non-college)	0.127	0.085	0.127
Women non-college)	0.165	0.079	0.165

Note: OLS estimates of a mincerian (logged) hourly wage regressions for each of the two sectors.

Finally, it is worth discussing some features related to wage compression in the public sector. According to Vandaele (2019), in 2009 union density in the private sector was 15.1% while in the public sector reached 32.6%. Though there is no information by sector beyond that year, the same source provides information on the overall density remaining fairly constant in Spain over 2010-2017. Thus, this evidence would be in favour of the so-called "sword of justice" effect whereby dispersion in pay is smaller in more unionised sectors. This implies that the return to human capital is lower in those sectors and that unions compress the wage structure by gender and occupation. To further check this hypothesis, we estimate quantile regressions-QR (see Koenker and Hallock, 2001) of the *mincerian* wage equation in (1), whose details are provided in Table A. 2 of the Appendix. Figure 5 (a, b) depicts the point estimates of the coefficients of interest for each of the three EES waves at 25th 50th and 75th quantiles. As can be observed, both the coefficients on Pub and $Pub * Fem$ are quite larger at the lower quantiles than at the median and higher quantiles. Since this is the case for the three waves, we take this evidence as confirming the wage-compression effect exerted by trade unions.

Figure 5. QR-coefficients of Public sector (panel a) and Public sector* Female (panel b).





6. INTERPRETATION OF EMPIRICAL RESULTS

To rationalise the previous findings, let us consider a cost-minimising monopsonistic sector with high (H) and less-skilled (L) workers subject to a Cobb-Douglas production function where parameter $a > 1$ captures the relative efficiency of H workers, having normalized the efficiency of L workers to 1. [6]The sector faces inverse labour supplies denoted as $w_L(L)$ and $w_H(H)$, respectively. Hence, the demand of H and L workers solves

$$\min_{L,H}\{w_L(L)L + w_H(H)H\} \quad s.t. \bar{Y} = (aH)^{\alpha} L^{1-\alpha}, \tag{2}$$

with f.o.c. given by

$$w_L\left(1+\frac{1}{\epsilon_L}\right) = \lambda(1-\alpha)\frac{\bar{Y}}{L},$$

$$w_H\left(1+\frac{1}{\epsilon_H}\right) = \lambda\alpha\frac{\bar{Y}}{H}.$$

Following the arguments provided before it is assumed that $\epsilon_L > \epsilon_H$. Hence, defining $e_i = 1 + {}^{1}/_{\epsilon_i}, i = H, L,$ it follows that $e_H > e_{HL}$. Then,

$$\frac{w_H H}{w_L L} = \frac{\alpha}{1-\alpha}\frac{e_L}{e_H} < \frac{\alpha}{1-\alpha} \tag{3}$$

implying that the relative wage bill between H and L workers is smaller than in the competitive equilibrium where $e_L = e_H = 1$, as labour supplies are perfectly elastic, i.e. $\epsilon_L, \epsilon_H \to \infty$.

The corresponding labour demands (conditional on output) are as follows

[6] It can be easily shown that the same qualitative results hold when a CES production function is assumed.

$$H = \left(\frac{1-\alpha}{\alpha}\right)^{-(1-\alpha)} \left(\frac{w_H e_H}{w_L e_L}\right)^{-(1-\alpha)} \frac{\bar{Y}}{a^{\alpha}}, \tag{4}$$

$$L = \left(\frac{1-\alpha}{\alpha}\right)^{\alpha} \left(\frac{w_H e_H}{w_L e_L}\right)^{\alpha} \frac{\bar{Y}}{a^{\alpha}}. \tag{5}$$

Next, let us assume that wages of both types of workers are determined in a monopoly union model where a trade union maximises its utility function Ω subject to the above labour demand functions. As usual in this kind of wage-bargaining models, the union´s goal is to maximise a combination of the wage surplus in relation to an alternative wage in the absence of agreement, $\overline{w}$, which we take to be the competitive wage, and employment, with weights given by η and $1-\eta$ for H and L workers, respectively. The novelty is that we also include in the utility function the union´s objective of achieving wage compression, captured by the penalty term $0.5\ \varphi(\ln w_H - lnw_L)^2$. Hence, the union solves the problem,

$$max_{\ w_H, w_L}\Omega = \Big[\eta\ (ln(w_H - \overline{w}_H) + lnH) + (1-\eta)(ln(w_L - \overline{w}_L) + lnL) - \frac{\varphi}{2}(\ln w_H - lnw_L)^2\Big] \text{ subject to (4) and (5),}$$

whose f.o.c. are

$$\frac{\partial\Omega}{\partial w_H} = \eta\left[\frac{z_H}{z_H-1} - (1-\alpha)\right] + (1-\eta)\alpha - \varphi\left[\frac{w_H}{w_L} - 1\right] = 0,$$

$$\frac{\partial\Omega}{\partial w_L} = \eta(1-\alpha) + (1-\eta)\left[\frac{z_L}{z_L-1} - \alpha\right] + \varphi\left[\frac{w_H}{w_L} - 1\right] = 0$$

where $z_i = {}^{w_i}/_{\overline{w}_i}$.

Combining both f.o.c. yields

$$\frac{z_H}{z_L} = \frac{1 - \alpha - \varphi(\frac{w_H}{w_L} - 1)}{\varphi\left(\frac{w_H}{w_L} - 1\right) - \alpha} = 1 + \frac{1 - 2\varphi(\frac{w_H}{w_L} - 1)}{\varphi\left(\frac{w_H}{w_L} - 1\right) - \alpha} \equiv 1 + \delta$$

or

$$\frac{w_H}{w_L} = (1 + \delta)\frac{\bar{w}_H}{\bar{w}_L} \tag{6}$$

Hence, the relative wage of H workers with respect to L workers will be smaller than in the competitive equilibrium whenever $-1 < \delta < 0,$ which holds for a sufficiently high values of the wage compression parameter φ.

The previous model has not distinguished workers by gender. However, it is well documented in the literature (see e.g. Alesina, Ichino and Karabarbounis, 2012) that male labour supply is much more inelastic (especially at the extensive margin) than female´s. Thus, the monopsonistic result in (3) is more realistic for men than for women. Nonetheless, the statistical discrimination arguments in De la Rica, Dolado and Llorens (2007) and Dolado, García Peñalosa and De la Rica (2013) are akin to those leading to (3), except that in this case they lead to lower female wages in the private sector in line with the empirical results reported above. To verify that statistical discrimination plays a key role in the private sector, we follow Altonji and Pierret (2001) who argue that such a type of discrimination should decrease as the individual is older or has longer job tenure. The insight is that employers should be able to learn much faster about the true productivity of more stable and senior workers because this learning investment process would be in their benefit. To do so, we run a similar regression to (1) but this time using a private sector dummy, PRI, its interaction with Fem and its triple interaction with Fem and tenure (Ten), $PRI * Fem * Ten$.

The results are gathered in Table 7 where we report the estimated coefficients in the model with the above-mentioned triple interaction. The coefficient on Ten is 0.4 lp. lower for females than for males in the private sector but the coefficients on $PRI * Fem * Ten$ are all positive and statistically significant, suggesting that statistical discrimination exerted in the private sector is a plausible hypothesis.

Table 7. OLS estimated coefficients of the mincerian wage regression with triple interaction (EES 2010, 2014, 2018)

	2010	**2014**	**2018**
PRI	-0.125	-0.080	-0.082
	(0.004)	(0.004)	(0.004)
Fem	-0.129	-0.132	-0.110
	(0.003)	(0.004)	(0.004)
Ten	0.018	0.016	0.015
	(0.0003)	(0.0003)	(0.0003)
PRI*Fem	-0.044	-0.016	-0.036
	(0.004)	(0.004)	(0.004)
PRI*Ten	0.004	0.003	0.003
	(0.0002)	(0.0002)	(0.0002)
Fem*Ten	-0.004	-0.004	-0.003
	(0.0001)	(0.0002)	(0.0002)
PRI*Fem*Ten	0.002	0.003	0.002
	(0.0002)	(0.0002)	(0.0002)

Note: OLS estimates of a mincerian (logged) hourly wage regressions for each of the three EES waves using a private sector and female dummies, double and triple interactions, plus the set of controls described in the note below Table 1. All coefficients are statistically significant at 1 percent level.

7. CONCLUSIONS

This paper analyses the (hourly) wage gap between employees in the public and private sectors in Spain. We start by documenting the main stylized facts of employment in the Spanish public sector according to the Spanish LFS (EPA), among which the overrepresentation of women and college graduates, the older age of public employees and the high rate of temporary employment in this sector stand out. Second, wage a demographics micro data from the EES is used in their waves of 2010, 2014 and 2018 to compute the Oaxaca-Blinder decomposition in *mincerian* equations of hourly wages for each sector, yielding the wage gap component which is not explained by differences in observed productivity-related characteristics. In line with the results obtained in the literature on this type of wage gap in southern EU countries, we find a favourable wage gap in the public sector. This gap oscillates between 4 and 9 logarithmic points. In addition, conclusive evidence is reported in favour of wage compression by education levels. So, while the gap is positive for public employees with lower qualifications, it turns out to be negative for the more qualified ones. When looking at gender, there is a wage bonus for females working in the public sector, which happens to be greater for non-college women.

Although not investigated in this paper, a plausible explanation of the previous findings could rely on the enormous duality of the Spanish labour market that makes women prefer to work in the public sector in order to reconcile family and work, and to avoid suffering potential statistical discrimination in the private sector. This would explain the overrepresentation of women in the public sector (AA.PP.) and their higher wages than in the private sector. With regard to men, the monopsonistic power of the public sector in the activities they carry out affects their wages more than women´s, as female labour supply is much more elastic than males´ and therefore less subject to monopsonistic explotation.

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APPENDIX

Table A.1. Descriptive statistiucs of selected variables (EES 2010, 2014, 2018).

Variable	Distribución (%)		
	2010	2014	2018
Occupations			
A0. Directors and Managers	3%	3%	3%
B0. Health/Educ Tech. and Profess.	6%	6%	7%
C0. Other sci./int. Tech and Profess.	10%	11%	11%
D0. Technicians: Support Professs.	18%	18%	16%
E0. Office empl. don't deal with public	9%	9%	7%
F0. Customer services clerks	5%	5%	7%
G0. Catering/trade serv. workers	6%	6%	7%
H0. Health/Social Care workers	5%	5%	6%
I0. Prot. and security serv. workers	2%	2%	2%
J0. Skilled agricultural workers	0%	0%	0%
K0. Skilled construction workers	4%	3%	3%
L0. Skilled manuf. industry workers	9%	9%	10%
M0. Stationary plant/machine operators	6%	7%	5%
N0. Mob. machine drivers/operators	4%	4%	4%
O0. Unskilled service workers	7%	6%	6%
P0. Agricultural, fishing, const. labour	5%	4%	6%
Q0. Military occupations	0%	0%	0%
Sector			
Public	17%	16%	16%
Private	83%	84%	84%
Sex			
Male	57%	57%	57%
Female	43%	43%	43%
Type of contract			
Part-time	17%	18%	18%
Full-time	83%	82%	82%
Region			
Northwest	12%	12%	11%
Northeast	15%	16%	16%
Madrid	16%	16%	16%
Central	12%	12%	12%
East	27%	27%	27%
South	14%	13%	14%
Canary islands	4%	4%	4%
Education			
None	2%	1%	1%
Primary	13%	14%	16%

Secondary I	26%	24%	23%
Secondary II	12%	23%	21%
Lower Vocational Taraining	9%		
Upper Vocational Training	10%	9%	10%
Diploma	11%	11%	11%
College, engineers and phds	17%	19%	18%
Age			
< 19	0%	0%	0%
20- 29	16%	11%	10%
30-39	34%	32%	24%
40 -49	27%	31%	33%
50- 59	18%	21%	25%
>59	4%	5%	7%
Continuous variables		**Mean (St. Dev.)**	
Job Tenure (years)	8.82 (9.62)	9.98 (9.69)	10.65 (10.18)
Hourly wage (euros)	12.17 (9.57)	12.46 (9.29)	13.22 (11.37)

Table A.2. Quantile regression estimates of the Public-Private sector wage gap for each of the three EES waves (2010, 2014, 2018)

EES 2010

	Q25	Q50	Q75
PUBLIC SECTOR	0.0988	0.0786	0.0757
	(0.003)	(0.003)	(0.004)
FEM	-0.1635	-0.1897	-0.2154
	(0.002)	(0.002)	(0.002)
PUB*FEM	0.0797	0.0713	0.0466
	(0.004)	(0.004)	(0.005)

EES 2014

	Q25	Q50	Q75
PUBLIC SECTOR	0.0638	0.0295	0.0126
	(0.003)	(0.003)	(0.004)
FEM	-0.1493	-0.1696	-0.1955
	(0.002)	(0.002)	(0.002)
PUB*FEM	0.0760	0.0578	0.0257
	(0.004)	(0.004)	(0.005)

EES 2018

	Q25	Q50	Q75
PUBLIC SECTOR	0.0923	0.0472	0.0060
	(0.003)	(0.003)	(0.004)
FEM	-0.1523	-0.1714	-0.1865
	(0.002)	(0.002)	(0.002)
PUB*FEM	0.0783	0.0673	0.0459
	(0.004)	(0.004)	(0.005)

Note: Results of the estimation of a quantile regression o fa mincerian (logged) hourly wage equation, controlling by sex and public sector (plus all the control variables used in the previous linear regression). Standard dev. in parentheses. All coefficients are statistically significant at 1 percent level.