The Public Sector Wage Gap in Spain:

Evidence from Income Tax Data*

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Abstract

This paper studies the public sector wage gap by gender and skill level in Spain using recent administrative data from tax records. We estimate wage distributions in the presence of covariates separately for men and women in the public sector and in the private sector. Then, we decompose the public sector wage gap along the wage distribution and isolate the part due to differences in the remunerations of observable characteristics. In line with previous literature we find that the public premium is higher for female and low-skilled workers. We also find that the shape of the distribution of the public wage gap is different among skill groups. Finally, recent cuts in public wages in Spain have affected the public premium quite differently across skill groups: interestingly, while the public wage gap decreased between 2007 and 2010 for low-skilled workers, it even increased in the case of high-skilled workers at the top of the wage distribution. Assuming that private wages evolved similarly across skill groups, this finding might point to a brain drain from the public to the private sector.

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1 Introduction

In 2010, more than 15% of the labor force received their wage from the public sector and compensation of employees represented around 30% of Spanish public consumption expenditures. On the other hand, in order to ensure fiscal sustainability under pressure from financial markets, the Spanish Government is currently undertaking huge fiscal consolidation efforts. As a result, the size of the public sector wage bill has been under scrutiny and measures aiming at its reduction have been announced or already implemented. Under these circumstances, a deep understanding of the public-private wage gap and its distribution seems of paramount importance.[1]

Public and private sectors workers can be paid differently because of several reasons: (i) the monopolistic power of governments in the provision of public services results in non-competitive wage settlements (Reder, 1975); (ii) the public sector might have different objectives from those of the private sector, for instance, vote maximization rather than profit maximization; (iii) the wage setting environment substantially differs between both sectors, for example, union density is often higher in the public sector; (iv) productivity-enhancing characteristics of employees such as education or experience might be different between both sectors. All in all, in this paper we argue that the room for cutting public sector wages should be based on the public wage gap due to reasons (i)-(iii) so that we focus on the analysis of the public wage gap not explained by observable productivity-related characteristics of employees in the two sectors.

Several studies have already addressed the issue of the public - private wage gap in different countries. Some examples are Smith (1976) or Borjas (2002) for the United States, Dustmann and Van Soest (1997) for Germany, Panizza and Qiang (2005) for Latin American countries, Anghel et al. (2011) for OECD countries, and Lassibille (1998), or Garcia-Perez and Jimeno (2007) for Spain. In general, there is consensus in the following findings: (i) the public premium is positive for low-skilled male workers but negative for the high-skilled ones when observable characteristics are accounted for; (ii) however, the public premium remains positive for females even after controlling for individual characteristics; (iii) the distribution of wages is more compressed in the public sector.[2] Moreover, since the public sector apparently compresses the distribution of wages, the mean public sector wage premium only provides an incomplete picture of the whole distribution. Therefore, several authors (e.g. Poterba and Rueben, 1995; Nielsen and Rosholm, 2001; Jürges, 2002; Melly, 2005) have applied quantile regression to analyze the distribution of the public-private wage gap. Since there is no such study for Spain, in this paper we aim to analyze the public-private wage gap distribution between the private and public sectors in Spain using recently developed methods for estimating counterfactual distributions (i.e. Chernozhukov et al., 2009) and a unique dataset based on tax records.

[1] Furthermore, as a side-effect, cuts in public sector wages might induce reductions in private wages with the subsequent gains in terms of competitiveness (see Lamo et al., 2012).

[2] See Gregory and Borland (1999) for a survey of this literature.

To the best of our knowledge, all empirical studies about the public-private wage gap are based on data bases in which responses are provided by individual workers (e.g. the German Socio-Economic Panel or the European Community Household Panel). Concerns about response errors in survey data and their implications for economic analysis date back to the fifties (e.g. Cohen and Lipstein, 1954; Miller and Paley, 1958). For instance, using two unique matched worker-employer data files, Mellow and Sider (1983) find that almost one-half of workers surveyed indicate a different detailed occupation than is reported by their employer. Zweimuller (1992) concludes that sample selectivity due to interviewees' refusal to answer to the survey-questionnaire is a significant problem, even of larger importance than the selectivity bias due to non-participation in the labor market.[3] Regarding the quality of survey measures of income, several studies (e.g. Herriot and Spiers, 1980; Gottschalk et al., 2008; Gottschalk and Huynh, 2010) use earnings reports from survey data (e.g. PSID or CPS) matched to tax records and find substantial evidence that measurement error in self-reported earnings is important and not classical. Moreover, an additional concern is that reporting biases may follow different patterns between public and private sector workers; while income sources for public sector employees are clearly determined and unambiguously-established, uncertainty surrounding income in the private sector is more important due to, for instance, bonuses or extra hours.

In this paper we use recently released social security data to characterize the evolution of the public - private gap in Spain. Social security records have several advantages compared to the survey-based datasets that have been previously used. These include large sample sizes, complete coverage of the part of the population that is covered by social security (more than 80% of the Spanish working population), and accurate earnings measurements. We focus our study in the period 2004-2010, for which the social security dataset has a proper longitudinal design (before 2004 the information is retrospective). In addition, in that period, annual income information from tax records are available for the same individuals as in the social security dataset. Contrary to the social security measure of labor earnings that is top- (and bottom-) coded, tax records are not subject to censoring, making them suitable to perform our study. On the other hand, the social security dataset do not record hours of work. To overcome this drawback, we match our dataset with information on hours from the Spanish Labor Force Survey.

We estimate wage distributions by skill level and separately for men and women in the public sector and in the private sector. Then, we decompose the public sector wage gap across all the wage distribution and isolate the part due to differences in the remunerations of the similar characteristics.

We find that the median of annual earnings is 41 per cent higher in the public sector than in the private sector, being the raw wage gap 38 per cent for males and 57 per cent for women. Once we take into account differences in working time, the corresponding

[3]For more details on this issue see also Griliches et al. (1978), Atkinson and Micklewright (1983), or Groves (2006).

figures for the hourly wage gap at the median are 41 and 43 per cent, respectively. In addition, once the contribution of differences in characteristics is net out, the conditional wage gap in favour of public employees is 24 per cent for men and 27 for women at the median, and even less than 10 per cent at the top of the wage distribution. Our results also show that the profile of the public sector wage gap along the wage distribution differs dramatically by skill level.

The rest of the paper is organized as follows. We start by describing the data in Section 2. Section 3 explains our methodological approach. Section 4 shows our premilinary results on the public sector wage gap in Spain. Lastly, Section 5 concludes.

2 Data

Our main data source for earnings is the Continuous Sample of Working Histories (*Muestra Continua de Vidas Laborales*, MCVL, in Spanish). The MCVL is a micro-level dataset built upon Spanish administrative records. It is a representative sample of the population registered with the social security administration in the reference year (so far, from 2004 to 2010). The MCVL also has a longitudinal design. From 2005 to 2010, those individuals who are present in a wave and subsequently remain registered with the social security administration stay as sample members. In addition, the sample is refreshed with new sample members so it remains representative of the population in each wave. Finally, the MCVL tries to reconstruct the market labor histories of the individuals in the sample back to 1967. In addition to the MCVL, we will use tax files that have been matched to the social security sample.

In order to compute a hourly wage measure, we combine the daily earnings from the MCVL with information on weekly hours from the Spanish Labor Force Survey (*Encuesta de Población Activa*, EPA, in Spanish).

2.1 Sample selection

The population of reference of the MCVL consists of individuals registered with the social security administration at any time in the reference year, including pension earners, recipients of unemployment benefits, employed workers and self-employed workers, but excluding those registered only as medical care recipients, or those with a different social assistance system (part of the public sector, such as the armed forces or the judicial power).[4] The raw data represents a 4 per cent non-stratified random sample of this reference population. It consists of nearly 1.1 million individuals each year.

We use data from native individuals in the 2005-2010 MCVL original samples. We

[4]Recall that in our dataset public employees refer to those belonging to the General Regime of the Social Security Administration. Hence, some government employees, such as the armed forces or the judicial power, are not generally included.

keep individuals enrolled in the general regime, that is, regular workers.[5] To ensure that we only consider income from wage sources, we also exclude all individuals enrolled in the self-employment regime. We exclude from our sample individuals younger than 20 and older than 60 years to avoid to get mixed with formal education enrolments issues and early retirement decisions, respectively. Finally, we obtain a panel of 659,979 individuals (352,253 men and 307,726 women) and more than 3.4 million yearly observations for the period 2004-2010.

2.2 Definition of public employees

In our dataset public employees refer to those workers who belong to the General Regime of the Social Security Administration. It includes workers from the central administration, as well as those from the regional governments and local corporations. However, some public employees, such as the armed forces or the judicial power are not generally included.[6]

According to our dataset, in Spain 15.6 per cent of employees work in the public sector (see Table 1). In the case of women the incidence is higher (20.6 per cent), and even more for the high-skilled workers (32.2 per cent, being 43.4 per cent in the case of high-skilled women).

Table 1. Sample composition

	All		Males		Females	
	Overall	% Public	Overall	% Public	Overall	% Public
Full sample	100.00	15.60	54.51	11.45	45.49	20.58
High-skilled	18.32	32.16	17.74	22.07	19.01	43.44
Low-skilled non manual	34.84	17.42	25.12	17.29	46.48	17.49
Low-skilled manual	46.84	7.78	57.14	5.58	34.50	12.13
# Observations	3,410,550		1,859,019		1,551,531	

Source: MCVL 2004-2010 sample.

Notes: % Public = Share of Public sector. High-skilled = groups 1-3.

Low-skilled non manual= groups 4-7. Low-skilled manual= groups 8-10.

[5] In Spain, more than 80 per cent of workers are enrolled in the general scheme of the social security administration. Separate schemes exist for some civil servants, such as the armed forces and justice staff, domestic workers, workers in fishing, mining and agricultural activities.

[6] The dataset includes an additional variable, so-called employee type, that allows us to also distinguish workers in public services to those in the private sector. We will use this second definition as a robustness check.

2.3 The public sector wage gap

According to Table 2, annual earnings are on average 32 per cent higher in the public sector than in the private sector. However, part of this gap is due to the different labor force composition of the two sectors. On average, public employees are older, more skilled, and work on a full-time basis. On the other hand, they have temporary contracts in a higher proportion.

Table 2. Summary statistics of the covariates
(Sample proportions unless otherwise stated)

	All	Males	Females	Public sector	Private sector
Annual earnings (mean)	18.188	21.073	14.732	22.811	17.334
Age (mean)	37.49	38.08	36.78	41.55	36.74
High-skilled	18.32	17.74	19.01	37.76	14.73
Low-skilled non manual	34.84	25.12	46.48	38.89	34.09
Low-skilled manual	46.84	57.14	34.50	23.35	51.18
Permanent contract	63.98	65.49	62.18	53.76	65.87
Temporary contract	36.02	34.51	37.82	46.24	34.13
Full-time	80.93	90.47	69.50	89.78	79.29
Part-time	19.07	9.53	30.50	10.22	20.71

Source: MCVL 2004-2010 sample.

Notes: Earnings measured in thousands of EUR (base 2006).

In addition, this pay gap in annual earnings includes differences in the total number of days worked in a given year, and also in the number of hours worked. First, with respect to the percentage of days not working in a given year, Table 3 shows that the probability of having some period of unemployment is on average higher in the private sector, so that the public sector wage gap will be lower in a daily basis than in annual terms (23 instead of 32 per cent).

More importantly, employees in the public and the private sector may differ in the number of hours of work. As mentioned in the introduction, the social security dataset do not record hours of work. To recover this information from the Labor Force Survey (EPA), we define cells given by year, age, gender, level of qualification, sector of activity, type of contract (fixed-term vs. open-ended), type of work schedule (full-time vs. part-time), and region. For each cell in the EPA, we compute the average number of usual weekly hours of work, and then we impute that number to those individuals beloging to an equally defined cell in the MCVL dataset. Then we divide those hours by 5 to obtain daily hours of work. Up to now, we have data for years 2007 and 2010 only. In the first case, we have been able to merge 96.74 per cent of the observations, and in the second, 96.55 per cent.

Table 3. Percentage of days not working in a year (%)

	Public	Private
All	18.86	19.71
Males	15.88	17.55
Females	20.85	22.61
High-skilled	9.32	11.27
Low-skilled non manual	11.78	17.48
Low-skilled manual	42.94	24.19
Permanent contract	3.35	7.41
Temporary contract	36.89	43.46
Full-time	16.93	16.07
Part-time	35.79	33.65

Source: MCVL 2004-2010 sample.

Notes: High-skilled=groups 1-3. Low-skilled non manual =groups 4-7. Low-skilled manual=groups 8-10.

As shown in Table 4, employees in the private sector worked on average 5.3 per cent more hours than public employees in 2007, but only 2.4 per cent more in 2010. By gender, we obtain than males worked on average 9.4 per cent more hours in the private sector than in the public sector in 2007, and 8.3 per cent in 2010; whereas for women, they worked 3.7 per cent less hours in the private sector than in the public sector in 2007, and 7 per cent less in 2010.

Once we have obtained our measure of hours of work, we calculate an individual hourly wage as the annual labor income from the tax record, divided by the annual days of work from the social security records and the average number of daily hours.

According to Table 5, annual earnings were on average 32 per cent higher in the public sector than in the private sector in 2007, and 31 per cent higher in 2010. However, once we take into account differences in days and hours of work, we obtain than the public sector hourly wage gap was 36 per cent in 2007 and 32 per cent in 2010. For men, those increases are even bigger (from an average gap in annual earnings of 29 per cent in 2007 and 23 per cent in 2010, to a hourly wage gap of 35 per cent in 2007 and 29 per cent in 2010), whereas for women the public sector decreases once differences in working time are taken into account (from an average gap in annual earnings of 58 per cent in 2007 and 55 per cent in 2010, to a hourly wage gap of 42 per cent in 2007 and 38 per cent in 2010), mainly due to the higher incidence of part-time jobs among women in the private sector.

The profile of the raw public sector wage gap differs by gender. As shown in Figure 1, for men we observe an inverse U-shaped pattern (more marked in the case of hourly wages), whereas for women the profile is more flat. As reported in Table 6, the gap has

Table 4. Daily hours of work

	Hours worked		Hours worked (full-time)		Hours worked (part-time)	
	Public	Private	Public	Private	Public	Private
			2007			
All	7.15	7.53	7.46	8.31	3.85	4.04
Males	7.44	8.14	7.59	8.44	3.95	3.99
Females	6.97	6.71	7.37	8.07	3.82	4.05
High-skilled	7.16	7.93	7.45	8.32	3.96	4.10
Low-skilled non manual	7.22	7.24	7.46	8.21	3.79	4.12
Low-skilled manual	7.03	7.60	7.47	8.37	3.77	3.96
			2010			
All	7.11	7.28	7.50	8.23	3.98	3.89
Males	7.33	7.94	7.58	8.37	4.00	3.68
Females	6.96	6.47	7.45	7.98	3.98	3.95
High-skilled	7.12	7.83	7.48	8.30	3.96	4.06
Low-skilled non manual	7.23	7.01	7.52	8.13	3.97	3.98
Low-skilled manual	6.89	7.31	7.50	8.28	4.02	3.78

Source: MCVL and EPA matched samples 2007 and 2010.

Notes: # Observations 2007= 490,971. # Observations 2010= 449,147. High-skilled = groups 1-3. Low-skilled non manual= groups 4-7. Low-skilled manual= groups 8-10.

Table 5. Public sector wage gap (per cent)

	Gap in annual earnings					
	All		Males		Females	
	2007	2010	2007	2010	2007	2010
Full sample	32.35	30.90	29.19	23.43	57.88	55.17
High-skilled	-10.42	-8.31	-10.91	-10.40	11.39	12.14
Low-skilled non manual	24.05	27.35	13.86	20.25	34.09	34.57
Low-skilled manual	-16.73	-21.14	-6.02	-17.25	-5.22	-9.40
	Hourly wage gap					
	All		Males		Females	
	2007	2010	2007	2010	2007	2010
Full sample	36.36	32.18	34.94	29.04	41.98	38.26
High-skilled	14.83	15.97	12.68	13.38	24.56	24.23
Low-skilled non manual	23.94	23.38	20.38	22.51	26.12	24.07
Low-skilled manual	13.71	7.58	15.55	9.13	20.12	12.67

Source: MCVL and EPA matched samples 2007 and 2010.

Notes: High-skilled = groups 1-3. Low-skilled non manual= groups 4-7.

Low-skilled manual= groups 8-10.

clearly decreased from 2007 to 2010 along the whole distribution (being the decrease more evident in the case of the hourly wage gap).

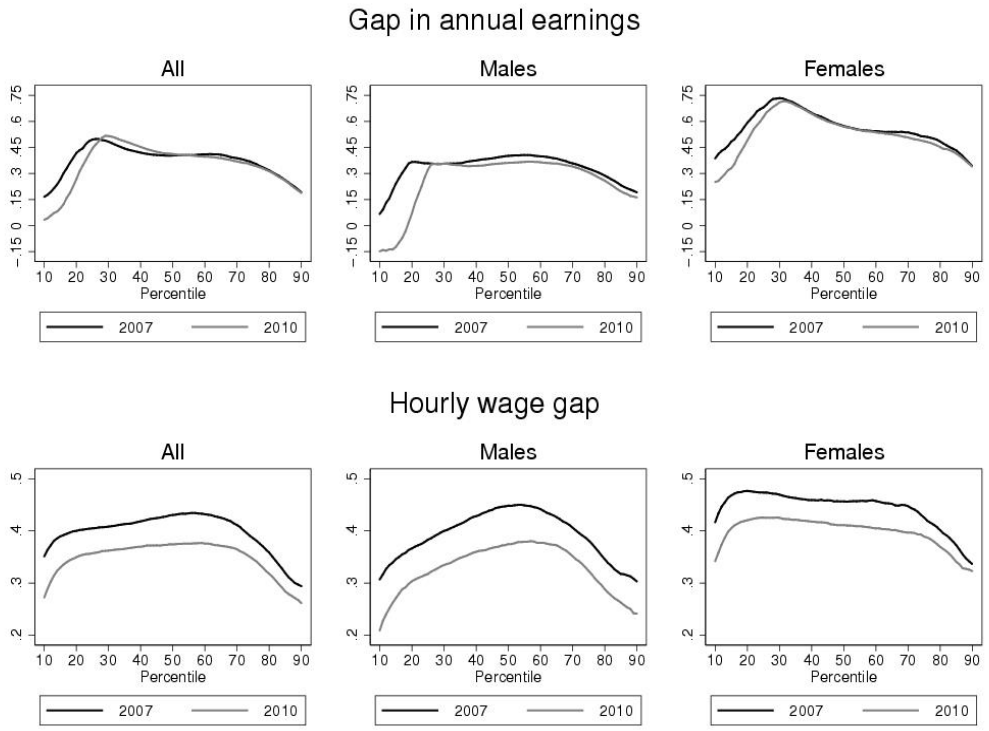
From now on, we use individual hourly wages as our main dependent variable.

The profile of the raw public sector wage gap also differs by skill level. As shown in Figure 2, we can see that the inverse U-shaped pattern comes from very distinct profiles for high-skilled (HS), low-skilled (LS) non manual and low-skilled (LS) manual workers. For the HS and LS non manual, the public sector gap is decreasing along the wage distribution, whereas for the LS manual workers the profile is increasing (especially at the bottom part of the distribution).

The figure also shows that the decrease in the public sector wage gap from 2007 to 2010 is mainly concentrated among manual workers.

Next, we will estimate the public sector wage gap along the wage distribution in the presence of covariates, and we will decompose the gap to isolate the part due to differences in the remunerations to those characteristics.

Figure 1. Percentiles of the gap in annual earnings and the hourly wage gap



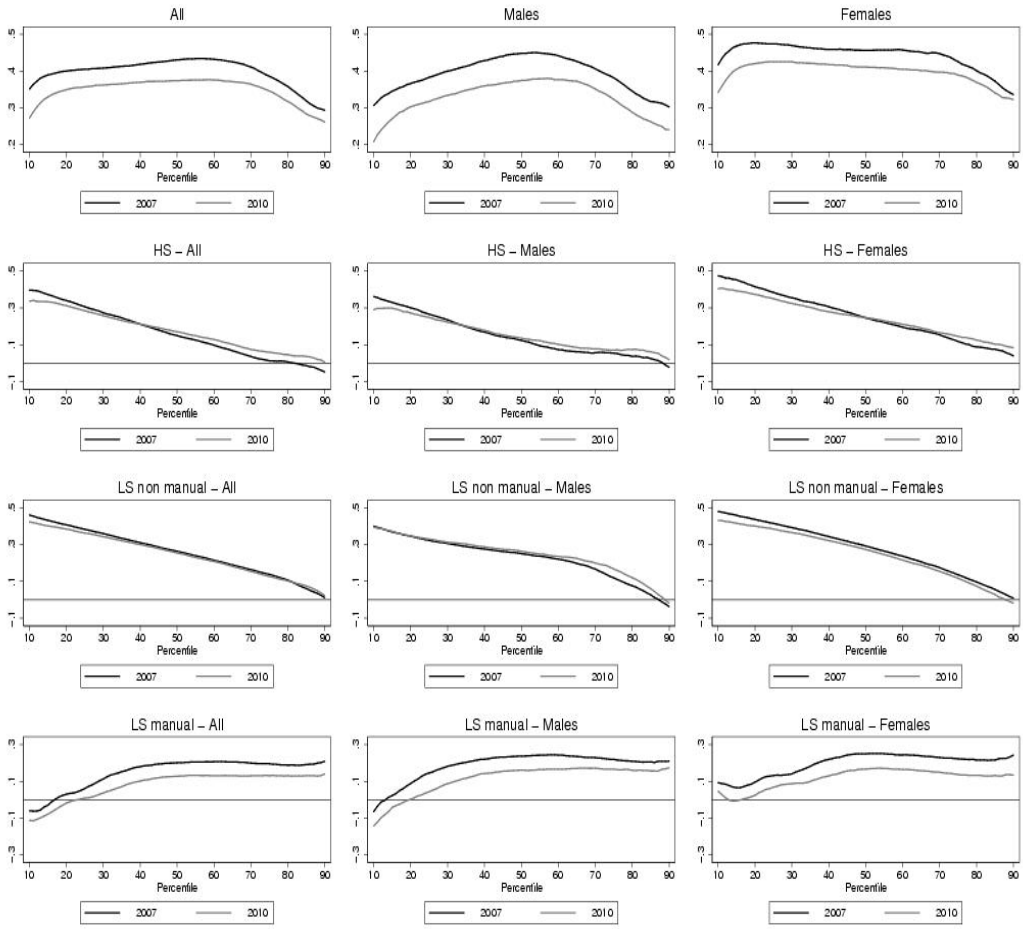
Source: MCVL and EPA matched samples 2007 and 2010.

Table 6. Public sector wage gap (per cent). Full sample

	Gap in annual earnings					
	All		Males		Females	
	2007	2010	2007	2010	2007	2010
10^{th} percentile	16.5	3.3	6.7	-14.8	38.7	25.1
25^{th} percentile	49.5	44.4	35.8	32.1	68.0	62.5
50^{th} percentile	40.3	41.2	40.1	36.1	57.3	56.9
75^{th} percentile	36.1	34.7	32.7	30.7	51.3	48.6
90^{th} percentile	19.1	18.9	19.1	16.2	34.3	33.9
	Hourly wage gap					
	All		Males		Females	
	2007	2010	2007	2010	2007	2010
10^{th} percentile	35.1	27.2	30.7	20.9	41.7	34.2
25^{th} percentile	40.5	35.7	38.3	31.7	47.4	42.5
50^{th} percentile	43.1	37.4	44.8	37.5	45.7	41.1
75^{th} percentile	38.6	34.6	38.2	32.3	42.6	38.9
90^{th} percentile	29.4	26.1	30.3	24.1	33.5	32.3

Source: MCVL and EPA matched samples 2007 and 2010.

Figure 2. Percentiles of the public sector hourly wage gap (raw data)



Source: MCVL and EPA matched samples 2007 and 2010.

Notes: High-skilled (HS) = groups 1-3. Low-skilled (LS) non manual= groups 4-7. Low-skilled (LS) manual= groups 8-10.

3 Methodology

Blinder (1973) and Oaxaca (1973) proposed to decompose the difference in average earnings between public and private workers into a explained component given by differences in characteristics and an unexplained component given by differences in coefficients. This popular approach only provides information about average differences. However, statistical measures of the public-private wage gap based on average effects might mask important differences along the distribution of wages (see Figure 1). Since Koenker and Bassett (1978) the quantile regression approach has became relatively popular to study the effects of a covariate (X) on the whole conditional distribution of the dependent variable (Y). Quantile regression provides a more complete picture of the conditional distribution of Y given $X = x$ when both lower and upper quantiles are of interest. More concretely, we can specify the θth quantile of the conditional distribution of y_i given X_i as a linear function of the covariates,

$$Q_\theta(y_i|X_i) = X_i\beta_\theta, \quad \theta \in (0,1). \tag{1}$$

The quantile regression estimator of β_θ estimates the effect of the covariates on the θth quantile of the dependent variable and solves the following problem (Koenker and Bassett, 1978):[7]

$$\hat{\beta}_\theta = argmin_\beta \left[\sum_{i \in \{i:y_i \geq X_i\beta\}} \theta|y_i - X_i\beta| + \sum_{i \in \{i:y_i < X_i\beta\}} (1-\theta)|y_i - X_i\beta| \right]. \tag{2}$$

Given the quantile regression approach just discussed, we can now present the details on the generalization of the Blinder-Oaxaca decomposition to the whole distribution of wages based on Chernozukov et al. (2009). In particular, we can proceed in seven steps:

Step 1. Quantile regressions: We sparately run two different sets of quantile regressions, one for the public sector (group 1) and one for the private sector (group 0) to obtain the two sequences of quantile coefficients $\hat{\beta}^1_{\theta_j}$ and $\hat{\beta}^0_{\theta_j}$ for $j = 1, ..., J$ with $\theta_j \in (0,1) \forall j$. Despite asymptotically one could estimate an infinite number of quantile regressions for each group (i.e. $J \to \infty$), following the suggestion in Portnoy (1991) we only estimate 150 different regressions to approximate the whole quantile function (i.e. $J = 150$).[8]

Step 2. Conditional quantile functions: Given the quantile regression coefficients obtained in the first step, it is straightforward to estimate the θ_j's conditional quantile of Y_g given X_i by computing $X_i'\hat{\beta}^g_{\theta_j}$ where $g = (0,1)$ represents the group (public or private

[7] Buchinsky (1998) provides an overview of the quantile regression estimator together with details on its asymptotic covariance matrix.

[8] In finite samples, Portnoy (1991) shows that given the set of points in which the vector of coefficients changes ($\theta_0 = 0, \theta_1, ..., \theta_J = 1$), the coefficients estimate $\hat{\beta}_{\theta_j}$ prevails in the interval from θ_{j-1} to θ_j.

workers). Hence we can construct the two conditional quantile functions as follows:

$$\begin{aligned} \hat{q}^1_{\theta_j} &= X_i'\hat{\beta}^1_{\theta_j} \quad \forall j = 1, ..., J \\ \hat{q}^0_{\theta_j} &= X_i'\hat{\beta}^0_{\theta_j} \quad \forall j = 1, ..., J. \end{aligned} \tag{3}$$

Step 3. Conditional distribution functions: We can also estimate the conditional distribution function by inverting the conditional quantile function obtained in step 2 so that:[9]

$$\begin{aligned} \hat{F}_{Y_1}(q|X_i) &= \int_0^1 (1(X_i'\hat{\beta}^1_{\theta_j} \leq q)d\theta) = \sum_{j=1}^{J}(\theta_j - \theta_{j-1})1(X_i'\hat{\beta}^1_{\theta_j} \leq q) \\ \hat{F}_{Y_0}(q|X_i) &= \int_0^1 (1(X_i'\hat{\beta}^0_{\theta_j} \leq q)d\theta) = \sum_{j=1}^{J}(\theta_j - \theta_{j-1})1(X_i'\hat{\beta}^0_{\theta_j} \leq q). \end{aligned} \tag{4}$$

where $F_Y(q)$ refers to the cumulative distribution function (CDF) of the random variable Y evaluated at q, $F_Y^{-1}(\theta)$ represents the inverse of the CDF, also known as quantile function evaluated at $0 < \theta < 1$, and $F_Y(q|X_i)$ refers to the conditional CDF of Y evaluated at q and given the realization $X = X_i$.

Step 4. Unconditional distribution functions: Theregore we can now estimate the unconditional distribution function for public ($g = 1$) and private ($g = 0$) workers as follows:

$$\begin{aligned} \hat{F}_{Y_g}(q|g=1) &= \int \hat{F}_{Y_g}(q|x)dF_X(x|g=1) = \frac{1}{n_1}\sum_{i:g=1}\hat{F}_{Y_g}(q|X_i). \\ \hat{F}_{Y_g}(q|g=0) &= \int \hat{F}_{Y_g}(q|x)dF_X(x|g=0) = \frac{1}{n_0}\sum_{i:g=0}\hat{F}_{Y_g}(q|X_i). \end{aligned} \tag{5}$$

where n_1 and n_0 are the number of public and private workers in the sample.

Step 5. Unconditional quantile functions: Given our interest in simulating counterfactual quantiles to decompose differences in the distribution of wages, we estimate the unconditional quantile function. For this purpose we take as an estimator of the θ^{th} quantile of the unconditional distribution from step 4 the minimum of the set as follows:

$$\begin{aligned} \hat{q}^1_\theta &= inf\left\{q : \frac{1}{n_1}\sum_{i:g=1}\hat{F}_{Y_1}(q|X_i)\right\} \\ \hat{q}^0_\theta &= inf\left\{q : \frac{1}{n_0}\sum_{i:g=0}\hat{F}_{Y_0}(q|X_i)\right\}. \end{aligned} \tag{6}$$

Step 6. Counterfactual quantile functions: Armed with the previous function estimates, we are now able to estimate the counterfactual quantile function. That is, we estimate the θ^{th} quantile of the distribution that we would observe if public workers

[9]Note that since the estimated quantile function might not be monotonic, we need to resort to the following property of the CDF: $F_{Y_g}(q|X_i) = \int_0^1 (1(F^{-1}_{Y_g}(\theta|X_i) \leq q)d\theta) = \int_0^1 (1(X_i'\beta^g_{\theta_j} \leq q)d\theta)$.

$(g = 1)$ would be paid as private workers $(g = 0)$:

$$\hat{q}_\theta^c = inf \left\{ q : \frac{1}{n_1} \sum_{i:g=1} \hat{F}_{Y_0}(q|X_i) \geq \theta \right\}. \tag{7}$$

where n_1 is the number of public workers in the sample. Note that for the construction of the conditional distribution $\hat{F}_{Y_0}(q|X_i)$ we used in step 3 the coefficients estimated for the private workers, i.e., $\hat{\beta}_\theta^0$; and we are computing the counterfactual quantile using the Xs among public workers, i.e., sum over individuals with $g = 1$. This counterfactual distribution is an interesting object per se that will deserve special attention in our empirical exercises.

Step 7. Decomposition: Analogously to the Blinder-Oaxaca approach for the mean, we can now compute a decomposition of the difference between the θ^{th} quantile of the unconditional distribution of public and private workers:

$$\hat{q}_\theta^1 - \hat{q}_\theta^0 = \underbrace{\left[\hat{q}_\theta^1 - \hat{q}_\theta^c\right]}_{\text{Coefficients Effect}} + \underbrace{\left[\hat{q}_\theta^c - \hat{q}_\theta^0\right]}_{\text{Characteristics Effect}} \tag{8}$$

4 Preliminary Results

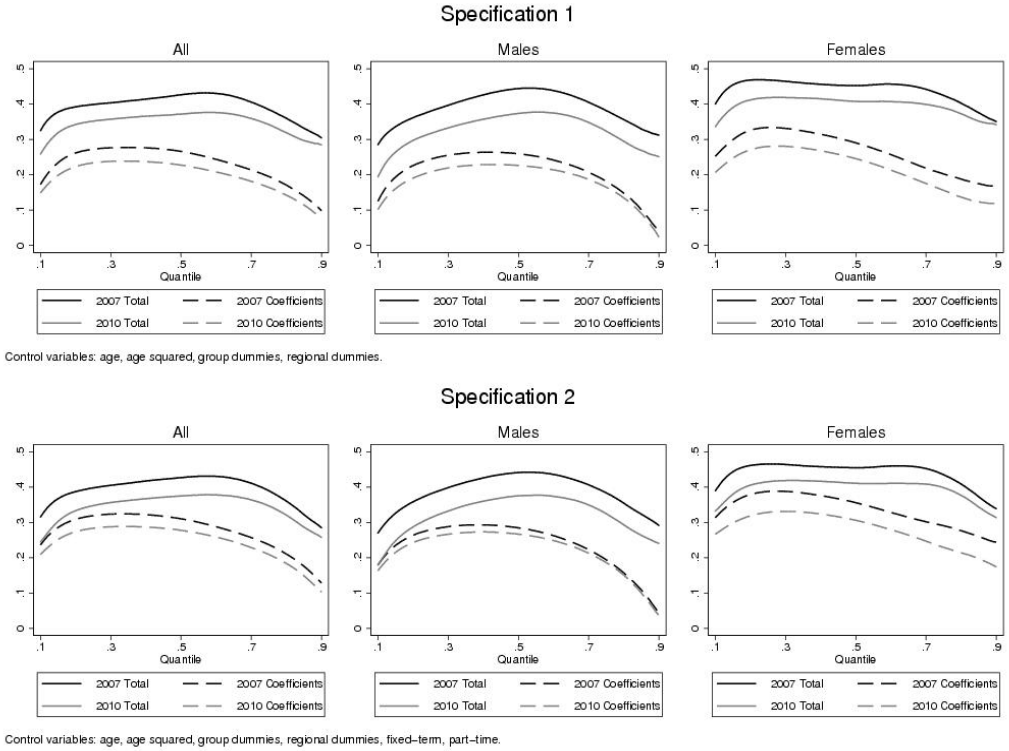
We model conditional wage distributions separately for the public and the private sectors, and also disaggregated by gender and skill level. More specifically, y_i would be individual log hourly wages in real terms, and X_i a set of covariates. In a first specification, we use as control variables those often included in Mincerian models, such as age, age squared, skill-group indicators, and regional dummies. In a second specification, we also include type of contract (fixed-term vs. open-ended), and type of work schedule (full-time vs. part-time).

Figure 3 shows the percentiles of the public sector conditional wage gap in the full sample and by gender. The black solid line stands for the raw wage gap in 2007, and the gray solid line for the raw wage gap in 2010; while the black (gray) dashed line corresponds to the public sector wage gap in 2007 (2010) once the contribution of differences in characteristics has been net out. Table 7 summarizes point estimates of the public sector wage gap due to different returns at slected quantiles of the wage distribution by gender.

We find that if workers in the private and in the public sectors had the same characteristics, the public sector wage gap would have significantly lower, especially at the top of the wage distribution. In fact, for men in the upper-part of the distribution, the positive wage gap practically disappears. This means that a substantial fraction of the public sector gap is due to the fact that public employees are in general better in terms of covariates than private sector employees.

Figure 4 shows the percentiles of the public sector conditional wage gap disaggregated by gender and skill level. As previously, the black solid line stands for the raw wage gap in 2007, and the gray solid line for the raw wage gap in 2010; while the black (gray) dashed

Figure 3. Percentiles of the public sector conditional wage gap



Source: MCVL and EPA matched samples 2007 and 2010.

Table 7. Public sector wage gap due to different returns (per cent). Full sample

	All		Males		Females	
Percentile	2007	2010	2007	2010	2007	2010
Specification 1						
10^{th}	17.25	14.86	12.48	10.14	25.23	20.64
25^{th}	27.23	23.37	24.39	20.78	33.39	28.03
50^{th}	26.60	22.72	25.93	22.63	29.02	24.56
75^{th}	19.49	16.41	18.09	16.46	20.21	15.55
90^{th}	9.80	7.65	3.90	2.31	16.61	11.87
Specification 2						
10^{th}	23.64	20.91	17.94	16.34	31.36	26.69
25^{th}	31.91	28.36	27.93	25.81	38.79	32.83
50^{th}	31.04	27.78	28.47	26.68	35.59	30.60
75^{th}	23.70	20.93	19.41	18.62	29.07	22.92
90^{th}	12.86	10.28	4.31	3.61	24.42	17.40

Source: MCVL and EPA matched samples 2007 and 2010.

Notes: Covariates: specification 1 = age, age^2, skill and regional dummies; specification 2 = specification 1 + fixed-term, part-time.

line corresponds to the public sector wage gap in 2007 (2010) once the contribution of differences in characteristics has been net out.

We find that if high-skilled workers in the private and in the public sectors had the same characteristics, the public sector wage gap would have been significantly lower, and even negative in the upper half of the wage distribution. For high-skilled men the conditional wage gap turns out negative already at the median. On the contrary, the role of characteristics for the low-skilled non manual workers is rather limited. Finally, for low-skilled manual workers the public sector wage premium is higher than the raw gap for observationally comparable individuals.

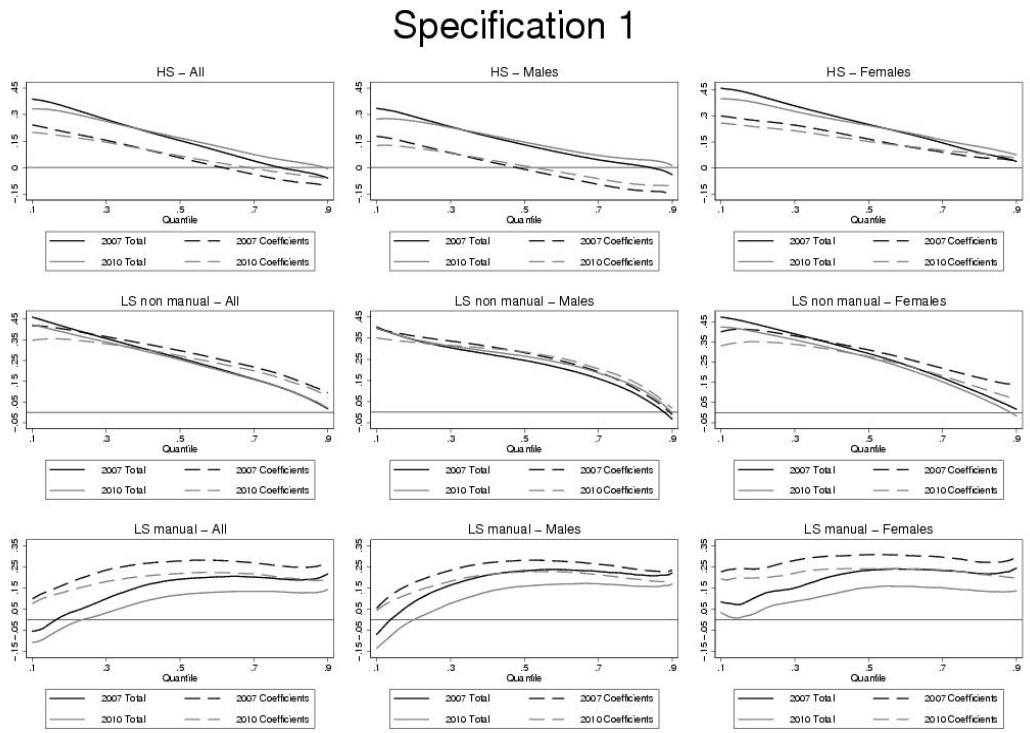
5 Concluding Remarks

This paper studies the public sector wage gap by gender and skill level in Spain using recent administrative data from tax records. We estimate wage distributions in the presence of covariates separately for men and women in the public sector and in the private sector. Then, we decompose the public sector wage gap along the wage distribution and isolate the part due to differences in the remunerations of similar characteristics.

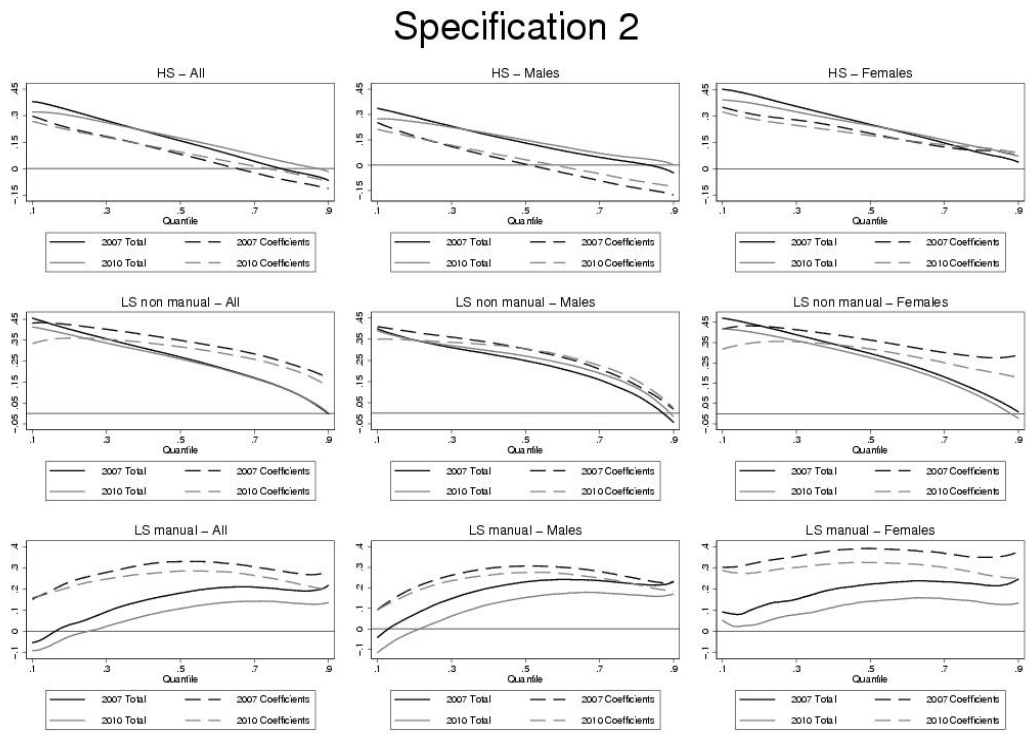
We find that public sector hourly wage gap is 41 per cent for men and 43 per cent for women. Our preliminary results show that, once the contribution of differences in characteristics is net out, the conditional wage gap in favour of public employees is 24 per cent for men and 27 for women at the median, and even less than 10 per cent at the top of the wage distribution. By skill level, we find that if high-skilled workers in the private and in the public sectors had the same characteristics, the public sector wage gap would have been negative in the upper half of the wage distribution. For high-skilled men the conditional wage gap turns out negative already at the median. On the contrary, the role of characteristics for the low-skilled non manual workers is rather limited. Finally, for low-skilled manual workers the public sector wage premium is higher than the raw gap for observationally comparable individuals.

As part of our future research agenda, we plan to use the panel structure of the data to account for sample selection.

Figure 4. Percentiles of the public sector conditional wage gap by skill group



Control variables: age, age squared, group dummies, regional dummies.



Control variables: age, age squared, group dummies, regional dummies, fixed–term, part–time.

Source: MCVL and EPA matched samples 2007 and 2010.

Notes: High-skilled (HS) = groups 1-3. Low-skilled (LS) non manual= groups 4-7. Low-skilled (LS) manual= groups 8-10.

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