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Firm-level bargaining and within-firm wage inequality: Evidence across Europe

Valeria Cirillo, Department of Political Sciences, Università degli Studi di Bari Aldo Moro, valeria.cirillo@uniba.it (corresponding author)

Matteo Sostero, European Foundation for the Improvement of Living and Working Conditions (Eurofound), matteo.sostero@eurofound.europa.eu

Federico Tamagni, Institute of Economics, Scuola Superiore Sant'Anna, federico.tamagni@santannapisa.it

Abstract. *The decentralization of wage-setting – from multi-employer bargaining to firm-level agreements – allows firms to adjust their internal wage structure but has uncertain effects on inequality. This article estimates the difference in within-firm wage inequality between centralized and firm-level bargaining. Exploiting employer–employee earnings data over 2006–18 for Belgium, Czechia, France, Germany, Spain and the United Kingdom, we compare various bargaining traditions over a period of economic change. The findings defy simple classifications of national bargaining systems: the difference in inequality between firm-level and centralized bargaining varies considerably across and within countries and there is no common time trend.*

Keywords: *within-firm wage inequality, firm-level bargaining, coordinated bargaining, wage-setting regimes, matched employer–employee data, Europe.*

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1. Introduction

The rise in inequality observed in many countries since the 2008 global recession has reopened the debate on the causes of inequality. Together with technological change, globalization, the decline in union power and the role of finance, scholars have suggested that institutional changes to increase the flexibility of labour markets and wage-setting played a major role in increasing wage inequality (Cobb 2016). Reforms were implemented in many countries between the late 1990s and the early 2000s, in line with the policy recommendations of the 1994 OECD Jobs Strategy report.

This article examines the effect of the devolution of bargaining levels on wage inequality. The progressive shift in the locus of collective wage-setting from more centralized levels (national or industry) to the level of individual firms was intended to cater to the specific needs of firms, allowing them to adjust wages based on their internal and local market conditions (Undy 1978). This trend has affected wage-setting legislation particularly in Europe, where the previously-dominant "corporatist" system of industrial relations (Wallerstein, Golden and Lange 1997), which included high union coverage and centralized collective bargaining, has gradually morphed into a "hybrid" system (Braakmann and Brandl 2016). Although coordinated (or "multi-employer") collective bargaining conducted at centralized levels may still predominate, firm-level ("single-employer") collective agreements increasingly derogate from specific provisions stipulated at centralized levels (Visser 2013).

The increased role of firm-level collective agreements has been connected to two types of wage inequality, that is *between* or *within* firms. Most studies focus on between-firm wage inequality, asking whether firm-level bargaining can explain why otherwise similar workers are paid differently in different firms. The general finding, confirmed also by the recent cross-country analysis coordinated by the OECD (Criscuolo et al. 2020, 2021 and 2023), is that between-firm wage inequality is mostly determined by firm wage-setting practices rather than by workers' characteristics alone. Firm-level agreements tend to increase between-firm wage gaps across countries (OECD 2017) – a finding already highlighted in the 2018 OECD Economic Outlook (OECD 2018). Dahl, Le Maire and Munch (2013) explain this through the greater bargaining power of high-skilled employees under local bargaining, leading these already well-paid employees to enjoy even higher wages under firm-level pay agreements than under centralized bargaining.

This article addresses the much less studied effect of wage-setting decentralization on within-firm inequality, considering whether the internal wage structure of firms that apply firm-level bargaining is more unequal than that of firms setting wages only under centralized bargaining schemes. Considering within-firm wage inequality is important for two reasons. First, in most countries, wage differences within firms account for nearly half of overall wage inequality, on a par with differences between firms (Lazear and Shaw 2007; Fournier and Koske 2013; ILO 2016; Criscuolo et al. 2020). The exception is the United States, where differences between firms are more significant than within-firm inequality (Barth et al. 2016). Second, wage differences between firms provide an incomplete picture of wage-setting dynamics. They can indicate whether firm-level practices affect the deviations from an equal market wage observed for otherwise equal employees, but they do not show how firm-level bargaining affects wage dynamics at the organization level. It is only by looking at within-firm wage inequality that we can see how the possibility of setting wages locally is used by firms to increase or decrease the wages of specific types of employees, thereby contributing to overall income inequality.

As we detail in the second section of this article, the literature on the role of firm-level bargaining in within-firm inequalities provides contrasting theoretical predictions. The few existing empirical studies find mixed results, mostly based on relatively old data relating to the second half of the 1990s, when the push towards reforming labour markets started.

In this article, we provide three main contributions to this relatively underdeveloped literature by drawing on the matched employer–employee data recorded in the Structure

of Earnings Survey (SES) for six European Union (EU) Member States – Belgium, Czechia, France, Germany, Spain and the United Kingdom[1] – for the years 2006, 2010, 2014 and 2018.

First, we estimate the difference between within-firm wage inequality under centralized and firm-level bargaining. This contrasts with previous studies, which have considered the aggregate explanatory power of different bargaining levels relative to other determinants of wage inequality, according to an inequality decomposition framework. We instead design a regression framework intended to estimate directly whether firms under firm-level bargaining show greater or smaller within-firm wage inequality compared with firms that only bargain at more centralized levels. Our measure of within-firm inequality is the interdecile range of the within-firm distribution of residual wages, controlling for worker and firm characteristics. This allows us to examine whether firms use the possibility of bargaining locally – departing from centralized agreements – to adjust the wages of high-paid or low-paid employees, and whether the wages of high-paid workers are even higher, those of low-paid ones even lower, a combination of both, or even the opposite.

Second, we take a cross-country perspective, which allows us to consider how the association between firm-level bargaining and within-firm inequality may vary across institutional contexts. These institutions – chiefly the national system of industrial relations – frame the conditions for implementing firm-level bargaining. Although the data do not cover all European countries, those included in our analysis represent different collective wage-bargaining traditions in Europe. While these countries all share a common trend towards the decentralization of their bargaining levels, they also maintained marked differences in the prevalent form of collective bargaining over the period under analysis. This can influence the effect of firm-level bargaining in different ways.

Third, we also contribute by considering whether the relationship between firm-level bargaining and within-firm inequality changed over the two decades under study. In general, we would expect the use of firm-level agreements to differentiate salaries and its impact on within-firm wage inequality to have increased steadily. However, the period covered by our analysis includes the Great Recession of 2008–09, which turned into the deep financial and debt crises that affected European countries from 2012 to 2013. Those major events put pressure on wages, which might create the expectation of a marked change in the association between firm-level bargaining and within-firm wage inequality as early as 2010, but particularly over the period 2014–18.

The findings document ample heterogeneities in the estimated effects of firm-level bargaining, across countries and over time. At the same time, such heterogeneities do not map neatly onto country-specific features of national bargaining systems or onto broad classifications of countries based on prevailing bargaining levels.

The remainder of this article is organized as follows. The second section presents the main theories that inform our research question, and the limited empirical evidence on the subject. We then briefly discuss the key features of the relevant wage bargaining systems, providing some hypotheses about the heterogeneity of effects that we could expect to observe from the empirical analysis. The data and main measurement variables are presented in the third section. The fourth section sets out our empirical models and estimation strategies, while the fifth section presents our results. Lastly, we provide some conclusions in the sixth section.

2. Background and hypotheses

The traditional approach in the literature examining the role of bargaining systems in inequality dynamics is, first, to decompose overall wage inequality into its within-firm and between-firm components, and then to estimate the relative importance of the bargaining

[1] Before the withdrawal of the United Kingdom from the European Union in 2020.

level adopted by firms (centralized or firm-level) in explaining the two components, relative to other firm attributes or institutional characteristics. Within this literature, however, the vast majority of studies focus only on between-firm wage inequality, testing if firm-level bargaining can explain why otherwise similar workers (in terms of individual and job characteristics) are paid differently in different firms (Dell'Aringa and Lucifora 1994; Hibbs and Locking 1996; Palenzuela and Jimeno 1996; Hartog, Leuven and Teulings 2002; Rycx 2003; Cardoso and Portugal 2005; Checchi and Pagani 2005; Plasman, Rusinek and Rycx 2007; Card and De La Rica 2006; Dell'Aringa and Pagani 2007; Daouli et al. 2013; Ehrl 2017). This attention to between-firm inequalities, which stresses the central role of the firm as the key locus of wage inequality creation, has been reinforced in recent years, driven by the OECD's efforts to understand the origins of inequality across countries (Criscuolo et al. 2020, 2021 and 2023) and also in relation to the emergence of new technological trends such as firms' use of big data (Silva, Leitao and Montana 2022). This article, by contrast, relates to the much narrower literature that examines whether firm-level bargaining affects wage inequality within firms.

2.1. Theoretical and empirical literature

The link between the level of collective bargaining and within-firm wage inequalities can be framed by several approaches, with contrasting predictions about whether firm-level bargaining should result in higher or lower within-firm inequality, compared to centralized bargaining.

Economic theories primarily stress firm-specific incentives as drivers of the adoption of firm-level agreements. On the one hand, decentralized bargaining should increase within-firm inequality in models where firm-level agreements are designed to elicit or selectively compensate the contribution of different employees to the firms' performance and objectives (Bayo-Moriones, Galdón-Sánchez and Martínez-de-Morentin 2013). This may happen under performance-related pay or other compensating differential schemes consistent with tournament theory (Lazear and Rosen 1981). The same may occur when firm-level schemes are used to remunerate human capital or particularly valuable firm-specific resources selectively, taking a resource-based view of the firm, or to solve transaction costs and agency problems arising for different occupational groups (Eisenhardt 1989; O'Shaughnessy 1998). On the other hand, local bargaining may also reduce within-firm inequality compared to centralized bargaining if firm-level agreements respond to workers' pursuit of re-distribution, fairness or equity. This may stem from the preference of workers or unions to equalize wages (across but also within firms), as described in "insider–outsider models with unions" (Lindbeck and Snower 1986 and 2001) or "fair wage" theories (Akerlof 1984).

Other mechanisms linking within-firm wage inequalities to centralized or decentralized bargaining are suggested by wage-setting models that explain the wage gap between the market-clearing wage and the wage actually paid to workers, on the basis of efficiency-wage, rent-sharing or differential compensation for unmeasured worker ability. Although these practices are more directly related to between-firm wage inequalities, they may also affect inequalities within a firm if they are used by employers to selectively reshape the overall pay scale in order to adjust the wages of specific groups of workers and not of others. It is, however, difficult to formulate predictions on whether these practices would result in increased or decreased within-firm pay inequality. Their effect depends on their actual implementation and on the willingness of workers and unions to pursue egalitarian objectives of standardizing wages in firm-level negotiations.

Beyond the incentive motives analysed by economists, other literatures highlight the role of different firm-specific characteristics on the internal wage structure of firms. Sociological and socio-economic research stresses the role of organizational inertia and the relative balance of power among groups within organizations, particularly in organizational approaches to stratification that discuss the firm as the central locus of wage inequality

creation (Stainback, Tomaskovic-Devey and Skaggs 2010; Cobb 2016). Resistance to change favours the continuation of individuals' positions and the wage structure within a firm, whereas the resolution of conflicts among groups with different goals and power in the hierarchical, organizational and occupational structure may result in either reducing or increasing inequalities within firms, both statically and over time (Blau and Duncan 1967; Goldthorpe and Hope 1972; Wright 1980; Erikson and Goldthorpe 2002).

Overall, the implementation of firm-level bargaining can vary considerably across firms, with uncertain outcomes on within-firm wage inequality depending on the relative strength of the factors mentioned above. The relationship of firm-level bargaining with within-firm wage inequality remains ultimately an empirical question.

Mirroring the contrasting predictions in the theoretical literature, the few existing empirical studies on the matter (all relating to the 1990s and early 2000s) find mixed results. Dell'Aringa and Lucifora (1994) examine data for Italy for the year 1990 (using a sort of national precursor to the SES) and find that within-firm wage dispersion does not differ between firms that only apply centralized bargaining and those that also apply firm-level agreements. This result is confirmed for Belgium, Ireland, Italy and Spain for the year 1995 by Dell'Aringa et al. (2004), highlighting the need to include residual wages and control variables in estimation models. Indeed, they show that wider unconditional within-establishment wage inequality, observed for enterprises covered by a single-employer agreement, disappears when a large set of controls is included. Conversely, using data for 1995, Canal Domínguez and Rodríguez Gutiérrez (2004) find that firm-level bargaining reduces within-firm wage dispersion in Spain. Lastly, Addison, Kölling and Teixeira (2014) find a modest widening of within-establishment wage dispersion for establishments that exit sectoral agreements, using a panel of German establishments over the period 1996–2008.

Our study complements this limited literature by providing a framework to compare within-firm inequality under centralized and firm-level bargaining across European countries with different institutional traditions and analyse how the relationship changed over time.

2.2. Wage-setting frameworks in selected countries and working hypotheses

The main features of the national bargaining systems of the countries included in our study, over the period covered by the data, are summarized in table SA1 in the supplementary online appendices.

On the one hand, despite a general trend towards devolution of bargaining levels in the period under analysis, countries arguably show significant differences in terms of the scope, coverage and extent of derogation of firm-level bargaining from centralized bargaining. Although the sign of the relationship between firm-level bargaining and within-firm wage inequality is theoretically uncertain overall, the institutional setting in some countries may favour the inequality-enhancing effects of firm-level agreements. In particular, the national systems of Czechia and the United Kingdom are more likely to result in firms that bargain locally having more unequal wage structures, compared to firms that only bargain at more centralized levels. More egalitarian outcomes seem likely to be associated with firm-level contracts in Germany and Spain, whereas no effect is predicted to emerge in Belgium and outcomes are uncertain in France. Our choice to perform separate analyses by country is precisely intended to verify such potentially heterogeneous effects.

On the other hand, we also observe some broad similarities across some countries, especially as regards the prevailing locus of collective bargaining. In line with Fulton (2013), the countries can be assigned to different "bargaining regimes": Belgium is an emblematic example of an "inter-industry/national regime"; in contrast, Czechia and the United Kingdom represent instances of an "individual-employer regime"; Germany and Spain fall into an intermediate "sectoral regime"; and France is an outlier, owing to the particularly complex interaction across all bargaining levels. Accordingly, one might expect that firm-level agreements in countries assigned to one same regime would affect inequality in a similar

way, and that this effect would possibly be more similar than country-specific institutional features alone would predict. Nevertheless, it is difficult to predict whether egalitarian or inequality-enhancing pressures would prevail in economies where firm-level bargaining has always been commonplace (such as Czechia and the United Kingdom), or in countries that traditionally favour more centralized forms of bargaining (such as Belgium, France, Germany and Spain). In this last category, the law or workers' action may prevent firm-level contracts from introducing inequalities in firms' internal wage structures. This would reduce the likelihood that, in these countries, firms bargaining locally present more unequal wage structures – if at all – than firms bargaining at higher levels, compared to Czechia and the United Kingdom. However, firm-level bargaining may also be used by firms to differentiate internal wages, precisely to escape the rigidity and complexity of negotiations typical of more corporatist regimes. If this second tendency prevails, we may find higher within-firm inequality under firm-level bargaining in Belgium, France, Germany and Spain, compared to the United Kingdom or Czechia.

An additional – to some extent extreme – hypothesis is that, as wage-setting institutions progressively converge, blurring the institutional differences across countries or the borders across regimes (see Baccaro and Howell 2017), any predicted difference in the relationship between firm-level bargaining and within-firm wage inequality may eventually lose significance. If this were the case, our empirical analysis should reveal the same or comparable effects across all countries.

Regarding time effects, the evolution of national wage bargaining systems (see table SA1 in supplementary online appendix A) suggests two main hypotheses. On the one hand, as the legal provision stipulating firm-level collective agreements was introduced in all countries before the period under study – around the end of the 1990s and the early 2000s – the years spanned by our data correspond to a relatively stable phase for national bargaining frameworks. There are signals that firm-level bargaining was spreading and gaining ground over the period, but no major reforms were implemented (except in France in 2016). We can thus expect a steady increase in the use of firm-level bargaining and a steady increase in the associated extent of within-firm inequality without major time breaks. On the other hand, we might expect significant change in the second part of the sample period, because of the Great Recession of 2008–09 and the ensuing deep financial and debt crises in Europe from 2012 to 2013. As wages were under pressure, firms may have increased their use of flexibility to adjust wages locally through firm-level agreements in the years 2014–18. The effect of firm-level bargaining may thus be greater in later years.

3. Data and main variables

3.1. Data source and sample

The SES data set collected by Eurostat is an established source of data on labour dynamics in Europe. It encompasses a rich set of earnings-related, personal and jobs-related variables for many workers in the EU, matched with data on some characteristics of the employing firms. It has been used in other empirical studies, particularly within the vast literature on between-firm inequality and its determinants. Early national editions of the survey, covering the 1990s, were used in the few existing studies that examined our research question, as discussed in section 2.

The SES data collection strategy selects a random sample of firms (stratified by size, sector of activity and geographical location) for each country and survey year to be representative of the national industrial relations system. Within each selected firm, it draws a representative sample of employees and, for those employees, provides a large set of personal and job-related characteristics, including wages, age, sex, education, type of contract, tenure, occupation type and others. As such, the available data set can be seen as a matched employer–employee data set, providing a unique source for consistent comparisons across economies.

Of course, the SES data have their own limitations. First, the sample of business units considered in the SES generally includes those with at least ten employees, which limits the analysis as far as micro firms are concerned. Second, although the surveying procedure provides information on an impressive number of workers across Europe (about 10 million per survey year), the sampling rate of employees varies by firm size and by country. Third, the data concerning employees' personal and work-related characteristics are very rich, but the information on firms is limited to five variables: size class, geographical location, sector of activity, public or private control and – crucial for our purposes – the level of wage bargaining adopted in the firm. Fourth, the survey does not allow the same workers to be identified across waves. This implies that a panel data set cannot be identified, following the surveyed employees or firms over time. Thus, although the rich set of individual characteristics should cure a great deal of omitted variable bias in estimating residual wages (see section 4 below for details), it is not possible to control fully for time-invariant unobserved worker characteristics.

For this study, we used the 2006, 2010, 2014 and 2018 waves of the SES. The countries included in the analysis – Belgium, Czechia, France, Germany, Spain and the United Kingdom – were selected based on two criteria: first and foremost, the availability of information about the type of bargaining in place in the sampled firms, which forced us to exclude countries where none or only a handful of firms responded to the specific SES question on the issue; and second, as discussed in the previous section, we wanted to ensure a reasonable representation of different institutional contexts and industrial relations traditions in Europe. We kept the United Kingdom in the sample, even though it does not provide figures for the 2018 wave, as the paramount example of the Anglo-Saxon individual-centred bargaining system.[2]

Given that, by definition, measuring within-firm wage inequality requires observing wages for at least two employees in one single firm, we define our working sample as including only firms with at least three sampled employees. It is also worth noting that, even though we pool firms across pairs of survey waves in the empirical analysis, this provides repeated cross-sectional data, since the SES does not report any identification code that can be used to match the same firm over time.

3.2. Types of collective bargaining agreements

For our purposes, the key information provided by the SES relates to a question about the type of wage bargaining practised at each firm. This allows us to distinguish three broad cases of collective bargaining coverage. The first case includes *centralized bargaining* agreements, or what the SES calls "Type-A: National level or inter-confederal agreements", "Type-B: Industry agreements" or "Type-C: Agreements for individual industries in individual regions". The second case includes *firm-level bargaining*, where firms depart from centralized agreements. The SES categorizes such cases as "Type-D: Enterprise or single employer agreements", "Type-E: Agreements applying only to workers in the local unit" or "Type-F: Other types of firm agreements". The third case is the *lack of collective bargaining agreement* ("Type-N: No collective bargaining exists").[3]

[2] Italy is the only large European economy missing from our analysis, excluded because all firms report using only national collective bargaining. We do not include any of the Nordic countries for different reasons: Denmark does not participate in the SES; Finland does not report the (anonymized) firm identifiers, so within-firm inequality measures cannot be measured (see below); Sweden does not report the type of collective bargaining applied by firms at all; and none of the sampled firms in Norway reports having adopted firm-level bargaining.

[3] The seven A–F (+N) types of pay agreements correspond to those laid down in the Eurostat guidelines for implementation of the SES (cf. the documentation accompanying the various SES waves entitled "Eurostat's arrangements for implementing the Council Regulation 530/1999, the Commission Regulations 1916/2000 and 1738/2005"). National statistical offices have autonomy in the development and phrasing of the SES questionnaire.

Centralized wage bargaining is the dominant form of wage-setting among the firms in our sample in Belgium, France and Spain, covering around 70–90 per cent of firms and 65–85 per cent of employees (see table SB1 in supplementary online appendix B). Firm-level agreements in these countries cover only about 6–20 per cent of firms and 15–25 per cent of employees, while a smaller share of firms and employees are not covered by any collective agreement. In Germany, although most companies (67–74 per cent) are not covered by collective agreements, these are mostly small in size and thus represent less than half of the employees sampled. A larger share of employees are covered by centralized agreements, while firm-level agreements are comparatively rare, covering around 3–6 per cent of firms, and around 3–7 per cent of employees. In Czechia and the United Kingdom, the share of firms and employees not covered by collective bargaining is comparable to Germany's, but among those covered by some form of collective bargaining, firm-level agreements are more frequent, consistent with our description of market-oriented regimes in the previous section. Over time, the share of firms and employees covered by firm-level agreements fluctuates but remains essentially stable in all countries except Czechia. This is consistent with the intuition that the devolution of bargaining levels continued but did not become stronger over the sample period, as the major institutional changes occurred beforehand.

The focus of this article is on bargaining decentralization, which involves a shift from coordinated central bargaining to decentralized firm-level bargaining and is a separate phenomenon from the complete lack of collective wage agreements. Therefore, in our empirical analysis we only consider firms that do apply some form of collective bargaining. We define a variable *FLB*, which compares the firms that apply firm-level bargaining (*FLB* = 1) and those that only apply centralized bargaining (*FLB* = 0).[4]

3.3. Measuring wage inequality within firms

Within-firm wage inequality is measured on the basis of the hourly compensation of employees reported in the SES. To account for differences in workforce composition and corporate characteristics across firms, and in line with an established practice in the literature on wage inequalities – dating back to at least Winter-Ebmer and Zweimüller (1999) – a meaningful comparison of wages across individuals requires isolating the component of individual wage that is not directly related to the average market compensation of job, personal and other characteristics of otherwise similar individuals.

As our measure of within-firm inequality for each firm *j*, we take the interdecile range of residual log-wages, that is, the gap between the 90th and 10th percentile log-wage premiums:

$$\Delta w_j^{90/10} = \hat{w}_j^{90} - \hat{w}_j^{10} \tag{1}$$

where $\hat{w}_j^p$ is the *p*th percentile of the distribution of the residual wage $\hat{w}_{ij}$ obtained for each employee *i* of firm *j* from the following Mincer-type regression estimated separately by country and by survey year:

$$\begin{aligned}\log\left(W_{ij}\right) &= b_0 + b_2\,\text{experience}_{ij} + b_3\,\text{experience}_{ij}^2 + b_1\,\text{age}_{ij} + b_4\,\text{sex}_{ij} + b_5\,\text{education}_{ij} \\ &+ b_6\,\text{contract}_{ij} + b_7\,\text{part\_time}_{ij} + b_8\,\text{occup}_{ij} + b_9\,\text{share\_ft}_{ij} + \phi FE_j + w_{ij}\end{aligned} \tag{2}$$

[4] A comparison of firms that apply firm-level bargaining with firms that do not apply any form of collective bargaining is certainly an interesting, complementary direction for future research. It would possibly require larger and more detailed data on single countries. With SES data, the comparison between firms that apply at least one form of collective agreement is the most meaningful comparison to make across countries, considering that in Belgium, France and Spain, nearly all employees are covered by some form of collective agreement.

In this Mincer equation, $\log(W_{ij})$ is the logarithm of the hourly wage as reported in the SES, which is regressed against a standard set of employee individual and job characteristics: years of tenure, age, sex, education level (International Standard Classification of Education – ISCED), type of contract (permanent, temporary or apprenticeship), a dummy for part-time contract, occupation (International Standard Classification of Occupations – ISCO) and the share of full-time working hours. Lastly, we include a firm fixed effect FE_j.

Accordingly, the residual w_{ij} is a *wage premium* capturing the deviation of individual-specific wage from the average wage that could be expected for an employee of firm j based on their characteristics, while also controlling for firm-specific average wage premium paid in firm j, captured by firm fixed-effect FE_j. For example, if a firm had a policy of paying exactly a 10 per cent premium on average market wages to its employees, this firm-level premium would be accounted for by the coefficient ϕ and this firm's wage policy would have no net effect on within-firm wage inequality in equation (1), allowing for meaningful comparison across individuals and firms.[5]

Taking the interdecile range of within-firm distribution of wage premiums allows us to examine if firm-level bargaining is used by firms to adjust wages of low-paid or high-paid employees. In fact, as we detail in the next section, we can split the effect of firm-level bargaining on the two percentiles. Other measures of inequality usually employed in the literature, such as the variance (or the standard deviation), do not allow us to identify the source of increased or reduced inequality.

4. Empirical models and estimation strategy

Estimating the effect of institutional changes, such as shifts in collective bargaining regimes, is generally complex. If firms can choose between centralized and decentralized bargaining schemes, it can create endogeneity, raising questions of comparability and selection between firms that choose one regime over the other. Ideally, we would like to observe countries with comparable institutions and conditions enacting discrete reforms to their collective bargaining institutions. In the absence of these ideal experimental conditions, in order to derive comparable estimates by country, we control for employee and firm characteristics and account for the propensity of individual firms to use firm-level bargaining.

4.1. Firm-level bargaining and within-firm inequality

Our empirical setup is intended to estimate whether there is a significant difference in within-firm inequality between firms under firm-level bargaining and those under centralized bargaining, and whether this gap varies (i) by country and (ii) over time, across the initial two (2006 and 2010) or the subsequent two (2014 and 2018) survey waves available in the SES data.

We estimate the following two regression models for each country, one pooling the data for the 2006 and 2010 SES waves:

$$\begin{aligned}\Delta w_j^{90/10} &= \alpha_0 + \alpha_1 FLB_j + \alpha_2 Y_j^{2010} + \alpha_3 Y_j^{2010} \times FLB_j + \gamma \widehat{FLB}_j \\ &+ \zeta \mathbf{X}_j + \eta \text{sector}_j + \theta \text{region}_j + \epsilon_j\end{aligned} \tag{3}$$

and the other pooling the data for the 2014 and 2018 waves:

$$\begin{aligned}\Delta w_j^{90/10} &= \beta_0 + \beta_1 FLB_j + \beta_2 Y_j^{2018} + \beta_3 Y_j^{2018} \times FLB_j + \gamma \widehat{FLB}_j \\ &+ \zeta \mathbf{X}_j + \eta \text{sector}_j + \theta \text{region}_j + \epsilon_j\end{aligned} \tag{4}$$

[5] Table SB2 in supplementary online appendix B shows averages of $\Delta w^{90/10}$ by country, year and type of bargaining (firm-level or centralized).

In both models, $\Delta w_j^{90/10}$ is the measure of within-firm wage inequality defined in equation (1), computed for each firm *j*; FLB_j indicates whether firm *j* applies centralized bargaining ($FLB_j = 0$) or firm-level bargaining ($FLB_j = 1$); γ_j^{2010} and γ_j^{2018} are dummy variables indicating whether firm *j* is sampled in the final year of the two wave pairs, that is, in 2010 or 2018, respectively; $\mathbf{X}_j$ is a set of firm characteristics and workforce composition variables (discussed below); $sector_j$ and $region_j$ are fixed effects for the economic sector (reported in the SES at 1-digit NACE[6]) and geographical location (reported in SES at NUTS 1 level[7]) of the firm, respectively; $\widehat{FLB}_j$ is a propensity score representing the probability that firm *j* adopts firm-level bargaining, included to correct for potential endogenous selection effects (discussed below); ϵ_j is an idiosyncratic error term.[8]

The α and β parameters are the main coefficients of interest. The intercepts α_0 and β_0 measure the average level of within-firm inequality in the baseline group of firms under centralized bargaining in the initial years (2006 and 2014, respectively). The coefficients α_1 and β_1 capture the difference in within-firm inequality between firm-level bargaining firms and the baseline of fully centralized bargaining firms in the initial years (2006 and 2014, respectively). Then, α_2 and β_2 measure the change in inequality occurring over time for firms under centralized bargaining between 2006 and 2010 and between 2014 and 2018, respectively, while α_3 and β_3 capture the additional growth in inequality occurring over time for firms under firm-level bargaining, between 2006 and 2010 and between 2014 and 2018, respectively. Separate estimates of the regression models (and thus of the key parameters) by country allow us to account for differences in bargaining systems across countries. In fact, as we discussed above, the definition of firm-level bargaining firms ($FLB = 1$) is relatively homogeneous in the SES across all countries, while there is greater variation across countries for the bargaining system prevailing in the control group of firms that do not apply firm-level bargaining ($FLB = 0$).

The identification of the key parameters proceeds as follows. First, sector and regional fixed effects, together with the firm-level controls in $\mathbf{X}_j$, account for factors that jointly determine inequality and adoption of firm-level bargaining, thus potentially creating an omitted variable bias if not included in the regressions.[9] The vector $\mathbf{X}_j$ encompasses in particular two groups of variables available for each firm *j* in SES. The first group includes corporate characteristics: a categorical variable for firm size (by number of employees) and a dummy for private or public control over the firm. The expectation is that within-firm wage dispersion is lower in large and publicly owned firms, as unions tend to be more powerful in these contexts (Canal Domínguez and Rodríguez Gutiérrez 2004). The second group encompasses the workforce characteristics of firm *j*, highlighted in previous studies as determinants of wage inequality. For every firm, we measure the share of women employed in the firm; a set of dummies for the modal age of the workforce; the share of employees with secondary or tertiary education; the mean tenure of workers in the firm; the share of managers and professionals (1-digit ISCO codes 1 and 2); the share of part-time employees; and the share of employees with a permanent contract.

[6] Referring to the statistical classification of economic activities in the EU – the acronym NACE is derived from its French title: *Nomenclature statistique des activités économiques dans la Communauté européenne*.

[7] The nomenclature of territorial units for statistics (NUTS) divides each EU country into three levels: NUTS 1 – major socio-economic regions; NUTS 2 – basic regions (for regional policies); NUTS 3 – small regions (for specific diagnoses).

[8] Sector fixed effects at the NACE 1-digit level amount to 14 sector dummies to be estimated in each country. The number of regional dummies varies by country, according to the official splitting of territories defined by the NUTS-1 classification. There are 3 in Belgium, 6 in Germany, 7 in Spain, 8 in France and 12 in the United Kingdom, while Czechia has only one NUTS-1 region, so we cannot include regional dummies in the estimates for this country.

[9] Controlling for sector fixed effects is especially important in order to account for the possibility – put forward by Bechter, Brandl and Meardi (2012) and Hassel (2014) – that industrial relations may be primarily driven by cross-national tendencies specific to industrial sectors, playing a role above and beyond country-specific institutional settings.

Although these controls are relevant in theory, their individual relationship with within-firm inequality is difficult to predict in isolation. Usually, within-firm wage differences are expected to rise with age, tenure and education, because wages tend to increase with all these characteristics and dispersion is usually higher in firms where average wages are higher (Canal Domínguez and Rodríguez Gutiérrez 2004). As for gender, the well-documented existence of female wage gaps would predict wider inequality in firms where the proportion of women is lower. Furthermore, earnings inequalities are expected to be lower in firms with a relatively larger proportion of full-time (vs part-time), permanent (vs fixed-term) and blue-collar (vs white-collar) workers, given that these types of employees are generally more likely to unionize, and their firms are thus more likely to be more affected by unions' efforts to push for equalization of wages among members (Canal Domínguez and Rodríguez Gutiérrez 2004).[10]

In addition to including fixed-effects and firm-level controls, when estimating equations (3) and (4), we also address the potential endogeneity of the *FLB* dummy that may arise from non-random selection of firms. Indeed, there may still be unobserved determinants of the decision to adopt firm-level collective agreements that correlate with the unobserved determinants of the dependent variable of interest. This may occur despite controlling for employer-specific components of wages and firm-level average wages through the preliminary Mincer regression, and despite the inclusion of an extensive set of firm-level covariates. Following a solution adopted in the empirical literature (Card and De La Rica 2006; Daouli et al. 2013), we address this possible source of bias by augmenting the model with a preliminary probit estimate of the probability (propensity score) that a given firm will adopt firm-level collective bargaining ($\widehat{FLB}$). The overall rationale is that if *FLB* status is essentially assigned randomly conditional on observed controls, then conditioning also upon propensity scores allows us to clean any further bias due to unobserved firm characteristics (see supplementary online appendix C for details). However, we refrain from interpreting our results as fully causal since, as mentioned, the non-panel structure of the SES data does not allow us to follow employees and firms over time, thus preventing us from fully controlling for firm and employee fixed effects.

4.2. Firm-level bargaining and high- and low-paid employees

To better understand the role of firm-level bargaining on within-firm inequality, we estimate the following variations of equations (3) and (4):

$$\begin{aligned} w_j^p &= \alpha_0 + \alpha_1 FLB_j + \alpha_2 Y_j^{2010} + \alpha_3 Y_j^{2010} \times FLB_j + \gamma \widehat{FLB}_j \\ &+ \zeta \mathbf{X}_j + \eta \text{sector}_j + \theta \text{region}_j + \epsilon_j \end{aligned} \tag{5}$$

and

$$\begin{aligned} w_j^p &= \beta_0 + \beta_1 FLB_j + \beta_2 Y_j^{2018} + \beta_3 Y_j^{2018} \times FLB_j + \gamma \widehat{FLB}_j \\ &+ \zeta \mathbf{X}_j + \eta \text{sector}_j + \theta \text{region}_j + \epsilon_j \end{aligned} \tag{6}$$

where the dependent variable w_j^p is, alternatively, the 90th or the 10th percentile of the distribution of residual wage premiums in firm *j*, estimated by the Mincer regression described in equation (3).

Importantly, these specifications help to understand the source of the overall difference in $\Delta w_j^{90/10}$ estimated in equations (3) and (4), by comparing the 90th and 10th percentiles of wages across firms operating under centralized and firm-level bargaining. For instance,

[10] Basic descriptive statistics for control variables are presented in tables SB3, SB4 and SB5 in the supplementary online appendix.

suppose we found a positive association between firm-level bargaining $\Delta w^{90/10}$ and in a given country. Does it stem from the (residual) wages of the highest-paid employees (w^{90}) being higher under firm-level bargaining than in other firms, or from the wages of the lowest-paid workers (w^{10}) being lower? Furthermore, should no statistical difference in overall inequality $\Delta w^{90/10}$ emerge between different bargaining regimes, the estimates of equation (5) and (6) could tell us, for instance, whether this was owing to the two components being offset in the same direction under firm-level bargaining.

The estimation of equations (5) and (6) follows the same strategy as the baseline models in equations (3) and (4). We perform separate regressions by country, augmented with the same set of firm-level covariates and fixed effects, and preliminary first-step probit estimates of firm-specific *FLB* propensity scores. The estimates of α_1 and β_1 on the *FLB* dummy give the difference in average outcomes between firms bargaining locally and those under centralized bargaining in the initial years (2006 and 2014, respectively). The coefficients on the interaction terms α_3 and β_3 capture possible changes in the *FLB* coefficient over time.

5. Results

We first report and comment on the role of firm-level bargaining in "overall" within-firm inequality $\Delta w^{90/10}$ and then move to analysing the results by the top and bottom wage premium deciles.

5.1. Within-firm inequality

Table 1 presents the estimates of equation (3), focusing on the period 2006–10.[11] In 2006, there is substantial variation across countries in the level of within-firm inequality of the baseline group of companies under centralized bargaining, as revealed by estimated α_0. The lowest level of inequality is in Spain, where the baseline difference is estimated at 0.299, or approximately 30 percentage points. This level is more than doubled for France, which has the highest baseline inequality of around 62 percentage points, while the level in most other countries is around 45–55 percentage points. At the same time, there is mostly no difference in inequality between firms that adopted firm-level bargaining and those under centralized bargaining in 2006. Indeed, the estimated α_1 coefficients are not statistically different from zero, except for the United Kingdom. In this case, the inequality of wage distribution is significantly lower (by about 1.3 percentage points, or around 2 per cent of baseline inequality) for firm-level bargaining firms compared to other firms.

By 2010, within-firm wage inequality in firms under centralized bargaining drops compared to the baseline inequality for 2006 (see α_2 estimations) in most countries except Czechia and Germany. For some countries, the change is quite sizeable: around 11 per cent in Spain and 13 per cent in the United Kingdom. Firms bargaining locally in 2010 follow the same trend (see α_3 estimations, which are mostly not significant), except in Spain and France, where such firm-level bargaining dampens (or reverses) the egalitarian trend. In both countries, whereas there is no significant difference between companies that applied centralized and firm-level bargaining for 2006, the results for 2010 indicate a widening gap (around 2.2 percentage points in Spain, 3.6 in France). On balance, while within-firm inequality decreases appreciably in 2010 for Spanish and French firms under centralized bargaining, it narrows substantially less for companies under firm-level bargaining in Spain (adding α_2 and α_3) and even increases for those in France.

[11] Here and in the rest of this section, in order to convey the main message from our analysis, we focus the discussion on the parameters of main interest and do not comment on the control variable coefficient estimates. Note that the estimated coefficient on the propensity score $\widehat{FLB}_j$ is often statistically significant, confirming the need to correct for endogenous selection into *FLB* in most estimates.

Table 1. Within-firm inequality and firm-level bargaining, 2006–10

Dependent variable $\Delta w^{90/10}$	Belgium	Czechia	France	Germany	Spain	United Kingdom
α_0: Intercept	0.455***	0.463***	0.624***	0.529***	0.299***	0.596***
(Base inequality, FLB = 0 in 2006)	(0.0340)	(0.0427)	(0.0401)	(0.0539)	(0.0259)	(0.122)
α_1: FLB	−0.00158	−0.0103	−0.00478	−0.00285	0.00510	−0.0129**
(Additional inequality of FLB = 1 in 2006)	(0.00420)	(0.0100)	(0.00990)	(0.00638)	(0.00458)	(0.00634)
α_2: Year 2010	−0.0334***	−0.0142	−0.0151***	0.00454	−0.0326***	−0.0798***
(Additional inequality of FLB = 0 in 2010)	(0.00265)	(0.0119)	(0.00348)	(0.00424)	(0.00273)	(0.00842)
α_3: FLB × 2010	0.00148	0.00496	0.0362***	0.00323	0.0217***	−0.00420
(Additional inequality of FLB = 1 in 2010)	(0.00592)	(0.0129)	(0.0114)	(0.00846)	(0.00672)	(0.00849)
γ: Probability FLB	0.0953***	0.117**	0.105***	−0.000383	−0.226***	−0.00772
(Additional inequality of predicted FLB status)	(0.0355)	(0.0458)	(0.0359)	(0.0520)	(0.0250)	(0.125)
Firm-level controls	✓	✓	✓	✓	✓	✓
Region FE	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓
Observations	13 765	3 498	30 009	12 312	37 887	14 502
R^2	0.187	0.230	0.118	0.064	0.197	0.123

*, ** and *** indicate statistical significance at the 5, 1 and 0.1 per cent levels, respectively.
Notes: FLB = firm-level bargaining. Firm-level controls are firm size class (50–249 or ≥250 employees); public firm; modal age of employees; average experience of employees; and share of employees who are women, with tertiary and secondary education, who are managers or professionals, who are part-time, and with permanent contracts. Bootstrap standard errors appear in parentheses (200 iterations).
Source: Our own calculations based on SES 2006, 2010, 2014 and 2018 wave data.

Table 2 presents the estimates of equation (4), focusing on the period 2014–18. They confirm the considerable cross-country heterogeneity that already emerged from the 2006–10 estimates. For 2014, the extent of within-firm inequality characterizing the baseline group of firms that only bargain at centralized levels differs by country (see β_0 estimates) and we also observe clear differences in the additional inequality associated with firm-level bargaining (see β_1 estimates). In fact, the levels of within-firm wage inequality are not significantly different for firm-level bargaining firms, compared with other firms, in Belgium, Czechia and the United Kingdom. In contrast, firm-level bargaining results indicate an increase in the $\Delta w^{90/10}$ gap in Germany, Spain and France. This may reflect some particularly strong use of firm-level agreements to differentiate salaries in these countries, in the aftermath of and in response to the crisis period. However, the increase in within-firm inequality associated with firm-level bargaining in these countries does not continue over time. By 2018, the results indicate an increase in wage inequality under firm-level bargaining (see β_3 estimates) only in Czechia, while differences compared to fully centralized firms are not statistically significant for any of the other countries. Conversely, firms that only bargain at more centralized levels change in different ways over time (see β_2 estimates), becoming even more unequal over time in Belgium and Spain but less unequal in Czechia, France and Germany.

Table 2. Within-firm inequality and firm-level bargaining, 2014–18

Dependent variable $\Delta w^{90/10}$	Belgium	Czechia	France	Germany	Spain	United Kingdom
β_0: Intercept	0.228***	0.311***	0.592***	0.417***	0.283***	0.590***
(Base inequality, FLB = 0 in 2014)	(0.0344)	(0.116)	(0.0488)	(0.0457)	(0.0962)	(0.0969)
β_1: FLB	–0.00114	–0.00450	0.0111*	0.0266***	0.0123**	–0.00742
(Additional inequality of FLB= 1 in 2014)	(0.00312)	(0.00856)	(0.00572)	(0.00550)	(0.00558)	(0.00780)
β_2: Year 2018	0.0184***	–0.0247**	–0.01000*	–0.0232***	0.00578**	
(Additional inequality of FLB = 0 in 2018)	(0.00237)	(0.0102)	(0.00525)	(0.00285)	(0.00275)	
β_3: FLB × 2018	0.000606	0.0193*	0.00659	–0.00134	0.00515	
(Additional inequality of FLB = 1 in 2018)	(0.00438)	(0.0107)	(0.00644)	(0.00826)	(0.00704)	
γ: Probability FLB	0.0118	–0.140***	–0.0449**	0.0686**	–0.196***	–0.106
(Additional inequality of predicted FLB status)	(0.0719)	(0.0390)	(0.0212)	(0.0282)	(0.0338)	(0.106)
Firm-level controls	✓	✓	✓	✓	✓	✓
Region FE	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓
Observations	12 350	11 597	47 101	21 383	30 048	5 181
R^2	0.220	0.447	0.154	0.113	0.211	0.150

*, ** and *** indicate statistical significance at the 5, 1 and 0.1 per cent levels, respectively.
Notes: FLB = firm-level bargaining. Firm-level controls are firm size class (50–249 or ≥250 employees); public firm; modal age of employees; average experience of employees, share of employees who are women, with tertiary and secondary education, who are managers or professionals, who are part-time, and with permanent contracts. Bootstrap standard errors appear in parentheses (200 iterations).
Source: Our own calculations based on SES 2006, 2010, 2014 and 2018 wave data.

5.2. High- and low-paid employees

We then move to the estimates of equation (5) and equation (6), which allow us to estimate separate coefficients of firm-level bargaining for higher- vs lower-paid employees.

The results for the period 2006–10 are reported in table 3. These are informative in explaining the greater inequality under firm-level bargaining observed above for France, Spain and the United Kingdom (see table 1). The lower inequality in UK firm-level bargaining firms in 2006 stems from significantly higher wage premiums paid at the bottom of internal wage distribution in firm-level bargaining firms compared to centralized bargaining firms (see α_1 estimate for q_{10}). In Spain, the lower overall wage inequality $\Delta w^{90/10}$ in 2010 observed earlier for firms under centralized bargaining results from a relative reduction in the 90th percentile wage premiums and a corresponding increase of those at the 10th percentile, leading to an overall wage inequality reduction as a result of both extremes moving closer. Crucially, this reduction in inequality is dampened for both q_{90} and q_{10} under firm-level bargaining (see α_3 coefficients), leading to a total 2.17 percentage point difference between the two regimes in 2010. France seems to have experienced a more extreme version of the same dynamics: the wage premiums at the top increased and those at the bottom decreased under firm-level bargaining, leading to an overall difference of 3.6 percentage points.

Table 3. Firm-level bargaining and 90th and 10th percentiles of wage premiums, 2006–10

Dependent variable	Belgium		Czechia		France		Germany		Spain		United Kingdom	
	*q*90	*q*10	*q*90	*q*10	*q*90	*q*10	*q*90	*q*10	*q*90	*q*10	*q*90	*q*10
α_0: Intercept	0.226***	−0.228***	0.244***	−0.219***	0.315***	−0.309***	0.270***	−0.259***	0.148***	−0.151***	0.307***	−0.290***
	(0.0203)	(0.0173)	(0.0223)	(0.0195)	(0.0234)	(0.0173)	(0.0289)	(0.0265)	(0.0134)	(0.0112)	(0.0722)	(0.0571)
α_1: FLB	−0.00106	0.000520	−0.00479	0.00548	−0.00187	0.00292	−0.00945***	−0.00660*	−0.000250	−0.00535**	−0.00414	0.00877***
	(0.00276)	(0.00244)	(0.00521)	(0.00535)	(0.00500)	(0.00601)	(0.00343)	(0.00394)	(0.00260)	(0.00239)	(0.00373)	(0.00320)
α_2: Year 2010	−0.0189***	0.0145***	−0.00548	0.00871	−0.00764***	0.00741***	0.00678***	0.00223	−0.0174***	0.0151***	−0.0392***	0.0406***
	(0.00158)	(0.00135)	(0.00623)	(0.00728)	(0.00202)	(0.00162)	(0.00236)	(0.00262)	(0.00139)	(0.00131)	(0.00530)	(0.00419)
α_3: FLB × 2010	0.00159	0.000108	0.00125	−0.00371	0.0195***	−0.0167***	0.00578	0.00255	0.0148***	−0.00693**	−0.00431	−0.000113
	(0.00332)	(0.00298)	(0.00693)	(0.00771)	(0.00600)	(0.00598)	(0.00451)	(0.00452)	(0.00346)	(0.00316)	(0.00533)	(0.00443)
y: Probability FLB	0.0539***	−0.0415**	0.0595**	−0.0576***	0.0678***	−0.0374**	−0.0153	−0.0149	−0.133***	0.0928***	−0.0112	−0.00350
	(0.0173)	(0.0171)	(0.0259)	(0.0212)	(0.0183)	(0.0167)	(0.0238)	(0.0296)	(0.0151)	(0.0129)	(0.0739)	(0.0573)
Firm-level controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Region FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	13 765	13 765	3 498	3 498	30 009	30 009	12 312	12 312	37 887	37 887	14 502	14 502
R^2	0.138	0.199	0.226	0.191	0.105	0.115	0.059	0.059	0.174	0.191	0.110	0.124

*, ** and *** indicate statistical significance at the 5, 1 and 0.1 per cent levels, respectively.
Notes: FLB = firm-level bargaining. Firm-level controls are firm size class (50–249 or ≥250 employees); public firm; modal age of employees; average experience employees, share of employees who are women, with tertiary and secondary education, who are managers or professionals, who are part-time, and with permanent contracts. Bootstrap standard errors in parentheses (200 iterations).
Source: Our own calculations based on SES 2006, 2010, 2014 and 2018 wave data.

Table 4. Firm-level bargaining and 90th and 10th percentiles of wage premiums, 2014–18

Dependent variable	Belgium		Czechia		France		Germany		Spain		United Kingdom	
	*q*90	*q*10	*q*90	*q*10	*q*90	*q*10	*q*90	*q*10	*q*90	*q*10	*q*90	*q*10
β_0: Intercept	0.106***	−0.122***	0.186***	−0.125**	0.310***	−0.282***	0.202***	−0.215***	0.155***	−0.128***	0.322***	−0.269***
	(0.0167)	(0.0188)	(0.0637)	(0.0508)	(0.0288)	(0.0207)	(0.0295)	(0.0258)	(0.0592)	(0.0345)	(0.0464)	(0.0457)
β_1: FLB	0.000366	0.00151	−0.00311	0.00139	0.00489	−0.00623**	0.0136***	−0.0129***	0.00250	−0.00976***	−0.00467	0.00275
	(0.00199)	(0.00181)	(0.00498)	(0.00462)	(0.00342)	(0.00265)	(0.00302)	(0.00309)	(0.00287)	(0.00273)	(0.00448)	(0.00382)
β_2: Year 2018	0.00895***	−0.00946***	−0.0141**	0.0105*	−0.00677**	0.00323	−0.00913***	0.0140***	0.00327**	−0.00251*		
	(0.00131)	(0.00118)	(0.00586)	(0.00555)	(0.00304)	(0.00242)	(0.00156)	(0.00140)	(0.00164)	(0.00143)		
β_3: FLB × 2018	−0.000386	−0.000992	0.0108*	−0.00850	0.00242	−0.00417	−0.00427	−0.00293	0.00660	0.00145		
	(0.00260)	(0.00231)	(0.00599)	(0.00563)	(0.00365)	(0.00321)	(0.00443)	(0.00437)	(0.00412)	(0.00380)		
y: Probability FLB	0.0101	−0.00175	−0.0955***	0.0446**	−0.0261**	0.0187*	0.0402**	−0.0284*	−0.109***	0.0866***	−0.0892*	0.0166
	(0.0387)	(0.0394)	(0.0252)	(0.0191)	(0.0129)	(0.0104)	(0.0167)	(0.0153)	(0.0168)	(0.0172)	(0.0515)	(0.0522)
Firm-level controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Region FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	12 350	12 350	11 597	11 597	47 101	47 101	21 383	21 383	30 048	30 048	5 181	5 181
R^2	0.195	0.188	0.415	0.411	0.148	0.136	0.110	0.093	0.190	0.201	0.142	0.144

*, ** and *** indicate statistical significance at the 5, 1 and 0.1 per cent levels, respectively.
Notes: FLB = firm-level bargaining. Firm-level controls are firm size class (50–249 or ≥250 employees); public firm; modal age of employees; average experience employees, share of employees who are women, with tertiary and secondary education, who are managers or professionals, who are part-time, and with permanent contracts.
Bootstrap standard errors in parentheses (200 iterations).
Source: Our own calculations based on SES 2006, 2010, 2014 and 2018 wave data.

Table 4 reports the estimates using the 2014–18 data. They reveal that the difference in inequality observed in table 2 in fact originates from different underlying patterns, with firm-level bargaining used differently by firms to adjust wages of low-paid or high-paid employees. The greater $\Delta w^{90/10}$ inequality under firm-level bargaining estimated in 2014 for Germany stems from two combined differences: compared to firms bargaining at centralized levels, a lower 10th percentile and a larger 90th percentile is estimated for firms bargaining locally. That is, they pay low-paid employees less and high-paid employees more. This is not the case for the greater inequality under firm-level bargaining observed in France and Spain in 2014. In these countries, the overall difference comes solely from firms that practise firm-level bargaining, paying their low-paid employees less compared to firms bargaining at centralized levels. The opposite pattern holds for Czechia in 2018, where increased inequality is explained by employees in the 90th percentile earning more under local bargaining.

6. Conclusion

This article expands the literature on the impact of collective bargaining agreements on income inequality, by focusing on wage inequality *within* firms – as opposed to *between* firms – in different institutional systems. We use matched employer–employee earnings data from the 2006, 2010, 2014 and 2018 waves of the SES for six European economies (Belgium, Czechia, France, Germany, Spain and the United Kingdom) to compare the wage inequality in firms that apply firm-level bargaining and those under more centralized levels – sectoral or national. We account for differences in workforce composition and mitigate the endogeneity of the selection of bargaining regime used by the firm.

Considering the key characteristics of the wage bargaining systems of the countries under study, over the two decades spanned by our data, we expected higher inequality under firm-level bargaining for Czechia and the United Kingdom, while our predictions for Belgium, France, Germany and Spain were more uncertain overall, owing to a non-trivial combination of country-specific and regime-specific factors. We also hypothesized that greater inequality under firm-level bargaining would widen further over the sample period, irrespective of the country, in line with the increasing emphasis on the benefits of devolving bargaining levels, although there were no major changes or reforms affecting wage bargaining over the period (except in France). Furthermore, we envisaged that the Great Recession and the ensuing financial and debt crises could play a role, pushing firms to make greater use of the flexibility allowed by firm-level agreements and resulting in greater inequality under firm-level bargaining, already in 2010 but especially in 2014 and 2018.

Our results only partially match these predictions. Our first and main finding is that there is no uniform pattern: firms bargaining locally can have similar, higher or lower within-firm wage inequality than those bargaining at more centralized levels. Moreover, these differences can change over time, even within the same country. Over the 2006–10 period, we find lower inequality for firms bargaining locally than for those under centralized bargaining only in the United Kingdom in 2006, while no difference emerges in the other countries. By 2010, it is only in Spain and France that we observe a divergence in inequality between firms under centralized bargaining and those under firm-level bargaining, the latter becoming more unequal. Then, in 2014, firm-level bargaining is associated with higher within-firm inequality not only in Spain and France but also in Germany, while in 2018 there is no difference between firm-level and centralized bargaining, except in Czechia.

The decomposition of wage premiums by deciles of within-firm wage distribution reveals additional heterogeneities. The higher inequality under firm-level bargaining observed in France and Spain in 2010 results from higher wages at the bottom of the distribution and lower wages at the top under centralized bargaining, which are either not reflected or are even reversed under firm-level bargaining, suggesting that firm-level negotiations were increasingly used to escape standardization of wages in these two countries. However, results for 2014 in those two countries indicate that the higher inequality under firm-level bargaining results solely from an associated reduction in the wages of low-paid workers

(in the bottom decile of firm wage premiums), without any differences in wages for the top decile. But other patterns are also possible: firm-level bargaining may be associated with higher pay at the bottom of the distribution, compared to centralized bargaining, as is the case of the 2006 results for the United Kingdom.

Interestingly, the variety of results does not map neatly onto the features of national bargaining systems, or onto the sharp distinctions made in the literature between bargaining regimes. Countries that share some institutional characteristics show different results, as in the case of Czechia and the United Kingdom in 2006, or Germany and Spain in 2010. Conversely, comparable estimates emerged for countries with otherwise different collective bargaining institutions and traditions, such as Belgium and Germany compared with Czechia and the United Kingdom in 2010, or across all countries but Czechia in 2018.

We also find no evidence of a common time trend indicating that firms bargaining locally grow more (or less) unequal over time. There are signals that there may have been greater recourse to firm-level bargaining in order to differentiate wages as a response to economic crisis around 2014, but this pattern does not appear in all countries and has essentially disappeared by 2018.

Ultimately, our findings provide an average picture of the dynamics between countervailing firm-specific drivers of the use of firm-level negotiations suggested in the literature – such as incentive motives, inertia and conflicts of power. They indicate that these dynamics vary across countries but do not systematically relate to a specific prevailing regime.

While our article has focused on the role of national systems, future research could investigate the impact on within-firm inequalities of firm-level bargaining across sectors, rather than countries. If international sectoral patterns mattered more than country-specific ones – as suggested by Bechter, Brandl and Meardi (2012) – we should envisage different uses of firm-level contracts in some sectors as opposed to others, across countries.

Overall, our study offers new evidence and methods to inform the renewed debate on the determinants of wage inequality. We have highlighted the importance of the locus of collective wage bargaining and shown that firm-level bargaining can act not only as a driver of wage inequality between firms, but also within them.

Competing interests

The authors declare that they have no competing interests.

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