

DISCUSSION PAPER SERIES

IZA DP No. 12013

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## ABSTRACT

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# Wage Differentials by Bargaining Regime in Spain (2002-2014): An Analysis Using Matched Employer-Employee Data

This research examines wage differentials associated to different collective bargaining regimes in Spain and their evolution over time based on matched employer-employee microdata. The primary objective is to analyse the wage differentials associated to the presence of a firm-level agreement and how they have evolved, taking into account the changes in the economic cycle and the recent labour reform of 2012. The second objective of the study is to examine the impact on wages of an absence of a collective agreement. This regime has become more prevalent due to the regulatory changes associated to the labour reform. From the evidence obtained it may be concluded that, although the higher wages observed in company-level agreements are systematically explained by the better characteristics of firms with labour agreements, there is a positive wage premium that favours workers mostly in the middle and upper-middle end of the wage distribution. This premium has remained relatively stable over time and does not seem to have been affected by the reform, although a degree of cyclical evolution cannot be ruled out. With respect to the impact on wages of the absence of a collective agreement, the results suggest that this level of bargaining, which is still fairly scarce, despite displaying an increasing trend, is associated, on average, to comparatively low wages, and, consequently, to higher wage flexibility. The principal explanatory cause for this wage differential is the existence of a negative wage premium for workers of firms covered by sectoral agreements, particularly those at the lower end of the distribution.

**JEL Classification:** J31, J51

**Keywords:** collective bargaining, wage differentials, decomposition methods, economic cycle

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## **1. Introduction**

The aim of this research is to analyse the wage differentials existing in the Spanish labour market between different types of collective agreement, specifically between firm (or establishment) agreements and sectoral agreements (provincial or national). With data corresponding to the years 2002, 2006, 2010 and 2014, the study seeks to analyse the evolution of the wage premium of firm-level agreements over the years and, more specifically, whether this premium is sensitive to the economic cycle and whether it has been affected by the 2012 labour reform.

In addition, for the period 2010-2014, the wage differentials (both average and those across the wage distribution) existing between the three levels of bargaining are analysed: firm-level agreement, sectoral agreement and, as a novelty, the absence of an agreement, due to the increase in the number of firms applying this regime as a result of the labour reform.

Much like the North American literature on wage differentials between unionised and non-unionised workers, a range of studies has been carried out for certain European countries which analyse - given the institutional diversity between the two sides of the Atlantic - the wage differentials between workers covered by a collective agreement and those who are not, but especially the differentials between different types of agreements, as most European countries have a high level of coverage. A common finding of these studies is the detection of a positive wage premium for workers covered by an agreement as opposed to those who are not. Stephan and Gerlach (2005), Gürtzgen (2006) and Heinbach and Spindler (2007), among other more recent studies, estimate these positive premiums for Germany, a country where the regime of an absence of collective bargaining agreements has expanded. Evidence is available for a greater number of countries in terms of estimating a positive premium for employees covered by firm-level agreements with respect to those covered by higher-level agreements. Different studies coincide in estimating positive premiums, although of different sizes due partly to the use of different methodologies and because they refer to countries with their own institutional frameworks (Rycx, 2003 for Belgium; Card and de la Rica, 2006 for Spain; Plasman et al., 2007 for Denmark, Belgium and Spain; Daouli et al., 2013 for Greece; Dahl et al., 2013 for Denmark; Andreasson, 2014 for

Sweden and Addison et al., 2014 for Germany, although – also for Germany - Gürtzgen, 2016 does not find any evidence of this positive premium).

The hypotheses regarding both the power of collective bargaining and *wage efficiency* offered by firms can explain these positive wage premiums. There is no agreement, however, with respect to the effect on wage dispersion. Therefore, in some studies and countries there seems to be wider dispersion in the firm-level agreements as it is understood that within this bargaining framework the firm has greater autonomy to adjust wages to the productivity of the workers. However, there is also evidence of the contrary, supported by the argument that the firm-level agreement responds to the strength and pressure of the unions and a central objective of the unions is to reduce wage differentials between workers.

One aspect which the literature has not addressed is the sensitivity of these wage premiums to the economic cycle, which constitutes one of the objectives of this study. The evidence regarding wage differentials by type of agreement for the Spanish case is very limited and outdated as it refers only to 1995. As mentioned above, Card and de la Rica (2006) and Plasman et al (2007) estimate a positive wage premium for the firm-level agreements with respect to sectoral agreements. Regards dispersion, Card and de la Rica (2006), Dell'Aringa and Pagani (2007) and Canal and Rodríguez (2016) coincide in that firm-level agreements increase wage inequality slightly, while Plasman et al (2007) find a reduction in the differences in these agreements.

Analysing the Spanish case is particularly interesting for different reasons. On the one hand, the available evidence is scarce and partly contradictory. It also refers to a time in the distant past. On the other hand, the Spanish economy and its labour market have experienced a long-lasting deep economic crisis with unemployment reaching extreme levels, which may have altered the bargaining capacity of the workers and created difficulties for firms to continue paying *efficiency wages*. A third reason is that in 2012 a broad labour reform was passed which modified multiple aspects of the labour framework with potentially significant effects on wage levels.

The effects of the 2012 labour reform on wage premiums can be summarised in the following hypotheses: 1) The premium of the firm-level agreements with respect to the sectoral agreements may have grown due to the reform of Article 41 of the Workers' Statute (more favourable wages and working conditions than the agreement) and due

to the possible overriding of supra-firm agreements. It may have reduced, however, due to the greater decentralisation of bargaining. The possible effect of the limitation of ultra-activity seems minimal. 2) The premium of the sectoral agreements with respect to workers not covered will a priori reduce due to the modifications made to Article 41 and the possibility of an overriding of the sectoral agreement.

The study makes several contributions. First, it quantifies the wage premium between the different types of agreement for the years 2002, 2006, 2010 and 2014. For the latter two years it also analyses the premium with respect to a regime of an absence of an agreement, an aspect which, to date, has only been studied for Germany. Second, it identifies the bargaining level at which the wage differentials are greatest by conducting an analysis across the complete wage distribution. Third, the evolution of the differences between types of agreement and between the quantiles of the distribution provides evidence on whether it has varied slightly with the end of growth and the impact of the deep recession.

The study is structured as follows. The following section provides a description of the Spanish institutional collective bargaining framework. Next, a brief literature review is conducted. Subsequently, the databases are described and the evidence obtained is presented. The study ends by drawing the main conclusions.

## **2. Institutional framework of collective bargaining in Spain**

After returning to democracy, Spain regulated the labour market following the model in force in neighbouring countries of Western Europe. The system for determining wages was approved in the Workers' Statute of 1980. As well as using the example mentioned as a reference, it sought to compensate some individual features derived from the young democracy, such as the low union membership and the under-representation of the unions in an economy predominated by small and medium-sized firms.

Consequently, the Workers' Statute established that the unions obtain the capacity to negotiate collective agreements based on a minimum result in the union elections (10%, or 15% regional), irrespective of the number of members. The agreements are negotiated by sector - usually on a provincial level - between the business associations and the unions that have obtained the minimum number of representatives in the union elections: in this way many small and medium-sized firms

are not present at either side of the table in the negotiations. Despite this, all of the firms of a sector - including those not present in the negotiation - are obliged to apply the agreement because it has the force of law and must be fulfilled by all firms in the same sector and territory, according to the general principle of automatic effectiveness. Therefore, the agreement legally extends to all firms automatically, irrespective of their size and without the need for them to adhere to it and it applies to all workers, both unionised and not. Furthermore, until the reform of 2012, the agreements had an unlimited validity as they were indefinitely renewed when they expired until a new agreement was made (ultra-activity). These features explain the very high coverage of collective bargaining in Spain (around 80% of wage earners), although there is a very low union density (approximately 18%) (ILO, 2015).

There is also the possibility of negotiating firm-level agreements. Bargaining is carried out by the board of directors and the firm worker's committee (or the personnel delegates in firms of less than 50 workers). The firm-level agreements cannot establish conditions that are worse for the workers than the sectoral agreements, which completely predominated until 1994 after which they continued to be prevalent but with certain limitations until 2012. These legal restrictions and the small size of Spanish firms explain the low incidence of decentralised bargaining and the low percentage of workers covered by these firm-level agreements (11% before the labour reform). In practice, firm-level agreements are negotiated on the request of the firm worker's committee in large-size firms with a high union presence, generating higher wages than in sectoral agreements.

The far-reaching labour reform approved in 2012 amidst the economic crisis gave rise to different changes in the collective bargaining system<sup>1</sup>. These changes sought to facilitate wage flexibility on a micro-economic level and enable fast modifications to be made to wages and other conditions so as to adapt to the economic cycle. Regarding collective bargaining and wage determination, the legal changes focused on four aspects: a) the reform introduced the applicative priority of firm-level agreements over sectoral agreements, with very few exceptions, promoting, therefore, the decentralisation of collective bargaining; b) it facilitated the overriding of the sectoral

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<sup>1</sup> For a review of recent changes in the characteristics of collective bargaining in OECD countries see Visser (2016).

agreements; c) it enabled firms to revoke the most advantageous conditions that the sectoral agreement may have been applying (including wages, hours worked and work schedule), and d) it limited the validity (ultra-activity) to one year after the finalisation of the agreement.

The literature studying the impact on wages of these modifications of the legal framework concludes that there was an acceleration of wage adjustment which coincided with the approval of the reform. One of the most evident effects of the reform is precisely wage moderations which has given rise to greater macro-economic wage flexibility (Izquierdo et al., 2013; Arpaia et al., 2015; International Monetary Fund, 2015 and Izquierdo and Puente, 2015). There is also evidence to sustain that the wage adjustment has not affected all workers equally, but has had a greater impact on new hires (Fernández-Kranz, 2015; OECD, 2015 and Orsini, 2014) and low wage earners (López-Mourelo and Malo, 2015). The evidence on microeconomic wage flexibility, on the other hand, is scarce. It is worth pointing out that the IMF (2015) has observed that after the implementation of the reform, sectoral and regional wages continue to respond very weakly to specific variations in the economic circumstances of their respective environments. To date, the literature has not analysed the effect that the labour reform could have had on the wage differentials in accordance with the bargaining regime.

The effect of the labour reform on these wage differentials depends largely on the effective use made by employers of each of the above-mentioned wage flexibility factors. So, following the increased decentralisation of bargaining, the new firm agreements correspond to smaller firms, which are predictably less productive, and therefore pay lower wages, contributing to reducing the wage gap between firm and sectoral agreements. The possibility of not applying the sectoral agreement can generate effects that are difficult to predict as they depend largely on the response of the firm in the WES questionnaire regarding the type of agreement that it is covered by. Nevertheless, the effect would be very small as non-application has affected only 0.14% of firms with an agreement (Rodríguez and Canal, 2016). The revoking of conditions which are more advantageous than those in the agreement (Article 41 of the Workers' Statute) will have reduced the difference between the agreed wage and the wage that



is effectively paid<sup>2</sup>. As this revocation will have been applied mainly in firms with a sectoral agreement, it is expected, *ceteris paribus*, that the wage gap will increase between the two types of agreement. On the other hand, there will be a reduction in the wage differential between the wages of firms with a sectoral agreement and those of firms without an agreement. The size of the effect will depend on the number of firms that have used this flexibility measure, which can be assumed to be very few according to what can be deduced from other sources (Izquierdo and Jimeno, 2015). Finally, the reduction of the ultra-activity to one year will not have had any relevant effects, as in 2014, the Spanish Supreme Court ruled that the conditions agreed in the expired agreement will remain unchanged in the employment contracts of the workers. In summary, the effects of the 2012 labour reform on wage differentials depending on the bargaining regime, when they exist, will have the opposite sign (lower differential due to decentralisation and larger differential due to the reduction in the wage cushion), and, in any case they are likely to be scarce.

### **3. Literature review**

Since the 1970s there has been an abundance of studies for the United States on the wage differentials between unionised and non-unionised workers (Block and Kushin, 1978; Ashenfelter, 1978). These studies estimate a wage premium for unionised workers of around 15%<sup>3</sup>. There has been much criticism of these cross sectional studies (mainly wage imputation, poor classification of union status of workers and bias in the selection of the unionised workers) and doubts have been raised regarding the size of the wage premium. The estimates based on longitudinal data, even when correcting for the possible bias in the selection, only moderate the wage premium slightly (Freeman, 1984; Card, 1996). The studies conducted by Hirsch (2004) and Hirsch and Schumacher (2004) seeking to resolve a good part of the problems confirm the previous results.

Much like the North American literature, a range of studies has been carried out for certain European countries which analyse - given the institutional diversity between the two sides of the Atlantic - the wage differentials between workers covered by a

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<sup>2</sup> Cardoso and Portugal (2005) call this difference the *wage cushion* and they analyse it for the case of Portugal with 1999 data. Its size varies between 0.20 and 0.47, depending on the sector and its effect is to increase wage dispersion.

<sup>3</sup> Lewis (1986) summarises this early literature and discusses its critical points.

collective agreement and those who are not, but especially the differentials between different types of agreements as most European countries have a high level of coverage<sup>4</sup>. The European literature is much more recent and limited. The majority of studies use individual cross-sectional data. A common finding of these studies is the detection of a positive wage premium of between 5% and 10% for workers covered by an agreement as opposed to those who are not. The amount seems to depend not only on the controlled variables and the years, but also on the social model prevailing in the country. Therefore, contrary to the majority of continental countries, in Ireland, a country with a liberal Anglo-Saxon social model, the wage premium of the agreement is negative (McGuinness et al., 2010) while in the Netherlands, a corporatist country, the premium is non-existent (Hartog et al., 2002). Magda et al. (2016) also estimate non-existent premiums in the Czech Republic in 2002 and 2006.

For the majority of countries, including Spain, the coverage of sectoral agreements is so high that practically everybody is covered by an agreement. Therefore, in this case, only wage premiums of firm-level agreements with respect to sectoral agreements have been estimated. The studies published by Rycx (2003) for Belgium, de Card and de la Rica (2006) for Spain, de Plasman et al. (2007) for Denmark, Belgium and Spain, de Daouli et al. (2013) for Greece, de Dahl et al. (2013) for Denmark or de Andreasson (2014) for Sweden estimate premiums for firm-level agreements which are mostly between 5% and 7%.

Germany is, undoubtedly the country for which there is most literature. This is because it has a triple-level wage bargaining regime, including a significant and growing part of its business fabric that has no type of coverage. There are also rich longitudinal databases available for Germany. The studies carried out with cross-sectional data (Stephan and Gerlach, 2005; Heinbach and Spindler, 2007; Khon and Lembcke, 2007; Fitzenberger et al., 2008) estimate premiums of sectoral agreements with respect to uncovered workers of between 4% and 10% which are greater among women and in western Germany. The premiums of firm-level agreements are approximately 7%. The most recent studies carried out with longitudinal data enable the selection biases to be completely controlled and, therefore, reduce the size of the premiums to around 3% (Gürtzgen,

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<sup>4</sup>The principle characteristics and results of the European literature on the subject may be consulted in Table A.1. of the Appendix.

2006; Addison et al., 2014). In a more recent study, Gürtzgen (2016) rules out the existence of real wage premiums of the agreements once selection biases and the declining trend of firms that end up switching to a no-agreement regime are controlled.

Contrary to Germany, the evidence regarding the wage differentials by type of agreement for the Spanish case is very limited and outdated as it refers only to 1995. As mentioned above, Card and de la Rica (2006) and Plasman et al (2007) estimate a positive wage premium for the firm-level agreements with respect to sectoral agreements. The size of the premium is estimated at between 4% and 7%<sup>5</sup>. It is worth pointing out the efforts undertaken by Card and de la Rica (2006) to try to control the selection biases despite using cross-sectional data. The methodology that they propose has been used by subsequent literature<sup>6</sup> in cases where it is not possible to work with longitudinal data.

#### **4. Data**

The microdata used in the research correspond to the 2002, 2006, 2010 and 2014 waves of the Wage Structure Survey (WES) carried out by Spain's National Statistics Institute (INE). It is a statistical operation conducted every four years which constitutes the sample for Spain of the *European Structure of Earnings Survey*, a survey undertaken with a harmonised methodology in all of the member countries of the European Union and based on independent cross sections. This survey is administered to firms (it uses a two-stage sampling technique among wage earners based on the social security contribution accounts of their firms) and covers employees registered with Social Security throughout the month of October during the year of reference. On the other hand, although the sectoral coverage of the survey has been extended over time, the four waves analysed are representative of practically all of the establishments of the private sector (specifically, they include those establishments of any size registered with the general social security regime and whose economic activity corresponds to sections B to S of the CNAE-2009 sectoral classification. Therefore, it leaves out, exclusively, certain sectors of activity such as agriculture or domestic service), although it is worth highlighting that firms with less than ten employees are covered by the survey only after

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<sup>5</sup> Canal and Rodríguez (2004) detect –also for 1995- a premium of 11% in a study analysing wage dispersion in Spanish companies.

<sup>6</sup> MacGuinnes et al. (2010) and Daouli et al. (2013) use it, as does this study.

the 2006 wave. It consists of a matched employer-employee database which provides highly detailed information about wages and the characteristics of the workers (sex, age, education and nationality); their job positions (occupation, seniority, type of contract and undertaking of supervision tasks) the firms (sector, size, region, type of ownership and type of market) and information referring to the type of collective agreement existing in each of the establishments considered<sup>7</sup>. The wage concept used in this research is the hourly gross wage, calculated by dividing the pay corresponding to the month of reference of the survey (October) by the weekly working hours multiplied by 4.3. Wages are expressed in gross terms and their calculation incorporates any type of payment by the firms, including commissions, bonuses for night and weekend work and overtime payments.

The type of collective bargaining that exists is indicated by each firm as a response to a specific question of the WES about how labour relations are regulated to cover the majority of the workers. Until the wave of 2006, the possible responses to this question only considered different types of collective agreement, while from the 2010 wave this question requests that the respondent indicate whether a collective agreement or, if not, any other form of regulation exists. Therefore, it explicitly considers the possibility that no collective agreement exists. Consequently, the dependent variables in the analysis correspond to categorical variables that reflect the presence of a firm-level collective agreement (including agreements on a firm, work centre or group of firm's level) or the absence of collective bargaining (if another type of regulation is indicated by the firm), as opposed to the alternative of a sectoral agreement (state or lower level).

Much like previous studies on the same issue, the analysis is limited to full-time employees working in the private sector, given the differences in the wage determination processes with respect to the public sector. The explanatory variables which have been considered cover both the characteristics of the individuals and their job positions and firms. The individual characteristics refer to the nationality of the individual (distinguishing between natives and immigrants); the level of general

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<sup>7</sup> To analyse the topic proposed, it would be more appropriate to use a longitudinal matched employer-employee database, however, the only source that fulfils these requirements for the Spanish economy, namely the Continuous Professional Life Sample, does not provide information about collective bargaining.

education (distinguishing between three levels: primary, secondary and tertiary education) and age (distinguishing between four brackets). The characteristics of the job positions are years of seniority in the current job and its quadratic form; the type of contract (indefinite or fixed-term); occupation (six categories) and the undertaking of supervision tasks. Finally, the attributes of the firms are the sector (twelve categories, corresponding to the sections of the CNAE-93); size (three brackets) and region (seven NUTS1).

The sample of the study has filtered out observations which provide no information about the main variables of interest, such as those corresponding to individuals with hourly wages of less than 2.5 euros or over 200 euros. Furthermore, it has also eliminated observations referring to establishments with less than two observations and, in order to limit the analysis to workers employed in the private sector, it has eliminated observations corresponding to section O of the CNAE-2008 classification (Public Administration and defence; compulsory social security) and publicly controlled firms in other sections of activity. The final sample is made up of 164,494 observations for 2002, 179,386 for 2006, 144,467 for 2010 and 139,894 for 2014.

## **5. Results**

### *5.1. Descriptive evidence*

Table 1 contains information about the average hourly wage (expressed in euros and logarithms respectively), according to the level of collective bargaining during the period considered (depending on the information on the bargaining level contained in the EES, for the whole of the period a distinction is made between sector and firm-level agreements and, after 2010 the absence of an agreement is also distinguished). This evidence confirms the existence of significant wage differentials between bargaining levels, which also experience considerable changes over time. So, taking the predominant type of bargaining as a reference, namely the sector level, it is found that in firms with their own agreement, average wages are substantially higher (between 0.2 and 0.3 logarithmic points or, alternatively between approximately 20% and 30%) although the differential tends to decrease over time. The wage differential associated to firm agreements is not, however, homogeneous across the whole wage distribution

(Table 2), It has an inverted U shape, being comparatively lower at the left tail, increasing significantly in the central part of the wage distribution and falling off at the right tail. In the case of firms which are not covered by collective bargaining, the average wages are notably lower in comparative terms, although the wage penalty observed displays a significant decreasing trend between 2010 and 2014 (from 0.18 to 0.06 logarithmic points). This wage penalty is comparatively more acute in the lower part of the distribution and reduces over the length of the curve until it becomes favourable for workers in firms without agreements at the right end of the distribution in 2014.

Table A.2 of the Appendix contains the descriptive statistics of the samples used in the analysis. Based on these statistics, differences in the characteristics of the workers and their job positions can be appreciated between the different bargaining regimes, which are significant and persistent over time. Therefore, taking sectoral bargaining as a reference again, it may be observed that workers employed in firms with their own agreement have differential characteristics which, in general terms, are systematically associated to higher wages. Without being exhaustive, these employees are mainly men and native; on average they have higher levels of education, they are older with more years of seniority; they display a lower incidence of fixed-term contracts and have a greater presence in large manufacturing firms with an international focus, and, as described above, with a workforce that is comparatively qualified (observed in dimensions such as age, seniority and education) and with a comparatively low presence of women and immigrants. In the case of firms without an agreement, on the other hand, in relative terms we can observe both a higher presence of certain characteristics associated to lower relative wages (including a significant incidence of women and a higher rate of fixed-term contracts) and comparatively higher wages (higher education levels and an occupational structure with a greater presence of professions which require higher levels of qualification). There is also a sectoral distribution characterised by a greater presence in activities in the services sector.

Finally, with respect to the distribution of the samples according to the bargaining regime (last row of Table A.2), it is worth highlighting that the relative weight of collective bargaining at the firm level is relatively stable throughout the period, with values of between 20% and 25%, with the only exception being the increase experienced at the beginning of the economic crisis between 2006 and 2010. In the case of an

absence of bargaining, its relative presence is comparatively lower, although over time it can be observed to increase, from 2.5% of the workforce in 2010 to 3.8% in 2014.

## *5.2. Results of the analysis*

Table 3 shows the results of estimating a Mincer equation that relates the logarithm of individual wages to different variables associated with the characteristics of the workers, their job positions and the characteristics of the firm where they work. This equation has been estimated separately for each of the samples available of the Wage Structure Survey (2002, 2006, 2010 and 2014), using the sample elevation factors on an individual level.

The controls consider gender, nationality (native/immigrant), educational level (3 levels), age (4 categories), seniority in the firm and its square, whether workers have a dead-end contract or not, the occupational category (6 groups), the region of the establishment on a NUTS1 level (7 regions), the sector of activity (12 sectors), the size of the firm (3 categories), the firm's principal market (4 groups) and an additional series of variables that include the average characteristics of the workers of each firm and that, as argued Daouli et al (2013), enable the control (at least partially) of the possible bias derived from the non-random assignment of workers between firms. Finally, the predominant level of collective bargaining is considered, which, for the period 2002-2006, only takes two values (firm-level agreement or higher level agreement). For the period 2010-2014, however, it takes three values (firm-level agreement, higher level agreement or absence of an agreement). The category of reference for this group of variables in the different estimates is the existence of agreements at a higher level than the firm level. Given that the variable of interest (the predominant level of collective bargaining) and other characteristics of the firm are aggregated at a higher level than that of the endogenous variable (the logarithm of individual wages), the standard errors of the estimate have been corrected by applying the cluster option at a firm level. Card and de la Rica (2006) also indicate the need for the analysis to take into account the tendency of the firm to adopt one type of collective bargaining or another. For this reason, a probit model has been used to estimate the probability that a specific firm is covered by collective bargaining at the firm level as opposed to a higher level agreement. This model has been estimated for each of the years available, introducing the characteristics of the firm and its workers as explanatory variables. This has enabled

a propensity score to be obtained which was subsequently introduced as an additional regressor in the Mincer equations for each of the four waves considered. For the two waves corresponding to 2010 and 2014, the same procedure has been carried out for the probability of not having an agreement as opposed to the probability of having a sectoral agreement<sup>8</sup>. In these two equations, therefore, an additional regressor has been introduced that includes the propensity score obtained through this additional analysis. The inclusion of the *propensity scores* in the Mincer equations controls the potential impact on the estimates of the possible situation where the predominant type of collective bargaining in a firm is correlating with specific unobservable factors that may simultaneously affect wages.

The results obtained in relation to the control variables coincide with those in the literature. For the four waves analysed, evidence has been found of a positive wage premium for men, which, at the beginning of the period, was around 16 logarithmic points and at the end had fallen to 12. Returns to education are also positive and significant for the whole of the period analysed both for secondary and tertiary levels of education. Greater experience (measured through age) and seniority in the job position also have a positive effect on wages although, in the case of seniority, there is evidence of decreasing returns, given that the quadratic term is statistically significant at the usual levels. Having an indefinite contract as opposed to a fixed-term contract also has a positive effect on wages of between 4 and 7 logarithmic points depending on the year analysed. The most notable firm characteristics are the existence of a positive wage premium for those workers who are employed by firms of a larger size and those oriented towards European or international markets.

With respect to the predominant level of collective bargaining, the evidence obtained indicates the existence of a wage premium associated with firm agreements. In 2002, this premium was 6.5 logarithmic points which increased slightly in 2006 to 7.5 logarithmic points and then reduced to 6.4 logarithmic points in 2010 and to 5.4 logarithmic points in 2014. As the findings reveal, the premium has remained relatively stable over time, although a cyclical profile cannot be ruled out. In fact, the estimated coefficient increased during the years of economic growth, then reduced during the first phase of the crisis and also during the second recession after the labour reform of 2012.

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<sup>8</sup> The results of these estimates are available from the authors on request.



This result is most probably explained by the wage dynamics of firms with their own agreement. Two elements confirm this hypothesis. First, based on the *Wage Dynamics Network*, Bertola et al. (2010) conclude that wage adjustment to changes in the economic situation is more frequent in firms that have their own collective agreement. Similarly, Bentolila et al. (2010) highlight that newly-signed agreements are more sensitive to the cycle and, therefore, the large firms with their own agreements are those that *“have been able to adapt more quickly to the new economic context”* (Page 190). Second, the data from the Annual Labour Cost Survey show that the wage dynamics of firms with more than 200 workers - those more likely to sign their own agreement – have been more moderate than the average since 2008. These data and the afore-mentioned studies coincide with the idea that the probable reduction in the wage differential between firm and sector agreements is essentially due to greater wage flexibility during the crisis in firms with their own agreements.

The probable decrease in the wage differential between 2010 and 2014 could have partly been driven, as indicated earlier, by the growing decentralisation of bargaining, facilitated by the labour reform of 2012.

The results obtained with respect to the absence of a collective agreement, a level which has gained importance in the latter years considered, show a negative effect on wages, which, in 2010, amounted to 11.2 logarithmic points but only 4.3 in 2014. Thus, it seems that this regime, driven by the regulatory changes associated to the labour reform, is related to comparatively lower wages once the rest of the factors are controlled, and, consequently, linked to higher wage flexibility. The reduction of the average penalty observed between 2010 and 2014 may be due to the fact that, thanks to the greater flexibility, these firms, which are not subject to an agreement, implemented the bulk of the wage adjustment at the beginning of the crisis, a period for which there are no data available in order to confirm this. On the contrary, the firms subject to a sector agreement with an average duration of more than two years have needed more time to moderate their wages. This may have been facilitated after 2012 by some of the measures approved in the reform, such as the possibility of not applying agreements or the greater facility to withdraw non-negotiated wage supplements. On the other hand, it cannot be ruled out that the reduction of the wage penalty for the

non-covered regime may also be due to a composition effect, owing to the entry of many small tertiary firms into this category.

The previous evidence corresponds to an analysis of averages based on an estimate using minimum least squares. In order to confirm that the effect of the different regimes of collective bargaining considered is not linear and varies across the whole of the wage distribution, the results obtained using quantile regressions are presented below. To do this, two different methods have been used: the standard quantile regression method (Koenker and Basset, 1978) and the *unconditioned* quantile regression method proposed more recently by Firpo et al. (2009). Therefore, while the former quantifies the effects of the explanatory variables on the conditioned distribution of the dependent variable (and, consequently, on the *within-groups* wage dispersion for groups of workers with the same observed characteristics), the second quantifies the effects on the unconditioned distribution (also including an additional effect of *between-groups* wage differences), which is of more interest.

Therefore, Tables 4 and 5 display the results of estimating conditioned and unconditioned regressions of the Mincer equation which relates the logarithm of individual salaries with the afore-described variables for each of the years considered, in a similar way to the results presented in Table 3. Only the results obtained for the variables associated to the predominant level of collective bargaining are presented<sup>9</sup>. As shown in Table 4, (conditioned regression), the wage premium associated to having a firm agreement has an inverted U shape in 2002 and 2006, while after 2010, coinciding with the crisis, the premium is higher for the individuals situated on the right part of the wage distribution, showing, therefore a growing trend. The results of the more recent years, in line with the findings of Canal and Rodríguez (2016a), show that wage dispersion rises in firms with their own agreement. It may also be verified that the differences between the wage premiums observed throughout the distribution became more pronounced during the crisis. The results obtained with respect to workers not covered by an agreement are very different in the two years 2010 and 2014. In 2010, not having an agreement systematically represented a wage penalty compared with being covered by a higher level agreement than the firm level. However, in 2014, there are important differences across the distribution and no penalties can be observed for

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<sup>9</sup> The detailed results are available from the authors on request.

workers located at the right hand side of the distribution. This result is probably due to important changes in the composition of the firm and workers over time.

The results in Table 5 (unconditioned regression) are similar, but have two differential characteristics which are worth highlighting. First, the positive premium of the firm-level agreement maintains its inverted U shape over time. Its effect is clear: at all times it widens the wage inequality at the lower part of the distribution, while it reduces it at the upper part and it is not affected by the economic crisis or the labour reform of 2012. On the other hand, the unconditioned distribution has a much more pronounced concavity than the conditioned distribution. This may be indicating that the *between-groups* effect dominates the central part of the distribution, while the opposite is the case at the two tails, as there the estimated premium is higher in the conditioned regression.

The final part of the empirical analysis involves the Oaxaca-Blinder decomposition (Oaxaca, 1973; Blinder, 1973) of the wage differentials between bargaining regimes with respect to the explained components due to the differences in the endowment of characteristics observed (component of characteristics or explained part) and, alternatively, due to the difference in wage returns of these characteristics (component of returns or unexplained part). This decomposition has been developed for both the average wage differentials (using the traditional Oaxaca-Blinder decomposition) and for the wage differentials observed in different points of the wage distribution (using the equivalent method proposed by Firpo et al. (2011), based on the unconditioned quantile regression). Following the recommendations of Firpo et al. (2011), the empirical strategy has evolved from initially carrying out a robustness test, comparing the results of the standard econometric decomposition with an alternative decomposition which, combining the first with the *reweighting* method of DiNardo et al. (1996), based on the use of counterfactual distributions, enables the presence of two additional error terms to be taken into account, potentially arising from the non-linearity of the model. In so far as the results of the two methods are comparable in practice, given that the effect of the errors is on the whole relatively small (Tables A.3 and A.4 of the Appendix, where the so-called composition effect corresponds to the characteristics component and the bargaining regime effect to the returns component), the rest of the analysis focuses on the results of the standard decomposition without *reweighting*

(Tables 6 to 8 and Figures 1 and 2; in these latter figures the characteristics component is divided between the characteristics of the individuals, that of their job positions and their firms).

Figure 1 graphically represents the afore-mentioned, in the sense that the wage differential is positive in favour of the firm-level agreements with respect to the sectoral agreements and can be observed across the whole of the wage distribution (although it is not constant as it has an inverted U shape being higher for the wages of the central quantiles). Furthermore, when the evolution over time is compared it is observed that the slope of the curve reduces, particularly in 2014 when it is substantially flatter.

As previously mentioned, the decomposition of these differences reveals that the endowment of characteristics has a greater relative explanatory capacity across the wage distribution in all years. Specifically, they represent around three quarters of the average difference observed, decreasing somewhat over time from 79% in 2002 to 73% in 2014. The characteristics with the highest explanatory capacity are those relating to the job position and the firm. On the contrary, the individual characteristics have a low prominence, revealing that the labour force characteristics are fairly similar between bargaining regimes systematically throughout the whole distribution. Nevertheless, these individual characteristics gain a degree of importance as the wage distribution advances, as men with a high level of education and extensive professional experience have a greater presence at the right end. The job position characteristics have a growing trend as there is a greater presence of permanent jobs and good occupations towards the right part of the distribution. Meanwhile, the characteristics of the firm have a greater quantitative importance and have an upward trend until a fairly advanced point of the distribution, but reduce at the right end, producing a slightly concave shape. The most relevant characteristics for explaining this trend are the market in which the firm operates, the composition of the workforce within it and the *propensity score* (which highlights the importance of controlling the possible correlation between the predominant type of collective bargaining in the firm and the unobservable factors which may simultaneously affect wages). Finally, the wage premium (corresponding to the unexplained component of the decomposition) shows a clear inverted U shape, with a fairly large size in the central quantiles of the distribution and very low or zero values (even negative in some parts) at the extremes. The inverted U shape of the wage

premium which is slightly off-centred towards the right enables us to conclude that the firm-level agreements favour the workers in the central part of the wage distribution more intensely and quite a lot less the workers with higher wages, while in general, they have no effect (except on 2006) on workers with the lowest wages of the firm. A possible explanation of these results would be that the recently hired workers are concentrated in this first decile as the same agreement can establish lower wages for them than the rest of the workers, provided that there is an “*objective and reasonable justification*”<sup>10</sup>.

Figure 2 shows the decomposition of the wage differentials between workers covered by a sector agreement and those who are not in 2010 and 2014. Contrary to the results of Figure 1, the evidence shown in Figure 2 reveals how the factor with the greatest explanatory capacity of the wage differential is - by far - the negative wage premium. The endowment of characteristics of uncovered workers seems only slightly worse than that of workers covered by sectoral agreements. For example, the differences observed in individual characteristics are practically imperceptible across the whole of the distribution (only a greater presence of young women). The differences in the job position characteristics are also growing in this case, as a result of the different incidence of temporary hiring over the whole of the wage distribution. The characteristics of the firms penalise uncovered workers in terms of their wages, particularly in 2010 as there is a greater presence of low salary sectors and of firms operating predominantly in the local market. The incidence of these characteristics is relatively constant over the distribution. However, the component with the highest explanatory capacity of the wage differentials observed is, in this case, the negative wage premium of workers without coverage with respect to the sectoral agreement. In 2010, the whole of the distribution is affected, although unequally as it has a clear inverted U shape and the highest penalties are observed at the two extremes of the distribution. On the other hand, in 2014, it has a growing trend as it progresses along the distribution from negative but decreasing values in the first half to positive and strongly increasing values at the right end. Therefore, the results of the most recent period seem to indicate that market forces significantly widen the wage differentials between workers, while sectoral agreements reduce them.

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<sup>10</sup> According to sentence 17/2016 of Spain's National High Court, these double pay scales emerged in the 1990s and have been used more in moments of economic crisis.

In short, when comparing the wage premiums that emerge under the different wage bargaining regimes, it can be observed that sectoral agreements, compared with the free functioning of the market, reduce wage differentials due to the positive premium generated. They also increase the wages of workers at the lower part of the wage distribution, reducing wage inequality. The firm-level agreements seem to rectify this correction. As they give rise to a higher positive premium for the workers of the central part and some of the workers on the right of the distribution, they re-establish part of the previously existing wage differentials. Therefore, it can be said that the wages established in sectoral agreements respond to the bargaining power of union organisations and favour the majority of their members and voters; relatively low wage earners. On the contrary, firm-level agreements enable the more productive firms to pay efficiency wages to the more productive workers, those who they have an interest in retaining and motivating, given that they accumulate more training and experience and their wages are situated in the middle and upper-middle part of the distribution. It is surprising, however, that the workers at the higher end of the distribution receive a relatively lower premium which probably does not reduce their wages with respect to the previous situation.

## **6. Conclusions**

The objective of the research is to examine the wage differentials associated to different collective bargaining regimes in Spain and their evolution over time based on the microdata from the 2002, 2006, 2010 and 2014 waves of the *Wage Structure Survey*.

Therefore, the primary objective of the study is to analyse the wage differentials associated to the presence of a firm-level agreement and how they have evolved in the recent past, characterised by changes in the economic cycle and the recent labour reform which has given rise to this more decentralised type of bargaining. The evidence obtained in this sense confirms that the comparatively higher wages in firms covered by their own agreement in relation to the sectoral bargaining level are explained largely by the better endowment of labour force and firm characteristics. However, even when this element is controlled, a significant wage premium persists associated to firm-level agreements. This premium has remained relatively stable over time, falling only during

the first phase of the economic crisis and does not seem to have been affected by the important regulatory changes associated to the labour reform of 2012.

The second objective of the study is to examine the impact on wages of an absence of a collective agreement, a regime which has also gained prevalence due to the labour reform. The results obtained in this sense suggest that this area of negotiation, which still has a fairly insignificant relative presence despite displaying an increasing trend, is associated, on average, to comparatively low wages, and, consequently, to higher wage flexibility.

When the analysis is extended across the whole of the wage distribution, the results obtained confirm that the wage differentials between firm-level and sectoral agreements are systematically explained in all points of the distribution by the different endowment of characteristics (being comparatively more relevant the differences in firm characteristics). Furthermore, the wage premium in favour of firm agreements has an inverted U shape (favouring workers in the middle and upper-middle part of the wage distribution to a greater extent). Similarly, when the wage differentials are decomposed between firms without an agreement compared with those covered by sectoral agreements, it can be observed that the main explanatory cause of the lower wages established by the market is the existence of a negative wage premium which varies throughout the distribution. Therefore, while the negative premium in 2010 affects the whole of the distribution, it does so unequally, implying higher penalties at the extremes of the distribution. On the contrary, in 2014, the premium begins at negative values and increases throughout the distribution, reaching clearly positive values at the extreme right. This evidence seems to suggest, therefore, that in the absence of an agreement the wage differentials widen between workers, while sectoral agreements reduce them.

In conclusion, it should be pointed out that the findings of this study seem to suggest that wages established in sectoral agreements respond to the negotiating power of union organisations and favour the majority of their members and voters, while firm-level agreements enable the more productive firms to pay *efficiency wages* to the workers in the middle and upper-middle part of the wage distribution.

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## Tables and figures

**Table 1.**  
**Average wages by collective bargaining regime.**

	2002	2006	2010	2014
Euros				
Sectoral collective agreement	7.795	8.580	10.329	11.129
Sectoral collective agreement	10.627	11.769	13.501	13.776
No collective agreement	-	-	9.141	11.496
Differential firm agreement- sectoral agreement	2.832	3.189	3.172	2.647
Differential no agreement- sectoral agreement			-1.188	0.367
Logarithms				
Sectoral collective agreement	1.912	2.029	2.227	2.301
Sectoral collective agreement	2.227	2.339	2.488	2.510
No collective agreement	-	-	2.086	2.273
Differential firm agreement- sectoral agreement	0.315	0.309	0.261	0.209
Differential no agreement- sectoral agreement	-	-	-0.141	-0.028

*Notes:* Average wages are measured as hourly wages, and in euros and logarithms, respectively. The weights provided by the WES have been included in its calculation.

**Table 2.**  
**Wage differences by collective bargaining regime**  
**throughout the wage distribution.**

	Firm collective agreement				No agreement	
	2002	2006	2010	2014	2010	2014
Percentile 10	0.144	0.188	0.115	0.101	-0.274	-0.229
Percentile 25	0.314	0.275	0.235	0.196	-0.221	-0.133
Median	0.433	0.398	0.344	0.269	-0.090	-0.014
Percentile 75	0.367	0.391	0.348	0.281	-0.082	0.067
Percentile 90	0.275	0.279	0.262	0.212	-0.114	0.137

*Notes:* Wages are measured as logarithms of the hourly wage and the weightings provided by the WES have been included in its calculation. The category of reference is sectoral collective agreements.

**Table 3.**  
**Wage differences by collective bargaining regime in Spain. (to be continued)**

	2002	2006	2010	2014
Male	0.162 (0.004)***	0.154 (0.004)***	0.124 (0.003)***	0.116 (0.003)***
Native	-0.016 (0.007)**	0.003 (0.005)	-0.008 (0.006)	-0.014 (0.006)**
Secondary education	0.034 (0.005)***	0.028 (0.005)***	0.032 (0.005)***	0.044 (0.006)***
Higher education	0.083 (0.006)***	0.098 (0.006)***	0.092 (0.006)***	0.118 (0.008)***
Age less than 20	-0.251 (0.014)***	-0.207 (0.016)***	-0.208 (0.032)***	-0.141 (0.044)***
Age 20-29	-0.194 (0.010)***	-0.145 (0.012)***	-0.141 (0.012)***	-0.162 (0.012)***
Age 30-39	-0.103 (0.010)***	-0.073 (0.011)***	-0.071 (0.013)***	-0.073 (0.011)***
Age 40-49	-0.049 (0.010)***	-0.032 (0.011)***	-0.029 (0.013)**	-0.015 (0.010)
Age 50-59	-0.015 (0.010)	-0.003 (0.011)	-0.008 (0.013)	0.010 (0.011)
Tenure	0.018 (0.001)***	0.018 (0.001)***	0.013 (0.001)***	0.010 (0.001)***
Tenure*tenure	-0.000 (0.000)***	-0.000 (0.000)***	-0.000 (0.000)***	-0.000 (0.000)**
Permanent contract	0.053 (0.005)***	0.056 (0.004)***	0.037 (0.004)***	0.067 (0.005)***
Unskilled worker	-0.853 (0.015)***	-0.809 (0.014)***	-0.790 (0.015)***	-0.680 (0.016)***
Blue-collar worker	-0.761 (0.015)***	-0.707 (0.013)***	-0.699 (0.015)***	-0.580 (0.015)***
White-collar worker	-0.727 (0.016)***	-0.695 (0.014)***	-0.659 (0.015)***	-0.558 (0.015)***
Support technician	-0.529 (0.015)***	-0.514 (0.013)***	-0.494 (0.014)***	-0.400 (0.014)***
Professional technician	-0.288 (0.018)***	-0.358 (0.016)***	-0.322 (0.016)***	-0.222 (0.016)***
Region NUT2	0.144 (0.009)***	0.127 (0.008)***	0.127 (0.010)***	0.114 (0.011)***
Region NUT3	0.128 (0.012)***	0.144 (0.011)***	0.101 (0.011)***	0.094 (0.013)***
Region NUT4	0.000 (0.009)	-0.008 (0.008)	0.005 (0.010)	-0.015 (0.010)
Region NUT5	0.151 (0.009)***	0.157 (0.008)***	0.128 (0.009)***	0.119 (0.010)***
Region NUT6	0.037 (0.009)***	0.037 (0.009)***	0.035 (0.010)***	0.036 (0.011)***
Region NUT7	0.030 (0.013)**	-0.045 (0.011)***	0.002 (0.017)	-0.041 (0.017)**
Manufacturing	-0.225 (0.025)***	-0.173 (0.016)***	-0.146 (0.023)***	-0.143 (0.023)***
Production of electricity, gas and water	-0.155 (0.032)***	-0.145 (0.025)***	-0.132 (0.028)***	-0.103 (0.029)***
Construction	-0.121 (0.026)***	-0.056 (0.018)***	-0.067 (0.024)***	-0.087 (0.026)***
Trade	-0.209 (0.026)***	-0.185 (0.017)***	-0.157 (0.024)***	-0.174 (0.025)***
Hospitality	-0.193 (0.026)***	-0.112 (0.019)***	-0.103 (0.027)***	-0.110 (0.029)***
Transport and communications	-0.199 (0.027)***	-0.170 (0.021)***	-0.195 (0.024)***	-0.213 (0.025)***

**Table 3.**  
**Wage differences by collective bargaining regime in Spain. (continuation)**

	2002	2006	2010	2014
Financial intermediation	-0.127 (0.035)***	-0.056 (0.023)**	0.027 (0.027)	-0.020 (0.029)
Real estate and rental	-0.264 (0.027)***	-0.187 (0.019)***	-0.195 (0.024)***	-0.214 (0.024)***
Education	-0.204 (0.034)***	-0.162 (0.030)***	-0.102 (0.035)***	-0.158 (0.036)***
Health	-0.263 (0.042)***	-0.245 (0.027)***	-0.203 (0.026)***	-0.221 (0.026)***
Other social and services activities	-0.301 (0.030)***	-0.258 (0.020)***	-0.216 (0.025)***	-0.217 (0.025)***
Firm size 50-199	0.062 (0.008)***	0.046 (0.008)***	0.024 (0.008)***	0.005 (0.010)
Firm size 200 or more	0.077 (0.018)***	0.023 (0.013)*	0.008 (0.014)	-0.001 (0.015)
Market of the firm: local	-0.125 (0.012)***	-0.095 (0.014)***	-0.086 (0.011)***	-0.095 (0.011)***
Market of the firm: national	-0.056 (0.011)***	-0.028 (0.014)*	-0.046 (0.010)***	-0.056 (0.010)***
Market of the firm: E. Union	-0.011 (0.015)	-0.012 (0.016)	0.009 (0.014)	0.001 (0.014)
Proportion of semi-skilled workers	0.035 (0.014)**	-0.016 (0.014)	0.011 (0.014)	-0.019 (0.017)
Proportion of skilled workers	0.117 (0.034)***	0.170 (0.028)***	0.148 (0.022)***	0.083 (0.029)***
Proportion of females	-0.140 (0.013)***	-0.087 (0.012)***	-0.093 (0.012)***	-0.085 (0.013)***
Proportion secondary education	-0.032 (0.010)***	-0.010 (0.010)	-0.005 (0.010)	-0.005 (0.011)
Proportion higher education	0.096 (0.017)***	0.050 (0.018)***	0.068 (0.016)***	0.106 (0.017)***
Proportion fixed-term contracts	-0.008 (0.012)	0.021 (0.011)*	0.024 (0.011)**	-0.002 (0.014)
Proportion of immigrants	-0.033 (0.028)	-0.017 (0.025)	-0.041 (0.020)**	-0.017 (0.022)
Average tenure	0.002 (0.001)*	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
Proportion age less than 30	0.047 (0.017)***	0.018 (0.017)	0.014 (0.016)	0.013 (0.016)
Proportion age over 49	0.013 (0.017)	0.023 (0.017)	0.015 (0.015)	0.020 (0.017)
Propensity score - firm	0.265 (0.066)***	0.553 (0.055)***	0.393 (0.048)***	0.405 (0.062)***
Propensity score – no agreement	-	-	-0.248 (0.121)**	-0.143 (0.173)
Firm collective agreement	0.065 (0.010)***	0.075 (0.009)***	0.064 (0.008)***	0.055 (0.009)***
No agreement	-	-	-0.114 (0.021)***	-0.045 (0.017)***
Constant	2.525 (0.038)***	2.538 (0.031)***	2.725 (0.040)***	2.677 (0.039)***
Number of observations	164,494	179,386	144,467	139,894
R <sup>2</sup>	0.57	0.56	0.56	0.53

\*  $p < 0,1$ ; \*\*  $p < 0,05$ ; \*\*\*  $p < 0,01$

**Table 4.**  
**Wage gap by collective bargaining regime in Spain throughout the wage distribution.**  
**Conditioned quantile regression.**

	Firm collective agreement				No agreement	
	2002	2006	2010	2014	2010	2014
Percentile 10	0.040***	0.051***	0.051***	0.033***	-0.145***	-0.133***
Percentile 25	0.065***	0.066***	0.068***	0.056***	-0.114***	-0.077***
Median	0.078***	0.078***	0.084***	0.075***	-0.069***	-0.025***
Percentile 75	0.073***	0.073***	0.088***	0.090***	-0.026***	0.020***
Percentile 90	0.068***	0.065***	0.093***	0.094***	-0.011***	0.044***

*Notes:* Results obtained from the estimation of conditioned quantile regressions incorporating the controls detailed in Table 3. \*\*\*, \*\* and \* indicate that the coefficients are statistically significant at 1%, 5% and 10%, respectively.

**Table 5.**  
**Wage gap by collective bargaining regime in Spain throughout the wage distribution.**  
**Unconditioned quantile regression.**

	Firm collective agreement				No agreement	
	2002	2006	2010	2014	2010	2014
Percentile 10	-0.025***	0.058***	0.003	0.004	-0.223***	-0.202***
Percentile 25	0.064***	0.103***	0.082***	0.070***	-0.180***	-0.128***
Median	0.147***	0.144***	0.117***	0.083***	-0.067***	-0.041***
Percentile 75	0.073***	0.074***	0.090***	0.080***	-0.069***	0.021**
Percentile 90	0.045***	-0.005	0.030***	0.063***	-0.117***	0.108***

*Notes:* Results obtained from the estimation of conditioned quantile regressions incorporating the controls detailed in Table 3. \*\*\*, \*\* and \* indicate that the coefficients are statistically significant at 1%, 5% and 10%, respectively.

**Table 6.**  
**Decomposition of wage differentials between workers covered by firm and sectoral**  
**agreements. Estimates with unconditioned quantile regression. Methodology of**  
**Fortin-Lemieux-Firpo without reweighting. 2002-2006.**

	2002				2006			
	Average	q=0.10	q=0.50	q=0.90	Average	q=0.10	q=0.50	q=0.90
Difference	0.315 (0.005)***	0.144 (0.006)***	0.434 (0.005)***	0.275 (0.009)***	0.309 (0.005)***	0.188 (0.005)***	0.398 (0.005)***	0.279 (0.008)***
Total explained component	0.249 (0.004)***	0.169 (0.004)***	0.286 (0.003)***	0.229 (0.007)***	0.234 (0.004)***	0.130 (0.004)***	0.255 (0.003)***	0.284 (0.007)***
Total unexplained component	0.065 (0.004)***	-0.026 (0.008)***	0.147 (0.004)***	0.046 (0.010)***	0.075 (0.004)***	0.058 (0.007)***	0.144 (0.004)***	-0.005 (0.009)
<i>Explained component</i>								
Gender	0.006 (0.001)***	0.004 (0.000)***	0.006 (0.000)***	0.009 (0.001)***	0.003 (0.001)***	0.001 (0.000)***	0.002 (0.000)***	0.005 (0.001)***
Nationality	-0.000 (0.000)*	0.000 (0.000)	0.001 (0.000)**	-0.002 (0.000)***	0.000 (0.000)	0.002 (0.001)**	0.002 (0.001)***	-0.005 (0.001)***
Age	0.017 (0.001)***	0.005 (0.001)***	0.014 (0.001)***	0.033 (0.002)***	0.011 (0.001)***	0.003 (0.001)***	0.009 (0.001)***	0.021 (0.001)***
Education	0.007 (0.001)***	0.002 (0.001)***	0.005 (0.001)***	0.014 (0.002)***	0.008 (0.001)***	0.003 (0.001)***	0.005 (0.001)***	0.016 (0.001)***
Tenure	0.049 (0.002)***	0.025 (0.002)***	0.058 (0.002)***	0.054 (0.004)***	0.046 (0.002)***	0.022 (0.002)***	0.049 (0.002)***	0.067 (0.004)***
Contract	0.007 (0.001)***	0.009 (0.001)***	0.011 (0.001)***	0.002 (0.001)	0.007 (0.001)***	0.007 (0.001)***	0.008 (0.001)***	0.002 (0.001)*
Occupation	0.032 (0.002)***	0.011 (0.001)***	0.030 (0.001)***	0.055 (0.003)***	0.030 (0.002)***	0.007 (0.001)***	0.026 (0.001)***	0.056 (0.003)***
Region	-0.000 (0.001)	-0.002 (0.001)***	0.003 (0.001)***	-0.003 (0.001)***	-0.002 (0.001)**	-0.001 (0.001)**	0.000 (0.001)	-0.006 (0.001)***
Sector	-0.020 (0.001)***	-0.030 (0.002)***	-0.013 (0.002)***	-0.019 (0.003)***	-0.029 (0.002)***	-0.042 (0.002)***	-0.021 (0.002)***	-0.037 (0.003)***
Size of firm	0.030 (0.003)***	-0.001 (0.004)	0.031 (0.003)***	0.064 (0.007)***	0.010 (0.003)***	0.013 (0.005)***	0.009 (0.004)**	0.006 (0.007)
Market of firm	0.025 (0.001)***	0.019 (0.001)***	0.026 (0.001)***	0.026 (0.003)***	0.021 (0.001)***	0.011 (0.002)***	0.018 (0.001)***	0.027 (0.003)***
Pscore	0.064 (0.006)***	0.081 (0.008)***	0.071 (0.007)***	-0.012 (0.018)	0.121 (0.006)***	0.084 (0.009)***	0.131 (0.009)***	0.140 (0.015)***
Composition of firm workforce	0.032 (0.003)***	0.044 (0.004)***	0.045 (0.004)***	0.008 (0.008)	0.008 (0.003)***	0.019 (0.004)***	0.015 (0.004)***	-0.008 (0.006)
<i>Unexplained component</i>								
Gender	-0.003 (0.002)	0.013 (0.004)***	-0.002 (0.003)	-0.020 (0.006)***	0.001 (0.002)	0.007 (0.003)***	0.001 (0.002)	-0.012 (0.004)***
Nationality	-0.010 (0.014)	0.010 (0.032)	-0.007 (0.014)	-0.059 (0.032)*	-0.019 (0.011)*	0.014 (0.018)	-0.037 (0.010)***	-0.048 (0.019)**
Age	-0.027 (0.022)	0.701 (0.111)***	0.136 (0.025)***	0.174 (0.043)***	0.074 (0.050)	-0.172 (0.055)***	-0.137 (0.030)***	-0.352 (0.062)***
Education	0.089 (0.008)***	0.039 (0.012)***	0.076 (0.011)***	0.178 (0.023)***	-0.102 (0.008)***	-0.001 (0.008)	-0.011 (0.008)	-0.010 (0.016)
Tenure	-0.004 (0.008)	0.064 (0.012)***	0.006 (0.009)	-0.099 (0.018)***	-0.001 (0.008)	0.010 (0.009)	0.046 (0.009)***	-0.066 (0.017)***
Contract	0.008 (0.005)*	0.013 (0.010)	0.003 (0.006)	-0.001 (0.008)	0.008 (0.005)	0.030 (0.009)***	0.007 (0.006)	-0.017 (0.006)***
Occupation	-0.003 (0.005)	0.011 (0.005)**	-0.047 (0.004)***	0.046 (0.013)***	0.013 (0.004)***	-0.001 (0.003)	-0.041 (0.003)***	0.094 (0.010)***
Region	-0.003 (0.002)	-0.007 (0.005)	-0.007 (0.003)**	-0.001 (0.005)	-0.000 (0.002)	-0.003 (0.004)	0.010 (0.002)***	0.001 (0.003)
Sector	-0.000 (0.004)	-0.011 (0.007)*	0.009 (0.004)**	0.030 (0.010)***	-0.012 (0.004)***	-0.027 (0.005)***	-0.018 (0.004)***	0.034 (0.008)***
Size of firm	0.015 (0.004)***	0.067 (0.009)***	0.002 (0.004)	-0.032 (0.008)***	0.008 (0.004)**	0.077 (0.006)***	-0.002 (0.004)	-0.025 (0.005)***
Market of firm	0.006 (0.002)**	0.002 (0.002)	0.010 (0.003)***	0.007 (0.007)	0.008 (0.003)***	0.007 (0.003)**	0.012 (0.003)***	-0.005 (0.006)
Pscore	-0.060 (0.023)**	-0.213 (0.042)***	0.097 (0.025)***	-0.028 (0.051)	-0.027 (0.021)	-0.257 (0.034)***	0.172 (0.023)***	-0.123 (0.036)***
Comp. of firm workforce	-0.003 (0.035)	0.257 (0.072)***	-0.115 (0.038)***	-0.146 (0.066)**	-0.023 (0.035)	0.023 (0.055)	-0.137 (0.041)***	-0.144 (0.055)***
Constant	0.060 (0.041)	-0.972 (0.131)***	-0.013 (0.046)	-0.002 (0.084)	0.147 (0.060)**	0.352 (0.080)***	0.278 (0.048)***	0.667 (0.086)***
Number of observations	164,494	164,494	164,494	164,494	179,386	179,386	179,386	179,386

\* p<0.1; \*\* p<0.05; \*\*\* p<0.01.



**Table 7.**  
**Decomposition of wage differentials between workers covered by firm and sectoral**  
**agreements. Estimates with unconditioned quantile regression. Methodology of**  
**Fortin-Lemieux-Firpo without reweighting 2010-2014.**

	2010				2014			
	Average	q=0.10	q=0.50	q=0.90	Average	q=0.10	q=0.50	q=0.90
Difference	0.261 (0.005)***	0.115 (0.005)***	0.345 (0.004)***	0.262 (0.007)***	0.210 (0.005)***	0.101 (0.006)***	0.269 (0.005)***	0.213 (0.007)***
Total explained component	0.197 (0.004)***	0.112 (0.004)***	0.227 (0.003)***	0.232 (0.007)***	0.153 (0.004)***	0.097 (0.004)***	0.186 (0.003)***	0.149 (0.006)***
Total unexplained component	0.065 (0.003)***	0.003 (0.006)	0.117 (0.004)***	0.030 (0.008)***	0.057 (0.004)***	0.005 (0.007)	0.083 (0.005)***	0.064 (0.008)***
<i>Explained component</i>								
Gender	0.004 (0.001)***	0.002 (0.000)***	0.004 (0.000)***	0.005 (0.001)***	0.006 (0.001)***	0.003 (0.000)***	0.005 (0.000)***	0.008 (0.001)***
Nationality	-0.000 (0.000)	0.000 (0.001)	0.001 (0.000)	-0.003 (0.001)***	-0.001 (0.000)*	0.001 (0.001)	0.000 (0.000)	-0.003 (0.001)***
Age	0.008 (0.001)***	0.004 (0.001)***	0.007 (0.001)***	0.013 (0.001)***	0.006 (0.001)***	0.003 (0.000)***	0.006 (0.000)***	0.011 (0.001)***
Education	0.007 (0.001)***	0.003 (0.001)***	0.008 (0.001)***	0.008 (0.001)***	0.005 (0.001)***	0.003 (0.001)***	0.006 (0.001)***	0.010 (0.001)***
Tenure	0.038 (0.001)***	0.017 (0.002)***	0.040 (0.002)***	0.057 (0.003)***	0.032 (0.001)***	0.018 (0.002)***	0.034 (0.002)***	0.045 (0.003)***
Contract	0.003 (0.000)***	0.003 (0.001)***	0.005 (0.001)***	-0.000 (0.001)	0.003 (0.000)***	0.003 (0.001)***	0.004 (0.000)***	-0.000 (0.000)
Occupation	0.015 (0.002)***	0.004 (0.000)***	0.014 (0.001)***	0.031 (0.003)***	0.003 (0.002)*	0.003 (0.000)***	0.007 (0.001)***	0.003 (0.002)
Region	0.004 (0.001)***	0.003 (0.001)***	0.007 (0.001)***	0.002 (0.001)	-0.001 (0.001)	-0.001 (0.001)	0.000 (0.001)	-0.004 (0.001)***
Sector	-0.012 (0.001)***	-0.020 (0.002)***	-0.008 (0.002)***	-0.020 (0.003)***	-0.004 (0.001)***	-0.010 (0.002)***	0.003 (0.002)	-0.017 (0.003)***
Size of firm	0.007 (0.003)**	-0.015 (0.006)***	-0.001 (0.004)	0.055 (0.008)***	0.001 (0.003)	0.004 (0.005)	-0.001 (0.004)	-0.006 (0.007)
Market of firm	0.017 (0.001)***	0.014 (0.001)***	0.015 (0.001)***	0.014 (0.003)***	0.017 (0.001)***	0.012 (0.002)***	0.015 (0.002)***	0.018 (0.003)***
Pscore	0.094 (0.006)***	0.080 (0.010)***	0.117 (0.009)***	0.074 (0.016)***	0.076 (0.006)***	0.040 (0.010)***	0.093 (0.008)***	0.103 (0.015)***
Composition of firm workforce	0.012 (0.002)***	0.015 (0.004)***	0.020 (0.003)***	-0.003 (0.006)	0.007 (0.002)***	0.018 (0.004)***	0.014 (0.003)***	-0.019 (0.005)***
<i>Unexplained component</i>								
Gender	-0.001 (0.001)	0.009 (0.002)***	0.002 (0.001)	-0.018 (0.003)***	-0.001 (0.001)	0.005 (0.002)***	0.004 (0.002)***	-0.015 (0.003)***
Nationality	-0.012 (0.015)	0.043 (0.015)***	-0.019 (0.008)**	-0.021 (0.012)*	0.004 (0.008)	0.004 (0.017)	-0.000 (0.010)	0.009 (0.013)
Age	-0.001 (0.006)	0.072 (0.036)**	0.047 (0.024)**	-0.078 (0.055)	-0.127 (0.042)***	-0.172 (0.152)	-0.136 (0.054)**	-0.039 (0.058)
Education	0.012 (0.006)	0.012 (0.018)	0.011 (0.015)	-0.036 (0.022)	0.006 (0.007)	0.082 (0.016)***	0.120 (0.013)***	0.184 (0.018)***
Tenure	0.019 (0.007)***	0.034 (0.010)***	0.047 (0.009)***	-0.045 (0.016)***	0.005 (0.009)	0.028 (0.013)**	0.030 (0.010)***	-0.065 (0.017)***
Contract	0.004 (0.010)	0.017 (0.007)**	0.008 (0.006)	-0.017 (0.007)**	0.011 (0.005)**	0.049 (0.010)***	0.005 (0.007)	-0.012 (0.008)
Occupation	0.049 (0.008)***	0.004 (0.003)	-0.027 (0.003)***	0.082 (0.010)***	0.019 (0.004)***	0.009 (0.004)**	-0.025 (0.004)***	0.096 (0.010)***
Region	-0.000 (0.002)	0.011 (0.005)**	0.002 (0.003)	0.001 (0.004)	0.004 (0.003)	0.012 (0.005)**	0.005 (0.003)*	-0.006 (0.004)
Sector	-0.023 (0.005)***	-0.010 (0.007)	-0.026 (0.005)***	0.049 (0.010)***	0.011 (0.005)**	-0.020 (0.007)***	0.018 (0.005)***	0.019 (0.010)*
Size of firm	-0.013 (0.004)***	0.035 (0.008)***	0.016 (0.003)***	-0.017 (0.005)***	0.007 (0.004)*	0.051 (0.007)***	0.005 (0.003)	-0.010 (0.005)*
Market of firm	0.045 (0.005)***	0.002 (0.003)	-0.001 (0.003)	0.022 (0.006)***	0.002 (0.002)	0.000 (0.003)	-0.007 (0.003)**	0.003 (0.006)
Pscore	0.007 (0.021)	-0.055 (0.037)	0.128 (0.021)***	-0.135 (0.034)***	0.030 (0.024)	-0.169 (0.042)***	0.118 (0.026)***	0.026 (0.042)
Composition of firm workforce	-0.090 (0.032)**	-0.041 (0.055)	-0.203 (0.038)***	-0.001 (0.055)	0.006 (0.041)	0.209 (0.069)***	-0.107 (0.047)**	0.027 (0.061)
Constant	0.069 (0.022)***	-0.130 (0.057)**	0.132 (0.043)***	0.243 (0.079)***	0.081 (0.056)	-0.082 (0.164)	0.053 (0.069)	-0.155 (0.082)*
Number of observations	140,820	140,820	140,820	140,820	139,894	134,539	134,539	134,539

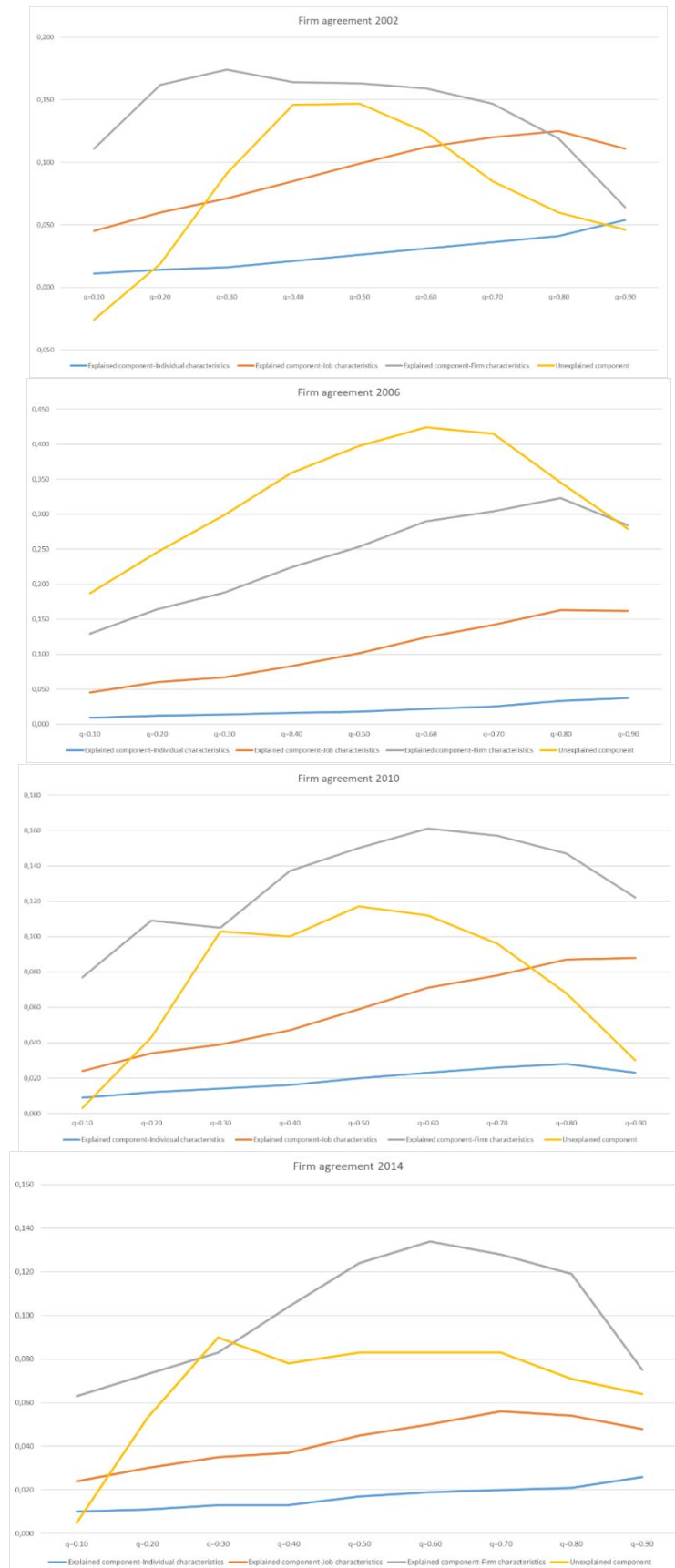
\* p<0.1; \*\* p<0.05; \*\*\* p<0.01.

**Table 8.**  
**Decomposition of wage differentials between workers with no agreements and covered**  
**by sectoral agreements. Estimates with unconditioned quantile regression.**  
**Methodology of Fortin-Lemieux-Firpo without reweighting.**

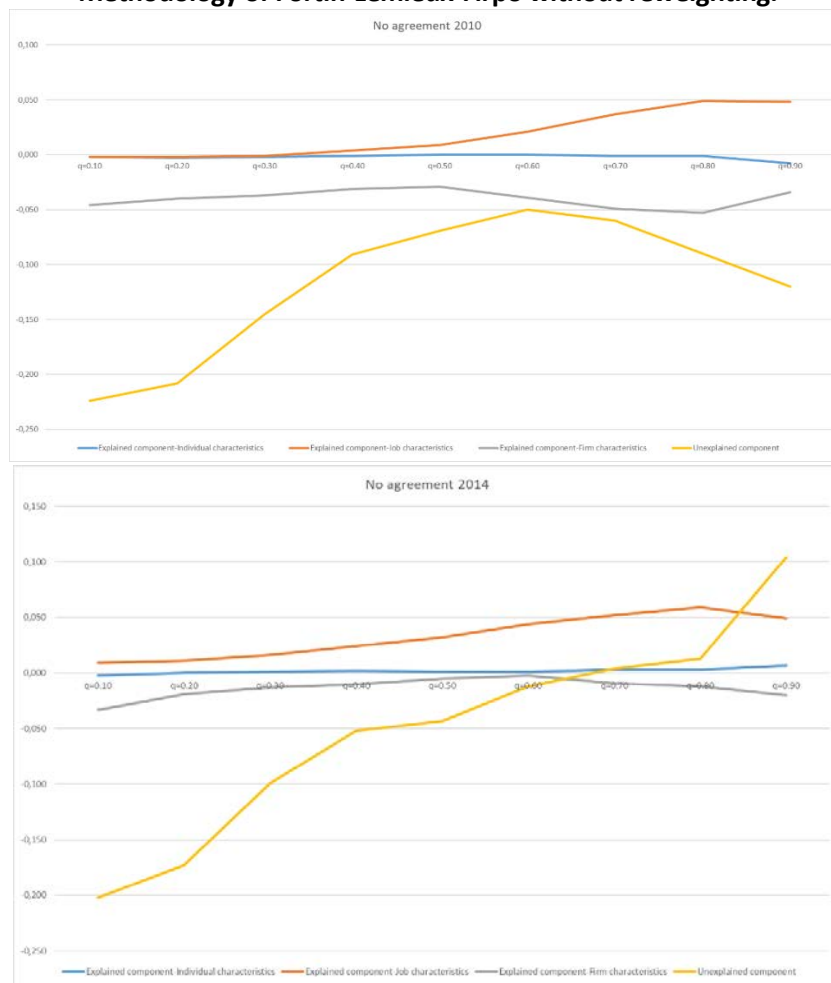
	2010				2014			
	Average	q=0.10	q=0.50	q=0.90	Average	q=0.10	q=0.50	q=0.90
Difference	-0.141 (0.014)***	-0.274 (0.010)***	-0.090 (0.013)***	-0.114 (0.020)***	-0.028 (0.014)*	-0.229 (0.013)***	-0.014 (0.015)	0.141 (0.028)***
Total explained component	-0.024 (0.010)**	-0.050 (0.004)***	-0.020 (0.006)***	0.006 (0.011)	0.019 (0.009)**	-0.026 (0.004)***	0.030 (0.005)***	0.037 (0.009)***
Total unexplained component	-0.117 (0.011)***	-0.224 (0.011)***	-0.069 (0.012)***	-0.120 (0.020)***	-0.047 (0.009)***	-0.202 (0.014)***	-0.043 (0.014)***	0.104 (0.027)***
<i>Explained component</i>								
Gender	-0.010 (0.002)***	-0.005 (0.001)***	-0.009 (0.001)***	-0.015 (0.002)***	-0.007 (0.002)***	-0.004 (0.001)***	-0.007 (0.001)***	-0.013 (0.002)***
Nationality	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Age	-0.003 (0.001)**	-0.001 (0.000)**	-0.002 (0.001)***	-0.006 (0.002)***	0.000 (0.002)	-0.000 (0.000)	-0.001 (0.001)	0.002 (0.002)
Education	0.010 (0.001)***	0.004 (0.001)***	0.011 (0.001)***	0.013 (0.003)***	0.009 (0.001)***	0.002 (0.001)*	0.009 (0.001)***	0.018 (0.002)***
Tenure	-0.019 (0.002)***	-0.010 (0.001)***	-0.020 (0.001)***	-0.030 (0.003)***	-0.000 (0.002)	-0.001 (0.001)	-0.000 (0.001)	0.000 (0.002)
Contract	-0.004 (0.001)***	-0.004 (0.001)***	-0.006 (0.001)***	0.000 (0.001)	-0.004 (0.001)***	-0.004 (0.001)***	-0.005 (0.001)***	-0.000 (0.001)
Occupation	0.041 (0.006)***	0.012 (0.001)***	0.035 (0.003)***	0.078 (0.007)***	0.034 (0.005)***	0.014 (0.001)***	0.037 (0.003)***	0.049 (0.005)***
Region	-0.010 (0.002)***	-0.006 (0.001)***	-0.012 (0.002)***	-0.007 (0.002)***	-0.004 (0.002)***	-0.001 (0.001)	-0.007 (0.001)***	-0.004 (0.001)**
Sector	-0.031 (0.002)***	-0.024 (0.003)***	-0.038 (0.003)***	-0.018 (0.007)***	-0.021 (0.002)***	-0.012 (0.004)***	-0.024 (0.003)***	-0.030 (0.006)***
Size of firm	-0.002 (0.001)***	-0.001 (0.000)	-0.004 (0.001)***	-0.002 (0.001)**	0.001 (0.000)	0.001 (0.000)*	0.002 (0.001)***	-0.003 (0.001)***
Market of firm	-0.002 (0.001)**	-0.002 (0.000)***	-0.003 (0.001)***	-0.001 (0.001)**	-0.002 (0.001)*	-0.001 (0.000)**	-0.002 (0.001)***	-0.002 (0.001)**
Pscore	-0.012 (0.003)***	-0.014 (0.005)***	0.012 (0.004)***	-0.045 (0.009)***	-0.002 (0.004)	-0.038 (0.006)***	0.014 (0.004)***	-0.000 (0.009)
Composition of firm workforce	0.018 (0.003)***	0.001 (0.003)	0.016 (0.003)***	0.039 (0.006)***	0.015 (0.002)***	0.018 (0.003)***	0.012 (0.002)***	0.019 (0.005)***
<i>Unexplained component</i>								
Gender	-0.001 (0.001)	-0.005 (0.002)***	-0.000 (0.002)	0.001 (0.003)	0.002 (0.001)	-0.000 (0.002)	0.002 (0.002)	0.003 (0.004)
Nationality	-0.008 (0.014)	0.002 (0.015)	-0.012 (0.014)	-0.023 (0.030)	0.014 (0.020)	0.000 (0.036)	0.043 (0.021)**	0.019 (0.040)
Age	-0.125 (0.069)*	0.069 (0.048)	0.086 (0.067)	0.066 (0.091)	-0.230 (0.051)***	0.079 (0.448)	-0.083 (0.105)	-0.276 (0.136)**
Education	-0.099 (0.021)***	-0.054 (0.021)**	-0.126 (0.028)***	-0.136 (0.039)***	-0.111 (0.019)***	-0.043 (0.081)	0.120 (0.065)*	0.128 (0.076)*
Tenure	0.025 (0.016)	0.035 (0.014)**	0.065 (0.020)***	-0.070 (0.032)**	0.017 (0.020)	-0.010 (0.023)	0.069 (0.034)**	-0.044 (0.067)
Contract	0.004 (0.007)	-0.010 (0.008)	0.016 (0.011)	-0.001 (0.015)	-0.000 (0.010)	-0.009 (0.019)	-0.011 (0.016)	0.043 (0.026)*
Occupation	-0.037 (0.010)***	-0.004 (0.005)	-0.039 (0.009)***	-0.034 (0.027)	-0.029 (0.009)***	-0.028 (0.010)***	-0.052 (0.011)***	-0.034 (0.041)
Region	0.009 (0.004)**	-0.008 (0.003)**	0.015 (0.004)***	0.010 (0.006)	-0.013 (0.005)***	-0.043 (0.009)***	-0.016 (0.008)**	0.007 (0.014)
Sector	-0.045 (0.015)***	-0.061 (0.011)***	-0.035 (0.022)	0.038 (0.028)	0.029 (0.012)**	-0.015 (0.014)	0.056 (0.022)**	0.126 (0.038)***
Size of firm	-0.032 (0.017)*	-0.043 (0.015)***	-0.022 (0.021)	0.030 (0.033)	-0.003 (0.009)	-0.041 (0.017)**	0.004 (0.013)	0.038 (0.025)
Market of firm	-0.100 (0.015)***	-0.058 (0.010)***	-0.097 (0.016)***	-0.122 (0.033)***	-0.046 (0.011)***	-0.053 (0.022)**	-0.054 (0.014)***	-0.045 (0.028)
Pscore	0.045 (0.034)	0.097 (0.026)***	-0.038 (0.039)	0.172 (0.081)**	-0.077 (0.045)*	-0.111 (0.074)	-0.115 (0.064)*	0.069 (0.146)
Composition of firm workforce	-0.051 (0.084)	-0.178 (0.086)**	0.116 (0.102)	-0.312 (0.150)**	0.086 (0.090)	0.561 (0.151)***	-0.070 (0.155)	0.080 (0.208)
Constant	0.296 (0.113)***	-0.008 (0.096)	0.004 (0.136)	0.261 (0.176)	0.314 (0.106)***	-0.488 (0.464)	0.063 (0.161)	-0.010 (0.227)
Number of observations	108,662	108,662	108,662	108,662	105,619	105,619	105,619	105,619

\* p<0.1; \*\* p<0.05; \*\*\* p<0.01.

**Figure 1.**  
**Decomposition of wage differentials between workers covered by firm and sectoral agreements. Estimates with unconditioned quantile regression. Methodology of Fortin-Lemieux-Firpo without reweighting.**



**Figure 2.**  
**Decomposition of wage differentials between workers with no agreements and covered by sectoral agreements. Estimates with unconditioned quantile regression.**  
**Methodology of Fortin-Lemieux-Firpo without reweighting.**



## Appendix

**Table A.1.**  
**Recent studies on wage differences by bargaining regime (to be continued)**

Author	Country	Year	Data Base (1)	Bargaining regime (2)	Wage differences (3)	Control of selection bias
Hartog et al. (2002)	Holland	1991	Dienst Arbeidsvoorwaarden (S, CS)	Industry, Firm, Extension and <i>No Agreement</i>	Not statistically significant	Partial
Rycx (2003)	Belgium	1995	Wage Structure Survey (WES) (S, CS)	<i>National/Sectoral</i> versus Firm	5.1%	No
Canal and Rodríguez (2004)	Spain	1995	WES (S, CS)	<i>National/Sectoral</i> versus Firm	10.9 log points	Heckman methodology
Stephan and Gerlach (2005)	Germany (Lower Saxony)	1990, 1995, 2001	WES (S, CS)	Sector, Firm and <i>No Agreement</i>	Sector: 4% (90), 9% (95) 12% (01) Firm: 3%, 7% y 11%	No
Card and de la Rica (2006)	Spain	1995	WES (S, CS)	<i>National/Sectoral</i> versus Firm	Men: 5.3 log points Women: 6.9 log points	Partial (own methodology)
Gürtzgen (2006)	Germany	1995-2002	LIAB (S, LD)	Sector, Firm, <i>No Agreement</i>	Sector: 2.4 log points (West Germany) Firm: 2.1 log points (East Germany)	Complete
Heinbach and Spindler (2007)	Germany	1995, 2001	WES (S, CS)	Sector/Firm versus <i>No Agreement</i>	1995: 4.5 log points 2001: 7.5 log points	No
Khon and Lembcke (2007)	Germany	2001	WES (S, CS)	Sector, Firm and <i>No Agreement</i>	Sector: Men qualif. West G.: 2.0 log.p. Men qualif. East G.: 7.3 log.p. Women qualif. West G.: 5.0 l.p. Women qualif. East G.: 13.7 l.p. Firm: Men qualif. West G.: 0 l.p. Men qualif. East G.: 0 l.p. Women. qualif. West G.: 7.1 l.p. Women. qualif. East G.: 13.4 l.p.	No
Plasman, Rusinek and Rycx (2007)	Denmark, Belgium, Spain	1995	WES (S, CS)	<i>Multi-Firm</i> versus Firm	Denmark: 3.1 log points Belgium: 4.1 log points Spain: 4.1 log points	No

(1) S: Survey; AD: Administrative Data; CS: Cross-Section; LD: Longitudinal Data.

(2) In italics the bargaining regime taken as a reference.

(3) The wage differences are obtained in wage equations that include all available controls in the dataset. They are not raw observed differences.

**Table A.1.**  
**Recent studies on wage differences by bargaining regimen (continuation)**

Author	Country	Year	Data Base (1)	Bargaining Regime (2)	Wage Differences (3)	Control of Selection bias
Fitzenberger et al. (2008)	West Germany	2001	WES (S, CS)	Sector, Firm and <i>No Agreement</i>	Sector: 3.4 log points Firm: 6.7 log points	No
McGuinness and O'Connell (2010)	Ireland	2003	National Employment Survey (S, CS)	<i>National, Sector, and other agreement</i> , Firm, No Covered	Firm: 6.8% No Covered: 8.6%	Partial (Card and de la Rica, 2006, methodology)
Daouli et al. (2013)	Greece	2006	WES (S, CS)	<i>Sector</i> versus Firm	6.6 log points	Partial (Card and de la Rica, 2006, methodology)
Dahl, le Maire and Munch (2013)	Denmark	1992-2001	IDA (AD, DL)	<i>Sector</i> , Two-tiered, Firm	Two-tiered: 0 Firm: 4.65 log points	Complete
Andreason (2014)	Sweden	2007-2010	Own data-set merging administrative data and firm data (AD, LD)	<i>Centralized</i> , Two-tiered and Decentralized	Two-tiered: 0.7 log points Decentralized: 5.0 log points	Complete
Addison et al. (2014)	Germany	2000-2008	IAB (S, LD)	Agreement versus <i>No Agreement</i>	Agreement: 3% – 4%	Complete
Gürtzgen (2016)	West Germany	1995-2008	LIAB (S, DL)	Sector, Firm and <i>No Agreement</i>	There is not “true” wage differences	Complete
Magda, Marsden and Moriconi (2016)	Czech Republic, Hungary, Poland	2002-2006	WES (S, CS)	Sector, Firm and <i>No Agreement</i>	Czech R.: No statistically significant Hungary: Sector 15.7 log points Firm 10.5 log points Poland: Sector 14.3 log points Firm: 0	Only workers unobserved skills by characteristics of workers in the same firm and occupation

(1) S: Survey; AD: Administrative Data; CS: Cross-Section; LD: Longitudinal Data

(2) In italics the bargaining regime taken as a reference.

(3) The wage differences are obtained in wage equations that include all available controls in the dataset. They are not raw differences.

**Table A.2.**  
**Descriptives by collective bargaining regime. (to be continued)**

	2002		2006		2010		2014			
	Sectoral	Firm	Sectoral	Firm	Sectoral	Firm	Sectoral	Firm		
Male	0,693	0,731	0,676	0,695	0,630	0,659	0,551	0,619	0,665	0,556
Native	0,961	0,986	0,901	0,973	0,910	0,957	0,905	0,929	0,967	0,930
Primary education	0,282	0,220	0,279	0,216	0,192	0,141	0,105	0,183	0,139	0,135
Secondary education	0,466	0,434	0,449	0,426	0,505	0,464	0,456	0,481	0,472	0,430
Higher education	0,252	0,346	0,272	0,358	0,303	0,395	0,439	0,336	0,389	0,435
Age less than 20	0,006	0,007	0,005	0,006	0,006	0,007	0,005	0,005	0,006	0,006
Age 20-29	0,319	0,236	0,288	0,216	0,212	0,149	0,233	0,149	0,117	0,166
Age 30-39	0,324	0,291	0,343	0,331	0,368	0,363	0,383	0,351	0,329	0,334
Age 40-49	0,223	0,250	0,233	0,255	0,259	0,280	0,242	0,305	0,337	0,294
Age 50-59	0,102	0,185	0,106	0,168	0,126	0,169	0,110	0,161	0,180	0,167
Age over 59	0,026	0,031	0,025	0,024	0,029	0,032	0,027	0,029	0,031	0,033
Tenure	6,529	12,261	5,878	10,765	7,260	11,451	5,314	8,631	12,209	8,640
Permanent contract	0,732	0,872	0,727	0,844	0,820	0,893	0,716	0,853	0,893	0,793
Unskilled worker	0,120	0,082	0,144	0,104	0,100	0,102	0,109	0,094	0,084	0,078
Blue-collar worker	0,491	0,457	0,476	0,403	0,469	0,426	0,333	0,449	0,435	0,334
White-collar worker	0,127	0,111	0,129	0,155	0,123	0,104	0,119	0,120	0,116	0,147
Support technician	0,160	0,210	0,152	0,199	0,166	0,204	0,215	0,164	0,195	0,187
Professional technician	0,078	0,118	0,073	0,105	0,114	0,130	0,198	0,141	0,138	0,231
Manager	0,024	0,022	0,026	0,034	0,028	0,034	0,026	0,032	0,032	0,023
Region NUT1	0,079	0,091	0,084	0,083	0,094	0,091	0,114	0,086	0,084	0,076
Region NUT2	0,098	0,182	0,092	0,170	0,104	0,171	0,138	0,101	0,166	0,134
Region NUT3	0,189	0,212	0,178	0,182	0,192	0,238	0,137	0,205	0,200	0,203
Region NUT4	0,084	0,087	0,097	0,092	0,103	0,085	0,110	0,093	0,095	0,097
Region NUT5	0,364	0,270	0,341	0,262	0,326	0,257	0,231	0,332	0,268	0,274
Region NUT6	0,141	0,121	0,163	0,167	0,140	0,127	0,190	0,141	0,142	0,133
Region NUT7	0,045	0,037	0,045	0,044	0,041	0,031	0,080	0,042	0,045	0,083
Extractive industries	0,004	0,008	0,003	0,007	0,002	0,006	0,003	0,002	0,007	0,002
Manufacturing	0,267	0,429	0,197	0,348	0,195	0,321	0,097	0,194	0,307	0,073
Prod. of electricity, gas and water	0,005	0,029	0,005	0,027	0,006	0,066	0,015	0,009	0,061	0,012
Construction	0,174	0,029	0,198	0,037	0,140	0,020	0,016	0,087	0,026	0,023
Trade	0,190	0,118	0,207	0,152	0,217	0,171	0,182	0,223	0,159	0,294

Notes: Descriptive evidence has been obtained using the sample weights in the WES.

**Table A.2.**  
**Descriptives by collective bargaining regime. (continuation)**

	2002		2006		2010		2014			
	Sectoral	Firm	Sectoral	Firm	Sectoral	Firm	Sectoral	Firm		
Hospitality	0,058	0,012	0,065	0,014	0,075	0,024	0,011	0,074	0,017	0,003
Transport and communications	0,047	0,102	0,053	0,102	0,082	0,137	0,068	0,095	0,131	0,087
Financial intermediation	0,054	0,031	0,042	0,028	0,045	0,053	0,009	0,044	0,039	0,012
Real estate and rental	0,121	0,115	0,143	0,104	0,135	0,115	0,264	0,141	0,130	0,231
Education	0,029	0,011	0,025	0,011	0,029	0,010	0,060	0,040	0,008	0,017
Health	0,026	0,050	0,031	0,090	0,044	0,047	0,156	0,061	0,085	0,166
Other social and services activities	0,025	0,066	0,031	0,080	0,030	0,030	0,119	0,030	0,030	0,080
Firm size less than 50	0,519	0,142	0,621	0,187	0,617	0,157	0,241	0,580	0,177	0,557
Firm size 50-199	0,268	0,241	0,204	0,223	0,208	0,216	0,160	0,208	0,224	0,186
Firm size 200 or more	0,213	0,617	0,175	0,590	0,175	0,627	0,599	0,212	0,599	0,257
Market of the firm: local	0,458	0,221	0,541	0,278	0,483	0,235	0,517	0,432	0,220	0,443
Market of the firm: national	0,409	0,477	0,360	0,459	0,399	0,512	0,382	0,398	0,457	0,412
Market of the firm: European Union	0,062	0,160	0,047	0,129	0,046	0,083	0,040	0,063	0,079	0,042
Market of the firm: World	0,071	0,142	0,052	0,134	0,072	0,170	0,061	0,107	0,244	0,103
Proportion of semi-skilled workers	0,777	0,778	0,757	0,757	0,755	0,727	0,665	0,730	0,738	0,663
Proportion of skilled workers	0,102	0,140	0,100	0,139	0,146	0,171	0,227	0,177	0,178	0,259
Proportion of females	0,307	0,269	0,324	0,305	0,368	0,336	0,446	0,379	0,332	0,441
Proportion secondary education	0,466	0,434	0,449	0,426	0,503	0,460	0,455	0,480	0,467	0,428
Proportion higher education	0,252	0,346	0,272	0,358	0,305	0,399	0,440	0,338	0,394	0,437
Proportion fixed-term contracts	0,268	0,128	0,273	0,156	0,180	0,106	0,283	0,147	0,107	0,207
Proportion immigrants	0,039	0,014	0,099	0,027	0,090	0,044	0,095	0,071	0,033	0,071
Average tenure	6,529	12,261	5,878	10,765	7,286	11,539	5,342	8,666	12,283	8,655
Proportion age less than 30	0,324	0,291	0,343	0,331	0,367	0,359	0,382	0,348	0,325	0,331
Proportion age over 49	0,223	0,250	0,233	0,255	0,261	0,282	0,242	0,307	0,337	0,295
<i>Number of observations</i>	131.480	33.014	145.076	34.310	105.015	35.805	3.647	100.264	34.275	5.355
<i>Relative weight in the sample</i>	0,799	0,201	0,809	0,191	0,727	0,248	0,025	0,717	0,245	0,038

Notes: Descriptive evidence has been obtained using the sample weights in the WES.



**Table A.3.**  
**Decomposition of wage differentials between workers covered by firm and sectoral agreements.**  
**Methodology of Fortin-Lemieux-Firpo with and without reweighting.**

	2002				2006				2010				2014			
	Average	q=0.10	q=0.50	q=0.90	Average	q=0.10	q=0.50	q=0.90	Average	q=0.10	q=0.50	q=0.90	Average	q=0.10	q=0.50	q=0.90
Wage differential	0.315	0.144	0.434	0.275	0.309	0.188	0.398	0.279	0.261	0.115	0.345	0.262	0.209	0.101	0.269	0.213
<i>A) Without reweighting</i>																
Composition effect	0.249	0.169	0.286	0.229	0.234	0.130	0.255	0.284	0.197	0.112	0.227	0.232	0.153	0.097	0.186	0.149
Bargaining regime effect	0.065	-0.026	0.147	0.046	0.075	0.058	0.144	-0.005	0.065	0.003	0.117	0.030	0.057	0.005	0.083	0.064
<i>A) With reweighting</i>																
Composition effect	0.266	0.169	0.328	0.221	0.265	0.160	0.321	0.260	0.160	0.088	0.198	0.170	0.147	0.080	0.181	0.157
Composition term error	-0.001	-0.029	0.020	0.028	-0.003	-0.020	-0.023	0.027	0.000	0.001	0.013	-0.011	-0.002	-0.002	0.007	-0.014
Bargaining regime effect error	-0.024	0.010	-0.017	-0.027	-0.022	-0.004	-0.025	-0.028	0.021	0.025	0.030	0.007	-0.006	0.012	-0.004	-0.024
Bargaining regime effect	0.073	-0.006	0.102	0.053	0.070	0.052	0.115	0.019	0.080	0.006	0.104	0.096	0.070	0.011	0.084	0.095

\* p<0.1; \*\* p<0.05; \*\*\* p<0.01.

**Table A.4.**  
**Decomposition of wage differentials between workers without agreements and covered by sectoral agreements.**  
**Methodology of Fortin-Lemieux-Firpo with and without reweighting.**

	2010				2014			
	Average	q=0.10	q=0.50	q=0.90	Average	q=0.10	q=0.50	q=0.90
Wage differential	-0.141	-0.274	-0.090	-0.114	-0.028	-0.229	-0.014	0.141
<i>A) Without reweighting</i>								
Composition effect	-0.024	-0.050	-0.020	0.006	0.019	-0.026	0.030	0.037
Bargaining regime effect	-0.117	-0.224	-0.069	-0.120	-0.047	-0.202	-0.043	0.104
<i>A) With reweighting</i>								
Composition effect	-0.011	-0.026	0.001	-0.012	0.004	-0.037	0.012	0.021
Composition term error	0.002	0.001	0.002	0.009	-0.002	-0.006	0.001	-0.005
Bargaining regime effect error	-0.023	-0.014	-0.021	-0.008	0.011	0.013	0.013	0.007
Bargaining regime effect	-0.109	-0.235	-0.072	-0.103	-0.040	-0.198	-0.040	0.119

\* p<0,1; \*\* p<0,05; \*\*\* p<0,01,