

PUBLIC-PRIVATE WAGE GAPS IN THE PERIOD PRIOR TO THE ADOPTION OF THE EURO: AN APPLICATION BASED ON LONGITUDINAL DATA*

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ABSTRACT

This paper analyses the evolution of public wages and the public-private wage gaps in the period prior to the adoption of the euro in the countries then engaged on the fulfillment of the Maastricht criteria. The results suggest a relative moderation in the growth of public sector wages in several European countries in the 1990s and the existence of a positive wage differential benefiting public employees that appears to have increased along the period. Therefore, the fact that European countries were undertaking efforts to comply with the requirements for adopting the single currency does not seem to have contributed to the reduction of the wage premium that the literature has typically associated with public sector employment. It is noteworthy that the countries where the wage differential is higher are Portugal, Ireland, Greece and Spain. This differential is, to a large extent, an actual wage premium associated with the public sector, but self-selection effects determining that the best workers prefer the public sector cannot be neglected. Nevertheless, the wage premia tend to be smaller in the case of individuals with higher earnings, making it difficult for the public sector to attract the more qualified workers. This difficulty may be worsened by across-the-board measures to reduce wages and employees.

1. Introduction

Compensation of employees is one of the main drivers of public expenditure in the euro area. In the current context, where most Member-states are undertaking consolidation efforts, the size of the public sector wage bill has been under scrutiny and measures aiming at its reduction have been announced across Europe. Campos (2011) identified and analysed episodes of fiscal adjustment taking place in a period in which, as currently, European countries were engaged in fiscal consolidation, then with the goal of fulfilling the criteria for adopting the single currency. That paper confirmed that on the transition to the European Monetary Union no major cuts were made in primary expenditure items such as social transfers and compensation of employees. Nevertheless, the need to comply with the Maastricht criteria could have allowed European governments to eliminate positive public-private wage gaps without major political costs. In order to assess the validity of this idea, in this paper we focus on the analysis of these gaps in several Member-states in the period bounded by the coming into force of the Maastricht Treaty and the inception of the euro area (1993-1999).

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To analyse the evolution of public wages and the public-private wage gaps on the run-up to the euro area, we use data from the European Community Household Panel (ECHP), that covers EU-15 Member-states in the period from 1993 to 2000. In order to measure this wage differential while controlling for unobservable individual attributes of workers, we take advantage of the longitudinal structure of the ECHP and resort to fixed effects regressions. An exploratory analysis of the data suggests that in the period leading to the adoption of the euro, there is evidence of a certain degree of wage moderation in several Member-states. However, the estimates suggest that European governments did little to reduce the markup that the literature generally associates with public employment.

2. Data

We use data drawn from the ECHP. This dataset, made available by Eurostat, is a longitudinal survey of households and individuals that covers 15 EU Member-states. Eight waves of data have been released, spanning from 1994 to 2001. However, not all countries participated in the survey from the beginning: Austria, Finland and Sweden were only added in the second, third and fourth years, respectively. The main advantage of this data source is that the questionnaire and methodology are standardized, thus cross-country comparisons are allowed. The panel is supposed to be representative of the EU population both in cross-sectional and longitudinal terms, at the level of households and individuals. The dataset comprises information on gender, age, education, wage and other income sources, marital status and occupation, among other variables.

A few preliminary points should be made regarding some of the variables that are used to estimate the public-private wage gap. We use the hourly wage as a measure for individual earnings. As the information on gross wages is not available for the Luxembourg we excluded this country from our analysis and, for the remaining countries, we computed the logarithm of hourly earnings using data on the weekly number of working hours.¹ Moreover, the wage variables in the ECHP do not include elements such as performance-related and in-kind payments, that can be an important part of the individuals' total earnings (particularly in the private sector). Other differences between sectors stemming from pension entitlements, health-care schemes or implicit benefits such as life-long job protection are also difficult to quantify. Finally, it is worth highlighting that, while most of the other variables refer to the year of the interview, those related to individual earnings report values for the year prior to the survey. Thus, for the purpose of our analysis, we consider that the period covered is actually 1993-2000.

The information on educational attainment is restricted to a very general categorical variable that distinguishes between third level education and two stages of secondary education. There is no information on the experience accumulated by the individuals since joining the labour force. However, it is possible to identify the tenure in the current job. The inclusion of the "age" variable in our regressions mitigates the absence of data on the total work experience.

The sample was selected according to several criteria. In particular, we excluded the observations corresponding to individuals that are not working in paid employment, do not have a full-time job, do not report the employment sector, are not of working age (*i.e.*, that are younger than 15 or older than 65 years) or are not followed for, at least, two consecutive years. Finally, we detected that the sample referring to Belgium suffered considerable depletion along the eight years of the ECHP. As the small size of the Belgian sample may compromise the validity of the results, we excluded this country from the analysis. Denmark, Sweden and the United Kingdom were also excluded. By restricting the sample according to these conditions, we ended up with 206,468 observations, corresponding to 46,752 individuals, from 10 euro area countries.

¹ The observations for which the computation resulted in an amount of hourly earnings below the 1st or above the 99th percentile of the distribution for each country-year pair were excluded from the sample.

3. Exploratory analysis of the data

Table 1 compares the share of public sector employees in total employment, as reported in the Eurostat's NewCronos database, with the sub-sample of ECHP we are using. It shows that the composition of employment by sector in the sample is close that what would be obtained in official statistics (with the exception of Germany in 1993 and Finland).

Table 1

PROPORTION OF PUBLIC SECTOR EMPLOYEES IN THE LABOUR FORCE PER CENT				
	Eurostat		ECHP	
	1993	2000	1993	2000
Germany	21.3	25.1	32.7	26.2
Netherlands	30.3	28.3	28.6	25.4
France	29.3	29.5	25.8	24.9
Ireland	24.6	22.1	23.5	22.0
Italy	28.1	29.0	38.6	37.5
Greece	29.3	28.8	46.4	39.4
Spain	21.8	20.6	32.8	25.8
Portugal ^(a)	21.0	21.5	22.5	21.1
Austria ^(b)	22.0	22.3	21.2	22.2
Finland ^(b)	32.3	28.9	46.2	39.3

Sources: Authors' calculations based on data from the ECHP and Eurostat's Labour Force Survey.

Notes: (a) The Labour Force Survey data features a structural break in the case of Portugal. Thus, as an alternative, we use National Accounts data, that is only available from 1995 onwards. (b) For Austria and Finland the earlier figures refer to 1995.

Approximately 86.8 per cent of the individuals that report being a public sector employee have remained in that sector during the entire time span covered by the panel, while 7.6 per cent report having worked in both sectors in the period considered. Table 2 compares public and private sector employees across a set of individual characteristics as of time of the first and last waves of the ECHP. It shows, in particular, that public employees are, on average, older and have more tenure than private sector workers. There is also evidence that, in every country in our sample with the exception of Greece in 1993, the proportion of women in the public sector is higher than in the private sector. Finally, the table indicates that the percentage of individuals reporting tertiary educational level is considerable higher amongst public employees.

The fact that public and private sector employees are different in terms of the individual characteristics depicted in table 2 brings about differences in what regards their hourly wages. In fact, as shown in table 3, in general, the average hourly wage is higher among public sector employees. In the first wave of the ECHP the difference averages 17.3 per cent, ranging from 3.2 per cent in Finland to 36.0 per cent in Portugal. In the last year of the survey, the average gap stands at 17.4 per cent, Portugal continues to present the highest public-private wage differential (36.6 per cent), while France features the smallest gap (1.8 per cent).

As shown in chart 1, the raw wage gap between the public and the private sectors narrowed along the 1993-2000 period in most countries. Greece, Ireland, Italy and Portugal are the only exceptions, with the gap widening by 10.6, 4.7, 1.0 and 0.6 percentage points, respectively. It is noteworthy that results in Campos (2011) suggest that, in this set of countries, consolidation efforts in the period prior to the adoption of the euro were not substantial: only a limited number of small episodes of fiscal adjustment was identified, none of which was persistent in reducing the fiscal deficit and public debt ratios. In terms of monthly wages, the gap between public and private sectors is considerably less pronounced (averaging 13.0 per cent and 12.1 per cent, respectively in the first and last waves), which is explained by the fact that the average number of working hours per week is higher in the private sector (a feature that is observable in every country in our sample). We also find important differences between the two sectors' wage distributions. In the first place, the coefficients of variation, computed using the figures in

Table 2

PUBLIC VS PRIVATE SECTOR WORKERS: SUMMARY STATISTICS										
	1993									
	Age (average, years)		Married (per cent)		Males (per cent)		Tertiary Education (per cent)		Tenure (average, years)	
	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private
Germany	40.6	39.0	70.3	69.8	58.3	71.8	35.2	20.9	13.7	11.2
Netherlands	39.9	37.5	65.3	66.5	67.9	78.4	41.2	17.2	13.9	11.4
France	40.4	38.4	65.8	63.7	42.6	65.4	34.0	21.4	16.3	12.6
Ireland	39.5	35.3	75.6	57.3	54.8	71.3	37.6	16.1	16.2	10.9
Italy	41.9	36.6	80.6	64.1	63.5	69.9	11.0	4.3	17.7	13.3
Greece	40.4	36.5	80.0	65.5	68.9	65.2	38.5	21.9	15.6	9.4
Spain	40.8	38.7	74.6	68.5	60.5	75.4	50.0	18.3	15.9	12.3
Portugal	40.9	36.6	79.3	65.4	46.9	64.9	19.0	2.6	16.3	11.7
Austria ^(a)	39.7	36.0	67.8	57.6	54.3	71.9	21.0	4.2	10.7	8.6
Finland ^(a)	43.2	40.1	76.0	66.2	39.7	62.1	51.3	32.4	10.8	8.7
	2000									
	Age (average, years)		Married (per cent)		Males (per cent)		Tertiary Education (per cent)		Tenure (average, years)	
	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private
Germany	42.5	40.6	66.6	68.0	52.9	68.9	43.5	26.6	11.7	9.7
Netherlands	42.8	39.6	61.5	62.3	63.9	76.7	25.4	13.7	11.5	9.1
France	43.0	39.6	65.6	57.9	42.1	61.7	38.2	32.9	15.5	11.4
Ireland	43.1	36.7	70.0	56.4	55.2	66.7	49.3	21.2	15.0	8.3
Italy	43.8	37.7	76.0	66.7	56.4	68.6	17.4	6.7	16.0	10.7
Greece	42.4	36.3	75.6	59.5	60.6	64.1	45.6	21.6	14.5	7.6
Spain	41.4	37.0	70.9	63.2	55.0	68.9	61.2	31.3	13.4	8.3
Portugal	40.9	36.4	74.3	66.9	40.9	61.2	32.0	6.2	13.9	9.8
Austria ^(a)	41.4	37.6	64.5	54.0	53.6	70.2	26.5	5.5	14.2	11.0
Finland ^(a)	44.1	40.0	71.4	58.6	35.9	62.6	57.3	35.7	12.0	8.3

Sources: Authors' calculations based on data from the ECHP.

Note: (a) Data for Austria and Finland refer to 1994 and 1995, respectively.

table 3, are generally higher in the private sector, implying that the wage distribution tends to be more compressed in the public.

Chart 2 shows that the densities vary greatly across countries. As a matter of fact, there are countries, such as Germany, France and Ireland, in which both sectors' wage distributions are relatively disperse, but in Italy, Greece and Portugal they feature heavier tails. A within-country comparison between the distributions referring to the public and private sector wages also points out several interesting differences. On the one hand, in the cases of Germany or Austria, the wage distribution in the private sector is very similar to that of public employees. On the other hand, data concerning countries such as Greece, Spain, Portugal and Ireland suggest that the distributions of public and private sector wages are quite different, with the distribution estimated for the private sector skewed to the left and the probability mass concentrated around lower wage levels.

The public sector wage evolution in the period covered in the ECHP is consistent with a feature documented in Alesina *et al.* (2008): in the period leading to the adoption of the euro, the countries that were then engaged in fulfilling the Maastricht criteria experienced a certain degree of wage moderation.² This feature is naturally less obvious in a set of countries coinciding with those for which evidence in Campos (2011) suggests that consolidation efforts undertaken during the period immediately before the inception of the euro area were not remarkable. Notwithstanding, the need to comply with the requirements for adopting the single currency could have offered European governments a window of opportunity to

² For more details on the evolution of public and private sector wages in the countries in the sample, see Campos and Centeno (2012).

Table 3

HOURLY WAGES: SUMMARY STATISTICS ^(a) IN EURO ^(a)									
	1993			Standard deviation		Median		Skewness	
	Public	Mean Private	Differential (%)	Público	Privado	Público	Privado	Público	Privado
Germany	8.9	8.0	9.6	3.5	3.1	8.0	7.6	1.2	1.0
Netherlands	8.9	7.9	10.3	2.4	2.3	8.5	7.5	1.0	1.1
France	9.6	8.7	9.2	4.1	4.1	8.6	7.7	1.9	1.7
Ireland	9.2	6.5	28.8	3.6	3.0	8.5	6.0	0.7	1.1
Italy	6.2	5.2	16.2	1.6	1.6	5.8	4.8	1.9	1.4
Greece	3.5	2.7	21.1	1.0	1.1	3.3	2.5	0.9	1.5
Spain	6.8	4.7	30.3	2.5	2.1	6.2	4.2	1.0	1.5
Portugal	3.5	2.2	36.0	1.7	1.1	3.0	1.9	1.0	2.0
Austria ^(b)	8.6	7.9	8.7	2.6	2.7	8.1	7.5	0.8	0.9
Finland ^(b)	7.5	7.2	3.2	2.1	2.0	7.0	6.8	1.0	1.1

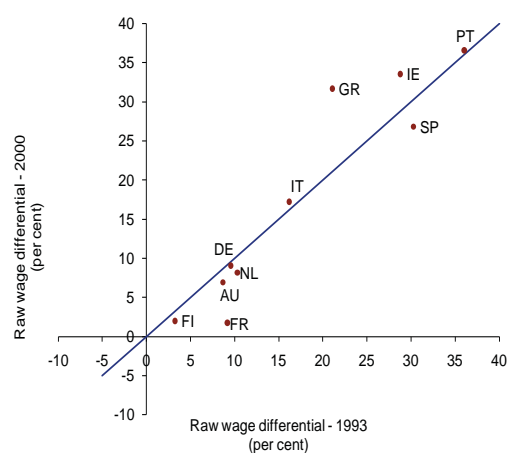
	2000			Standard deviation		Median		Skewness	
	Public	Mean Private	Differential (%)	Público	Privado	Público	Privado	Público	Privado
Germany	10.1	9.2	9.1	3.4	3.3	9.5	8.6	0.9	1.0
Netherlands	10.7	9.9	8.2	3.0	3.2	10.4	9.2	1.1	1.2
France	10.5	10.3	1.8	3.8	4.5	9.8	9.2	1.1	1.5
Ireland	16.4	10.9	33.5	7.1	3.9	14.7	10.3	1.0	1.0
Italy	7.9	6.5	17.2	2.2	2.0	7.3	6.1	1.5	1.4
Greece	6.2	4.3	31.7	2.2	1.7	5.7	3.8	1.0	1.8
Spain	8.9	6.5	26.8	3.3	2.9	8.1	5.8	0.7	1.5
Portugal	5.3	3.4	36.6	2.6	1.6	4.5	2.8	1.1	2.4
Austria	8.8	8.2	6.9	2.5	2.3	8.2	7.9	1.2	0.9
Finland	9.2	9.0	2.0	2.5	2.5	8.8	8.4	1.1	1.1

Sources: Authors' calculations based on data from the ECHP.

Notes: (a) The information on wages and salaries was originally expressed in national currency, but we converted it in euro to ensure cross-country comparability. (b) Data for Austria and Finland refer to 1994 and 1995, respectively.

Chart 1

PUBLIC VS PRIVATE SECTOR: RAW WAGE DIFFERENTIAL

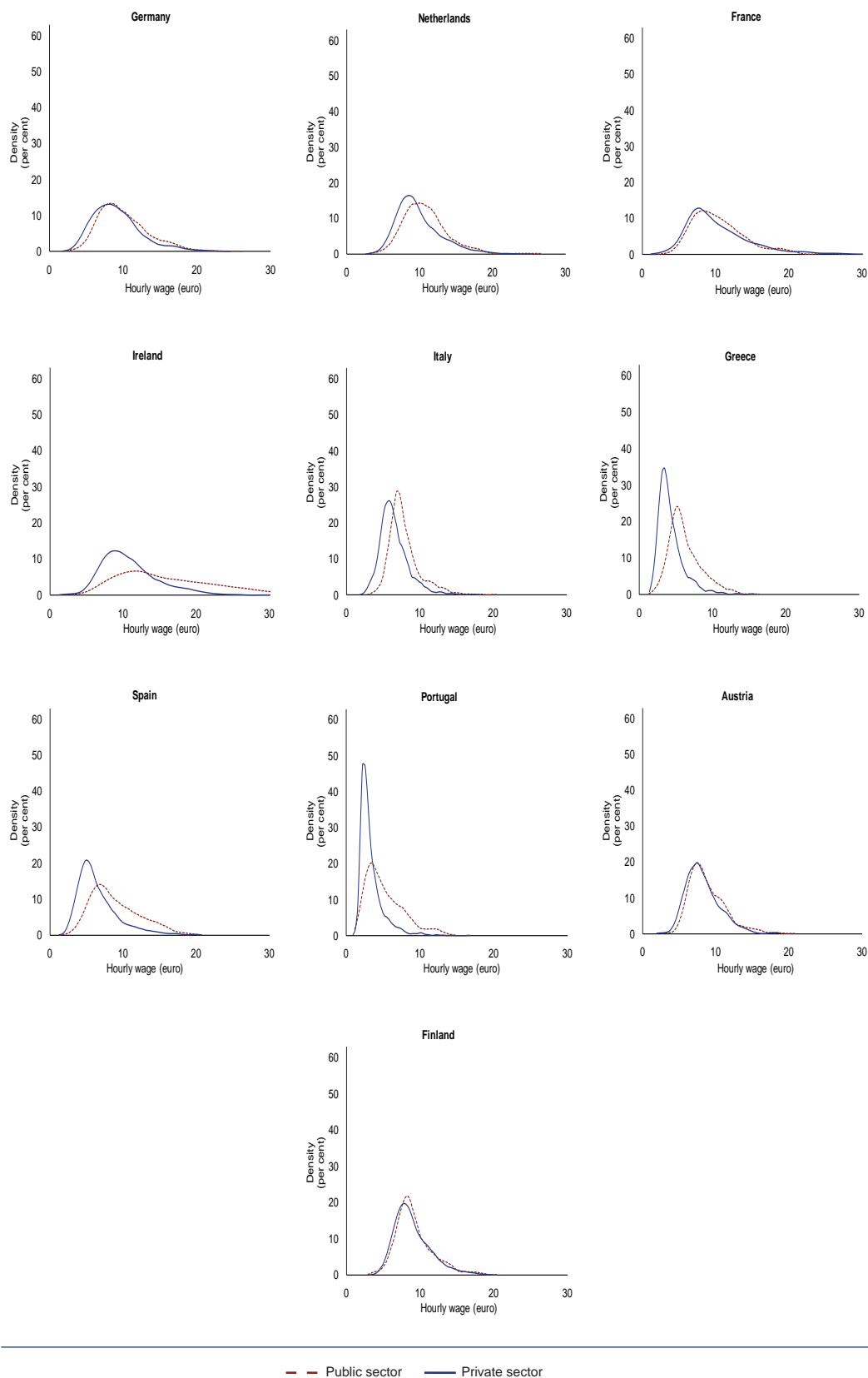


Sources: Authors' calculations based on data from the ECHP.

Note: The raw wage gap is measured as the difference between the public and private sector average wages as a percentage of the former.

Chart 2

ESTIMATED DENSITY FUNCTIONS FOR PUBLIC AND PRIVATE SECTOR HOURLY WAGES | 2000



Sources: Authors' calculations based on data from the ECHP.

Note: The charts depict, for each country, the distribution of hourly wages estimated using the Epanechnikov kernel function.

eliminate the markup rate that the literature generally associates with public service. In order to assess the validity of this idea, in what follows we analyse how the public-private wage gap changed along the period corresponding to the run-up to the inception of the euro area.

4. Empirical analysis: Estimation of the public-private wage gap

4.1. Methodology

In the previous section we point out that public and private sector employees differ in terms of their personal characteristics. In particular, we provide evidence that, on average, public employees are older, have more tenure and are more educated than workers in the private sector, which can explain the existence of the raw wage differential depicted in chart 1, as well as the differences between both sectors' wage distributions shown in chart 2. These differences may reflect the sorting of workers between sectors or distinct distributions of employee attributes and not necessarily an actual sector effect. Therefore, to assess whether individuals that otherwise share the same productivity-related characteristics are paid differently because they work in the public sector, those characteristics must be controlled for.

Previous works on this matter include Disney and Gosling (1998), focusing on data for the United Kingdom, Jorges (2001) and Melly (2002), that study the German case, Lucifora and Meurs (2004), that analyse the cases of France, Italy and the United Kingdom, Boyle *et al.* (2004), that focused on Ireland, Bargain and Melly (2008), that shed light on the public sector pay gap in France, and studies by Portugal and Centeno (2001) and Campos and Pereira (2009), applied to Portugal. The public wage gap varies considerably across countries, reflecting differences in the institutional settings that govern employment and wage determination both in the public and the private sector. However, in general, these studies provide evidence of a positive public-private wage gap. This gap tends to be higher in the case of women and typically narrows as one moves up the earnings distributions.

In order to identify the existence of significant public-private wage gaps, the most extensively used strategy consists in a wage regression including work-related characteristics of individuals (X_i) and a dummy indicating public sector employment (P_i). The coefficient referring to this dummy (δ) is interpreted as a premium, if positive, or a penalty, if it is negative:

$$y_i = X_i'\beta + \delta P_i + \varepsilon_i \quad (1)$$

As Melly (2002) points out, the dummy-based approach has an important shortcoming: implicitly, it assumes that the returns to individual attributes and job characteristics are equal in the public and the private sectors and limits the effect of the sector of employment to a single coefficient. An alternative approach consists in the break-down of the wage gap in two components: differences between the public and private sector in terms of measurable attributes of its workers and differences in the returns to the same attributes. The latter difference is interpreted as the wage premium. These differences may be evaluated at the means of the two sectors wage distributions (as in the seminal works of Blinder (1973) and Oaxaca (1973)) or at different quantiles (as in Machado and Mata (2001)). The analysis undertaken in this paper relies on the dummy approach, applied to cross-section and longitudinal data.

We begin by computing the public-private wage gap using cross-sectional methods. In particular, to obtain estimates of the impact of working in the public sector at the mean of the distribution of wages, we run Ordinary Least Squares (OLS) regressions pooling data for public and private sector employees. This method is complemented by the estimation of quantile regressions, introduced by Koenker and Basset (1978), to estimate θ different coefficients that measure the marginal effect of the sector of employment on the logarithm of wages at θ different points of the distribution.

Cross-sectional methods do not take into account unobserved (and thus unmeasurable) individual heterogeneity. In fact, there are features that can affect differently individuals in the two sectors but cannot be assessed by simple raw wage comparison and that are not captured by estimations conditional on observables. This includes not only unobserved personal skills that may affect wages, but also individual preferences determining the sorting of employees between the sectors (for instance, the utility obtained from working in the public sector *per se* or from benefiting from a stable employment relationship). These aspects determine unmeasured individual heterogeneity and may generate self-selection into one of the sectors, in which case cross-sectional results are hampered by endogeneity. Therefore, in addition to provide a more accurate assessment of the wage gap, controlling for individual heterogeneity is also useful to obtain insight on the relative quality of the human resources in each sector.

As Bargain and Melly (2008) and Bargain and Kwenda (2009), we take advantage of the longitudinal structure of our data to control for selection and use a fixed effects model to obtain results for the mean of the distributions. To control for the time-specific effects, we include dummies for the first seven waves of the panel. The same strategy cannot be used to control for the individual-specific effects given the short length of our panel and the large number of individuals. Instead, we remove the individual fixed effects by time-demeaning the data using the within transformation that is undertaken by subtracting to the variables the corresponding individual means (for additional details on the fixed effects estimations, see Campos and Centeno (2012)).

4.2. Results

4.2.1. Cross-sectional approach

The results of the estimation of the public-private wage gap based on OLS for each country and each wave of the panel are summarized in table 4.³ This table shows that the evolution of the gap (conditional on observables) is similar to the trend obtained for the raw differential (Chart 1), but its level is - in some cases considerably - lower. This suggests that, although the better human capital endowments of civil servants explain part of the wage gap between the two sectors, a non-negligible part remains attributable to a pure sector effect. In most countries in our sample the unexplained part is favourable to public employees and represents a wage premium, but results vary greatly. The highest average gaps were obtained for Portugal (19.8 per cent), Ireland (18.9 per cent) and Greece (18.6 per cent). On the contrary, the smaller gaps correspond to France and Austria (2.9 and 3.0 per cent, respectively), while Finland is the only country for which the estimate for the public sector coefficient is negative across the entire period. Table 4 also shows that the average public-private wage gap decreased along the time-span covered in our analysis. Nonetheless, small increases are observable in the cases of Germany and the Netherlands, while in Greece and Ireland the gap considerably widened.

The estimates presented in table 4 are broadly in line with previous literature on public-private wage gaps. For instance, using data from the Bank of Italy Survey of Household Income for 1998, Lucifora and Meurs (2004) presents figures that are very similar to those we estimate for Italy using the 1998 wave of ECHP, but their results for France point to higher gaps. Bargain and Melly (2008) also obtained higher values for the public-private wage gap in France, using data from the French Labour Force Survey for the 1991-2002 period. Campos and Pereira (2009) used the Portuguese Public Administration Census and matched employer-employee data from “*Quadros de Pessoal*” to estimate the public-private wage gap in Portugal in 1996 and 1999 and obtained figures very close to ours. Finally, Boyle *et al.* (2004)

³ The full set of results of OLS-based estimations (available from the authors upon request) shows that, in the majority of cases, the coefficients have the expected sign and are statistically significant. In particular, our results for every country point out that, both for men and women, earnings are positively related to tenure, age (although there is evidence of non-linearity), and third-level education.

Table 4

PUBLIC-PRIVATE WAGE GAP AT THE MEAN PER CENT									
	1993	1994	1995	1996	1997	1998	1999	2000	Average
Germany	7.9*	8.2*	9.2*	8.6*	8.4*	8.1*	10.4*	9.5*	8.79
Netherlands	3.6*	5.3*	5.1*	6.6*	7.5*	6.5*	5.6*	4.4*	5.58
France	3.9*	7.7*	7.6*	5.7*	2.8*	0.2	-1.5	-3.2*	2.90
Ireland	16.3*	21*	21.9*	19.2*	18.6*	16*	17.3*	20.5*	18.85
Italy	10.3*	12.1*	10.3*	12.1*	11*	10.7*	11*	10.1*	10.95
Greece	9.6*	12.5*	15.8*	20.8*	20.1*	21.8*	21.8*	18.2*	17.58
Spain	20.3*	18.8*	17.6*	15.3*	15.2*	16.4*	13.5*	13.8*	16.36
Portugal	22.9*	23*	21.3*	19.6*	16.7*	17.4*	17.8*	19.7*	19.80
Austria	n.a.	3.9*	4.3*	3*	2.8*	2.2	3.4*	1.5	3.01
Finland	n.a.	n.a.	-0.2	-0.1	-0.1	-1.3	0	-1.6	-0.55
Average	11.85	12.50	11.29	11.08	10.30	9.80	9.93	9.29	10.33

Sources: Authors' calculations based on data from the ECHP.

Notes: The table presents, for each country-year pair, the coefficient for the public sector dummy estimated by OLS (using a robust variance-covariance matrix) and multiplied by 100. The covariates included in the regressions are the following: dummy variables for gender, marital status, age, age squared and tenure in the current job. Coefficients tagged with "*" are significant, at least, at the 10 per cent level.

estimated the wage gap in Ireland using the ECHP and focusing on the same period and, although the covariates in the regressions and the sample selection criteria are slightly different, obtained essentially the same results.

Regarding the estimates of the wage gap across the distribution, based on the traditional QR for each country and repeated for each of the eight years covered by the ECHP, they are synthesized in table 5. The table shows that the gap generally decreases with the wage level, suggesting that the public sector compresses the wage dispersion. It also shows that the narrowing of the public-private differential between 1993 and 2000 is noticeable in most countries across the entire distribution, albeit more obvious below the median. However, it should be highlighted that the decrease in the differentials across the distribution is not as obvious as in previous studies, a feature that may be justified by the fact that we are estimating the premia using hourly wages (*i.e.*, controlling for differences in the number of working hours in each sector), while monthly wages are generally used.

Table 5

THE PUBLIC-PRIVATE WAGE GAP ACROSS THE DISTRIBUTION PER CENT									
	1993			1996			1999		
	Q25	Median	Q75	Q25	Median	Q75	Q25	Median	Q75
Germany	9.6*	6.7*	6*	10.9*	6*	4.7*	12.4*	7.6*	7.6*
Netherlands	5.8*	4.5*	2.8*	8.4*	7.8*	5.9*	8.2*	7.8*	4.5*
France	7.5*	4.3*	-0.6	7.2*	5.2*	2.4	1.8	-2.1	-4.9*
Ireland	17.2*	14.8*	14.2*	18.2*	16.3*	16.3*	16.4*	14.1*	13.7*
Italy	14.1*	10.4*	9.5*	13.3*	11.5*	10.5*	11.4*	10.6*	11.6*
Greece	15.2*	10.8*	5.5*	24.2*	21.8*	20*	24.5*	19.7*	21.9*
Spain	22.8*	18.9*	16.8*	19*	14.5*	9.7*	15.1*	12.6*	10.3*
Portugal	23.6*	20*	20.7*	16.6*	19.2*	21*	19.5*	17.7*	14.7*
Austria	-	-	-	3.1*	4.7*	3.5*	3*	4.2*	2.3
Finland	-	-	-	1.9*	-0.9	-1.9	0.8	-0.6	-2.5*

Sources: Authors' calculations based on data from the ECHP.

Notes: The table presents, for each country-year pair, the coefficient estimated for the public sector dummy using traditional QR, multiplied by 100. The covariates included in the regressions are listed in the note in table 4. Coefficients tagged with "*" are significant, at least, at the 10 per cent level.

4.2.2. Longitudinal approach: the public-private wage gap controlling for the role of unobservable characteristics

A first assessment of the role of unobservable attributes in explaining pay differences between public and private sector employees can be drawn from the analysis of chart 3. This chart provides a comparison between the coefficients estimated using a fixed effects model (controlling for endogenous sector choice) and those obtained through a pooled-OLS approach with time-dummies.⁴

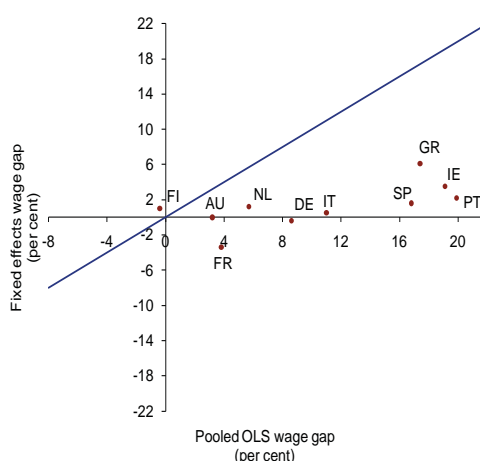
Chart 3 shows that the estimates for the public-private wage gap based on the fixed effects approach are, in general, lower than those obtained using the pooled model. According to Bargain and Melly (2008), this fact suggests a positive selection effect determining that better-endowed individuals choose to work in the public sector rather than in the private. The only exception refers to Finland, in which case pooled-OLS estimates yield penalties associated with public employment that are attenuated when unobserved and time-invariant factors are taken into account. Note that, while the OLS-based estimates are generally statistically different from zero, the fixed effects estimator typically yields non-significant mean gaps. The only countries for which our findings suggest that the average gap is not nil are Greece, Ireland, Portugal and Netherlands. Thus, these results suggest that in most countries, once both observed and time-invariant unobservable factors are controlled for, there is no evidence of a positive wage gap between the public and the private sectors. It is worth noting that consolidation efforts in these countries in the period analysed were not striking. In fact, Campos (2011) identified a relatively small number of fiscal adjustments for these country-year pairs, none of which was considered to be successful.

As in Bargain and Melly (2008), we assessed how the public-private wage gap evolved over time by including terms expressing the interaction between the public sector dummy and time dummies for the first seven years of the panel. The differential between this time-varying gap and the one depicted in table 4 can be attributed to the fact that we are now controlling for unobserved individual heterogeneity. Table 6 confirms, in the first place, that controlling for unobserved characteristics generally brings down the public-private wage gap and in several cases the results imply statistically significant penalties.

The difference between results obtained by fixed effects and OLS suggests that the latter may be hampered

Chart 3

PUBLIC-PRIVATE WAGE GAP AT THE MEAN: THE ROLE OF SELECTION



Sources: Authors' calculations based on data from the ECHP.

Note: The figure presents, for each country-year pair, the coefficient for the public sector dummy (multiplied by 100) estimated using fixed effects regressions (on the axis of ordinates) and pooled OLS (on the axis of abscissas). The covariates included in the regressions are listed in the note in table 4.

⁴ The pooled estimation consists of a regression on data for the entire period.

Table 6

PUBLIC-PRIVATE WAGE GAP AT THE MEAN CONTROLLING FOR UNOBSERVABLES: EVOLUTION ALONG TIME PER CENT								
	1993	1994	1995	1996	1997	1998	1999	Average
Germany	-1.4*	-1.2*	-0.9*	-0.5*	-0.1	-0.5*	1.5	-0.4
Netherlands	0.5	0.9	1	2.6*	2.6*	1.9*	0.1	1.4
France	-4.5*	-1.5*	-0.4*	-0.9*	-2*	-2.9*	-4.9*	-2.4
Ireland	3.3	4.8*	3.5	4.6*	3.9*	3.1	0.3*	3.4
Italy	1.2	1.1	-0.6	1.3	0.9	0.3	0	0.6
Greece	-2.8*	-1.6*	1.8*	6.9*	7.5*	11.4*	10.6*	4.8
Spain	5.2*	4.3*	2.8*	2.3*	1.4*	1.3*	-1.7	2.2
Portugal	0.1*	1.7*	2.6*	1.2*	0.9*	1.4*	4.4*	1.8
Austria	n.a.	0.4	0.9	-0.5	-0.3	-0.6	0.2	0.0
Finland	n.a.	n.a.	1.7	2.5*	0.9	-0.3	0.7	1.1
Average	0.2	1.0	1.2	2.0	1.6	1.5	1.1	1.2

Sources: Authors' calculations based on data from the ECHP.

Notes: The table presents, for each country-year pair, the estimated coefficient (multiplied by 100) for the public sector dummy in a fixed effects equation including interaction terms between the public sector dummy and year dummies. The covariates included in the regressions are listed in the note in table 4. Coefficients tagged with "*" are significant, at least, at the 10 per cent level.

by an upward bias stemming from the omission of relevant determinants of wages (and sector of employment). Note however that if the variability in the "sector" regressor is mostly cross-sectional and there is a relative stability over time, fixed effects estimates also tend to be imprecise (Cameron and Trivedi (2007)). Although we identify 2,888 changes from the public to the private sector and 2,554 switches in the opposite direction, we cannot rule out that our estimates are hampered by a lack of variability. Moreover, fixed effects results are particularly prone to attenuation bias arising from measurement errors. In fact, since the model is identified using a differencing of the data, the estimate for the coefficient associated to the variable "sector" is obtained based on switches between sectors. Thus, if this variable is miscoded or misreported, those switches did not actually take place, resulting in a measurement error that also changes from wave to wave and that tends to bias the coefficient towards zero (Angrist and Pischke (2009)). This inconsistency caused by measurement error may possibly offset the bias generated by the omitted factors. In order to assess to what extent this issue is actually affecting our results, we performed a series of robustness checks that confirmed the findings described above (see Campos and Centeno (2012)).

5. A robustness test of sector effects on wages

The existence of a public sector effect can be further analysed by focusing on results obtained specifically for the sub-sample of sector switchers. In particular, such analysis is useful to assess whether the public-private conditional wage differential should be seen as an actual public sector premium, as a result of the sorting of individuals across sectors determined by their unobserved idiosyncratic characteristics or the combined effect of the two. In order to do so, we undertake an exercise similar to that in Gibbons and Katz (1992), focusing on the sub-sample of individuals constituted by sector switchers and assuming that there are only two moments in time: pre- and post-switch (respectively, $t = 1$ and $t = 2$).

We begin by estimating the pre-switch wage differential between the public and private sectors:

$$y_{i,1} = X'_{i,1}\beta + \delta P_{i,1} + \varepsilon_{i,1} \quad (2)$$

where $X_{i,1}$ represents a set of individual attributes observable in period 1.⁵ $P_{i,1}$ is the dummy for the public

⁵ See the note in table 4 for the set of covariates included in the regressions.

sector, that equals one if the individual left that sector and joined the private and zero if the transition was in the opposite direction. The δ parameter represents the public-private wage gap.

Second, we estimate an equation for the wage change between the two periods:

$$\Delta y_{i,2} = X'_{i,2}\beta + \rho\Delta P_{i,2} + \Delta\varepsilon_{i,2} \quad (3)$$

where the dependent variable represents the percentage change in the individual's hourly wage and the remaining variables are measured after the switch. Note that this estimation takes into account individual-specific and time-invariant unobservable factors, under the assumption that they are equally valued in the public and private sectors.

Finally, we estimate the effect of the pre-switch sector on the post-switch wage:

$$y_{i,2} = X'_{i,1}\beta + \eta P_{i,1} + \varepsilon_{i,2} \quad (4)$$

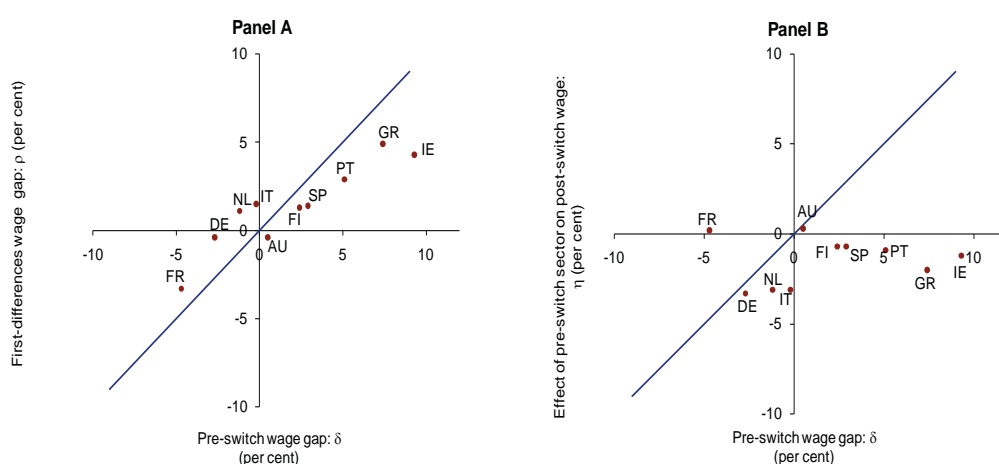
where, since the set of covariates in vector $X_{i,1}$ and $P_{i,1}$ are measured in $t = 1$, the impact of the pre-switch sector on the post-change earnings, $y_{i,2}$, is given by η .

As Gibbons and Katz (1999) points out, if the conditional wage differential given by $\hat{\delta}$ is exclusively due to the sorting of employees across sectors as a result of individual-specific factors, the $\hat{\rho}$ parameter in equation (3) should be nil. Moreover, one would expect that if individual unobserved heterogeneity is the sole explanation for public-private wage gap, employees in better-remunerated positions that switch sector would have higher post-switch wages than those that were originally in low-pay jobs. This would imply a positive relationship between the $\hat{\eta}$ and $\hat{\delta}$ parameters. On the contrary, if the wage differential is an actual public sector premium, then $\hat{\rho}$ should equal $\hat{\delta}$.

Results in Panel A of chart 4 (that plots $\hat{\delta}$ against $\hat{\rho}$) show that, in general, individuals that move from the private to the public sector are affected by wage changes of the same sign and of similar magnitude of the public-private gap estimated from equation (2). Moreover, as expected, the premia estimated for

Chart 4

PUBLIC-PRIVATE WAGE DIFFERENTIAL: A "PURE" PUBLIC PREMIUM OR THE RESULT OF SELF-SELECTION?



Sources: Authors' calculations based on data from the ECHP.

Notes: The figure plots the estimates for the public-private wage gap obtained from equation (2) against $\hat{\rho}$, from (3), and $\hat{\eta}$, from (4) (respectively in panels A and B). Note that, in both cases, the estimations were conducted only for the sub-sample of individuals that switch sectors along the 1993-2000 period.

the sub-sample of switchers are generally smaller than that obtained using the fixed effects estimator for the entire sample (depicted in chart 3), suggesting that the individuals that change sector are those for which the premia were originally lower. These pieces of evidence seem to suggest that movements across sectors are motivated by pay differences, implying the existence of a “sector effect” associated to the estimated gaps. Additionally, the absence of a positive relationship between the $\hat{\eta}$ and $\hat{\delta}$ parameters (depicted in Panel B of chart 4) implies that in most countries the individuals that move from high pay jobs in the public sector do not continue to benefit from a positive wage differential. This is consistent with a “pure” public sector premium, an effect that is particularly clear in the cases of Ireland, Greece and Portugal. On the contrary, results for Germany, Netherlands, Italy and Austria suggest that individual unobserved heterogeneity justifies the maintaining of the wage differentials after a switch of sector.

Therefore, the robustness analysis presented seems to suggest that, although the public-private wage gap is partially explained by self-selection effects, in most countries there is evidence of non-negligible “sector effects”.

6. Concluding remarks

This paper focuses on the estimation of the public-private wage gap in several European countries in the period immediately before the adoption of the euro. The estimation is undertaken by using methods that control for the impact of differences in both observable and unobservable endowments on wages and sector selection.

In the period prior to the inception of the euro area there is evidence of a relative wage moderation in the public sector in the countries that were then engaged in the fulfillment of the Maastricht criteria. This is less obvious in a set of countries including Greece, Portugal and Ireland, for which results in Campos (2011) suggest that no major consolidation efforts were undertaken in the period in analysis. As regards the public-private wage gap, the estimates obtained controlling for the impact of unobserved and time-invariant individual characteristics show, on average, a slight increase along the period. Note that the widening of the gap is particularly noticeable in countries coinciding with those for which fiscal adjustments identified in Campos (2011) were small in magnitude and were not accompanied by remarkable cuts in primary expenditure items and, in particular, in compensation of employees. Note also that the premia estimated using the fixed effects methodology are considerably lower than the obtained using OLS, a feature that, to a large extent, can be explained by the fact that in the latter case unobserved individual characteristics are not taken into account. However, fixed effects estimates may be underestimated as a result of a downward bias arising from measurement errors, while those obtained using cross-sectional methods may be hampered by an overestimation stemming from the omission of relevant unobserved factors. Thus, the actual wage premia are expected to lie in between.

The public-private wage gaps typically narrow along the distribution. At the upper part of the wage distribution results point to a considerable decrease in the premia and, in several cases, to the existence of penalties associated with public employment. These results imply that, in several euro area countries, the wage compression generally associated with the public sector can make it difficult to retain the more capable workers in better-remunerated positions. This problem may hamper the efficiency in the provision of services by the public sector, with possible consequences as regards its quality. Notwithstanding, it is note highlighting that the decrease in the differentials across the distribution is not as obvious as in previous studies, a feature that may be justified by the fact that we are estimating the premia using hourly wages (*i.e.*, controlling for differences in the number of working hours in each sector), while monthly wages are generally used.

Measures specifically aiming at reducing the weight of the public sector wage bill have recently been adopted in several European countries. It will be interesting to assess if these measures will be reflected in the public-private wage gaps or if the consolidation efforts will not be accompanied by relevant

developments in this regard - as appears to have been the case along the 1990s. Note, however, that wage cuts that compress the wage distribution may be effective in reducing general government primary expenditure and raw wage differentials, but fail to reduce pure premia benefiting particular categories of public employees. In order to do it, the implementation of this sort of measures should be carefully thought of and should ideally be underpinned by a full understanding of the factors determining the pay differential between the public and the private sector (along the entire wage distributions).

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