Industrial relations reform, firm-level bargaining and nominal wage floors

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Abstract

Decentralised bargaining is an important wage setting mechanism that promotes wage flexibility which in turn determines how earnings and employment are affected by economic shocks. We investigate the impact of the 2011 industrial relations reform in Greece that allowed firms with less than 50 employees to participate in firm-level bargaining. Matching administrative contractual data with longitudinal firm-level data we identify treated and non-treated firms. We find that during the first post-reform year, treated firms with less than 50 employees experienced a 4.8 percent increase in firm-level bargaining and a 12 percent drop in wage floors relative to non-treated firms. We also document a positive employment impact.

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1 Introduction

Decentralised collective bargaining is a commonly used mechanism to set wage floors that reflect workplace characteristics, productivity and market idiosyncrasies (Card and de la Rica, 2006; Le Bihan et al., 2012; Breda, 2015; Fougère et al. 2018). This mechanism has been found to be popular during recessionary periods because it facilitates nominal downward wage adjustments (Daouli et al. 2016; Addison et al. 2017; Janssen, 2017). However, apart from market and firm-specific attributes, the probability of a firm to engage in decentralised collective wage negotiations is also affected by the provisions of the existing industrial relations laws applied to a specific country (Dustmann et al. 2014; Lucifora and Origo, 2015). Hence, restructuring the industrial relations framework may alter the motives and characteristics of the agents participating to wage floor negotiations. This eventually is expected to alter the structure of firm-level contracting, the determinants of contractual nominal wage floors and employment as well (Katz, 1993; Jimeno and Thomas, 2013; de Pinto, 2017).

In this paper we study the decentralised bargaining system in Greece by investigating the 2011 industrial relations reform in Greece which allowed firms with less than 50 employees to participate in firm-level bargaining. The reform (Law 4024/2011, implemented in October 2011) aimed in confronting the longstanding wage rigidities and align labour costs to firm-specific characteristics and labour market conditions. For analytical purposes, we collected the universe of administrative contractual data for the period 2006-2016 and matched this information to longitudinal firm-level data in order to identify treated and non-treated firms based on their firm size. Based on a difference-in-differences estimation strategy, we find that during the first twelve months after the reform firms with less than 50 employees experienced a 4.8 percent increase in firm-level bargaining compared to firms with more than 50 employees. During that period (November 2011-December 2012) the number of firm-level agreements

quadrupled compared to pre-reform years. However, that rise was short lived. Firm-level negotiations became less popular amongst employees' unions and policy makers in later years as they were leading to primarily downward nominal wage adjustments (Daouli at al. 2016). Nevertheless, recent empirical evidence suggests that since 2012, the allocation of labour across firms improved drastically, as more productive firms were able to attract or retain more workers (Bulman and Pisu, 2018). In this paper, we attempt to provide detailed evidence regarding the labour market effects of the 2011 industrial relations reform using longitudinal firm-level data. More specifically, we aim to estimate the impact of the reform on contractual wages by using firms that do not sign firm-level agreements as the counterfactual scenario and, for the first time, to estimate the impact of firm-level bargaining on employment in Greece.

The collective bargaining framework in Greece until the 2011 reform was governed by the provisions of Law 1876/1990. Representation of workers within a firm was possible either through a trade union (TU) or an association of persons (AP) as both types were officially recognised by earlier legislation (Law 1264/1982). TUs can be formed by a minimum of 20 workers and APs could be established by at least 10 workers but only in firms employing up to 40 workers and only in the absence of a TU covering already half the firm's workforce. Moreover, APs were short-lived as they could not be active for more than 6 months, and they were formed only for very specific purposes. Furthermore, under the previous regime, firm-level collective agreements over wages and other employment conditions could be signed only in firms with TUs and only in those employing more than 50 workers. This institutional feature restricted a large part of the labour force from engaging in firm-level wage negotiations, as workers in firms with less than 50 workers represent at least 60 percent of the total private sector workforce in Greece. Under the 2011 reform (Law 4024/2011) the restrictions regarding the ability of APs to sign firm-level collective agreements have been removed. For example, the reform eliminated the firm size threshold according to which APs could be formed only in

firms with up to 40 workers. Therefore, it allowed workers to form APs regardless the firm size, given that the AP represents at least 60 percent of the total workforce and that there is not a TU within the firm. In addition, the reform allowed APs to operate on a permanent basis instead for 6 months only. Hence, the 2011 reform made possible for all firms to participate in decentralised wage negotiations by removing the institutional threshold previously set to 50 workers. The only firm size restriction is that APs should be formed in firms with at least 5 employees in order to ensure that the 3 out of 5 employees are elected as workers' representatives.

In terms of negotiated wage outcomes, the 2011 reform redefined the limits within which wages floors can oscillate. Under the previous regime, if the remuneration of an employee was subject to different collective agreements (sectoral, occupational, firm-level), then the one with the most favourable provisions was applied, i.e. the "favourability principle". Moreover, firm-level negotiations were not allowed to result in wage floors lower than those set at broader levels of collective bargaining, i.e. sectoral and occupational. However, under 2011 reform, firm-level collective agreements prevail relative to sectoral and occupational agreements, but not relative to the national general collective agreement. Therefore, negotiations between employers and employees can result in wage floors that deviate either above or below thresholds set at the sectoral or occupational levels while the national minimum wage provisions remain statutory and apply to all workers. A detailed description for the transformation of the employment regulation in Greece is provided in Voskeritsian and Kornelakis (2014) and a detailed analysis regarding the role of the APs under the 2011 reform is presented in Daouli et al. (2013, 2016).

For analytical purposes we develop a unique dataset containing all wage floor-setting official firm-level collective agreements signed in Greece during the period 2006-2016. It is an extension to the data developed by Daouli et al. (2016) to analyse nominal wage adjustments

in firm-level agreements during the period 2010-2013. The importance and superiority of contract data as compared to survey data for analysing downward wage rigidities has been highlighted in several studies (e.g. Christofides and Stengos, 2003; Druant et al., 2012; Le Bihan et al., 2012). However, covering a longer period is not the only extension. Firm-level contractual data have been matched to demographic and balance sheet information not only for those firms engaged in decentralised negotiations but also for firms that do not set their wages at the firm level. This will allow us to identify any changes in the behaviour of firms before and after the reform regarding firm-level contracting and the outcomes of decentralised negotiations. Despite an increasing public interest about the future of decentralised collective bargaining in Greece (van Ours et al. 2016) our knowledge about its changing structure due to the 2011 reform remains limited.

Our empirical strategy focuses on the identification of firms that were affected by the 2011 reform. The developed longitudinal dataset provides us with information on firm size. The treated group consists of firms employing 5-50 employees. The contractual wage floors of this group are compared with wage floors of firms with more than 50 employees. Since we observe wage floors for both groups in the pre- and post-reform periods, we rely on differences-in-differences estimators to identify the differential impact of the reform on nominal contractual wages. We also estimate linear and non-linear probability models regarding the incidence of firm-level contracting using a wide set of firm-specific characteristics and flexible model specifications. This will allow us to identify whether treated and non-treated firms, based on their firm-size, exhibited a differentiated response in firm level bargaining after the 2011 reform. In addition, we model contractual wage outcomes using OLS models and models corrected for non-random sorting of firms into decentralised negotiations. Lastly, we report estimates regarding the differentiated impact of firm-level contracting on employment by estimating a treatment effects model for affected and non-affected firms. Our results show that

4

firm-level contracting varies with firm size, location, industry, market power and performance. Moreover, this heterogeneity became more dispersed after the 2011 reform. Treated firms experienced an increase of 1.5 percent (compared to non-treated firms) in firm-level bargaining after the reform (November 2011-December 2016) which appears to be higher (4.8 percent) during the first twelve post-reform months. In addition, firms affected by the reform face higher downward nominal wage floor adjustments, in the range of 11-15 percent, compared to other non-treated firms. Finally, firms signed firm level contracts after the 2011 reform experienced an increase in employment.

Our paper contributes the literature on the determinants of firm-level contracting (Christofides and Stengos, 2003; Card and del la Rica, 2006; Avouyi-Dovi et al. 2013; Daouli, 2013; 2016) by examining how collective bargaining behaviour of firms changed due to the reformed provisions of the industrial relations framework. Moreover, our work is related to the literature of the determinants of negotiated wage floors set at broader levels of bargaining, i.e. industry-level wage floors (Fougère et al., 2018). In addition, the present study is linked to the literature investigating mechanisms of downward nominal wage adjustments during recessions, especially in southern European countries (Addison et al., 2017).

The reminder of this paper is structured as follows. Section 2 discusses the data. Section 3 outlines the empirical strategy and Section 4 presents and discusses the results. Section 5 concludes.

2 Data

We extract information on firm-level bargaining outcomes from the universe of official firm-level contracts signed in Greece during the period 2006-2016 in order to examine variation in contractual nominal wage floors. The dataset has been developed by using information from

multiple sources, i.e., the printed registry (2002-2008) and the online registry (2010-2016) maintained by the Ministry of Labour, Social Security and Welfare (YPAKP) and the publicly available agreements (online registry) from the website of the Greek Organisation for Mediation and Arbitration (OMED) covering the period 2006-2016. In order to ensure that each contract is a unique entry in our dataset we match all contracts using their signing date and company name. Since wage floor provisions are available for the period 2006-2016, contracts signed during 2002-2005 were excluded. There are 3,364 contracts during the period 2006-2016, containing information on business name, location of the agreement, signing and effective dates and 2,915 (86,6 percent) of them include wage floor provisions. Then, using the tax identification number and the company name referred in each contract we matched those contracts to firms included in the ICAP Data.Prisma dataset which covers all firms operating in Greece providing information on their basic characteristics, balance sheet data, contact details etc.

This exercise allowed us to create a rich longitudinal firm-level dataset following firms that either participate in firm-level bargaining or not before and after the 2011 reform. Moreover, we have information on the number of employees, the legal status of the firm, the sector of economic activity (NACE Rev.2, 4-digit) and the location (NUTS-3) of each firm. Firms are classified into treated and non-treated ones based on their average number of employees during the pre-reform period (2006-2011). For contracts without information on the tax identification number (163 out of 2915) we uncovered their number of employees by contacting them directly using details included in the official contract (along with information on legal status, sector and location). Thus, our dataset consists of monthly observations (January 2006-December 2016) of firms with non-missing information on firm-size, legal status, sector of economic activity and location. For firms signed a firm-level contract we also

keep information regarding their employees' representation type, i.e. TU, AP or local trade union.

Figure 1 compares the evolution of firm-level contacting for treated and non-treated firms. We observe that firm level bargaining increases a few months after the reform for firms with 5-50 employees. We also observe a spike 16 months before the reform for treated firms, but this refers to contracts signed by a local trade union and corresponds mainly to a specific industry (shipyards located at the Piraeus port). We should also note that the timing of firm-level contracting has altered its behaviour after the reform since most contracts before the reform were signed one month after the national collective bargaining agreement (June) but during the post-reform period this occurs earlier in the year (Figure 2).

[Figure 1 about here]

[Figure 2 about here]

Since the focus of this paper is on nominal wage adjustments, our wage level measure is the contract-specific wage floor as defined in the official document. Thus, for firms signed a firm-level contract in each month we observe their contractual wage floors. We also observe the wage floor change for those contracts and use it as an additional indicator for nominal wage adjustments. Figure 3 (4) compares wage floor levels (changes) for treated and non-treated firms 12 months before and after the reform. Wage floor reductions for treated firms were greater as compared to non-treated firms shortly after the reform (6 months) and that difference remained stable afterwards. Furthermore, pre-reform bargained wage outcomes seem to follow parallel trends.

[Figure 3 about here]

[Figure 4 about here]

7

Regarding the sources of firm-specific heterogeneity, we should notice that the available balance sheet information is limited, i.e. there are missing information on many firms, and restrict us from constructing firm-specific performance indicators. For instance, it is well established that including controls for market concentration and rent payments may explain a large part of variation in contractual wages (Guertzgen, 2009; Breda 2015). In order to overcome such difficulties, we estimate three indicators by sector and year to be included in our analysis. The first one relates to worker productivity. It is constructed by regressing (ln) hourly wage rates of the 2-digit NACE Rev.2 sector (Labour Force Survey, CPI: 2015=100) on age, years of education, gender and regional fixed effects. The second one captures profitability differences between sectors and more specifically refers to the estimated average profitability by year and sector (NACE Rev.2, 4-digit, ICAP, CPI: 2015=100). It is constructed by regressing the ratio of operating income net of depreciation over total assets on total assets, firm's age, the Herfindahl-Hirschman Index and year dummies (Grullon et al., 2017). The third index is the estimated price cost margin by year and sector (NACE Rev.2, 4-digit, ICAP, CPI: 2015=100) in order to account for industry concentration levels. We follow Aghion et al. (2005) and we define price cost margin as the operating income before depreciation minus depreciation scaled by total sales. We also use a variable indicating whether a sectoral agreement (at NACE Rev.2, 4-digit) is signed in each month in order to control for synchronization effects in the collective bargaining process. Lastly, in order to control for prevailing local labour market conditions, we include the monthly regional unemployment rate and its annual growth (provided by EL.STAT.).

Table 1 presents some basic descriptive statistics by period and group of firms for the main variables used in our empirical analysis. The incidence of firm-level contracting has increased significantly in the post-reform period for both treated and non-treated firms, although the increase is larger for the treated ones. Bargained wage outcomes have deteriorated

for all firms, however, reductions for treated firms are more pronounced after the 2011 reform. Other firm-specific characteristics, i.e. firm size, ownership status (private firm or not) as well as industry affiliation and geographical location, seem to be sufficiently balanced between periods and groups of firms. Some of the reported variables vary to more aggregate levels (i.e. sector of economic activity) and for this reason flexible model specifications with fixed will be used to capture this type of heterogeneity before and after the implementation of the reform.

[Table 1 about here]

3 Empirical Strategy

We apply a difference-in-differences empirical design to examine any differential effects on the probability of firm-level contracting as well as on labour market outcomes due to the 2011 industrial relations reform. Law 4024/2011 allowed firms employing less than 50 workers to engage in decentralised collective negotiations, with their employees being represented by a trade union (TU), a local trade union or an association of persons (AP) during the bargaining process. Therefore, we compare bargaining outcomes for firms employing less than 50 employees, i.e. those how are now allowed to engage in decentralised negotiations, to firms employing more than 50 employees, i.e. those not affected by the elimination of the size threshold. Our identifying assumption is that in the absence of the 2011 reform nominal wage floors would have evolved in a similar way for firms belonging to both firm size groups (as shown in Figures 3 and 4).

A first step is to examine how the probability of firm-level contracting has changed due to the reform. In this paper, the incidence of firm-level collective agreement and bargained nominal base wage outcomes are modelled in the following way:

$$y_{ijmt} = \alpha_{jt} + \beta_{tm} + \theta[Post_t \times \mathbf{1}(Treated_i)] + u_{ijmt} \tag{1}$$

where y_{ijmt} denotes the incidence of a decentralised agreement in firm i, classified in industry j at calendar month m of year t, or its bargained nominal base wage outcome. Our models will control for industry, time, region and firm-specific fixed effects as well for indicators capturing the prevailing economic conditions. The term $Post_t$ is an indicator variable equal to one during the period after the implementation of the reform (November 2011) and $\mathbf{1}(Treated_i)$ is equal to one for firms employing less than 50 workers, hence not eligible for decentralised bargaining before the reform. Therefore, θ is the parameter of interest representing the differential impact of the reform on firm-level contracting and bargained nominal base wage outcomes.

Results on the incidence of firm-level contracting will be reported using both linear probability estimates and probit marginal effects. Results on bargained nominal base wage outcomes will be reported using both unadjusted OLS estimates and estimates adjusted for non-random selection of firms in decentralised negotiations. For the latter, we follow Le Bihan et al. (2012) and Fougère et al. (2018) and estimate a probit model for engagement in firm-level bargaining, as in equation (1), augmented with dummy indicators regarding the workers' representation type within the firm, i.e. trade union or local trade union. According to these studies, variables related to either negotiation costs or legal constraints may serve as exclusion restrictions since they are assumed to affect only the timing of the bargaining process but not the size or the direction of wage floor adjustments.

4 Results

In Table 2 we first provide difference-in-differences estimates for the probability of firm-level contracting. We report linear probability estimates in columns 1 to 3. The results suggest that firms with 5-50 employees experienced a 0.10 percentage point increase per month (or 1.2 percentage points per year) in the probability of firm-level contracting, relative to firms

employing more than 50 workers, hence not affected by the reform. All estimates are statistically significant at the 1 percent level. Replacing year with month-of-agreement fixed effects (column 2) does not change the results in a meaningful manner. In column 3, we interact firm size with industry fixed effects and additionally include industry-year interactions. The results still suggest a 0.10 percentage point increase in firm-level contracting for treated firms.

We contrast the linear probability model results to probit marginal effects (Puhani, 2012) in columns 4-6. The estimated marginal effects are very close the OLS coefficients. We find that the reform led to a 0.15 percentage point increase per month (or 1.8 percentage points annually) in the probability of firm-level contracting for firms affected by the reform (5-50 employees) relative to firms with larger firm-size. The estimates are similar when we use industry-year interactions and month-of-agreement fixed effects (column 6) instead of year fixed effects (column 5).

[Table 2 about here]

Table 3 provides difference-in-differences OLS estimates regarding the impact of the reform on nominal base wage outcomes (levels and changes) using different model specifications. These models are estimated on the sample of firms that signed firm-level contracts during the period January 2006-December 2016. In the first three columns we use the (ln) nominal wage floor as the dependent variable. Depending on the adopted specification, we estimate a post-reform reduction, in the range of 11-15 percent, for firms employing less than 50 employees (columns 1-3). Without controlling for industry, size and year fixed effects the reduction in wage floors is 15 percent, while after controlling for such fixed effects and their interactions the estimated effect becomes smaller (11 percent, in column 3). Columns 4-6 report OLS estimates from models using the bargained nominal wage floor change as the outcome. The results point to the same conclusions, i.e. a reduction in bargained nominal wage changes in the neighbourhood of 8-10 percent, subject to the model specification. The reported

11

difference-in-differences estimates do not simply pick up any pre-existing trends in bargained nominal base wage outcomes. As already shown in Figures 3 and 4, both wage measures follow parallel patterns for both treated and non-treated firms before the reform. After the reform, all firms experience wage reductions although the mean reduction is greater for the group of firms that became eligible for decentralised bargaining.

[Table 3 about here]

So far, our difference-in-difference results suggest that the 2011 reform had a negative wage floor impact on treated firms. However, as these results are conditional on the sample of firms that signed a wage contract in a specific month, they could be biased due to non-random selection of firms into decentralised negotiations. In order to account for such non-randomness, we adopt a Heckman correction approach. In the first step, we estimated a probit model corresponding to specifications 4-6 in Table 2 augmented with a binary variable indicating the workers' representation type within the firm, i.e. a TU or a local trade union. As a variable argued to affect the bargaining process but not the outcomes, it will serve as our exclusion restriction that will allow to properly identify our model. Table 4 displays the results. It seems that the unadjusted OLS estimates presented in Table 3 are not seriously biased. The difference-in-differences parameter estimates are similar and indicate that both bargained nominal post-reform wage floors and changes are reduced for the treated group of firms, relative to the non-treated ones. At the same time the inverse Mills ratio obtained from the decentralised bargaining participation equation is statistically significant at the 1 percent level indicating negative selection.

[Table 4 about here]

After providing evidence that our parameters of interest are not driven by pre-policy trends and non-random selection, we test their robustness to the inclusion of additional

covariates capturing firm-specific and sectoral heterogeneity and prevailing market conditions. Firm-specific heterogeneity is captured by an ownership status (private or public) indicator and sectoral heterogeneity by productivity differences across industries (average hourly wage rate), by profitability differences (returns on assets) and by variation in industry concentration (price cost margins). In addition, a dummy indicator for whether a sectoral agreement has been signed during the same month is used in order to control for sectoral differences regarding the differences regarding the synchronization of firm-level contracting with collective bargaining at the sectoral level. Local labour market conditions are controlled by location fixed effects, the level and the growth of the regional unemployment rate. Table 5 displays the results. The first column displays the difference-in-differences results regarding the probability of firm-level contracting also controlling for the type of worker representation within the firm, i.e. it is our first stage regression used to account for non-random selection into decentralised negotiations while modelling bargained wage outcomes. The estimated difference-in-difference coefficient remains unchanged as compared to the one in Table 2. Moreover, it seems that private sector companies, those operating in sectors with high hourly wages and higher price cost margins and those located in regions with higher unemployment are less likely to sign firm-level contracts. Yet, firm-level contracting is more likely in regions where the unemployment grew faster. The results for bargained wage changes, either after accounting for selection or not, are also robust to the inclusion of these firm and market-specific covariates.

We also present estimates from our model specification for a shorter period around the reform (twelve months before and after the 2011 reform). We observe that treated firms are more likely to participate in firm-level bargaining by 0.40 percent more compared to non-treated firms (4.8 percent on annual basis). The likelihood of participation is higher for firms with TUs or local TUs and when the local labour market conditions deteriorate. In contrast, firm-level contracting is less likely for private firms, for firms in sectors with higher hourly

wage rates and higher return on assets, and in higher unemployment regions. Regarding wage floor outcomes, we observe that in all specifications the inverse Mills ratio is negative and statistically significant. In addition, the OLS estimates are smaller than the selectivity corrected ones, indicating that wage reductions are higher when selection is being accounted for. This implies that firms who decide to engage in firm-level bargaining are more prone to wage reductions due to several sources of heterogeneity such as productivity and profitability factors. In other words, firms from sectors with low productivity and low profitability have a higher probability of firm-level contracting. However, conditional on participation these factors are associated with higher wage floors.

[Table 5 about here]

The preceding analysis indicated a post-reform shift towards a more decentralised wage bargaining structure which in turn resulted in increased wage flexibility. This implies that aligning wages to productivity may contribute in higher employment levels. We estimate alternative model specification (difference-in-differences) in order to test this assumption regarding the effect of decentralized negotiations on firm-specific employment. We identify two periods, one before (2006-2011) and one after the reform (2012-2016) and define two groups of firms. The treated group consists of firms that signed their first firm-level agreement post-reform (after November 2011) and the control group consists of all other firms. According to our results (Table 6) treated firms exhibit a 10 percent increase in employment during the post-reform period. This implies that the increased wage flexibility induced by the 2011 reform is associated with a positive impact on employment. This finding is robust to alternative model specifications although it should be interpreted with caution due to imperfections in the measurement of our outcome variable and data limitations.

[Table 6 about here]

14

5 Conclusions

Decentralised collective bargaining is commonly used as a wage setting mechanism to align wages and employment to prevailing economic conditions, especially during economic downturns. This paper is the first to examine the impact of a 2011 industrial relations reform in Greece (Law 4024/2011) on the probability of firm-level contracting, on bargained wage outcomes and employment. Before the 2011 reform, firm-level negotiations between the employer and the labour side, represented by typical trade unions, were uncommon for firms employing less than 50 employees. After the reform firms with less than 50 employees can engage in firm-level negotiations if their employees are represented by either a trade union or an association of persons. Moreover, after the reform, wages set at the firm level can deviate below thresholds set at broader levels of bargaining, i.e. sectoral and occupational, but not the national minimum wage one.

This setting allowed us to examine the impact of the reform by applying a difference-in-differences estimation strategy using firms with more than 50 employees as the control group and firms with less than 50 employees as the treatment group. We use the universe of firm-level collective agreements signed in Greece during the period 2006-2016 and match this information to firm-specific characteristics not only for firms covered by firm-level contracts but also for those not covered. Using linear probability and probit models we find that the probability of firm-level contracting increased about 4.8 percent the first post-reform year for treated firms. We modelled bargained wage outcomes, using OLS and Heckman corrected models to account for non-random sorting of firms into decentralised negotiations. Our estimated difference-in-differences parameters suggest that that nominal wage floors decreased by about 12 percent for firms in the treatment group during the first year after the reform. Our results are robust to the inclusion of industry and time fixed effects and their interactions, as well as to additional covariates that capture firm-specific heterogeneity, local economic

conditions, inter-sectoral differences and synchronisation with broader levels of collective bargaining. Moreover, we document a 10 percent increase in employment for firms that signed a firm-level contract after the reform for the first time, although we cautiously interpret the results due to possible imperfection in the measurement of employment.

Overall our paper is a first empirical examination regarding the impact of the 2011 reform using a uniquely developed firm-level dataset. This will allow us to examine, in future research, how wages and employment have responded during an institutionally eventful period were several reforms, e.g. the reduction in the national minimum wage, have been implemented to deal with the economic crisis and the structural deficiencies of the Greek economy.

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Figures

Figure 1. Evolution of the frequency of firm level contracting for treated and non-treated firms
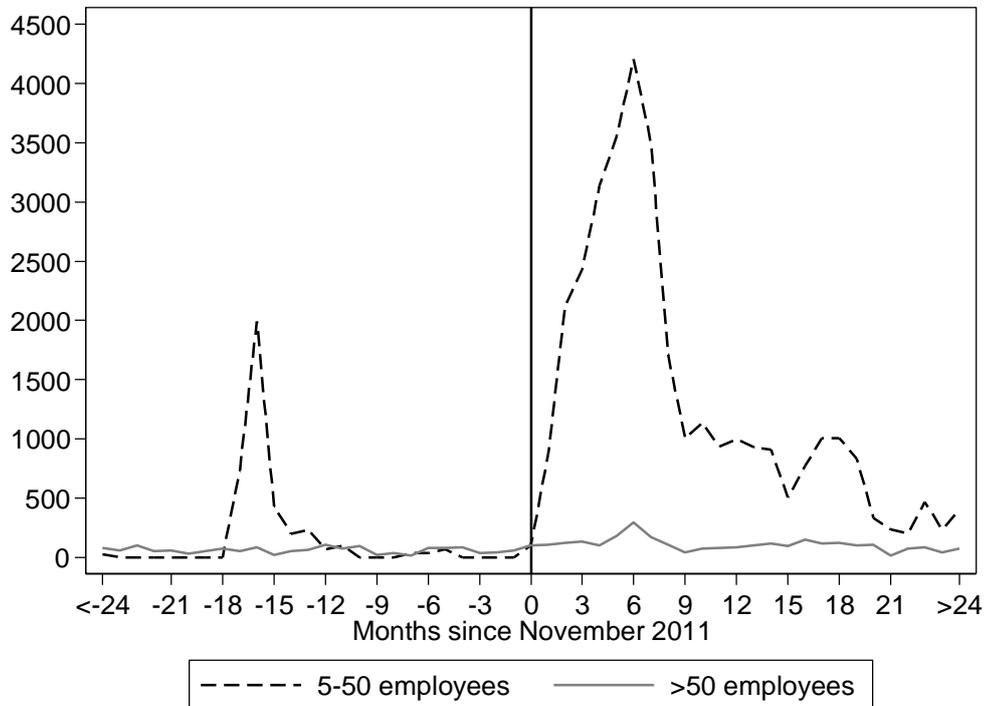
Source: Ministry of Labour, Social Security and Welfare, Greek Organisation for Mediation and Arbitration (OMED) and authors' calculations.
Notes: Vertical line indicates the implementation of Law 4024/2011.

Figure 2. Timing of national collective bargaining, institutional reforms in collective bargaining and within-year monthly frequency of firm-level bargaining
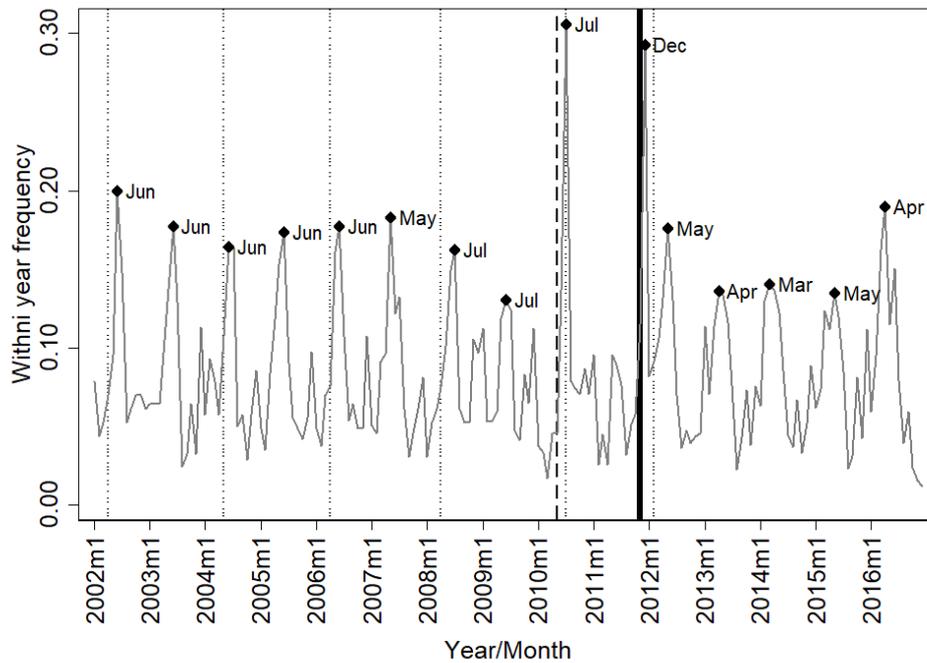
Source: Ministry of Labour, Social Security and Welfare, Greek Organisation for Mediation and Arbitration (OMED) and authors' calculations.

Notes: Black vertical dotted lines indicate the months in which statutory national miniumum wages through national collective bargaining were signed. The black vertical dash line, specified at 2010m05, indicates the implementation of Law 3899/2010. The black vertical solid line, specified at 2011m11, indicates the implementation of Law 4024/2011.

Figure 3. Wage floor for treated and non-treated firms before and after the reform
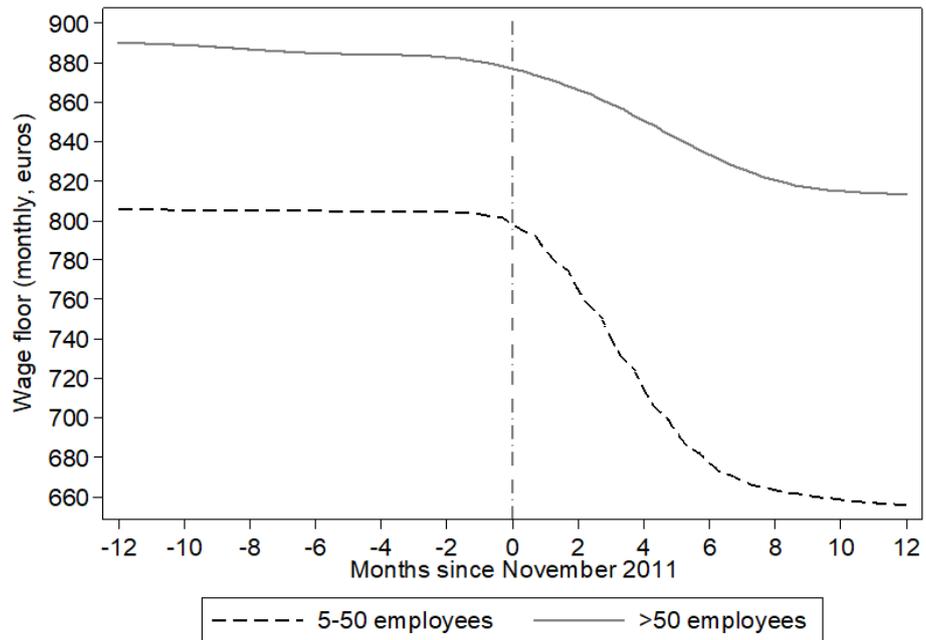
Figure 4. Wage floor change for treated and non-treated firms before and after the reform

Source: Ministry of Labour, Social Security and Welfare, Greek Organisation for Mediation and Arbitration (OMED) and authors' calculations.
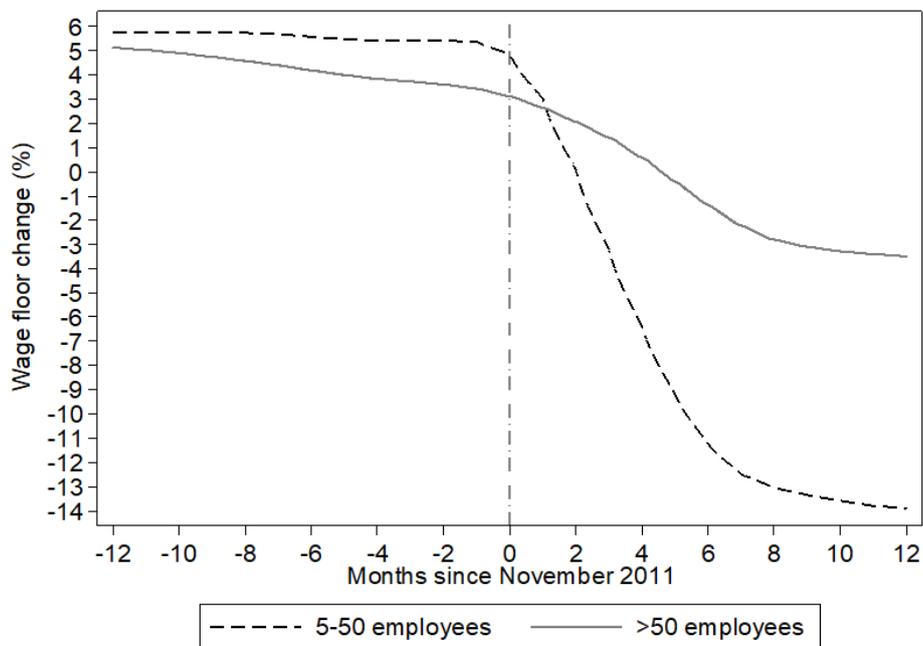*Notes:* Local polynomial smooth plot. Vertical line indicates the implementation of Law 4024/2011.

Tables

Table 1. Summary statistics and differences in firm-level bargaining outcomes before and after the reform

	Control (>50 employees)			Treated (5-50 employees)			Difference[1]
	Pre [1]	Post [2]	Difference[1] [3]: [2]-[1]	Pre [4]	Post [5]	Difference[1] [6]: [5]-[4]	[6] – [3]
Firm-level bargaining (0/1)	.0039	.0045	.0006***	.0002	.0017	.0015***	.0009***
	(.0001)	(.0002)	(.0002)	(.0001)	(.0001)	(.0001)	(.0001)
Wage floor (€, monthly)	869.15	800.65	-67.81***	829.68	648.56	-181.61***	-112.80***
	(1.38)	(1.04)	(1.76)	(3.14)	(.45)	(2.22)	(3.07)
Wage floor (ln, monthly)	6.752	6.664	-.087***	6.707	6.463	-.244***	-.156***
	(.002)	(.001)	(.002)	(.003)	(.001)	(.002)	(.004)
Wage floor change	.0614	-.0279	-.0894***	.0595	-.1206	-.1800***	-.0908***
	(.0004)	(.0006)	(.0009)	(.0005)	(.0005)	(.0005)	(.0024)
5-50 employees (0/1)	-	-	-	1.000	1.000	-	-
				(0.000)	(0.000)		
51-100 employees (0/1)	.4680	.4562	-	-	-	-	-
	(.0011)	(.0012)					
More than 100 employees (0/1)	.5320	.5438	-	-	-	-	-
	(.0011)	(.0012)					
Private company (0/1)	.9600	.9400	-	.9759	.9655	-	-
	(.0005)	(.0005)		(.0002)	(.0002)		
Average hourly wage (€)	3.2650	3.1085	-	3.229	3.0723	-	-
	(.0004)	(.0005)		(.0002)	(.0002)		
Return on assets	-.0279	-.0257	-	-.0311	-.0299	-	-
	(.0001)	(.0001)		(.0001)	(.0001)		
Price cost margin	-.0357	-.0194	-	-.0411	-.0244	-	-
	(.0001)	(.0001)		(.0003)	(.0004)		
Local unemployment rate	.1036	.2568	-	.1052	.2559	-	-
	(.0001)	(.0001)		(.0001)	(.0002)		
Local unemployment growth	.1119	.0747	-	.1131	.0803	-	-
	(.0006)	(.0005)		(.0002)	(.0002)		
Sectoral wage agreement (0/1)	.8301	.7948	-	.8245	.7923	-	-
	(.0009)	(.0010)		(.0004)	(.0004)		
Company Trade Union (0/1)	.0705	.1300	-	.0010	.0020	-	-
	(.0006)	(.0008)		(.0001)	(.0001)		
Local Trade Union (0/1)	.0013	.0046	-	.0019	.0138	-	-
	(.0001)	(.0002)		(.0001)	(.0001)		
Association of persons (0/1)	-	.0225	-	-	.0537	-	-
		(.0004)			(.0002)		
Eastern Macedonia and Thrace	.0272	.0333	-	.0325	.0345	-	-
	(.0003)	(.0004)		(.0002)	(.0002)		
Central Macedonia	.1271	.1345	-	.1470	.1633	-	-
	(.0007)	(.0008)		(.0003)	(.0004)		
Western Macedonia	.0063	.0093	-	.0120	.0134	-	-
	(.0001)	(.0002)		(.0001)	(.0001)		
Thessaly	.0312	.0351	-	.0387	.0397	-	-
	(.0004)	(.0004)		(.0002)	(.0002)		
Epirus	.0121	.0136	-	.0166	.0200	-	-
	(.0003)	(.0002)		(.0001)	(.0001)		
Ionian Islands	.0046	.0046	-	.0162	.0143	-	-
	(.0001)	(.0001)		(.0001)	(.0001)		
Western Greece	.0204	.0232	-	.0348	.0341	-	-
	(.0003)	(.0003)		(.0002)	(.0002)		
Central Greece	.0427	.0379	-	.0548	.0497	-	-
	(.0379)	(.0004)		(.0002)	(.0002)		
Peloponnese	.0191	.0206	-	.0273	.0279	-	-
	(.0003)	(.0003)		(.0002)	(.0002)		
Attica	.6709	.6478	-	.5472	.5287	-	-
	(.0011)	(.0011)		(.0005)	(.0005)		
North Aegean	.0043	.0053	-	.0106	.0099	-	-
	(.0001)	(.0001)		(.0001)	(.0001)		
South Aegean	.0041	.0047	-	.0084	.0124	-	-
	(.0001)	(.0001)		(.0001)	(.0001)		
Crete	.0296	.0297	-	.0533	.0506	-	-
	(.0004)	(.0004)		(.0002)	(.0002)		
Manufacturing, mining	.1288	.1367	-	.1207	.1221	-	-
	(.0007)	(.0008)		(.0003)	(.0003)		
Water supply; sewerage, etc.	.0157	.0205	-	.0067	.0066	-	-
	(.0003)	(.0003)		(.0008)	(.0001)		
Construction	.0046	.0114	-	.0113	.0315	-	-
	(.0001)	(.0002)		(.0001)	(.0002)		

Wholesale and retail trade	.3161	.2932	-	.3996	.3695	-	-
	(.0011)	(.0011)		(.0005)	(.0005)		
Transportation and storage	.0567	.0599	-	.0420	.0447	-	-
	(.0005)	(.0006)		(.0002)	(.0002)		
Accommodation and food	.0478	.0476	-	.0798	.0823	-	-
	(.0005)	(.0005)		(.0002)	(.0003)		
Financial services	.0557	.0550	-	.0212	.0195	-	-
	(.0005)	(.0006)		(.0001)	(.0001)		
Real estate activities	.0355	.0430	-	.0407	.0478	-	-
	(.0004)	(.0005)		(.0002)	(.0002)		
Professional, scientific etc.	.1018	.0980	-	.0925	.0898	-	-
	(.0007)	(.0007)		(.0002)	(.0003)		
Administrative activities	.1388	.1320	-	.1240	.1200	-	-
	(.0008)	(.0008)		(.0003)	(.0003)		
Public administration	.0707	.0747	-	.0399	.0446	-	-
	(.0006)	(.0006)		(.0002)	(.0002)		
Other service activities	.0272	.0274	-	.0210	.0212	-	-
	(.0004)	(.0004)		(.0001)	(.0001)		
Observations	177,205	161,716	-	893,475	807,572	-	-

Source: Ministry of Labour, Social Security and Welfare, Greek Organization for Mediation and Arbitration (OMED) and ICAP (2006-2016). Authors' calculations.

Notes: Standard errors in parentheses. [1] OLS estimates. Wages are CPI deflated (2015=100).

*** p<0.01, ** p<0.05, * p<0.10

Table 2. Differential impact of reform on firm-level contracting

	OLS			Probit		
	[1]	[2]	[3]	[4]	[5]	[6]
Post × 5-50 employees	.0010***	.0010***	.0009***	.0015***	.0015***	.0014***
	(.0002)	(.0002)	(.0002)	(.001)	(.001)	(.001)
Fixed effects	Size Year	Size Month	Industry × Size Industry × Year Month	Size Year	Size Month	Industry × Size Industry × Year Month

Source: Ministry of Labour, Social Security and Welfare, Greek Organization for Mediation and Arbitration (OMED) and ICAP (2006-2016). Authors' calculations.

Notes: Observations (monthly)=2,039,968. Firms=22,909. The post-reform period dummy takes the value of 1 for the period November 2011-December 2016 and 0 for the period January 2006-October 2011. In columns 4-6 probit marginal effects are reported (Puhani, 2012). Industry dummies correspond to NACE Rev. 2, 1 digit and size dummies to 3 categories of firm-size, i.e., 5-50 employees, 51-100 employees and more than 100 employees.

*** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table 3. Differential impact of reform on wage floor outcomes

	Wage floor level			Wage floor change		
	[1]	[2]	[3]	[4]	[5]	[6]
Post × 5-50 employees	-.149***	-.155***	-.110***	-.101***	-.100***	-.080***
	(.024)	(.024)	(.024)	(.006)	(.006)	(.008)
Fixed effects	Size Year	Size Month	Industry × Size Industry × Year Month	Size Year	Size Month	Industry × Size Industry × Year Month

Source: Ministry of Labour, Social Security and Welfare, Greek Organization for Mediation and Arbitration (OMED) and ICAP (2006-2016). Authors' calculations.

Notes: Observations (monthly)= 96,813. Firms=1,538. The post-reform period dummy takes the value of 1 for the period November 2011-December 2016 and 0 for the period January 2006-October 2011. Industry dummies correspond to NACE Rev. 2, 1 digit and size dummies to 3 categories of firm-size, i.e., 5-50 employees, 51-100 employees and more than 100 employees. Wage floors are CPI deflated (2015=100).

*** p<0.01, ** p<0.05, * p<0.10

Table 4. Differential impact of reform on wage floor outcomes (corrected for sample selection)

	Wage floor level			Wage floor change		
	[1]	[2]	[3]	[4]	[5]	[6]
Post × 5-50 employees	-.151***	-.156***	-.132***	-.098***	-.100***	-.050***
	(.020)	(.021)	(.031)	(.006)	(.007)	(.009)
Inverse Mills Ratio	-.209***	-.204***	-.182***	-.132***	-.128***	-.058***
	(.007)	(.008)	(.014)	(.005)	(.005)	(.005)
Fixed effects	Size Year	Size Month	Industry × Size Industry × Year Month	Size Year	Size Month	Industry × Size Industry × Year Month
Exclusion restriction			Bargaining type			

Source: Ministry of Labour, Social Security and Welfare, Greek Organization for Mediation and Arbitration (OMED) and ICAP (2006-2016). Authors' calculations.

Notes: Observations (monthly)=2,915. Firms=1,538. The post-reform period dummy takes the value of 1 for the period November 2011-December 2016 and 0 for the period January 2006-October 2011. Industry dummies correspond to NACE Rev. 2, 1 digit and size dummies to 3 categories of firm-size, i.e., 5-50 employees, 51-100 employees and more than 100 employees. The Inverse Mills Ratio corresponds to specifications (4-6) reported in Table 2. Bargaining type (included only in probit equations) corresponds to whether a company trade union or a local trade union operates within firm (fixed effect). Wage floors are CPI deflated (2015=100).
*** p<0.01, ** p<0.05, * p<0.10

Table 5. Differential impact of reform on wage floor outcomes (sample selection correction with additional controls)

	Firm-level bargaining		Wage floor level				Wage floor change			
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
	Jan 2011-Dec 2016	Nov 2010-Dec 2012	Jan 2011-Dec 2016	Nov 2010-Dec 2012	Jan 2011-Dec 2016	Nov 2010-Dec 2012	Jan 2011-Dec 2016	Nov 2010-Dec 2012	Jan 2011-Dec 2016	Nov 2010-Dec 2012
	Probit		OLS		Heckman		OLS		Heckman	
Post × 5-50 employees	.0015***	.0040***	-.132***	-.110**	-.121***	-.193***	-.045***	-.033*	-.041***	-.086***
	(.001)	(.0001)	(.034)	(.061)	(.032)	(.066)	(.009)	(.019)	(.009)	(.022)
Private company	-.0004**	-.0008***	-.038***	-.038*	.003	.003	-.013***	-.005	.001	.020
	(.0002)	(.0004)	(.016)	(.021)	(.017)	(.020)	(.004)	(.012)	(.005)	(.013)
Average hourly wage	-.0008**	-.0024***	.222***	.263***	.140***	.155***	.089***	.172***	.062***	.103***
	(.0003)	(.0007)	(.037)	(.036)	(.033)	(.034)	(.014)	(.023)	(.014)	(.021)
Return on assets	.0006	-.0333***	.876**	.919**	.643**	1.722***	.084	-.071	.006	.412***
	(.0026)	(.0081)	(.373)	(.397)	(.343)	(.402)	(.088)	(.193)	(.087)	(.195)
Price cost margin	-.0038**	.0012	.146	-.032	.029	-.445*	-.122	-.129	-.62**	-.397***
	(.0017)	(.0041)	(.243)	(.255)	(.231)	(.245)	(.092)	(.158)	(.090)	(.152)
Local unemployment rate	-.0010**	-.0057***	.082	.081	.093	.143	.012	-.033	.016	0.283
	(.0003)	(.002)	(.052)	(.100)	(.055)	(.099)	(.016)	(.078)	(.017)	(.076)
Local unemployment growth	.0006***	.0025***	-.032	-.007	-.056*	-.045	.010	.042	.002	.008
	(.0002)	(.0009)	(.033)	(.054)	(.031)	(.051)	(.017)	(.034)	(.017)	(.032)
Sectoral wage agreement	-.0001	.0004	.034**	.024	.030*	-.004	.014***	.029***	.013***	.008
	(.0001)	(.0003)	(.017)	(.015)	(.016)	(.014)	(.005)	(.008)	(.005)	(.008)
Company Trade Union	.0391***	.0378***	-	-	-	-	-	-	-	-
	(.0025)	(.0037)								
Local Trade Union	.0170***	.0245***	-	-	-	-	-	-	-	-
	(.0016)	(.0029)								
Inverse Mills Ratio	-	-	-	-	-.166***	-.192***	-	-	-.056***	-.121***
					(.015)	(.016)			(.005)	(.010)
Observations	2,039,968	415,163	2,912	1,130	2,912	1,130	2,912	1,130	2,912	1,130
Fixed effects	Industry × Size Industry × Year Month									

Source: Ministry of Labour, Social Security and Welfare, Greek Organization for Mediation and Arbitration (OMED) and ICAP (2006-2016). Authors' calculations.

Notes: The post-reform period dummy takes the value of 1 for the period November 2011-December 2016 and 0 for the period January 2006-October 2011. For the period November 2010-November 2012 the post period dummy indicator takes the value of 1 for the period November 2011-November 2011 and 0 otherwise. Industry dummies correspond to NACE Rev. 2, 1 digit and size dummies to 3 categories of firm-size, i.e., 5-50 employees, 51-100 employees and more than 100 employees. The Inverse Mills Ratio is derived from the probit model specification reported in Columns 1 and 2 depending on the period of analysis. In columns 1-2 probit marginal effects are reported (Puhani, 2012). Wage floors are CPI deflated (2015=100). All models include regional fixed effects (NUT2)
*** p<0.01, ** p<0.05, * p<0.10

Table 6. Differential impact of firm-level bargaining on employment

	[1]	[2]	[3]
Treatment: firm-level bargaining (observations: 21,242, firms: 10,621)			
Post × Firm-level contract	.111***	.109***	.106***
	(.025)	(.024)	(.027)
Post	.007	.007	.004
	(.005)	(.005)	(.086)
Firm-level contract	.844***	.869***	.814***
	(.064)	(.062)	(.063)
Industry	No	Yes	Yes
Region	No	Yes	Yes
Post × Industry	No	No	Yes

Source: Ministry of Labour, Social Security and Welfare, Greek Organization for Mediation and Arbitration (OMED) and ICAP (2006-2016). Authors' calculations.
Notes: OLS estimates reported. In parentheses, heteroskedasticity corrected standard errors with clustering at the level of firm. Pre-reform period is 2006-2011 and post-reform period is 2012-2016. Employment (ln) refers to average employment per period for each firm. Sample consists of firms with valid number of employees (and firm size with 5 or more employees) observed in both periods.
*** p<0.01, ** p<0.05, * p<0.10