

Firm-level pay agreements and within-firm wage inequalities: Evidence across Europe

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Abstract

This article investigates the relation linking single-employer bargaining – increasingly the norm in Europe – and within-firm wage dispersion – a significant driver of overall wage inequality. The study considers six European economies (Belgium, Spain, Germany, France, the Czech Republic and the UK), featuring different collective bargaining institutions, in 2006 and 2010. We examine two different measures of within-firm inequality, the interdecile wage-gap, and the wage gap between managers and low-layers employees, allowing to capture how different groups of employees may differently benefit from firm-level bargaining. Our findings show that firm-level bargaining has heterogeneous effects across countries, by inequality measures and over time. We interpret our evidence as supporting that country-specificities and the heterogeneous balance of power within organizations represent key elements to understand the role of bargaining systems in shaping inequalities.

Keywords: within-firm wage inequalities, occupational wage-gap, firm-level bargaining, matched employer-employee data

JEL classification: J31, J33, J51, J52

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1 Introduction

The notable ~~raise~~ of inequality observed since the Great Depression reopened the debate on the causes of this phenomenon among social scientists. Together with technological changes, globalization, financialization and changes in power relations among social groups, the evolution of wage-setting institutions is among the major candidates in explaining rising wage inequality (Cobb, 2016). In this article, we focus on the possible role played by devolution of bargaining levels – the progressive shift of the central locus of collective wage setting from more centralised levels (national or industry) to the level of single firms (Undy, 1978). This trend has affected wage bargaining systems – particularly in Europe – with the intended aim to provide more flexibility and a better match with the specific needs arising in the firms. The “corporatist” system of industrial relations (Wallerstein et al., 1997) that characterized most European countries in the second half of the 20th century, has progressively given way to an “hybrid” system (Braakmann and Brandl, 2016), where “multi-employer” collective bargaining conducted at centralised level still prevail, but “single-employer” collective agreements signed locally at the firm level are increasingly spread and allowed to derogate to specific provisions stipulated at centralised levels (Visser et al., 2013).

The increased role of firm-level collective agreements has been connected to two types of wage inequality. The vast majority of the studies focus on between-firm wage inequality, that is comparing the dispersion of wages among workers that are covered only by a centralised agreement against the dispersion observed among workers who also bargain at the firm-level, on top of centralised contracts (Dell’Arlinga and Lucifora, 1994; Hibbs and Locking, 1996; Palenzuela and Jimeno, 1996; Hartog et al., 2002; Rycx, 2003; Cardoso and Portugal, 2005; Checchi and Pagani, 2005; Plasman et al., 2007; Card and De La Rica, 2006; Dell’Arlinga and Pagani, 2007; Dahl et al., 2013; Daouli et al., 2013).

In this paper, we explore the effects of the level of collective bargaining on within-firm wage inequalities, comparing whether firms that apply firm-level bargaining exhibit more unequal wages than firms that only adopt centralised bargaining. That is, in line with approaches recognizing the key role of firms as a locus of inequality creation, we place our attention on whether firm-level bargaining is one of the ways through which employers shape inequality by deciding to ~~differently pay their different workers in different jobs~~. In fact, within-firm wage inequality is not less relevant than between-firm inequality, as it accounts for around half of overall wage dispersion in most economies (Lazear and Shaw, 2007; Fournier and Koske, 2013; ILO, 2016).

Theoretically, the links between the level of collective bargaining and within-firm wage inequalities can be framed within several approaches across different fields of research.

The labour economics literature offers a variety of competing frameworks that explain why wage setting at the workplace ~~as opposed to market wage setting~~ may be central in the creation of inequality. Tournament theory (Lazear and Rosen, 1979) predicts that firm-level bargaining

firms show a more unequal wage structure, due to performance-related pay or other differentials-in-compensation schemes being designed to elicit or reward workers' effort in the firm. Conversely, firms that bargain locally are expected to show lower wage dispersion in insider-outsider models "with unions" (Lindbeck and Snower, 1986, 2001), since unions are known to favor wage compression, as well as in theories of "fair wages" (Akerlof, 1984), suggesting that firms seek to avoid that too large pay differences, which may eventually end up detrimental to overall firm performance if perceived as "unfair". Other framework explaining wage determination on the basis of efficiency-wages, rent-sharing or differential compensations for unmeasured workers' ability – although more suited to explain between-firm inequalities – offer examples of other wage-setting practices that may affect within-firm wage dispersion, to the extent that they are used selectively by employers to reshape the ~~pay ladder~~ within firms. In fact, we would expect within-firm inequality to be higher in ~~firm-level bargaining firms~~ –as opposed to firms bargaining only at more centralised levels– every time contracts collectively bargained in the firm are used to ~~differently~~ compensate the contribution of different employees to the firms' objectives (Bayo-Moriones et al., 2013), ~~or~~ when firms want to ~~differently~~ remunerate human capital or particularly valuable firm-specific resources (according to the resource-based view of the firm), or to solve transaction costs and agency problems arising for different occupational groups (Eisenhardt, 1989; O'Shaughnessy, 1998). Yet, the actual implementation of such practices may also end up reducing within-firm inequalities ~~vis-a-vis~~ firms that only bargain at centralised levels, if these types of work-place collective agreements respond to redistributive, fair or egalitarian ~~purposes~~ (e.g. by workers or unions). Overall, many contrasting mechanisms may operate in different firms.

A major limitation of economic theories is that they are divorced from institutional contexts of countries, while cross-country differences in wage bargaining practices and their inter-temporal evolution represent key elements stressed in other literatures. Recent developments in organizational approaches to stratification, recognizing the central role of firms as drivers of wage-inequality, offer a broader perspective explaining how and why firms act on their internal wage structure. Three main driving forces coexist and shape stratification (Stainback et al., 2010). Inertia and the ~~balance of relative power~~ among groups represent the two key factors internal to the firm. Resistance to change favors reproduction of relative wages and positions of individuals within a firm, whereas the resolution of conflicts among groups within the firm may result into either ~~or~~ reducing or increasing inequalities within firms, both statically and over time. External to the firm, the institutions shaping the environment wherein firms operate constitute the third driving force of inequalities. Internal and external forces always coexist and constantly interact. Elaborating along these lines, Cobb (2016) provides an attempt towards a systematic theory for how firms contribute to shape inequality. The building blocks are at the intersection between environment-level characteristics – epitomized by the system of corporate governance prevailing in a country –, and their interactions with internal distribution of power (among firms' stakeholders). Our study speaks to this literature. Indeed, examining

the levels of collective wage bargaining allowed for by labour and industrial regulation in different countries and “chosen” by firms, and how such interactions impact upon internal wage structure, represents another interesting example to examine how institutional and environment characteristics interact to determine inequality outcomes. In particular, we draw from these approaches the notion that potential conflicts of power exist within firms and are critical to within-firm wage stratification. As we explain below, in fact, we use different measures of within-firm inequality that try to differently capture how different groups of employees (top vs. bottom paid, and managers vs. low-layers workers) may differently benefit from firm-level bargaining.

The empirical literature exploring the relation between within-firm wage inequalities and the level of collective bargaining, mostly by economists, is limited and based on fairly old data, dating back to the 1990s. Dell’Aringa and Lucifora (1994) find that within-firm wage dispersion does not differ between firms that only apply centralised bargaining and firms that also apply firm-level agreements, in a sample of Italian firms active in 1990. The result is confirmed in Dell’Aringa et al. (2004) for Italy, Spain, Belgium and Ireland on data covering the year 1995: enterprises covered by a single-employer agreement display greater *unconditional* within-establishment inequalities than multi-employer bargaining firms, but such differences become statistically insignificant once controlling for other factors and potential endogeneity of the choice to bargain at the firm level. Conversely, Canal Dominguez and Gutierrez (2004) find that firm-level bargaining reduces within-firm wage dispersion in Spain, on data again for the year 1995. Overall, these studies reflect the expectation that multiple contrasting mechanisms may be at work.¹

The present work contributes to this relatively underdeveloped empirical literature. We consider matched employer-employee data on six European countries – Belgium, Spain, France, Germany, the Czech Republic and the UK – available for the years 2006 and 2010, and exploit the variation in collective bargaining models in place at different firms in each country to shed light on three interrelated research questions.

Our first and central contribution is to examine to what extent, in the different countries and years spanned in the data, within-firm wage inequality differ across firms that apply firm-level bargaining on top of more centralised agreements as compared to firms that only apply centralised bargaining. We employ two different measures of within-firm wage dispersion: the inter-decile wage ratio (measured as the 90th-to-10th percentile wage-gap) is used to proxy the distance between the top vs. the bottom part of the internal wage structure, while we consider the pay-gap between managers and low-layers employees (manual workers and elementary occupations) to capture whether the effect of firm-level bargaining varies according to the occupation hierarchy within the firm. Although one can expect some degree of overlapping between the two measures, they do capture different aspects of wage inequalities within firms. The occupational wage-gap, in particular, more directly connects to whether firm-level bargaining works through the degree of power or control on firms’ decisions. In fact, there is a recent renewed

emphasis on the decline in wage premia of low-layers or low-skilled workers (Song et al. 2015) and the skyrocketing wages of professionals and managers (Piketty 2014; Mishel and Sabadish 2012). Whether the level of collective wage bargaining negotiations contributed to ~~this~~ trends has not been yet investigated.

As theories and previous evidence suggest, many counteracting effects are likely at work ~~at the same time~~, preventing to have a clear a-priori on whether firms which bargaining only at more centralised levels should be expected to be more or less unequal than firms that also bargain locally. Our analysis shall be informative about which forces prevail. Beyond estimating the effect of firm-level bargaining on the two measures of within-firm wage inequality, we also explore the effect of firm-level bargaining on the components of the two wage-gaps. This shall allow to uncover if an eventual statistically significant effect of firm-level bargaining on internal wage structures arises from favoring (or discriminating) certain categories of employees.

The second question we ask is whether the relations linking firm-level bargaining to within-firm inequality exhibit comparable patterns across countries. In line with theory, differences in environment and institutional frameworks are central to establish in which direction within-firm inequalities may evolve. As we detail below in Section 2 presenting the main features of collective bargaining models in the selected countries, the ~~margins to maneuver~~ warranted by firm-level collective agreements ~~vis-a-vis~~ more centralised wage bargaining significantly vary across ~~the national contexts~~, depending on the legal and institutional framework of the country where each firm operates its industrial relations. Accordingly, it would be difficult to predict that we shall observe exactly the same effect of firm-level bargaining in all countries. However, despite country-level specificities, some of the countries selected in our study can be classified as sharing similar wage bargaining regimes (Fulton, 2013), in turn mapping into a sort of “narrow” version of a Varieties of Capitalism framework, associating countries where firm-level bargaining is historically and still nowadays more relevant and spread (the UK and the Czech Republic) to a market-oriented model of capitalism, while putting under the common heading of coordinated market economies those countries where centralised forms of bargaining are historically and still nowadays prevailing (Germany, France, Belgium and Spain).² In this respect, our analysis shall provide a test for whether such a-priori ~~taxonomizations~~ are supported in the data, or it would otherwise suggest a different taxonomy, depending on which countries turn out to exhibit comparable patterns in the way firm-level bargaining shapes within-firm wage gaps.

Lastly, our third goal is to explore whether the (country-specific or regime-specific) relations linking firm-level bargaining to (our two measures of) within-firm inequality change over time, in between the two years covered in our data (2006 and 2010). In the regulatory framework of all countries we study, the legal provision to stipulate firm-level collective agreements was already established before the time span under analysis, but the years under study are those when the major reforms introduced in late 1990s and beginning of 2000s likely deployed their consequences. Also, the pressure toward assigning more relevance and wider scope to firm-level negotiations increased over time, as part of the broader tendency toward ~~increasing flexibiliza-~~

tion and de-unionization of labour relations. Our intuition is that, along this processes, an increasingly more marked use of firm-level agreements to differentiate salaries established over the years spanned in the data, thereby fueling the potential inequality-enhancing role of firm-level bargaining. As a result, the likelihood to observe that firm-level bargaining firms show more unequal wage structures than firms only bargaining at more centralised levels, should increase over time. This may be particularly the case in countries closer to coordinated-market regimes, where the structure of industrial relations at more centralised (national or industry) levels remains comparatively more rigid and more complex to manage. Whether this is the case may be particularly interesting to assess also considering that the Great Depression hit in between the two years available to us. Although we do not claim to identify any causal effect related to the global crisis, our results contribute to the discussion whether firm-level agreements have been a factor of amplification of inequalities in such a turbulent period.

The article is organised as follows. In Section 2 we describe the key features of the wage-bargaining systems in the selected countries and provide some hypotheses about the role of firm-level bargaining in the different national contexts. In Section 3 we introduce the data and provide details on the definition of the main variables we use in the empirical analysis. The empirical models and the estimation strategy are next described in Section 4, while the estimation results are presented in Section 5. We discuss interpretations of results in the concluding Section 6.

2 Firm-level wage bargaining across selected countries

The countries for which data available for this study – Belgium, the Czech Republic, Germany, Spain, France and the United Kingdom – provide a good representation of the heterogeneity of the bargaining regimes in Europe. We here present a brief description of the main characteristics of collective bargaining systems featuring the various countries.³ This allows to sketch country-specific hypotheses about whether we can expect differences in within-firm wage inequality between firms that negotiate their wages only at more centralised levels, and firms that choose to also apply firm-level collective agreements. Then, at the end of the section, we reflect on similarities and heterogeneities across countries and over time.

In Belgium, collective wage bargaining is highly structured with a central level at the top covering the entire private sector, an industry level covering specific industries, and company level negotiations at the bottom. Wage bargaining takes place predominantly at the national, cross-industry level. Notwithstanding two reforms occurred during the period under analysis (as reported in the *Labour Market Reforms-LABREF* database maintained by the European Commission⁴), the percentage of employees covered by collective bargaining has remained steady at 96% over the period 2006–2010 (source: ILOstat database⁵). According to the data from the *European Company Survey-ECS* (run by the Eurofound Industrial Relations Observatory),

in 2009 66.08% of companies apply a collective agreement which has been negotiated at a higher level than the establishment or the company, while 88.2% of companies applying national, inter-sectoral or sectoral collective bargaining declare it was not possible for them to derogate from these agreements. Elements of pay and work conditions – including national minimum wage, job creation measures, training and childcare provision - are set in binding national agreements, while industry and company bargaining mostly address non-pay issues, not affected by the ceiling imposed by the central agreement (Visser et al., 2013). Opening clauses – which can allow companies to deviate from centralised agreements – are present since 1982, but firm-level negotiations generally only agree on improvements upon what is settled at higher levels. The room for pay bargaining at the enterprise level is also limited due to indexation of wages in national agreements. As a result, we do not expect firm-level bargaining to play a major role in this country. The scope for local contracting to affect internal wage structures is limited, with no major changes over time.

Spain and Germany present bargaining systems where wages are predominantly set at the sector or industry level. The percentage of employees covered by enterprise-level agreements amounts to less than 9% in both countries in 2006 and such percentage does not significantly change in 2010 (source: the *Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts*-ICTWSS database).

In Germany, wages are bargained mostly at the industry level between individual trade unions and employers' organisations, although the agreements allow for flexibility at the company level. Collective agreements regulate a wide range of issues such as pay, shift-work payments, pay structures, working time, treatment of part-timers and training. Work councils play a central role because they can reach agreements with individual employers on issues not covered by collective agreements, or negotiate improvements on pay-related and other issues already covered by collective agreements, under the favourability principle. Opening clauses are present since 1993, and they were mostly used to increase wages, as a monetary compensation bargained by unions in exchange of more flexibility in covered firms (Brändle and Heinbach, 2013). During the period considered in our analysis, some reforms were implemented in the field of wage setting policies, such as the introduction of binding minimum wages in several sectors (LABREF data). However, the large prevalence of the higher bargaining levels remains quite stable over time. According to the ECS data, in 2009, the share of companies covered by forms of collective agreement higher than firm-level bargaining was as high as 66.92%, and the possibility to derogate from these higher level agreements was open to only a modest 17% of the surveyed companies. Given these features and the central role of workers/unions in the work councils, typically pushing toward wage standardization, we could conjecture that firm-level agreements signed on top of more centralised bargaining are in this country especially likely to pursue egalitarian purposes, thus aiming at compressing wage dispersion within firms. However, there is also evidence that the use of opening clauses produced significant wage worsening. Ellguth et al. (2012) estimate that, on average, firms pay via these clauses a 7% higher

wage than otherwise, but their use can lead to a wage reduction up to 9 %. This suggests that there may be room for firm-level bargaining firms to display more unequal pay structures than other firms.

In Spain, the majority of firms (66.09% in 2009 according to the ECS dataset) report to negotiate their wages outside the firm, and the structure of wage bargaining system shows a predominant role of industry-level much like in Germany. But there are features that are quite peculiar to this country. A first specific characteristic rests in the complex coexistence and interaction of negotiations at national and province-level, within industries. On top of this, firms adopting firm-level collective bargaining in Spain traditionally feature a higher presence of unions than multi-employer bargaining firms (Plasman et al., 2007), suggesting that in this country the union's pressure to compress wage inequalities may be particularly strong in firm-level bargaining firms. However, opening clauses are present since 2001, and a significant labour market reform in September 2010 enlarged the scope of such derogations (source: LABREF database), allowing firm-level agreements to be more able to at least potentially be used to increase inequality by lowering salary levels and/or the amount of working time of some groups of workers, compared to firms following centralised bargaining practices.

The Czech Republic and the United Kingdom represent two instances of countries where collective agreements prevalently takes place at the local – firm or establishment – level.

The UK is a paradigmatic case of the Anglo-Saxon tradition of industrial relations, where wage bargaining is mostly un-coordinated, with most workers bargaining work contracts individually with employers. In fact, only about a third of all employees (33.3% in 2006 and 30% in 2010, according to ILOstat) is covered by some form of collective bargaining. When a collective agreement occurs, the majority of them are signed at the firm-level (53.4% of companies in 2009, according to the ECS), but such agreements do not establish legally binding norms and, as a rule, they contain no contractual obligations such as opening clauses, they are not subject to legal regulation, and pay rates cannot be claimed in court (Visser et al., 2013). Also, collective agreements are very rare in the private sector, while in the public sector workers' coverage is more comparable to other countries (Fulton, 2013). This warrants public servants some more protection, although in May 2010 an emergency budget was approved freezing wages for high earners in the public sector for a two-year period as a temporary measure to face the 2008 global crisis (see LABREF data). Altogether, these features make the UK a peculiar case in view of our aim at comparing inequalities across firms that only apply centralised bargaining vis a vis firms that also adopt firm-level bargaining. Considering the traditionally high flexibility in the use and content of heterogeneous pay schemes at firm-level in this country, we conjecture that within-firm pay structures are particularly more unequal in firm-level bargaining firms than centralised-bargaining firms in this national context.

The Czech Republic well represents the tendency, spread across Eastern Europe countries to embrace decentralised, market-oriented institutional settings in the post Soviet Union era. In fact, uncoordinated wage setting directly occurring between individuals firms and individuals

are quite spread, although less than in the UK. The employees covered by collective wage bargaining are 50.8% in 2006 and 50.1% in 2010, according to ILOstat data. When collective agreements are reached, they occur at firm level: more than 80% of companies in Eurofound-ECS dataset declare to have conducted negotiations of wages at the firm or the establishment level. There exist a legal provision of the favourability principle, since collective bargaining regulations exclude opening clauses and derogations that set less favourable terms than those provided in agreements stipulated at higher levels. However, collective agreements signed at the industry level last for at least two years, while those signed at company level run for one year, thus allowing for a certain degree of flexibility in reshaping the wage ladder in the enterprise. These features suggest that in the Czech Republic, similarly to the UK, there is more room than in other countries for firm-level bargaining to result into more unequal within-firm pay structures.

The last country that we analyse, France, represents an outlying case, due to its complexity, since all the levels of collective negotiations – intersectoral, industry or company – are closely intertwined and, in turn, they occur at both national or local level (Fulton, 2013, 2015). Industry level bargaining is the most important in terms of numbers of employees covered (97.3% in 2006 and 98% in 2010 according to ILOstat data). More than 50% of companies declare to apply centralised bargaining in 2009 (see ECS data), but the vast majority apply a combination of different levels. The inversion of the favourability principle was introduced in 2004, recognizing to firm-level agreements the possibility to derogate from any condition settled at more centralised levels, if not explicitly prohibited (Keune, 2011). This mostly concerned working time, however, and few firms exploited the opportunity to act on pay structures. All in all, the combination of elements pushing to increase flexibility in the firm, with the enduring and complex role of centralised bargaining levels, makes particularly difficult to provide predictions.

Beyond providing some intuitions on the different effect that firm-level bargaining may exert on within firm inequality, the basic elements characterizing different bargaining systems suggest further considerations noteworthy for the interpretation of the empirical analysis.

A first qualification pertains the implications of country specificities for the intertemporal changes we could expect to observe in the estimated effect of firm-level bargaining. As argued in the introduction, we hypothesize that firm-level bargaining is likely to have gained an increasing role, and thus its potentially inequality-enhancing effects to become more likely to manifest over time in all countries. Yet, as the discussion of bargaining systems here above shows, major reforms did not take place in the period under study. In fact, firm-level bargaining was already legally established in all countries well before the initial year of our analysis. In this respect, any intertemporal change that we shall uncover in the relation between firm-level bargaining and within-firm wage inequalities should be taken as mirroring changes in the use of firm-level agreements, and not as a test of what happens when firms in a country are given the opportunity to move from a fully centralised system to fully decentralised wage bargaining.

An additional issue, important for subsequent interpretation our empirical analysis, regards the relative balance between the similarities and the heterogeneities observed comparing wage-bargaining systems. From the discussion here above, clearcut differences emerge in terms of bargaining coverage, structures and mechanisms of coordination: national, sectoral and company bargaining do not operate equally in all countries, and the relative diffusion, scope and content of firm-level collective bargaining are highly heterogeneous. Our choice to perform separate analysis by country exactly accomplishes the need to recognize that the choice of a firm to negotiate at firm level on top of more centralised levels has different meaning in different countries.

However, complementary to the focus on heterogeneities, one could also argue that interesting hypotheses may be derived from considering that different sets of countries do share broad common tendencies. In particular, countries can be grouped based on the prevailing locus where collective bargaining occurs, with Belgium being a paradigmatic example of the “inter-industry/national regime”, the UK and the Czech Republic representing instances of an opposite “individual-employer model”, Spain and Germany falling into the intermediate “sectoral model”, and France somehow outlying due the specifically complex interaction across all levels (Fulton, 2013). Different hypotheses can developed about the role of firm-level bargaining in shaping within-firm inequalities in these different regimes or models. On the one hand, it may be argued that where more centralised or complex models prevail, there is stronger resistance (by the laws or due to workers’ action) to allow for firm-level contracts to introduce inequalities in the firm internal wage structure. This would lead firms bargaining locally to be characterised by an only mildly higher inequality – if at all present – as compared to firms that bargain at higher levels in countries like Belgium or France, and to a less extent also in Spain and Germany. However, it may also be the case that firm-level bargaining is used more markedly by firms to differentiate their pay structures to escape the rigidities, complexities of negotiations and the greater pressures toward wage standardization that exactly characterize the more centralised regimes. Eventually, the process of progressive decentralization of wage-setting was justified precisely to allow firms more freedom to shape internal incentives as compared to the limited margins of maneuver allowed for by corporatist industrial relations. If this second tendency prevails, we could expect firm-level bargaining firms to display larger within-firm inequalities than other firms also in countries like Spain, Germany, France or Belgium. As mentioned in the introduction, this grouping by prevailing level of bargaining eventually end up evoking a Varieties of Capitalism type of reasoning. The prediction would be that firm-level bargaining is more likely to increase inequality in market-oriented, flexibility-friendly countries like the UK and the Czech Republic, than in the other countries we study, where a coordinated-market type of capitalism is reflected in their more centralised bargaining systems.

3 Data and main variables

The ~~SES~~ dataset collected by Eurostat is a well-known source of information for labour dynamics across Europe. It collects a rich number of earnings-related, personal and jobs-related variables for a vast set of workers, matched with information on some characteristics of the employing firms. For this study, we had access to the 2006 and 2010 waves of the SES for Belgium, Germany, Spain, France, the Czech Republic and the United Kingdom. We pool the two waves of the survey in the empirical analysis, but the pooled data must be intended as a repeated cross-section, since the SES does not report any identification code that can be used to match the same firm or the same employee over time.

The structure of the SES survey is such that, for each country, a random sample of firms (stratified by size, sector of activity and geographical location) is selected to be representative of the national industrial system. Then, within each selected firm, a representative sample of employees is drawn, and for those employees a large set of personal and job-related characteristics is provided, including age, gender, education, wages, type of contract, tenure, occupation type (according to the 2008 International Standard Classification of Occupations, ISCO), and others. As such, the SES data can be seen as a matched employer-employee dataset, representing a unique source for a consistent comparison across European economies, indeed repeatedly used in previous studies. Of course, the dataset has its own limitations. First, while the surveying procedure provides information on an impressive number of workers across Europe (about 10 million per survey year), for the firms that enter the data the sampling rate of employees varies by firm size and by country, ~~thus limiting the information available in some countries~~. Second, the sample of business units considered in the survey is restricted to those with at least 10 employees, which limits the analysis as far as micro firms are concerned. Third, the data are very rich concerning employees' personal and work-related characteristics, but the information on firms is limited to five variables: size class, geographical location, sector of activity, public vs. private control and – crucial for our purposes – the level of wage bargaining adopted in the firm.

The outcome variables of interest are two measures of *within-firm* wage inequalities. For each firm j , we first consider the ratio between the 90th and 10th percentile of the wages paid to the employees of firm j

$$\Delta w_j^{90/10} = \frac{w_j^{90}}{w_j^{10}} \quad (1)$$

yielding a characterization of the wage distribution between top and bottom ~~earnings~~ within the firm. This is in line with previous empirical studies, which in fact discuss a purely statistical characterization of within-firm dispersion of wages.

Second, and departing from the literature, we provide an occupation-related characterization of inequalities, considering the ratio between the average wages of managers and of workers

employed in low-layers occupations

$$\Delta w_j^{\text{jobs}} = \frac{\mathbb{E}(w_j^{\text{Managers}})}{\mathbb{E}(w_j^{\text{Low}})} . \quad (2)$$

Information about the employees' occupation is reported in the SES data according to the ISCO categories, at 1-digit level. We take employees with ISCO code 1 ("managers") to define ~~apical~~ managerial positions, while low-layers workers include employees with ISCO code 8 ("plant and machine operators, and assemblers") or 9 ("elementary occupations").

The two measures of inequality may correlate to some extent, but they ~~allow to uncover potentially different uses made of the firm-specific flexibility allowed for by firm-level agreements.~~ The first measure relates to the more standard question whether company-level agreements are used selectively across employees differently positioned in the within-firm wage distribution. The occupational wage-gap, instead, allows us to ask whether firm-level negotiations favor or reduce inter-occupational wage differences in relation to the hierarchical jobs structure within the enterprise.

Following an established practice in the literature on within-firm wage inequalities (at least since Winter-Ebmer and Zweimüller, 1999), in order to compute the two measures of wage inequality we start from adjusted residual wages. That is, the wages w that enter the two definitions above are the residuals from an augmented Mincerian wage-regression

$$\log(\hat{w}_{ij}) = b_0 + b_1 \mathbf{Z}_i + b_2 \text{Firm}_j + \varepsilon_{ij} \quad (3)$$

where the (log-)wage reported in the data for employee i of firm j , \hat{w}_{ij} , is regressed against a standard set of individual characteristics \mathbf{Z}_i (age, tenure and tenure squared, gender, education, contract duration, part-time status, share of full-timer's hours, and occupation at 1-digit ISCO), plus firm fixed-effects Firm_j . Separate preliminary regressions are estimated by year (2006 and 2010) and sector (one digit NACE), within each selected country.

As our measure of observed wages, we use hourly wages. In SES, these ~~are~~ recorded as the compensation actually paid to the workers, without distinguishing between the wage components that are set through firm-level bargaining from the components agreed upon at more centralised levels. In particular, as it is often the case in the literature, we do not have information on un-bargained wage drifts. ~~That is, of pay components unilaterally recognised by firms to some selected employees (or group of employees) on~~ top of the wage set in a collective agreement, outside collective bargaining, whatever the level of collective bargaining adopted by the enterprise. Cardoso and Portugal (2005) find for Portugal that such unilateral components increase wage inequalities within firms, although the theoretical possibility remains open that wage drifts – much in line with the mechanisms that may lie behind firm-level collective bargaining – operate to re-equilibrating the internal pay structure, for instance for fairness reasons. Also, although unilateral wage drifts may affect in principle all types of firms, they are expected

to be stronger and more frequent in firms that only bargain at national or industry level (e.g. when allowed for via opening clauses), as a way to gain flexibility and adjust the internal wage structure vis-à-vis the centralised agreements, but without going through a process of firm-level bargaining (Dell’Aringa and Pagani, 2007). If this is the case, then we expect such wage drifts to increase within-firm inequalities less in firms that bargain locally.

The construction of within-firm inequality measures – as well as the estimation of residual wages – require by definition that a minimum number of employees per firm are present in the sample. In particular, the professional wage-gap in Equation 2 implies that at least one manager and one lower-layer employee are sampled from the same firm. After careful consideration of alternative restrictions to the data, and sensitivity analysis about robustness of main results, we define our working sample as including only firms with at least three sampled employees.

~~As our main explanatory variable, according to our goal to estimate the incremental effect of firm-level collective agreements on top of centralised collective negotiations, we build a dummy that distinguishes firms that only adopt centralised bargaining vs. firms that also apply firm-level bargaining.~~ The variable in SES recording the type of wage bargaining in place at each firm, exactly reflects the incremental use made of the different levels. It distinguishes firms that do not apply any form of collective bargaining, and then split those that do into two groups: firms that only negotiate at more centralised levels and firms that also apply firm-level bargaining on top of higher level negotiations. Accordingly, we created a dummy variable FLB taking value 1 for the latter group, and zero for the former. More precisely, firms defined as negotiating only at centralised, multi-employer levels ($FLB = 0$) apply wage agreements classified by Eurostat as “national level or inter-confederal agreement”, “industry agreement”, or “agreement for individual industries in individual regions”. Firms which we define as engaging in firm-level bargaining ($FLB = 1$) also subscribe agreements classified as “enterprise or single employer agreements” or “agreements applying only to workers in the local unit”, on top of one or more of the above centralised contracts.

Table 1 shows the number and percentage shares of employees and firms falling in different categories of bargaining in our working sample, by country and by year, also providing information on firms which do not apply any form of collective bargaining, (*i.e.*, contract wages separately with each single employee). In line with discussion of country-specific bargaining regimes, the percentage of firms ~~and/or~~ employees covered only by more centralised levels of bargaining is generally higher in all other countries as compared to UK and Czech Republic, whereas in these two latter cases “no-collective bargaining at all” prevail.

Table 2 shows a basic difference-in-means test obtained by running a simple OLS regression of the two measures of (residual) wage inequality $\Delta w^{90/10}$ and Δw^{jobs} against the FLB dummy and a constant term. Considering the percentile wage-dispersion $\Delta w^{90/10}$, firms that adopt firm-level bargaining present, on average, higher inequality in Belgium and Spain, while lower dispersion in France, the United Kingdom, and the Czech Republic (except in 2010). In Germany, instead, the average $\Delta w^{90/10}$ do not differ statistically between the two groups of

firms, in both 2006 and 2010. In terms of the professional wage-gap Δw^{jobs} , the more common pattern seems to be that firms ~~under firm-level bargaining~~ display lower inequalities than other firms, although we observe insignificant coefficients on the FLB dummy in some country-year combination, and a positive coefficient for the Czech Republic in 2010. This exercise just provides a first descriptive assessment of the unconditional relation linking firm-level bargaining and wage inequalities. In the next session, we present the empirical framework that we design in order to obtain more reliable estimates, controlling for additional observables that may drive the differences in wage inequalities and for potential endogenous selection of the FLB dummy.

4 Empirical models and estimation strategy

To identify the effect of firm-level bargaining across countries and over time, we pool the observations available for each country over the years $t=2006$ and $t=2010$, and specify the following baseline regression model

$$\Delta w_{jt}^d = \alpha + \beta_1 \text{FLB}_{jt} + \beta_2 Y_{2010} + \beta_3 Y_{2010} \times \text{FLB}_{jt} + \gamma \mathbf{X}_{jt} + \epsilon_{jt} . \quad (4)$$

The dependent variable Δw_j^d is, alternatively, one of the two measures of (residual) wage inequality $\Delta w^{90/10}$ or Δw^{jobs} , computed as explained above for each firm j present in each survey year t (2006 or 2010). The set \mathbf{X}_{jt} include control variables (discussed further below), while the main regressor is the dummy FLB indicating if firm j applies firm-level collective bargaining or not in the year t , which we include both as a stand-alone variable and interacted with the dummy Y_{2010} set to 1 for the year 2010, accounting for possible time-varying effects of firm-level collective bargaining over the two survey years. That is, conditional on the control variables included in the set \mathbf{X}_{jt} , the coefficient β_1 accounts for the difference in wage inequalities ~~across firms that apply vs. firms that do not apply firm-level collective bargaining in 2006~~. The interaction coefficient β_3 captures whether the effect of collectively bargaining at the firm level in 2010 changes as compared to 2006.

As a further contribution, we provide a dissection of the effects of firm-level bargaining on the wages of the groups of employees that we implicitly compare in (numerator and denominator of) the wage-gaps $\Delta w^{90/10}$ and Δw^{jobs} . We estimate the following variation of the model in Equation (4)

$$w_{jt}^d = \alpha + \beta_1 \text{FLB}_{jt} + \beta_2 Y_{2010} + \beta_3 Y_{2010} \times \text{FLB}_{jt} + \gamma \mathbf{X}_{jt} + \epsilon_{jt} , \quad (5)$$

where as dependent variable w_{jt}^d we employ, alternatively, the 90th or the 10th percentile of the within-firm distribution of (residual) log-wages, or take the average (residual) log-wages of managers and of low-layers employees. As in Equation (4), the identification works across firms with different wage-bargaining. Thus, the estimates of the coefficient β_1 on the FLB dummy gives the difference in outcomes across firm-level bargaining vs. other firms in 2006, whereas

the coefficient β_3 on the interaction term $FLB \times Y_{2010}$ accounts for changes in the FLB effect over time. Notice that these separate regressions on the components of the two wage-gaps $\Delta w^{90/10}$ and Δw^{jobs} do not correspond to an exact split of the overall effects estimated from Equation (4) regressions. Nonetheless, the results are revealing of the underlying driving forces, telling which group of employees gains or loses from firm-level collective bargaining. Quite obviously, it makes an important difference if, for instance, an hypothetical increase in $\Delta w^{90/10}$ comes from firm-level bargaining firms paying their top paid employees more than the other firms, as opposed to a situation where firm-level bargaining increases inequality by lowering the wages at the bottom quantiles. In the two cases, the diverging interests between different groups of employees within the firm are clearly solved in opposite ways. Similarly, were firm-level bargaining found to have any effect on the professional wage-gap Δw^{jobs} , then it would be relevant to understand who benefits or loses between managers and low-layers workers.

A common empirical strategy is followed in estimating the regression models in Equations 4 and 5.

First, as mentioned, all the models are estimated separately country by country. Pooling the data across the six countries could have allowed to control for country fixed-effects, but that would have been a dangerous strategy to follow, given the considerable differences in wage bargaining systems. In particular, while the definition of firm-level bargaining firms (FLB dummy =1) is homogeneous in SES across all countries, there is great variation across countries about what type of bargaining level is more likely to prevail in the control group of firms that do not apply firm-level bargaining ($FLB=0$). We avoid any assumption of homogeneity across national institutional settings, by allowing coefficient estimates to vary by country.

Second, we include the same set of controls \mathbf{X}_{jt} in both regression 4 and 5, accounting for a number of other determinants of wage inequalities, beyond firm-level bargaining. Building on previous literature, wage dispersion within firms depends on firm characteristics as well as on personal and occupational characteristics of the workforce. The SES data allow to control for a variety of these confounding factors suggested by previous studies. As far as firm attributes are concerned, in SES we have information on firm size (as size-class by number of employees), and a dummy for private vs. public control on the firm. In general, the expectation is that within-firm wage dispersion is lower in large and publicly owned firms, as the unions tend to be more powerful in these contexts (Canal Dominguez and Gutierrez, 2004). Moreover, thanks to information on sector of main activity and geographical location of each firm, we can also control for the well-known variation of both wages and incidence of bargaining level across sectors and regions, via a full set of sector (reported in SES at 1-digit NACE) and regional (reported at NUTS-1 level) fixed-effects.

Concerning personal characteristics of the workforce, previous studies stress the relevance of gender, age, education, and experience. We capture all these features, by including in the empirical model the share of women employed in the firm, the share of employees with secondary or tertiary education, the mean tenure of workers in the firm, and a set of dummies

for modal age of the workforce. Usually, wage dispersion is expected to rise with age, tenure and education, because wages tend to increase in all these characteristics, and dispersion is usually higher in firms where average wages are higher (Canal Dominguez and Gutierrez, 2004). As for gender, the well-documented existence of wage-gaps favourable to males would suggest that larger inequalities are to be expected in firms where the proportion of females is lower.

The type of jobs and contracts present in the firm are also known to play a role. Unions' efforts to push for equalization of wages among their affiliates is usually identified as the channel through which within-firm wage differences are influenced by factors like having a permanent vs. a fixed-term contracts, a full-time vs. a part-time job, or the relative weight of blue-collar vs. more professionalised occupations in the firm. Since full-time, permanent, blue-collar workers are generally more likely to unionize, dispersion is expected to be lower in firms with a larger proportion of these job and contract types (Canal Dominguez and Gutierrez, 2004). We control for these factors by including, for each firm, the share of managers and professionals (according to 1-digit ISCO codes 1 and 2), the share of part-time employees and the share of employees with a permanent contract.

Notice, however, that the correlations between the workforce characteristics and the measures of within-firm inequality may be complicated by unobservable compositional effects. In fact, employees with different characteristics may fall more or less frequently into the wage groups that we compare (percentile or occupation-related wages). For instance, notwithstanding the gender pay-gap, a firm with a 100% share of males can be more equal than a firm with a single female employee, to the extent that all the males employees earn the same wage (or quite similar wages) in the former firm. An equal reasoning may replicate for the other controls measuring features like age, tenure, job and contract types, and so on, in turn suggesting predictions in contrast with findings in the literature.⁶

Finally, and perhaps most important, in estimating both regression 4 and 5, we address the potential endogeneity of the FLB dummy, due to non-random endogenous selection of firms between FLB and "non-FLB" status. Indeed, despite we (i) control for employer-specific components of wages and firm-level average wages through the preliminary Mincerian regression, and (ii) include a rich set of covariates, still there might be unobserved determinants of the decision to apply firm-level collective agreements that correlate with unobserved determinants of the dependent variables of interest in each regression equation.

In order to tackle this source of bias, we follow a solution commonly adopted in the empirics of within-firm wage inequality (Card and De La Rica, 2006; Daouli et al., 2013). That is, we augment the model with a preliminary estimate of the probability (propensity score) that a given firm adopts firm-level collective bargaining. This is obtained from a first step Probit

$$FLB_j = P(\alpha_0 + \alpha_1 \mathbf{V}_j) \quad (6)$$

where FLB_j is the dummy for the *observed* presence of firm-level bargaining in firm j , P is the

Probit link function, and \mathbf{V} a set of covariates that affect the choice to bargain at firm-level. Separate first-step Probit regressions are estimated country by country, and the corresponding predicted probabilities $\widehat{\text{FLB}}_j = P(\hat{\alpha}_0 + \hat{\alpha}_1 \mathbf{V}_j)$ obtained for each firm are then included as an additional control variable in a second-step estimation of the main regression models in Equations 4 and 5.

The overall idea is that if FLB status is as good as randomly assigned conditional on observed controls, then conditioning also upon the propensity scores allows to clean any further bias due to unobserved firm characteristics, and, thus, a simple OLS on the second step will return correct estimates of the FLB dummy coefficient. The predictors \mathbf{V} are for the most part the same as the controls appearing in the set \mathbf{X} in the main equations. However, to ease identification, we exclude average tenure of the workforce, as it is sensible to assume that tenure affects wages and wage inequalities, but it does not directly impact the decision to adopt FLB. Also notice that, in place of sector and regional fixed-effects included in the set \mathbf{X} (likely subject to incidental parameter problems in Probit estimates), the set of covariates \mathbf{V} includes the GDP per capita (at purchasing power parity, base year 2006) and the unemployment rate in the region where each firm is located, thus controlling for macroeconomic-and-regional dynamics that may play a direct influence on the decision to apply firm-level bargaining.⁷

5 Results

5.1 Firm-level bargaining and the 90th-to-10th percentile wage-gap

Table 3 shows the estimates of the specification of Equation 4 where we take the 90th-to-10th percentile wage-gap $\Delta w^{90/10}$ as the dependent variable. In general, they suggest that firm-level bargaining has heterogeneous effects on wage dispersion, both across countries and over time. In 2006 (cf. the coefficients on the FLB dummy) we do not observe statistically significant differences between firms that adopt firm-level bargaining as compared to other firms in any country but the UK, where firm-level bargaining firms are less unequal.

The initial picture observed for 2006 does not change in 2010 in four countries (Belgium, Germany, the Czech Republic and the UK, cf. the insignificant interaction coefficients). Conversely, we detect a common inter-temporal pattern in France and Spain, whereby the distribution of wages becomes more unequal over time in firm-level bargaining firms (positive estimated interaction coefficients).

The estimates also reveal heterogeneities concerning the correlation of controls and wage inequality within-firms. Starting with workforce characteristics, the modal age of employees in the firm has largely an insignificant association with wage inequality in Belgium, Germany, Spain and France, while the relation with the $\Delta w^{90/10}$ wage-gap is stronger (positive) in the Czech Republic and the UK. If anything has to be noticed, a common result across all countries is that wage inequality is larger within firms with the most senior workforce (60+ years old).

The share of women in the workforce, the average on-the-job tenure of employees and the share of permanent contracts show a negative association with within-firm wage dispersion in most countries, while educational levels, the share of part-time employees and the share of higher professional occupations tend to display a positive association (when significant) with within-firm wage dispersion. Further, moving to firm-level characteristics, we find that wage dispersion increases with firm size in Germany, Spain and France, but larger firms display lower wage dispersion than the baseline in the UK. Publicly-controlled firms feature lower wage dispersion compared to private firms in Belgium, the Czech Republic and France. Notice also that the significant coefficient on the propensity score $\widehat{\text{FLB}}_j$ confirms the need to correct for endogeneity of the FLB dummy in most countries. The same holds throughout all the estimates of this article, although we do not stress it in the following.

Next, we dissect the separate effect of firm-level bargaining on the 90th and the 10th percentile of the within-firm distribution of wages. Table 4 reports the estimates of the corresponding specifications of Equation 5.

We highlight three main patterns. First, consider the three countries (Belgium, Czech Republic and Germany) where firm-level bargaining did not have any significant effect in the analysis of $\Delta w^{90/10}$ shown above in Table 3. In Belgium and the Czech Republic, the analysis by percentiles confirms that firm-level bargaining does not have any statistically significant effect. In Germany, conversely, firm-level bargaining firms feature both a lower 90th percentile and a lower 10th percentile than other firms in 2006 (cf. the coefficient on FLB dummy), and these differences do not change over time (insignificant interaction coefficients). The magnitudes of the FLB effect on the two percentiles are comparable, hinting at why we do not see, in Table 3, an overall statistically significant difference in the $\Delta w^{90/10}$ wage-gap between FLB and other firms. Yet, the underlying dynamics seem to be that the adoption of firm-level agreements in Germany reduces wages at both the top and the bottom extreme of the within-firm wage distribution.

Second, the analysis by percentiles suggests that the equality-enhancing effect of firm-level collective bargaining on $\Delta w^{90/10}$ observed in Table 3 for the UK mainly works through FLB practices favouring low-paid workers. Indeed, we find that in the UK firm-level bargaining firms show an higher 10th percentile wage than other firms in both 2006 and 2010.

Third, and finally, the results also add to the understanding of the ~~over-time~~ increasingly detrimental effect of firm-level bargaining detected in Table 3 for Spain and France. In both countries, indeed, we observe a clear divergence in the patterns of top-paid and low-paid employees: over time, the employees in the 90th percentile are paid significantly more in firm-level bargaining firms than in other firms, whereas the opposite holds for employees in the 10th of within-firm wage distribution. In Spain, in particular, the 10th percentile wages in firms adopting firm-level agreements are lower than 10th percentile wages paid by other firms already in 2006.

Results on the controls are rather consistent across countries, although with some variation

in the significance levels. Modal age tends to positively correlate with the 90th percentile and negatively with the 10th percentile. A higher proportion of women in the workforce associates with lower wages at the 90th percentile, but with higher wages at the 10th percentile. A similar pattern is also detected for mean in-job tenure (with the exception of Spain) and for the share of workers covered by permanent contracts. Conversely, the share of educated workforce associates with higher wages at the 90th percentile and lower wages at the 10th percentile, and exactly the same pattern is detected for the proportion of apical professions in the firm and for the share of part-time workers (not in Belgium). Next, concerning firm characteristics, we find that larger firms show higher wages at the 90th percentile, but lower wages at the 10th percentile (not in the UK), whereas publicly-owned firms tend to pay more than private firms their workers at the 10th percentile and to pay less their workers at the 90th percentile.

5.2 Firm-level bargaining and inequalities between managers and low-layers workers

We then present the findings concerning whether firm-level bargaining affects wage inequality across occupations.

Table 5 reports the estimates of Equation 4, taking the within-firm professional wage-gap Δw^{jobs} as the dependent variable. In close similarity with the analysis of the the 90th-to-10th percentiles wage-gap, our general finding is that the effects of bargaining at firm-level on top of more centralised levels are widely heterogeneous, both across countries and over time. However, the estimated effects do not exactly replicate the patterns emerged above for $\Delta w^{90/10}$. This supports that accounting for the occupational content of wage inequalities does convey relevant additional information.

In three countries, namely Belgium, the Czech Republic and the UK, firm-level agreements do not display any relations with the professional wage-gap, neither in 2006 nor in 2010, whereas in Germany, Spain and France we observe statistically significant effects, varying by country and over time variation

In Germany, the Δw^{jobs} pay-gap is less unequal in ~~firm-level bargaining firms~~ than in other firms in 2006, but we observe a reversal in the use of FLB over time, such that the inequality-reducing effect of firm-level contracts vanishes by 2010. Indeed, the estimated interaction coefficient is of similar magnitude, but opposite sign as compared to the coefficient on the FLB dummy. In France and Spain, firm-level agreements show a somewhat opposite effect, more favourable to compressing the occupational wage-gap. In France, FLB firms feature a lower Δw^{jobs} than other firms in both 2006 and 2010. In Spain, firms that bargain at firm-level and other firms do not differ significantly in their occupational wage-gaps in 2006, while firm-level bargaining firms become less unequal than the other firms in 2010.

Concerning the estimates on the set of controls, starting from workforce characteristics, a higher share of women (when significant, i.e., Belgium, Germany and Spain) associates with a

higher occupational wage-gap across professional groups. Average tenure shows quite varying results: it is negatively related to the professional wage-gap in France and the Czech Republic, while ~~a positive association is detected~~ in Belgium, and insignificant estimates are obtained for the other countries. Overall, a higher proportion of educated workers associates with a higher occupational wage-gap in most countries (not in France). A larger share of part-time contracts negatively relates with the professional wage-gap in Germany, Spain and the Czech Republic. The opposite relation holds in the case of the share of workers with permanent contracts, at least in Germany and Spain. Among firm-level characteristics, firm size seems to play a consistent role, as larger firms experience greater professional wage-gaps in all countries but France. Public control associate with reduced wage differences across occupations as compared to private firms, in most countries (not in Spain and the United Kingdom).

As the last step our analysis, we examine the relations between firm-level bargaining and the two components of the professional wage-gap. Table 6 presents the estimates of Equation 5 taking the average wage of either the managers or the low-layers employees as the dependent variable. A first notable finding regards Belgium, the Czech Republic and the UK, namely the three countries for which firm-level bargaining did not show any statistical association with the Δw^{jobs} wage-gap in Table 5 above. Dissecting by wages of different occupational groups confirm the same picture: firms that bargain locally do not show significant differences compared to other firms, neither in terms of average wages of low-layers employees, nor insofar as wages of managers are concerned.

Second, as for Germany, the over time reversal in the effect of FLB on the professional wage-gap emerged in Table 5 seems to be driven by a change in the FLB practices towards managers. Indeed, FLB firms and other firms do not show differences in the average wages of their low-layers employees. Conversely, managers are paid on average less in FLB firms than in other firms in 2006, but they see an increase in their wages in 2010 in firms adopting FLB.

Finally, we find that a common underlying dynamics characterizes the overall equality-enhancing effect of FLB on Δw^{jobs} emerged in Table 5 above for France and Spain. In both countries, indeed, FLB firms are more equal than other firms due to both lower average wages paid to managers and higher average wages paid to low-layers workers. There is a different timing in the two countries, however. In France, this differential treatment of managers and low-layer employees across FLB and other firms is already in place in 2006, and remains unchanged in 2010. In Spain, it is only in 2010 that the average wages of the two occupational categories become statistically different across FLB and other firms.

Results on controls display, once again, heterogeneity across countries. The modal age of the workforce displays a significant association with wages of managers in Spain (positive) and in the UK (negative), while a relatively strong and negative association emerges with the average wage of low-layers employees in Belgium. The share of women in the workforce features a positive relation with managers' wages in Spain and Germany, but the relation is negative in France. Also, wages of low-layers employees are higher in firms with more women in the Czech Republic,

while they decrease with the number of women in Germany and Spain. Average tenure does not display strong associations in most countries, whereas education does, and the share of employees with tertiary education, in particular: in all countries (but France), firms with relatively more educated workforce pay relatively higher wages to managers and relatively lower wages to low-layers employees. The coefficient estimates on the share of managers/professionals and the contract types do not display a systematic pattern. Among enterprise characteristics, firm size tend to favour managers, as in most countries (not in France) we observe that larger firms pay managers more than other firms. The opposite tend to hold for public firms as compared to private firms.

6 Conclusions

The impact of collective pay agreements on inter-firm wage inequality across employees is well-documented in the empirical literature. However, there is less evidence on whether wage-setting happening at the level of firms – on top of more centralized bargaining levels – can explain wage differences emerging within the firm. A priori, firm-level agreements may induce an increase in within-firm inequality if they selectively encompass some specific workers, as a way to providing incentives or premia and gaining flexibility with respect to higher levels of negotiation. Or, conversely, firm-level bargaining may reduce inequalities within firms if they respond to fairness motives or, more generally, to egalitarian and redistributive objectives of employees and unions. All these mechanisms are likely context-dependent, according to the margins of flexibility allowed for to firm-level negotiations in the specific bargaining regimes in place in different countries, possibly changing over time.

Exploiting data for six European nations over the years 2006 and 2010, this article contributes by addressing three questions. First, does firm-level bargaining increase or decrease within-firm inequality and, if any, are the emerging patterns robust across measures of inequality that differently address possible conflicts of power across different groups (top vs. bottom paid, and managers vs. low-layer) of employees? Second, have these relations remained stable or changed over the years under study, when a broad process of increasing emphasis on decentralization of wage bargaining took place and the Great Depression hit? Third, in case firm-level bargaining emerges – either statically or over time – as significantly shaping the internal wage structures of firms, are there patterns in the findings that are common across all or at least some of the countries, mapping into broad bargaining regimes or models of capitalism?

Our empirical results, in summary, reveal ample heterogeneities by wage-inequality measure, by country and over time.

First, by country, we find no effect of the use of firm-level bargaining on within-firm inequality in Belgium and Czech Republic, while statistically significant results emerge for Germany, Spain, France and the UK. What is noteworthy is that these patterns do not easily map into theoretical attempts to taxonomies countries according to similar bargaining regimes or mod-

els of capitalism. Indeed, Belgium and Czech Republic are examples of opposite models, one highly centralised and featuring coordinated industrial relations, and the other characterised by markedly decentralised and market-oriented institutional set-up. Similarly, countries belonging to quite different models also coexist within the group of countries where firm-level negotiations have some effect on within-firm pay structures. This observation supports that country-specific heterogeneities deliver stronger explanatory power than rigid taxonomies predicting that consistent patterns should equally emerge for countries classified as a-priori similar.

Second, in cases where firm-level agreements are estimated to have an effect, we do not find evidence of a single, precise direction in the effects. In fact, the results vary not only across countries, but also within the same country depending on the measure of wage-gap and over time. In countries like Germany, Spain or France one could have expected that firm-level bargaining increases inequalities within firms, as firm-level negotiations may be used in these countries to escape standardization of wages, rigidities and complexities “imposed” to firms at higher levels of bargaining in these countries (notwithstanding hybridization processes). And a similar inequality enhancing effect could have also been predicted for the UK, where workplace bargaining is historically ~~informed~~ ^{inspired} to incentivize specific groups of workers via differential-in-pay schemes. We document that this is not always the case, since we find that firm-level bargaining agreements sometimes deliver more egalitarian outcomes, also according to the groups of workers across which we define the wage-gaps. Indeed, the inequality between high and low paid employees widens over time in firms bargaining locally in Spain and France, and the same happens in Germany to the occupational wage-gap. Conversely, the wage distance between managers and low-layers occupations reduces over time in Spanish and French firm-level bargaining companies. This may perhaps reflect fairness concerns toward management and CEOs’ excessive pay relative to other employees in reaction to the global crisis, but a further analysis would be needed to establish a more direct, causal link. Whatever the underlying mechanisms, we show that the opportunity to bargain at the firm-level, ~~on top of more centralised levels,~~ although it may reduce bargaining power of workers, does not necessarily create inequalities. As the variation of results by inequality measure suggests, corroborated by decomposition analysis of the effects by groups of employees, the final outcomes heavily reflect the management and resolution of potential conflicts of power within organizations.

Overall, this study offers new evidence and methods to inform the renewed debate on the determinants of increasing inequalities, highlighting the importance of the locus of collective wage bargaining as a potential driver of wage inequality arising within firms.

Notes

¹A more recent study, posing a related although different question, is by Addison et al. (2014), showing a modest widening of workplace wage dispersion across establishments that abandoned centralised (sector-level) collective bargaining in Germany over the period 1996-2008.

²See Crouch (2005) for a critical review of the Varieties of Capitalism literature, also discussing important refinements going beyond the original dualistic model distinguishing between market-liberal vs. coordinated-market countries, as developed, e.g., in Amable (2003).

³We draw here from our own elaboration from a number of data-sources and reports, cited in the text. See Fulton (2013, 2015) for a broader discussion of legal and institutional aspects featuring the bargaining systems of different countries.

⁴The LABREF dataset is available on-line at <https://webgate.ec.europa.eu/labref/public>.

⁵See the section “Industrial Relations” of the ILOstat website <http://www.ilo.org/ilostat>.

⁶Basic descriptive statistics on control variables are presented in Appendix A. Notice that some of the controls are not available for the Czech Republic. First, in the data there are no Czech firms with modal employees’ age in the range 20-29 years old, so we omit this age category. Second, the Czech Republic defines a single NUTS-1 region, so we cannot further exploit regional dummies in the estimates for this country.

⁷These additional variables are taken from EUROSTAT-Regional Statistics and measured at the level of NUTS-1 regions, since this is the precision of the information on firms’ geographical location in SES. The results of the first-step Probit regressions are reported in Table 10 in Appendix B. They show a satisfactory goodness of fit, in terms of relatively high values of the area under the ROC curve.

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Tables

Table 1: Total number of firms and employees by country, year, and type of collective agreement in the sample.

Bargaining	Centralized				Firm-level				None				Total	
	N firm	% firm	N empl	% empl	N firm	% firm	N empl	% empl	N firm	% firm	N empl	% empl	N firms	N empl
BE														
2006	7341	82,0%	131339	79,5%	1606	18,0%	33852	20,5%	0	0,0%	0	0,0%	165191	8947
2010	5581	81,1%	108109	78,8%	1304	18,9%	29145	21,2%	0	0,0%	0	0,0%	137254	6885
CZ														
2006	466	2,6%	122565	6,2%	1315	7,3%	942397	47,8%	16278	90,1%	905902	46,0%	1970864	18059
2010	517	2,9%	91588	4,6%	1504	8,3%	985320	49,4%	16025	88,8%	916717	46,0%	1993625	18046
DE														
2006	7546	20,3%	1688535	58,4%	2397	6,5%	161995	5,6%	27189	73,2%	1042351	36,0%	2892881	37132
2010	8001	27,0%	774884	45,5%	1787	6,0%	120223	7,1%	19815	66,9%	806251	47,4%	1701358	29603
ES														
2006	23896	87,5%	189372	80,5%	3405	12,5%	45900	19,5%	0	0,0%	0	0,0%	235272	27301
2010	19294	76,9%	141643	65,3%	3992	15,9%	57641	26,6%	1818	7,2%	17485	8,1%	216769	25104
FR														
2006	13583	88,3%	86640	76,2%	983	6,4%	19036	16,8%	820	5,3%	7965	7,0%	113641	15386
2010	27333	89,1%	180504	81,9%	3089	10,1%	37974	17,2%	271	0,9%	1891	0,9%	220369	30693
UK														
2006	9645	22,4%	32113	24,1%	12104	28,1%	33509	25,1%	21262	49,4%	67721	50,8%	133343	43011
2010	17838	17,1%	43622	24,4%	21611	20,7%	41709	23,3%	64778	62,2%	93785	52,4%	179116	104227

Table 2: Within-firm wage inequalities: OLS Difference-in-means test across firms under firm-level bargaining and other firms, by country and year.

			Firm-level bargaining		Constant		Obs.
	Country	Year	Coeff.	S.e.	Coeff.	S.e.	N
$\Delta w^{90/10}$	BE	2006	0.0120**	(0.00463)	0.384***	(0.00211)	8639
		2010	0.00927*	(0.00382)	0.357***	(0.00179)	6633
	DE	2006	−0.00735	(0.00521)	0.495***	(0.00238)	7462
		2010	0.00868	(0.00532)	0.494***	(0.00238)	9753
	ES	2006	0.0784***	(0.00453)	0.410***	(0.00168)	24278
		2010	0.0838***	(0.00434)	0.403***	(0.00193)	19108
	CZ	2006	−0.0225*	(0.0104)	0.531***	(0.00953)	1780
		2010	−0.000329	(0.00960)	0.521***	(0.00866)	2019
	UK	2006	−0.0196***	(0.00551)	0.531***	(0.00399)	9178
		2010	−0.0730***	(0.00680)	0.489***	(0.00524)	6079
FR	2006	−0.0317***	(0.00963)	0.472***	(0.00270)	10900	
	2010	−0.0475***	(0.00412)	0.451***	(0.00214)	19109	
Δw^{jobs}	BE	2006	0.000427	(0.0207)	−0.0166	(0.0115)	1411
		2010	−0.0179	(0.0179)	−0.0108	(0.00858)	1164
	DE	2006	−0.0706***	(0.0186)	−0.000797	(0.00913)	2706
		2010	−0.0115	(0.0170)	0.00555	(0.00747)	3529
	ES	2006	−0.0528*	(0.0212)	0.0597***	(0.0116)	2068
		2010	−0.154***	(0.0226)	0.0855***	(0.0138)	1695
	CZ	2006	0.0298	(0.0213)	0.0792***	(0.0192)	1598
		2010	0.127***	(0.0229)	−0.0490*	(0.0215)	1689
	UK	2006	−0.0156	(0.0260)	−0.0318	(0.0206)	1544
		2010	−0.124***	(0.0357)	−0.0228	(0.0259)	646
FR	2006	−0.167***	(0.0216)	0.0479***	(0.00875)	2572	
	2010	−0.108***	(0.0178)	0.0338***	(0.00638)	4323	

Notes: Robust standard errors in parenthesis; asterisks denote significance levels:

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: FLB and 90th-10th percentile wage inequality

	BE	DE	ES	CZ	UK	FR
FLB	-0.00158 (0.00420)	-0.00285 (0.00638)	0.00510 (0.00458)	-0.0103 (0.0100)	-0.0129** (0.00634)	-0.00478 (0.00990)
Year 2010	-0.0334*** (0.00265)	0.00454 (0.00424)	-0.0326*** (0.00273)	-0.0142 (0.0119)	-0.0798*** (0.00842)	-0.0151*** (0.00348)
FLB×2010	0.00148 (0.00592)	0.00323 (0.00846)	0.0217*** (0.00672)	0.00496 (0.0129)	-0.00420 (0.00849)	0.0362*** (0.0114)
Prob. FLB	0.0953*** (0.0355)	-0.000383 (0.0520)	-0.226*** (0.0250)	0.117 * * (0.0458)	-0.00772 (0.125)	0.105*** (0.0359)
Modal age workers:						
20-29	-0.0297 (0.0242)	0.0330 (0.0455)	0.0101 (0.0242)		0.00383 (0.0127)	-0.0654* (0.0369)
30-39	-0.0133 (0.0244)	0.0204 (0.0446)	0.0264 (0.0244)	0.0363*** (0.00985)	0.0378*** (0.0127)	-0.0557 (0.0370)
40-49	-0.00313 (0.0242)	0.0156 (0.0446)	0.0177 (0.0243)	0.0120 (0.0119)	0.0466*** (0.0131)	-0.0577 (0.0360)
50-59	0.0197 (0.0250)	0.0124 (0.0451)	0.0157 (0.0248)	0.0152 (0.0103)	0.0470*** (0.0139)	-0.0389 (0.0366)
60+	0.0322 (0.0311)	0.103* (0.0572)	0.0785*** (0.0284)	0.0955** (0.0381)	0.0309* (0.0166)	-0.0315 (0.0404)
% of women empl.	-0.0616*** (0.00599)	-0.0490*** (0.0119)	-0.0392*** (0.00467)	-0.0230 (0.0157)	-0.0386*** (0.00986)	-0.0451*** (0.00603)
Mean experience empl.	-0.00216*** (0.000392)	-0.00245*** (0.000522)	0.00344*** (0.000360)	-0.00468*** (0.000980)	-5.36e-05 (0.000576)	-0.000761*** (0.000287)
% empl. with tert. educ.	0.116*** (0.00836)	0.0847*** (0.0272)	0.165*** (0.00634)	0.249*** (0.0386)	0.103*** (0.0159)	0.0799*** (0.00814)
% empl. with sec. educ.	0.0184*** (0.00498)	0.0532*** (0.0185)	0.0730*** (0.00480)	0.0206 (0.0275)	0.0592*** (0.0134)	0.00665 (0.00802)
% managers and profess.	0.0931*** (0.00971)	0.0688*** (0.0204)	0.0745*** (0.00949)	0.121*** (0.0260)	0.251*** (0.0111)	0.148*** (0.00853)
% part-time empl.	-0.0108 (0.00773)	0.140*** (0.0126)	0.109*** (0.00664)	0.175*** (0.0529)	0.0419*** (0.0108)	0.00672 (0.00832)
% permanent contracts	-0.0781*** (0.0101)	-0.0861*** (0.0184)	-0.00416 (0.00509)	-0.00757 (0.0173)	-0.0464** (0.0190)	-0.160*** (0.0136)
Firm size:						
50-249 empl.	0.000931 (0.00562)	0.0361*** (0.00545)	0.121*** (0.00357)	0.0163 (0.0108)	-0.0631*** (0.0131)	0.0378*** (0.00429)
≥ 250 empl.	-0.00323 (0.00967)	0.0340*** (0.00513)	0.193*** (0.00641)	0.0112 (0.0164)	-0.0652*** (0.0117)	0.0490*** (0.00490)
Public firm	-0.0502*** (0.0119)	-0.00360 (0.0140)	0.0287 (0.00823)	-0.0797*** (0.0116)	0.0194 (0.0598)	-0.0694*** (0.00937)
Constant	0.455*** (0.0340)	0.529*** (0.0539)	0.299*** (0.0259)	0.463*** (0.0427)	0.596*** (0.122)	0.624*** (0.0401)
Observations	13.765	12.312	37.887	3.498	14.502	30.009
R-squared	0.187	0.064	0.197	0.230	0.123	0.118
Region FE	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓

Notes: Bootstrapped standard errors in parentheses (200 repetitions); asterisks denote significance levels: * p<0.05, ** p<0.01, *** p<0.001

Table 4: Decomposition of FLB effects on the 90th and 10th wage percentiles

	BE		DE		ES		CZ		UK		FR	
	q_90	q_10	q_90	q_10	q_90	q_10	q_90	q_10	q_90	q_10	q_90	q_10
FLB	-0.00106 (0.00276)	0.000520 (0.00244)	-0.00945*** (0.00343)	-0.00660* (0.00394)	-0.000250 (0.00260)	-0.00535** (0.00239)	-0.00479 (0.00521)	0.00548 (0.00535)	-0.00414 (0.00373)	0.00877*** (0.00320)	-0.00187 (0.00500)	0.00292 (0.00601)
Year 2010	-0.0189*** (0.00158)	0.0145*** (0.00135)	0.00678*** (0.00236)	0.00223 (0.00262)	-0.0174*** (0.00139)	0.0151*** (0.00131)	-0.00548 (0.00623)	0.00871 (0.00728)	-0.0392*** (0.00530)	0.0406*** (0.00419)	-0.00764*** (0.00202)	0.00741*** (0.00162)
FLB×2010	0.00159 (0.00332)	0.000108 (0.00298)	0.00578 (0.00451)	0.00255 (0.00452)	0.0148*** (0.00346)	-0.00693** (0.00316)	0.00125 (0.00693)	-0.00371 (0.00771)	-0.00431 (0.00533)	-0.000113 (0.00443)	0.0195*** (0.00600)	-0.0167*** (0.00598)
Prob. FLB	0.0539*** (0.0173)	-0.0415** (0.0171)	-0.0153 (0.0238)	-0.0149 (0.0296)	-0.133*** (0.0151)	0.0928*** (0.0129)	0.0595** (0.0259)	-0.0576*** (0.0212)	-0.0112 (0.0739)	-0.00350 (0.0573)	0.0678*** (0.0183)	-0.0374** (0.0167)
Modal age workers:												
20-29	-0.0141 (0.0136)	0.0156 (0.0117)	-0.00923 (0.0251)	-0.0423* (0.0244)	0.00651 (0.0131)	-0.00356 (0.0109)			0.00736 (0.00635)	0.00353 (0.00660)	-0.0306 (0.0211)	0.0348** (0.0165)
30-39	-0.00464 (0.0138)	0.00867 (0.0115)	-0.0135 (0.0250)	-0.0339 (0.0239)	0.0153 (0.0129)	-0.0111 (0.0108)	0.0183*** (0.00523)	-0.0180*** (0.00603)	0.0267*** (0.00684)	-0.0111* (0.00663)	-0.0250 (0.0209)	0.0308* (0.0166)
40-49	0.00105 (0.0139)	0.00418 (0.0116)	-0.0175 (0.0249)	-0.0331 (0.0238)	0.0108 (0.0131)	-0.00687 (0.0108)	0.00668 (0.00628)	-0.00533 (0.00640)	0.0315*** (0.00635)	-0.0151** (0.00674)	-0.0249 (0.0208)	0.0329** (0.0166)
50-59	0.0127 (0.0141)	-0.00702 (0.0118)	-0.0167 (0.0252)	-0.0291 (0.0237)	0.0101 (0.0133)	-0.00561 (0.0110)	0.00820 (0.00538)	-0.00701 (0.00583)	0.0332*** (0.00681)	-0.0138* (0.00723)	-0.0146 (0.0210)	0.0243 (0.0164)
60+	0.0193 (0.0175)	-0.0129 (0.0160)	0.0232 (0.0317)	-0.0798** (0.0325)	0.0437*** (0.0147)	-0.0348*** (0.0128)	0.0538*** (0.0184)	-0.0417** (0.0176)	0.0233*** (0.00895)	-0.00762 (0.00815)	-0.0108 (0.0224)	0.0206 (0.0186)
% of women empl.	-0.0294*** (0.00340)	0.0323*** (0.00323)	-0.0203*** (0.00576)	0.0287*** (0.00646)	-0.0176*** (0.00280)	0.0216*** (0.00247)	-0.00670 (0.00815)	0.0163** (0.00750)	-0.0215*** (0.00520)	0.0171*** (0.00427)	-0.0255*** (0.00333)	0.0196*** (0.00321)
Mean experience empl.	-0.00125*** (0.000228)	0.000907*** (0.000190)	-0.000873*** (0.000266)	0.00158*** (0.000301)	0.00188*** (0.000215)	-0.00156*** (0.000176)	-0.00276*** (0.000548)	0.00192*** (0.000481)	-3.41e-05 (0.000359)	1.95e-05 (0.000287)	-0.000512*** (0.000158)	0.000249* (0.000144)
% empl. with tert. educ.	0.0587*** (0.00431)	-0.0577*** (0.00406)	0.0597*** (0.0134)	-0.0251 (0.0169)	0.0844*** (0.00319)	-0.0804*** (0.00306)	0.130*** (0.0202)	-0.119*** (0.0193)	0.0494*** (0.00939)	-0.0531*** (0.00736)	0.0369*** (0.00473)	-0.0430*** (0.00388)
% empl. with sec. educ.	0.00871*** (0.00272)	-0.00971*** (0.00263)	0.0322*** (0.00874)	-0.0210 (0.0114)	0.0384*** (0.00267)	-0.0346*** (0.00239)	-0.00260 (0.0150)	-0.0232 (0.0145)	0.0264*** (0.00822)	-0.0328*** (0.00699)	-0.000259 (0.00400)	-0.00690* (0.00370)
% managers and profess.	0.0438*** (0.00600)	-0.0493*** (0.00515)	0.0319*** (0.00957)	-0.0369*** (0.0108)	0.0382*** (0.00466)	-0.0364*** (0.00488)	0.0571*** (0.0166)	-0.0637*** (0.0131)	0.125*** (0.00592)	-0.126*** (0.00558)	0.0820*** (0.00484)	-0.0660*** (0.00412)
% part-time empl.	-0.00418 (0.00418)	0.00662* (0.00375)	0.0570*** (0.00675)	-0.0829*** (0.00791)	0.0551*** (0.00342)	-0.0535*** (0.00332)	0.0777*** (0.0301)	-0.0969*** (0.0255)	0.0258*** (0.00612)	-0.0161*** (0.00545)	0.00355 (0.00412)	-0.00317 (0.00395)
% permanent contracts	-0.0345*** (0.00567)	0.0436*** (0.00617)	-0.0242*** (0.00906)	0.0619*** (0.0107)	0.000483 (0.00255)	0.00465* (0.00238)	-0.00203 (0.00795)	0.00554 (0.00835)	-0.0277*** (0.00961)	0.0188* (0.00979)	-0.0778*** (0.00750)	0.0826*** (0.00651)
Firm size:												
50-249 empl.	0.000439 (0.00275)	-0.000491 (0.00287)	0.0217*** (0.00268)	-0.0144*** (0.00314)	0.0657*** (0.00235)	-0.0554*** (0.00182)	0.00895 (0.00578)	-0.00736 (0.00566)	-0.0330*** (0.00776)	0.0301*** (0.00724)	0.0201*** (0.00258)	-0.0177*** (0.00217)
≥ 250 empl.	-0.00293 (0.00469)	0.000297 (0.00472)	0.0239*** (0.00275)	-0.0101*** (0.00313)	0.106*** (0.00397)	-0.0876*** (0.00347)	0.00620 (0.00880)	-0.00498 (0.00795)	-0.0332*** (0.00663)	0.0320*** (0.00592)	0.0226*** (0.00256)	-0.0264*** (0.00230)
Public firm	-0.0219*** (0.00592)	0.0283*** (0.00583)	-0.0129* (0.00663)	-0.00926 (0.00830)	0.0183*** (0.00436)	-0.0105*** (0.00379)	-0.0448*** (0.00719)	0.0349*** (0.00558)	0.00734 (0.0352)	-0.0121 (0.0268)	-0.0402*** (0.00458)	0.0292*** (0.00407)
Constant	0.226*** (0.0203)	-0.228*** (0.0173)	0.270*** (0.0289)	-0.259*** (0.0265)	0.148*** (0.0134)	-0.151*** (0.0112)	0.244*** (0.0223)	-0.219*** (0.0195)	0.307*** (0.0722)	-0.290*** (0.0571)	0.315*** (0.0234)	-0.309*** (0.0173)
Observations	13.765	13.765	12.312	12.312	37.887	37.887	3.498	3.498	14.502	14.502	30.009	30.009
R-squared	0.138	0.199	0.059	0.059	0.174	0.191	0.226	0.191	0.110	0.124	0.105	0.115
Region FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Bootstrapped standard errors in parentheses (200 repetitions); asterisks denote significance levels: * p<0.05, ** p<0.01, *** p<0.001

Table 5: FLB and the wage-gap between managers and low-layers workers

	BE	DE	ES	CZ	UK	FR
FLB	0.00463 (0.0227)	-0.0607*** (0.0231)	-0.00730 (0.0224)	0.0156 (0.0221)	0.0307 (0.0315)	-0.0862*** (0.0248)
Year 2010	0.00909 (0.0163)	0.0167 (0.0157)	0.0415** (0.0199)	-0.106*** (0.0296)	-0.106 * * (0.0537)	-0.0116 (0.0119)
FLB×2010	-0.0251 (0.0295)	0.0555** (0.0278)	-0.0839*** (0.0323)	0.0352 (0.0318)	-0.0258 (0.0554)	0.0190 (0.0302)
Prob. FLB	-0.311* (0.161)	-0.756*** (0.168)	-0.710*** (0.182)	0.367*** (0.104)	0.493 (0.676)	0.145 (0.137)
Modal age workers:						
20-29	0.0630 (0.0696)	0.149 (0.142)	0.144*** (0.0441)		-0.218* (0.121)	0.176 (0.169)
30-39	0.0957 (0.0690)	0.243* (0.141)	0.143*** (0.0342)	0.0335 (0.0273)	-0.227* (0.124)	0.201 (0.168)
40-49	0.118* (0.0687)	0.237* (0.140)	0.129*** (0.0342)	-0.0599** (0.0287)	-0.180 (0.123)	0.231 (0.168)
50-59	0.130* (0.0698)	0.220 (0.139)	0.145*** (0.0374)	-0.0348 (0.0279)	-0.164 (0.121)	0.270 (0.168)
60+	0.118 (0.156)	0.279* (0.156)	0.241*** (0.0917)	0.167*** (0.0600)	-0.243* (0.136)	0.283* (0.172)
% of women empl.	0.0555* (0.0305)	0.130*** (0.0380)	0.197*** (0.0389)	0.00441 (0.0371)	0.0411 (0.0539)	-0.0418 (0.0255)
Mean experience empl.	0.00489** (0.00199)	-0.00157 (0.00164)	0.00386 (0.00266)	-0.00457** (0.00226)	-0.00435 (0.00302)	-0.00292*** (0.00106)
% empl. with tert. educ.	0.110 * * (0.0473)	0.0636 (0.0759)	0.233*** (0.0505)	0.358*** (0.0820)	0.147 (0.100)	-0.190*** (0.0290)
% empl. with sec. educ.	0.0672** (0.0305)	0.203*** (0.0607)	0.0760* (0.0408)	-0.0734 (0.0531)	-0.00143 (0.0930)	-0.0784*** (0.0288)
% managers and profess.	0.0408 (0.0565)	-0.157*** (0.0533)	-0.215 * * (0.0859)	-0.399*** (0.0600)	0.139* (0.0751)	-0.0199 (0.0353)
% part-time empl.	-0.0238 (0.0493)	-0.145*** (0.0376)	-0.162*** (0.0612)	-0.337*** (0.0917)	-0.0800 (0.0775)	0.0610 (0.0382)
% permanent contracts	0.196*** (0.0522)	0.0388 (0.0560)	0.212*** (0.0460)	0.0339 (0.0392)	0.0994 (0.158)	0.0180 (0.0532)
Firm size:						
50-249 empl.	0.107*** (0.0302)	0.0991*** (0.0241)	0.179*** (0.0298)	0.0602** (0.0248)	0.0570 (0.0580)	-0.0878*** (0.0159)
≥ 250 empl.	0.146*** (0.0473)	0.0469** (0.0230)	0.215*** (0.0565)	0.0447 (0.0337)	-0.0330 (0.0579)	-0.177*** (0.0156)
Public firm	-0.0764 (0.0487)	-0.268*** (0.0458)	0.0199 (0.0504)	-0.131*** (0.0254)	0.184 (0.325)	-0.119*** (0.0383)
Constant	-0.322 * * (0.154)	-0.375 * * (0.176)	-0.352*** (0.0921)	0.0358 (0.102)	-0.564 (0.625)	0.134 (0.181)
Observations	2.416	4.396	3.443	3.006	2.059	6.895
R-squared	0.087	0.083	0.091	0.158	0.078	0.069
Region FE	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓

Notes: Bootstrapped standard errors in parentheses (200 repetitions); asterisks denote significance levels: * p<0.05, ** p<0.01, *** p<0.001

Table 6: Decomposition of FLB effects across managers and low-layers workers

	BE		DE		ES		CZ		UK		FR	
	Manag	Low	Manag	Low	Manag	Low	Manag	Low	Manag	Low	Manag	Low
FLB	0.00605 (0.0177)	0.00142 (0.00735)	-0.0466** (0.0207)	0.0141 (0.0117)	-0.0128 (0.0179)	-0.00548 (0.00888)	0.0195 (0.0176)	0.00385 (0.00671)	0.0296 (0.0224)	-0.00107 (0.0150)	-0.0412** (0.0176)	0.0451*** (0.0148)
Year 2010	9.62e-05 (0.0125)	-0.00899 (0.00581)	0.00862 (0.0143)	-0.00812 (0.00686)	0.0229 (0.0158)	-0.0186** (0.00749)	-0.0790*** (0.0221)	0.0268** (0.0105)	-0.0702* (0.0369)	0.0353 (0.0267)	-0.00862 (0.00838)	0.00299 (0.00565)
FLB×2010	-0.0198 (0.0261)	0.00531 (0.00856)	0.0390* (0.0249)	-0.0165 (0.0157)	-0.0485* (0.0276)	0.0354*** (0.0111)	0.0117 (0.0245)	-0.0236 (0.0105)	-0.0413 (0.0390)	-0.0155 (0.0256)	0.00421 (0.0214)	-0.0148 (0.0190)
Prob. FLB	0.0164 (0.139)	0.327*** (0.0717)	-0.540*** (0.130)	0.216*** (0.0743)	-0.498*** (0.153)	0.212*** (0.0772)	0.284*** (0.0939)	-0.0827** (0.0402)	0.564 (0.455)	0.0711 (0.308)	0.0362 (0.104)	-0.109* (0.0576)
Modal age workers:												
20-29	0.0241 (0.0999)	-0.0389 (0.0238)	0.134 (0.145)	-0.0147 (0.0569)	0.139*** (0.0328)	-0.00526 (0.0144)			-0.211 * * (0.0969)	0.00735 (0.0544)	0.109 (0.100)	-0.0674 (0.0727)
30-39	0.0402 (0.0998)	-0.0555** (0.0238)	0.200 (0.144)	-0.0427 (0.0611)	0.144*** (0.0273)	0.00146 (0.0124)	0.0197 (0.0245)	-0.0137 (0.0106)	-0.211 * * (0.0976)	0.0165 (0.0556)	0.130 (0.0988)	-0.0713 (0.0722)
40-49	0.0583 (0.0984)	-0.0593** (0.0234)	0.194 (0.145)	-0.0424 (0.0590)	0.129*** (0.0273)	0.000315 (0.0109)	-0.0568** (0.0271)	0.00309 (0.0107)	-0.178* (0.0985)	0.00148 (0.0543)	0.143 (0.0993)	-0.0876 (0.0719)
50-59	0.0733 (0.100)	-0.0566** (0.0246)	0.179 (0.146)	-0.0406 (0.0590)	0.134*** (0.0285)	-0.0104 (0.0113)	-0.0332 (0.0253)	0.00163 (0.0104)	-0.195 * * (0.0988)	-0.0313 (0.0539)	0.167* (0.0987)	-0.103 (0.0723)
60+	0.0541 (0.133)	-0.0636 (0.0582)	0.209 (0.157)	-0.0704 (0.0701)	0.211*** (0.0673)	-0.0297 (0.0324)	0.0964* (0.0512)	-0.0706** (0.0293)	-0.232 * * (0.107)	0.0105 (0.0573)	0.178* (0.102)	-0.105 (0.0779)
% of women empl.	0.0427 (0.0319)	-0.0128 (0.0140)	0.0672** (0.0312)	-0.0626*** (0.0195)	0.133*** (0.0331)	-0.0634*** (0.0149)	0.0469 (0.0289)	0.0425*** (0.0123)	-0.000410 (0.0418)	-0.0415 (0.0268)	-0.0389** (0.0155)	0.00291 (0.0109)
Mean experience empl.	0.00110 (0.00187)	-0.00379*** (0.000921)	-0.000924 (0.00150)	0.000641 (0.000740)	0.00212 (0.00218)	-0.00173* (0.000979)	-0.00354* (0.00206)	0.00103 (0.000815)	-0.00236 (0.00218)	0.00199 (0.00146)	-0.00254*** (0.000755)	0.000382 (0.000562)
% empl. with tert. educ.	0.0552 (0.0344)	-0.0550*** (0.0197)	-0.0876 (0.0683)	-0.151*** (0.0385)	0.158*** (0.0364)	-0.0743*** (0.0181)	0.261*** (0.0714)	-0.0971*** (0.0325)	0.0715 (0.0726)	-0.0757* (0.0449)	-0.102*** (0.0218)	0.0886*** (0.0153)
% empl. with sec. educ.	0.0471* (0.0254)	-0.0202* (0.0108)	0.0750 (0.0590)	-0.128*** (0.0212)	0.0543 (0.0350)	-0.0218 (0.0138)	-0.0544 (0.0540)	0.0190 (0.0178)	-0.0254 (0.0630)	-0.0239 (0.0423)	-0.0588*** (0.0196)	0.0196* (0.0112)
% managers and profess.	0.0930** (0.0470)	0.0522* (0.0293)	-0.0328 (0.0433)	0.124*** (0.0376)	-0.123* (0.0630)	0.0927** (0.0366)	-0.205*** (0.0475)	0.194*** (0.0321)	0.115 * * (0.0457)	-0.0236 (0.0421)	0.000121 (0.0236)	0.0201 (0.0225)
% part-time empl.	-0.0382 (0.0461)	-0.0144 (0.0183)	-0.0842*** (0.0294)	0.0609*** (0.0206)	-0.100 * * (0.0505)	0.0610*** (0.0191)	-0.260*** (0.0898)	0.0766*** (0.0290)	-0.0671 (0.0528)	0.0128 (0.0336)	0.0511** (0.0236)	-0.00988 (0.0157)
% permanent contracts	0.0518 (0.0567)	-0.144*** (0.0231)	0.0115 (0.0462)	-0.0273 (0.0295)	0.164*** (0.0402)	-0.0479*** (0.0154)	0.0377 (0.0344)	0.00382 (0.0124)	0.131 (0.114)	0.0311 (0.0577)	0.0670** (0.0338)	0.0490* (0.0294)
Firm size:												
50-249 empl.	0.0613*** (0.0238)	-0.0455*** (0.0122)	0.109*** (0.0178)	0.00998 (0.00996)	0.157*** (0.0250)	-0.0221** (0.0109)	0.0643*** (0.0213)	0.00412 (0.0106)	0.0667* (0.0398)	0.00975 (0.0311)	-0.0532*** (0.0115)	0.0346*** (0.00792)
≥ 250 empl.	0.0662 (0.0409)	-0.0801*** (0.0216)	0.0595*** (0.0199)	0.0126 (0.0109)	0.183*** (0.0451)	-0.0324 (0.0221)	0.0640** (0.0308)	0.0193 (0.0149)	0.0349 (0.0379)	0.0679*** (0.0262)	-0.104*** (0.0108)	0.0730*** (0.00859)
Public firm	-0.0209 (0.0444)	0.0555** (0.0266)	-0.182*** (0.0366)	0.0860*** (0.0224)	0.00974 (0.0411)	-0.0101 (0.0204)	-0.127*** (0.0209)	0.00489 (0.0118)	0.247 (0.220)	0.0632 (0.149)	-0.0541* (0.0300)	0.0653*** (0.0168)
Constant	-0.163 (0.134)	0.159*** (0.0472)	-0.212 (0.180)	0.163 * * (0.0654)	-0.295*** (0.0748)	0.0568 (0.0351)	0.0237 (0.0857)	-0.0121 (0.0274)	-0.556 (0.421)	0.00833 (0.286)	0.0460 (0.111)	-0.0877 (0.0828)
Observations	2.416	2.416	4.396	4.396	3.443	3.443	3.006	3.006	2.059	2.059	6.895	6.895
R-squared	0.046	0.347	0.063	0.054	0.079	0.061	0.169	0.098	0.054	0.113	0.052	0.053
Region FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Bootstrapped standard errors in parentheses (200 repetitions); asterisks denote significance levels: * p<0.05, ** p<0.01, *** p<0.001

Appendix A: Summary statistics of explanatory variables

Table 7: Distribution of firms by size by country

Firm size:	BE	CZ	DE	ES	FR	UK
1-49	4547	22218	26592	19695	7818	9343
50-249	4533	6633	19021	8662	9019	2765
≥ 250	5766	3251	15177	10400	14058	20332

Table 8: Summary means and standard deviations for continuous variables in regression

country	Stat.	BE	CZ	DE	ES	FR	UK
Mean experience empl. (yrs)	mean	9,506	9,061	8,574	7,235	10,748	7,079
	s.d.	5,810	5,229	6,051	6,202	6,361	5,278
% empl. with tert. educ.	mean	0,329	0,244	0,123	0,318	0,408	0,379
	s.d.	0,330	0,253	0,195	0,327	0,298	0,266
% empl. with sec. educ.	mean	0,419	0,654	0,706	0,190	0,420	0,523
	s.d.	0,305	0,255	0,236	0,244	0,270	0,262
% managers and profess.	mean	0,197	0,398	0,110	0,142	0,293	0,273
	s.d.	0,287	0,303	0,175	0,241	0,256	0,266
% part-time empl.	mean	0,229	0,139	0,266	0,152	0,159	0,269
	s.d.	0,260	0,186	0,248	0,247	0,231	0,268
% permanent contracts	mean	0,925	0,785	0,885	0,750	0,921	0,938
	s.d.	0,162	0,215	0,148	0,303	0,171	0,156

Table 9: Distribution of firms by modal age of employees by country

Modal age workers:	BE	CZ	DE	ES	FR	UK
14-19	35	19	276	127	68	987
20-29	2414	2288	9277	8726	3664	6954
30-39	4681	6254	10543	18674	9098	8052
40-49	5671	10787	28528	11421	9926	8929
50-59	2417	12166	11563	5275	7648	6174
60+	54	588	603	564	491	1371

Appendix B: FLB propensity scores

Table 10: Probit estimates of FLB propensity

	(1) BE	(2) DE	(3) ES	(4) CZ	(5) UK	(6) FR
Mean experience empl.	0.0300*** (0.00313)	0.0243*** (0.00276)	0.0409*** (0.00184)	0.0755*** (0.00730)	-0.0127*** (0.00277)	0.00221 (0.00282)
Modal age workers:						
20-29	-0.0844 (0.252)	-0.890*** (0.246)	-0.110 (0.218)		0.115 (0.0936)	0.125 (0.142)
30-39	0.0366 (0.250)	-0.564 * * (0.245)	-0.0319 (0.218)	-0.0328 (0.104)	0.141 (0.0938)	0.285 * * (0.136)
40-49	0.00410 (0.249)	-0.498 * * (0.244)	-0.0881 (0.218)	0.0855 (0.117)	0.124 (0.0934)	0.395*** (0.134)
50-59	-0.124 (0.251)	-0.559 * * (0.245)	-0.0560 (0.219)	0.0737 (0.107)	0.152 (0.0956)	0.420*** (0.134)
60+		-0.829*** (0.298)	-0.113 (0.232)	-0.357 (0.299)	0.120 (0.110)	
% empl. with tert. educ.	0.109 (0.0793)	0.662*** (0.135)	0.405*** (0.0393)	0.455 (0.347)	-0.198 * * (0.0991)	0.108 (0.0759)
% empl. with sec. educ.	0.137 * * (0.0557)	0.728*** (0.0982)	0.159*** (0.0382)	0.117 (0.237)	-0.133 (0.0945)	0.522*** (0.0699)
% managers and profess.	-0.0209 (0.0906)	0.0162 (0.110)	-0.186*** (0.0604)	0.206 (0.290)	-0.00602 (0.0594)	-0.581*** (0.0785)
% part-time empl.	-0.152 * * (0.0682)	0.115* (0.0648)	-0.0164 (0.0430)	0.0864 (0.366)	-0.0706 (0.0560)	0.386*** (0.0558)
% permanent contracts	0.510*** (0.115)	0.116 (0.127)	-0.156*** (0.0385)	-0.279* (0.151)	0.242 * * (0.0978)	-0.262*** (0.0797)
Firm size:						
50-249 empl.	0.704*** (0.0408)	0.105*** (0.0383)	0.624*** (0.0235)	0.440*** (0.0855)	-0.184 * * (0.0720)	0.473*** (0.0385)
≥ 250 empl.	1.135*** (0.0425)	0.179*** (0.0375)	1.133*** (0.0233)	1.164*** (0.0916)	-0.290*** (0.0511)	0.624*** (0.0387)
Public firm	-1.230*** (0.0964)	-0.921*** (0.0404)	0.570*** (0.0405)	0.202 (0.139)	-1.346*** (0.0403)	0.838*** (0.0428)
NACE Sector:						
D	-0.413* (0.243)	-0.293 * * (0.137)	-0.380*** (0.0667)	0.609*** (0.218)	0.201 (0.311)	-1.373*** (0.180)
E	-0.809*** (0.304)	0.407*** (0.141)	0.272*** (0.0803)	1.075*** (0.305)	0.141 (0.328)	1.157*** (0.155)
F	-1.140*** (0.253)	-1.096*** (0.203)	-0.882*** (0.0770)	-0.894*** (0.225)	-1.032*** (0.318)	-1.334*** (0.278)
G	-0.853*** (0.245)	-0.451*** (0.156)	-0.493*** (0.0715)	0.799*** (0.254)	0.405 (0.311)	-1.270*** (0.220)
H	-0.999*** (0.268)	0.275 (0.168)	-0.808*** (0.0832)		-0.510 (0.334)	-0.486*** (0.182)
I	-0.441* (0.248)	1.229*** (0.136)	-0.112 (0.0705)	-0.168 (0.228)	-0.248 (0.310)	0.573*** (0.152)
J	-0.0811 (0.255)	-0.816*** (0.161)	-1.105*** (0.0818)	0.216 (0.309)	0.562* (0.315)	-0.00925 (0.158)
K	-0.744*** (0.247)	0.117 (0.139)	-0.509*** (0.0728)	1.391*** (0.286)	0.0816 (0.314)	0.169 (0.155)
L			-0.101 (0.111)	2.351*** (0.364)	0.324 (0.311)	1.735*** (0.159)
M	-0.966*** (0.282)	-0.0856 (0.157)	-0.953*** (0.0920)	0.142 (0.286)	-0.676 * * (0.311)	-0.510*** (0.189)
N	-0.860*** (0.248)	0.973*** (0.138)	-0.670*** (0.0834)		-1.004*** (0.312)	-0.554*** (0.163)
O	-0.602 * * (0.254)	0.394*** (0.139)	0.126* (0.0744)	1.703*** (0.357)	-0.496 (0.311)	0.338 * * (0.155)
Regional GDP pps	0.00120 (0.00157)	0.000710 (0.00397)	0.00371 (0.00231)	0.302*** (0.0712)	0.00649*** (0.00181)	-0.00184 (0.00168)
Regional unemp. rate	0.00426 (0.00366)	0.0357*** (0.00585)	0.00866*** (0.00161)		0.0716*** (0.00832)	-0.0433*** (0.0101)
Constant	-1.770*** (0.374)	-1.832*** (0.329)	-1.679*** (0.235)	-7.023*** (1.437)	0.544 (0.351)	-2.022*** (0.243)
Observations	13.730	12.312	37.887	3.498	14.502	29.943
Area under ROC curve	0.781	0.811	0.825	0.870	0.875	0.935

Notes: Dependent variable is FLB dummy. Standard errors in parentheses; asterisks denote significance levels: * p<0.05, ** p<0.01, *** p<0.001