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Decentralized Bargaining and the Greek Labour Relations Reform (Law 4024/2011)

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Abstract

We investigate decentralized collective bargaining in Greece (2002-2016) under the industrial relations reform implemented in 2011. We match administrative data on firm-level contracts with non-participating firms to estimate determinants of decentralized bargaining before and after the reform. Decentralized bargaining increased in the post-reform period depending on firm size, industry and location. Nominal wage floors downgraded after 2011 in contacts signed by association of persons rather than trade unions. A base wage premium of 22 percent is found in favour of trade unions. Firm-level bargaining with trade unions is expected to promote decentralized bargaining with outcomes linked to firm-specific characteristics.

JEL codes: J31; J41; J52

Keywords: Labour relations; Decentralized collective bargaining; Nominal wages; Reform; Greece

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1 Introduction

The institutional aspects of the collective bargaining system play a central role in the determination of nominal wage rigidities. Through collective negotiations firms and their employees agree upon adjusting the wage level to their productivity and other shocks affecting the firm and the market into which it operates. It is well established that under normal economic circumstances nominal wage floors rarely adjust downwards. However, Daouli et al. (2016) show that during deep and prolonged recessions, such in the case of Greece, the majority of wage floors defined in firm-level collective agreements downgraded due to firm-specific attributes and specific institutional factors. More specifically, a major restructuring of the Greek labour relations framework was implemented in October 2011 (Law 4024/2011) which re-defined the limits within which base wages can oscillate and allowed workers in small-sized firms to negotiate over wages at the firm level. Its stated objective was to confront the longstanding wage rigidities and bring labour costs in line with firm-specific productivity and the prevailing labour market conditions. In particular, the reform allowed workers in firms that do not meet the requirements (more than 50 workers) for the establishment of a typical trade union (TU) to form associations of persons (AP) and participate into firm-level wage negotiations, as long as they represent at least 3/5 of the total workforce. Given the right-skewed firm-size distribution of the Greek economy the reform targeted in expanding the institution of firm-level bargaining and facilitating the wage adjustment process for the largest part of the private sector of the economy. In addition, it allowed for contractual base wages to deviate below thresholds set at broader levels of collective bargaining (i.e. sectoral, occupational and regional) but not below the national minimum wage (NMW) one.

Shortly after the reform of the collective bargaining framework a dramatic increase in the number of firm-level contracts was observed. A detailed description of the structure of decentralized bargaining before and after the reform is provided in Daouli et al. (2013; 2016) and Vorketisian and Kornelakis (2014). According to the Ministry of Labour, Social Security and Welfare, the number of firm-level agreements spiked to 976 in 2012 while this number ranged between 63 and 242 in the period 1991-2011 and between 263 and 409 in the period 2013-2016. At the same time, the number of

national-wide sectoral and occupational agreements and region-specific occupational agreements was considerably lower in the post-reform period. In addition, the coverage by collective agreements fell sharply from 83% in 2009 to 42% in 2013 with a clear further downward trend (van Ours et al. 2016). With respect to the wage settlements in decentralized bargaining, using a unique dataset with firm-level contracts for the period 2010-2013, Daouli et al. (2016) show that the direction of base wage changes in the post-reform period became negative due to the intention of firms to adopt massive reductions following the reduction of the NMW set by the state (it was cut by 22% for workers above 25 years old and 32% for workers under 25 years old). Furthermore, they found that nominal base wages were reduced after the reform, especially in firms in which workers were represented by AP, rather than typical TU (around 7.4%). While there is an increasing interest in the future of decentralized collective bargaining outcomes in Greece (van Ours et al. 2016) little is known about the real effects of the 2011 reform on the wage floors. In this paper we extend the analysis of Daouli et al. (2016) by using a much larger dataset of firm-level contracts which is spanned in a longer time period (2002-2016) capturing adequately the firm-level bargaining landscape before and after the reform. Also, our analysis includes firms not engaged in decentralized negotiations that are used as a reliable counterfactual scenario in order to estimate the determinants of firm-level contracting before and after the introduction of the new labour relations framework. Finally, we analyse the wage adjustment process at the firm level by exploring the association of bargained outcomes with the labour relations reform, the role of associations of persons and the subsequent decrease of the NMW imposed by the government.

Our empirical analysis is based on the development of a unique dataset containing the official firm-level collective agreements signed in Greece during the period 2002-2016. The importance and superiority of contract data as compared to survey data while analysing downward wage rigidities has been highlighted in several seminal studies (Christofides and Stengos, 2003; Druant et al., 2012; Le Bihan et al., 2012). These firm-level agreements are publicly available in raw format by the Ministry of Labour, Social Security and Welfare and the Greek Organisation for Mediation and Arbitration (OMED). They contain detailed information for 3,893 contracts regarding the (a) type of representation, (b) timing and duration of each contract, (c) wage settlements and (e) the place of the agreement, business name and tax identification

number of each firm. Using the latter, we matched each firm engaged in decentralized negotiations to additional attributes, i.e. number of employees, sectoral affiliation and ownership. This information is drawn from the iMentor database that covers all firms operating in Greece providing information on business demographics and balance sheet data.

We found that firm-level contracting exhibits a substantial degree of heterogeneity with respect to some basic observable characteristics, i.e. firm size, location, industry, market power and performance indicators, and this heterogeneity becomes more dispersed during the post-reform period. According to our findings the objective of the reform to engage a higher share of firms and workers in decentralised bargaining has been accomplished. Furthermore, we show that the observed nominal base wage changes occurred mostly in firms where workers were represented by AP while the adjustment process in firms where workers were organized in TU has been much more moderate. In addition, most of the firm-level contractual agreements signed in the post-reform period are associated with base-wage reductions linked to firm-specific characteristics and to the reduction of the NMW imposed by the government in 2012.

The contribution of this study is threefold. First, it uses contractual data to offer a first formal assessment of the impact of firm level collective bargaining on wage adjustments in a European economy with considerable downward wage rigidities. We should note that while the relevant research focuses at the determinants of firm-level contracting in Canada, the United States and some European countries (Christofides and Stengos, 2003; Card and del la Rica, 2006; Avouyi-Dovi et al. 2013; Daouli, 2013; 2016) none of them examine wage floor adjustments for a long time period during which a reform has implemented with a sharp reduction in the NMW. The importance of nation-wide base wage floor for the investigation of the determinants of wage floor adjustments is recently highlighted by Fougere et al. (2016) but in the context of industry-level agreements in France. Second, it provides detailed evidence on negotiated base-wage adjustments associated with a reformed collective bargaining regime in a recessionary period. Third, it explores the impact of a new form of workers' representation (AP) on collectively bargained wage outcomes.

The remainder of the paper is organized as follows. Section 2 presents the data and provides a brief description on the specific attributes of firm-level contracting before and after the reform. Section 3 outlines the strategy regarding the empirical modelling of firm-level contracting and the associated base wage adjustments. Section 4 presents the empirical results and Section 5 concludes.

2 Data and descriptives

2.1 Data Sources

In order to examine the variation of nominal base-wage outcomes in Greece during the period 2002–2016 we utilize contractual data pertaining to the universe of the official contracts of decentralized firm-level collective agreements (firm-level contracts Greek database, FLCGDB). The dataset has been developed by using (a) information extracted from the registry maintained by the Ministry of Labour, Social Security and Welfare (YPAKP) for the period 2002-2008 (b) the publicly available agreements from the website of the Ministry of Labor, Social Security and Welfare covering the period 2010-2016 and (c) the publicly available agreements 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 the name of the firm and the signing date.

The database contains 3,893 contracts with information on the business name, the place of agreement and the signing and effective dates. For those contracts signed during the period 2002-2005 we are not able to identify specific provisions on base wage outcomes since we have access only on the registry maintained by the YPAKP (we do not handle the core document of the contract). However, for the period 2006-2016 we are able to extract detailed additional information on the type of representation (TU or AP) and base wage settlements (change and/or level of base wages and adoption of NMW) since those contracts are publicly available by two official webpages (YPAKP and OMED). For this period the number of contracts is 3,364 and base wage provisions are included in more than 85% of the contracts (2,912). Regarding the period 2002-2016 we were unable to identify the tax identification number (based on the company name) for 220 contracts corresponding to 5.6% of the total sample. For those contracts with a valid tax identification number

we were able to find for each firm the sector of economic activity (4-digit NACE Rev 1.1.), the number of employees, the year of establishment, the legal form and the firm ownership status. The matching of this information was based on the tax identification number and it has been made possible due to the access granted from Infobank Hellastat S.A. (IBHS) to its iMentor online search engine. IBHS is a major business information provider and iMentor covers all firms operating in Greece providing information on their basic characteristics, balance sheet data, contact details etc. Given the increased incidence of decentralized agreements in the post-reform period, the constructed database enables us to investigate the structure of firm-level collective bargaining in the post reform period.

2.2 Descriptive statistics

Figure 1 displays the evolution of firm-level contracting in the Greek labour market. The data cover the period from 1990 when decentralized negotiations were originally introduced to the Greek labour relations system until 2016 which is the latest year available. The grey bars represent the annual number of signed firm-level agreements as those are provided by the registry maintained by YPAKP. The red bars represent the number of signed contracts according to the online OMED resources and the black bars represent the subset of those contracts that contain base wage provisions as there is a small number of agreements each year referring to organizational issues, internal regulations, insurance schemes etc. The total number of contracts was fairly stable with about 160 contracts each year during the pre-reform era. Hence, firm-level contracting was not very popular in the Greek labour market mostly because of the firm-size restriction imposed by the early 90's industrial relations law (Law 1876/1990). However, their number was rapidly increased in 2012 which was the first year of the reform (Law 4024/2011, October) and then was decreased again during the more recent years but to a much higher average, around 270 contracts per year, as compared to its pre-reform level.

<FIGURE 1 HERE>

Table 1 provides evidence on the structure of firm-level bargaining, using information from the FLCGDB for contracts with base wage settlements. We define three sub-periods in order to show the changing structure of collective bargaining in Greece

across periods of significant events that affected the economic activity in Greece. The first refers to the period 2006m1-2010m4 which is denoted as a period that has not been affected by policy interventions in the wage formation process, the second period (2010m5-2011m10) refers to a pre-reform one during which a fiscal consolidation agenda started being implemented (1st Memorandum of Understanding between the Greek government and the Troika) and the third is the post-reform period (2011m11-2016m12). For the last period descriptive statistics are disaggregated by the type of workers' representation (TU or AP) since the AP is a new wage bargaining entity introduced by Law 4024/2011.

Regarding the duration of firm-level contracts before the reform, the majority of them are one-year agreements with their frequency being increased during the second sub-period before the reform. However, during the post-reform period, AP sign contracts with longer duration, i.e. more than two years, and more open-ended contracts (see also Figure 2). This may indicate that the formation of base wages in the framework of firm-level bargaining is a tool for avoiding pressure at the workplace during a period of increased uncertainty. The firm-size distribution of firm-level contracting has changed considerably between the two pre-reform sub-periods. During the first one, firm-level contracting was more prevalent across large firms as it was more likely to have their workforce organized around a TU which is also dependent on the number of employees. However, during the second sub-period smaller firms that were facing severe financial problems were also allowed to sign special firm-level agreements with their base wages set below the sectoral/occupational thresholds (Law 3899/2010). As a result, nearly one half of the signed labour contracts come from the smaller size category while the frequency of firm-level contracting is reduced in the two larger size bands. However, during the post-reform period we observe that the vast majority (79.5%) of small firms (1-49 employees) negotiated for base wages through an AP while the distribution of firm-level contracting with a TU exerts a higher dispersion across firm-size categories. The firm-age distribution has not changed very much between the two pre-reform sub-periods but in the post-reform period contracts signed by an AP correspond to younger firms. In addition, the majority of firms engaged in decentralized bargaining operate in the private sector and the incidence of firm-level contracting in firms affiliated with the government or local authorities is considerably smaller in the post-reform period. Also, contracts signed by

APs seem to concentrate exclusively in the private sector. Regarding the legal type of the firm we observe that nearly 11% of contracts refer to sole proprietorships in the second sub-period while no contracts exist for those firms in the first-sub period.

With respect to the sectoral distribution of firm-level contracting we observe that in the pre-reform period it was more evident in manufacturing firms, representing the 30% of the total agreements. Together with the transportations sector they cover nearly half of firm-level agreements signed in first period. A notable difference appears when looking in the second period (2010m5-2011m10) where there is a sharp increase of firm-level contracting in the manufacturing sector due to the reduced contracting incidence in the transportations and nearly every other sector of economic activity. During the third period, the sectoral distribution of firm-level contracting the data exhibits a more dispersed picture where, apart from manufacturing, labour contracts are signed in firms operating in the wholesale and retail trade sectors as well as in hotels and restaurants. It should be noted that in the case of AP the majority of contracts found in hotels and restaurants, wholesale and retail trade and manufacturing. On the other hand, the majority of contracts signed by TUs comes from the manufacturing sector. This indicates that the changing distribution of contracts across sectors of economic activity is due to the introduction of APs in wage negotiations. Lastly, the regional distribution of decentralized bargaining in the pre-reform period seems to be concentrated in highly urbanized areas (Attica and Central Macedonia) while in the post-reform period, firm-level agreements signed by APs are much more dispersed across regions.

<TABLE 1 HERE>

<FIGURE 2 HERE>

Figure 3 depicts the timing of firm-level contracting by focusing on the monthly distribution of contracts within the signing year. Panel (a) refers to the total number of signed contracts regardless whether they contain base wage provisions. In the pre-reform period the majority of firm-level contracts were signed in May or June (the same holds for the NMW agreement). However, the introduction of Law 4024/2011 was followed by a post-reform peak observed in December 2011 and firm-level contracting seems to occur in spring ever since. Looking on contracts with wage settlements by the type of workers' representation (period 2006-2016) we observe that

the peak observed in December 2011 is mainly due to firm level contracts signed by APs (Panel b) while firm-level agreements established by TUs peaked in July 2010 (Panel c).

<FIGURE 3 HERE>

Table 2 presents descriptive statistics with respect to the bargained base wage outcomes (change and level) by period and type of workers' representation. During the first period none of the contracts signed by TUs included downward adjustments and the vast majority of them (98%) were associated with base wage increases. This resulted to an average base wage increase of 6.6%. In the second period, 6.0% of contracts signed by TUs set lower base wages but the majority of them (69.3%) kept establishing base wage increases. It should be noted that the percentage of contracts with unchanged wages increased to 25%. This led to an average base wage change of 2.1%, considerably lower from the mean increase observed in the first period. An inversed picture emerged soon after the collective bargaining framework reform. Decreases in nominal base wages became more frequent in decentralized bargaining. More specifically, 36.3% of the total agreements led to reductions and 56.3% left them unchanged with the mean base wage reduction being 5.2%. Breaking down between TUs and APs reveals that these developments are mostly driven from bargaining in firms in which workers were organized in an AP. In particular, only 4.7% of those contracts led to higher base wages and nearly half of them led to reductions (8.3% on average). The wage adjustment process was more moderate when workers were represented by a TU, since 67% of those contracts left wages unaltered and only 9.9% of them led to wage increases (the mean base wage reduction was 2.7%). These differences are also found to be sound in terms of statistical significance, according to the reported *t*-statistics in the last column.

The above evidence is also apparent in Figure 4 where we plot the firm-specific bargained wage changes before and after the introduction of Law 4024/2011. There is only a handful of downward nominal base wage adjustments observed just before the reform although the general trend is negative, especially after 2009, when TUs started agreeing upon substantially smaller increases and even wage freezes. Yet, as observed in Figure 4, these differences in the bargained wage outcomes between TUs and APs seem to have occurred mainly shortly after the reform. The reduction in base wages is

more pronounced for contracts signed by APs as compared to those signed by TUs. In addition, the variation of outcomes seems to be higher in the post-reform period although the adjustments established by both the bargaining entities exhibit a similar upward trend during the most recent years of our dataset. It should be noted that this post-reform variation encapsulates two interrelated facts. The first, refers to the provisions of Law 4024/2011 regarding the ability of firm level contracts to adopt the NMW and the second refers to the abrupt reduction of the NMW implemented in February 2012. We explore these developments more formally in the empirical analysis that follows.

Table 2 also presents evidence on the base wage level. There is a statistically significant difference between TUs and APs possibly reflecting, among other things, productivity differences and changing wage bargaining structures across firms (see also Daouli et al. 2016). According to our dataset, base wages in agreements signed by APs are almost 25% lower than those signed by TUs. Thus, we are able to identify not only the the nominal base wage change established in decentralized negotiations but also to measure the base wage level.

<TABLE 2 HERE>

<FIGURE 4 HERE>

Figure 6 provides a vivid picture on the evolution of average nominal base wages in firm-level contracting in Greece during the period 2006-2016 using the NMW level as a comparable outcome. Data refer to the effective years of contracts and in the case of firm-level contracting, the unconditional mean estimate of nominal base wages (and its 95% confidence interval) is weighted by the number of employees at the level of the firm corresponding to each contract. We observe that contractual base wages in firms with TUs are 22% higher than the NMW both in pre- and post-reform periods while base wages in contracts signed by APs during the post-reform period are nearly identical to the NMW. This confirms the argument that the variation in the workers' representation type can be used as a firm-specific attribute that may identify the impact of the reform on base wage adjustment in decentralized bargaining.

<FIGURE 5 HERE>

<FIGURE 6 HERE>

3 Empirical Analysis

3.1 Determinants of Firm-Level Bargaining

While there is evidence on the determinants of firm level contracting in the relevant literature (Card and de la Rica, 2006), in Greece there is limited evidence due to lack of data (Daouli et al. 2013; 2016). The dataset developed for this study (FLCGDB) provides us the ability to observe whether a firm engages in decentralized collective bargaining (versus firms that did not participate). Hence, we rely on logistic regression models to estimate the probability of signing a firm-level collective agreement (FLC) conditional on some basic firm-specific characteristics. The baseline model can be specified as follows:

$$Prob (FLC_{it}=1|\mathbf{X}_{it}^k, \mathbf{YD}_t^T) = A(\beta^k \mathbf{X}_{it}^k + \gamma^T \mathbf{YD}_t^T + \varepsilon_{it}) \quad (1)$$

where, A is the logistic function linking the incidence of a firm-level contract in firm i at year t to a vector of k observable characteristics \mathbf{X}_{it}^k and a vector of T year dummies \mathbf{YD}_t^T in order to control for time effects that are common across all firms. The vector of observables, \mathbf{X}_{it}^k , includes indicators for the size of the firm as measured by the number of employees, the region (NUTS-II) where the firm is located, the 2-digit sector of economic activity (NACE Rev.1), the legal form of the firm, a Herfindahl-Hirschman index and indicators for the asset turnover ratio (sales and assets are CPI deflated, 2015=100). The last two variables have been calculated at the 4-digit level of economic activity and they have been included in order to control for the level of concentration in the market the firm is facing and its ability to make rent payments (Guertzgen, 2009; Breda 2015). The term ε_{it} corresponds to the disturbance indicator. In order to control for common variance components across firms, we report standard errors corrected for heteroskedasticity and clustering by region and 2-digit sector of economic activity. All estimations are weighted using the number of firms by 4-digit sector of economic activity as weights. The derived vector of estimates γ^T is expected to provide us adequate evidence on the differentiated behaviour of firm-level contracting across years. We expect that these estimates will be higher in the years after the reform (2011 and onwards) compared to the years before the reform (2002-2010).

However, the model specified in equation (1) is not informative about a possible differentiation regarding the determinants of firm-level contracting in the post-reform period as compared to the pre-reform one. As already shown in the descriptive analysis, the post-reform period has been characterized by a massive increase of firm-level contracts where firms with different characteristics were allowed to enter the decentralized wage setting process. Therefore, we utilize a more flexible model specification with interaction effects in order to estimate whether the incidence of decentralized collective agreements has increased in the post-reform period and whether firm-specific attributes affect it in a differentiated way. Hence, instead of year dummy variables we introduce a post-reform indicator (PD) taking the value of 1 for the period 2011-2015 and zero, otherwise (2002-2010). This model is specified as follows:

$$Prob (FLC_{it}=1|\mathbf{X}_{it}^k, PD_t) = A\{\boldsymbol{\beta}^k \mathbf{X}_{it}^k + \delta PD_t + \boldsymbol{\theta}^k (\mathbf{X}_{it}^k \times PD_t) + \varepsilon_i\} \quad (2)$$

The estimated value of δ will now provide evidence on whether the likelihood of firm-level contracting has changed in the post-reform period compared to the pre-reform period. In addition, the vector of estimates $\boldsymbol{\theta}^k$ will inform us on whether the estimated impact of observable characteristics, \mathbf{X}_{it}^k , is also differentiated between the pre- and post-reform periods.

3.2 Nominal Base Wage Adjustments

Next, we turn into modelling the bargained wage changes at the firm level which should take into account the censoring of the dependent variable. More specifically, base wage changes are not observed for the total sample of firms used in this study, but only for the sub-sample of firms engaged in decentralized collective negotiations at some point of time, before or after the reform. We deal with this issue using the two-step Heckman estimator (Heckman, 1979; Puhani, 2000) where in the first stage, a selection equation for the probability of a firm to engage in firm-level negotiations is estimated, as in model (1), and the regression equation for the bargained wage adjustments (given that $FLC=1$) is specified as follows:

$$\Delta W_{it} = \boldsymbol{\beta}^k \mathbf{X}_{it}^k + \gamma^T \mathbf{YD}_t^T + \varphi_0 AP_{it} + \varphi_1 NMW_{it} + \varphi_2^T (\mathbf{YD}_t^T \times AP_{it}) + \varphi_3^T (\mathbf{YD}_t^T \times NMW_{it}) + \mu \lambda_{it} + u_{it} \quad (3)$$

where, Δw_{it} is the bargained nominal base wage change specified in a contract corresponding to firm i at year t , \mathbf{X}_{it}^k is a vector of k observable characteristics as the one defined in equation (1), AP_{it} is a dummy indicator taking the value of 1 if the contract is signed by an AP and 0 if signed by a TU, NMW_{it} is a dummy indicator taking the value of 1 if the base wage outcomes specified in the contract are explicitly linked to the provisions set by the national collective bargaining agreement, $(\mathbf{YD}_{t \times AP_i}^T)$ are interaction terms that help us to uncover the evolution of bargained wage adjustments over time given that the collective agreement was signed by an AP, $(\mathbf{YD}_{t \times NMW_{it}}^T)$ are interaction terms that capture the changing behavior of base wage adjustments across time in terms of adopting the NMW, λ_{it} is the estimated non-selection hazard (inverse Mill's ratio) derived from estimating the selection equation (1), and u_{it} is the error term. We expect that contracts signed by an AP (as compared to TUs) will be associated (vector of estimated effects ϕ^{T_2}) by a much greater reduction in the years 2011-2013 (see Figure 4) than in the years 2014-2015 implying a greater downward adjustment in base wages due to the reform. We also expect that the downward adjustment will be affected the NMW reduction in February 2012 which was channeled into those contracts (signed either by TUs or APs) through their explicit adoption of the NMW floor (vector of estimated effects ϕ^{T_3}). Using this two-step modelling procedure, we make an attempt to avoid any biases due to the non-random selection of firms into this bargaining type. In this way, sample selection bias is corrected by taking into consideration whether a firm belongs to the non-random sample of contracts with base wage provisions.

4 Estimation Results

4.1 Determinants of Firm-Level Bargaining

Table 4 displays the results regarding the probability of a firm to sign a firm-level agreement over the period 2002-2015. We model this probability by estimating equation (1) across several samples and weighting the regressions by the total number of firms by 4-digit sector of economic activity (NACE Rev.1). In column 1 we use the total matched sample of the firms engaged in decentralized negotiations and those that did not participate in this level of bargaining. Regarding the evolution of firm-level contracting, the probability is significantly higher in 2012, significantly lower and

without a clear trend during the pre-reform, and not statistically different in 2013-2014 (the comparison year is 2015). With respect to firm size, the probability of firm level contracting is steadily increasing with the number of employees. It is much smaller for those firms for which information on the number of employees is not available, however, these are mainly very small firms which do not publish information about their size. Next, we examine how the contracting probability varies for firms located in different geographical regions as compared to those observed in Attica. For example, it is more likely for a firm located in Macedonia to sign a firm-level agreement while this is not statistically different for firms located in Peloponnese, West Greece and the Ionian Islands. Regarding the sectoral distribution, the incidence of decentralized agreements is particularly high in electricity, gas and water supply, hotels and restaurants and financial institutions (as compared to the constructions sector). A firm-level contract is more likely to be in effect in sole proprietorships as compared to all other legal forms. Finally, firms operating in sectors with a higher degree of market power are more likely to sign firm-level contracts while this probability is significantly lower for firms operating in low performance sectors (according to the asset turnover ratio).

In model 2 the sample is restricted to exclude firms that have not published any balance sheet data regarding sales over a 3-year period. This criterion has been imposed during estimations in order to exclude firms that may have exited from the market. The deleted observations refer to firms that did not participated in decentralized bargaining since we assume that those firms that signed a firm-level contract during a specific year are alive. This leaves us with a sample of 458,267 firms instead of the original one containing 1,412,052 observations. However, the estimated results lead to the same indications regarding the association between firm-level contracting and observable characteristics. The only notable change is that the estimated parameter for sole proprietorships is much higher confirming the fact that those firms are very small ones and do not publish data on their size. In model 3 we exclude those firms for which the number of employees is not available, leading to a further reduction of the utilized sample to 253,340 observations. However, the estimated coefficients and standard errors are remarkably similar to those of the previous column, providing reassurance that our results are not sensitive to the lack of this information or the omission of those firms from the estimation sample. Finally, in

model 4 we specify the model of the previous column but including an additional indicator on whether the firm was under a decentralized collective agreement during the previous year. As expected, it takes some bias out from nearly all the other estimated coefficients which still indicate towards the results already discussed. Moreover, the estimated coefficient of the lagged dependent variable indicates that the probability of firm-level contracting exhibits some degree of persistence since is largely determined from the existence of an agreement during the last year.

<TABLE 4 HERE>

Table 5 presents the estimated results of equation (2) using the adopted specification presented in column 4 of Table 4. This will allow us to see whether the observable characteristics of firms affect the probability of a firm-level collective agreement in a differentiated way during the post-reform period. According to the results, the probability of firm-level contracting is much higher after the reform and it still affected by the existence of an agreement in the last year although to a lesser extend in the second period. This implies that the persistence in firm-level bargaining becomes smaller in the post-reform period due to the inclusion of firms without any prior experience in firm-level agreements. Regarding the total number of employees, larger firms are less likely to sign a contract during the second period. However, smaller firms appear more likely to participate in decentralized negotiations given that Law 4024/2011 offered them this opportunity. This finding is depicted at Figure 6 where the predicted probability of firm-level contracting before and after the reform is plotted across firm size (with and without accounting for dynamics). In addition, for firms located in certain regions, i.e. Thessaly, Central Greece, West Greece and Ionian Islands, the contracting probability is not changed during the post-reform period, however, it has increased substantially for some others, e.g. Epirus and Aegean Islands, and it appears to be reduced for firms located in Peloponnese. After the implementation of Law 4024/2011 the contracting probability is lower in sectors such as transportation, real estate, health, education and other community services. This is mostly due to the fact that under the new regime, more firms from other sectors (and located in regions with a low incidence of firm-level contracts) tend to sign collective agreements, e.g. hotels and restaurants. With respect to characteristics referring to the legal status of the firm or the market power and the profitability of the

sector, there is not a statistically differentiation in the contracting probability during the post-reform period.

<TABLE 5 HERE>

<FIGURE 6 HERE>

4.2 Nominal Base Wage Adjustments

With respect to wage floor adjustments, Table 6 presents the results obtained from the estimation of equation (3) using the model specifications already presented in Table 4. More specifically, the results are obtained from a two-step Heckman selection model which corrects for the probability of a firm to engage in decentralized bargaining in the first stage. Since we are interested in the impact of the interaction terms we do not present estimates for the rest of the variables utilized during estimations. Focusing on the estimated effects of the interaction of the AP indicator with the year binary indicators, we show that that a reduction of 6.1% in the nominal base wages originates in 2012 which was the first year after the reform while no further adjustment is evident during the remaining years. This result is stable across different model specifications and sub-samples. With regard to the interaction effects between the indicator denoting adoption of the NMW and the year dummies we found that contracts linking their base wages to the existing NMW conditions, experience a further reduction of approximately 11% in base wages during 2011 and 2012. This finding is confirmed across all models reported in Table 6 and there is no evidence for further nominal base wage changes in most recent years. This is also apparent in Figure 7 where we have plotted the predicted base wage levels established after negotiations with TUs and APs, alongside with the evolution of the NMW. Base wage adjustments in firms where workers are represented by APs are following closely the evolution of the NMW. Moreover, the major adjustment process in those firms occurred in 2012 and no significant changes are observed since then. At the same time, a sizeable base wage premium is observed for workers in firms where workers have formed typical TUs instead of APs (around 22%). This premium seems to be quite stable in the periods before and after the reform, although a much smaller adjustment process has taken place in those firms as well after 2010.

<FIGURE 7 HERE>

5 Conclusions

This study investigates nominal contractual base-wage adjustments in Greece associated with the 2011 industrial relations reform. The reform redefined the limits within which base wages can oscillate and allowed to workers' associations to negotiate for wages at the firm level. The assessment covers the period 2002–2016 and is based on information extracted from the universe of firm-level contracts signed in this period. According to our results, the number of firm-level contracts increased dramatically shortly after the reform, now covering a larger pool of workers, especially from smaller firms. In order to examine the determinants of firm-level contracting, we matched the firms engaged in decentralized negotiations with firms that did not (2002-2015) and provided evidence on the factors shaping the incidence of a firm-level agreement. Furthermore, we showed that this probability is increased after the reform and its determinants appear to be differentiated between the pre and the post-reform period, especially regarding firm size and sector of economic activity.

With respect to the nominal base wage adjustments, we provided evidence regarding two very important features of the post-reform era, i.e. the ability of workers in small firms to form associations of employees and negotiate over wage issues and the sharp decrease in the national minimum wage in 2012. Taking into account the selection of firms into the decentralized level of collective bargaining, we showed that nominal base wage reductions are higher when workers are represented by an association of persons rather than a typical trade union. Moreover, our results indicate that these reductions occurred shortly after the reform without significant changes being observed in most recent years. From a policy perspective, firm-level bargaining with trade unions is expected to promote decentralized bargaining with outcomes linked to firm-specific characteristics.

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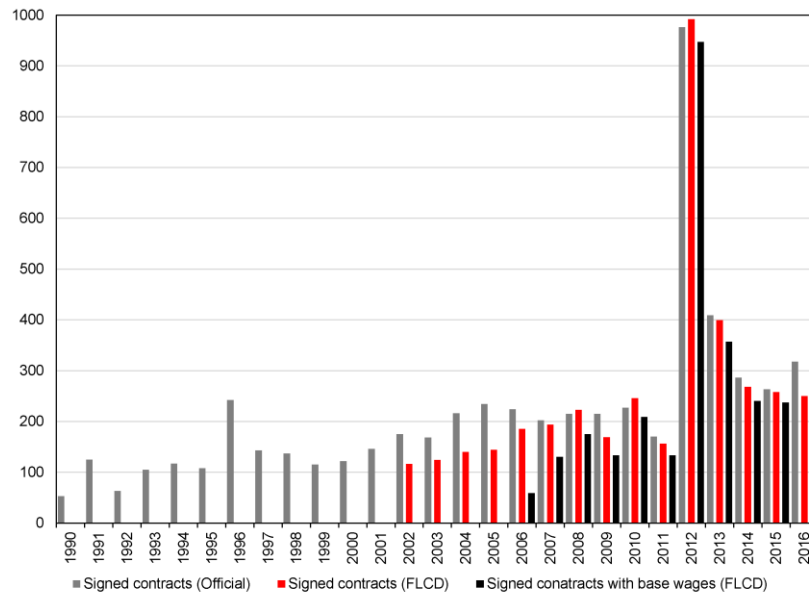
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Figures & Tables

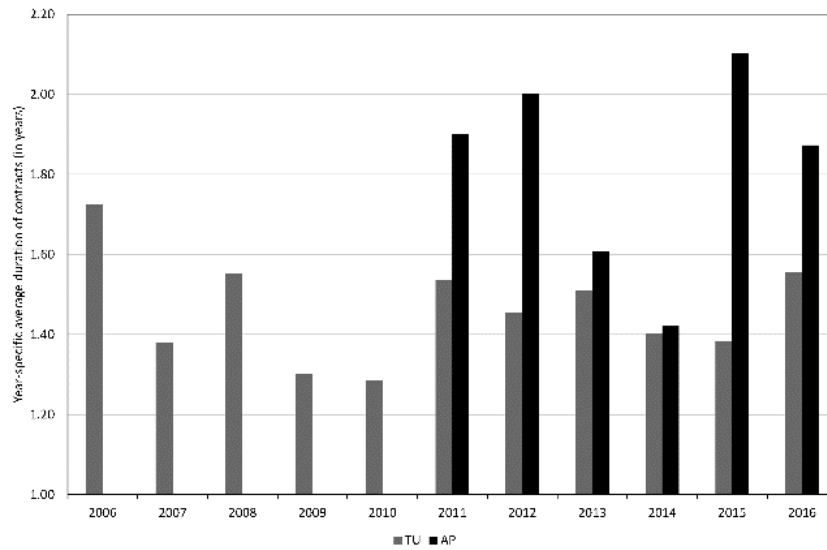
Figure 1 Evolution of firm-level contracting in Greece (1990-2016)



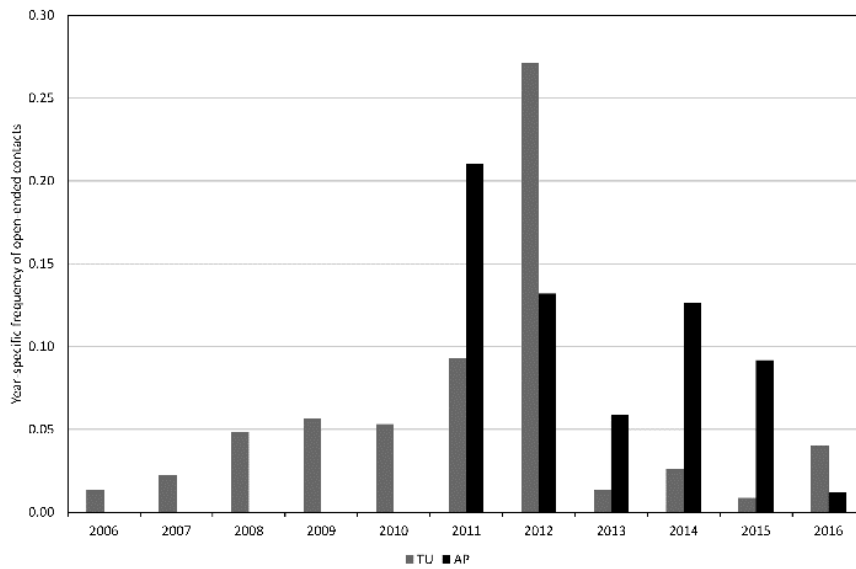
Source: Ministry of Labor, Social Security and Welfare and OMED (authors' calculations).

Figure 2 Duration of wage-setting firm-level contracts in Greece (2006-2016)

(a) Contact duration (in years) by the effective (starting) year of contract



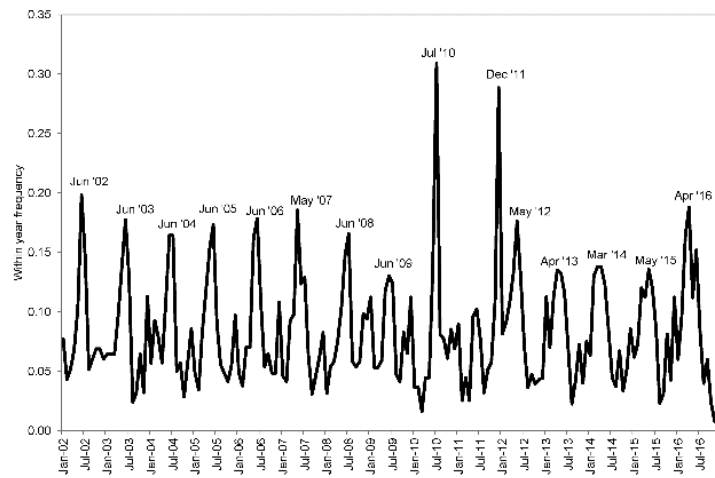
(b) Frequency of open-ended contracts by the effective (starting) year of contract



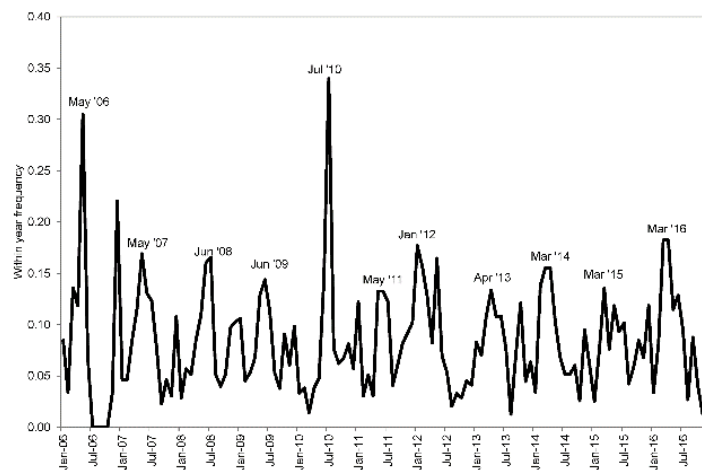
Source: Ministry of Labor, Social Security and Welfare and OMED (authors' calculations).

Figure 3 Timing of firm level contracts in Greece (2002-2016)

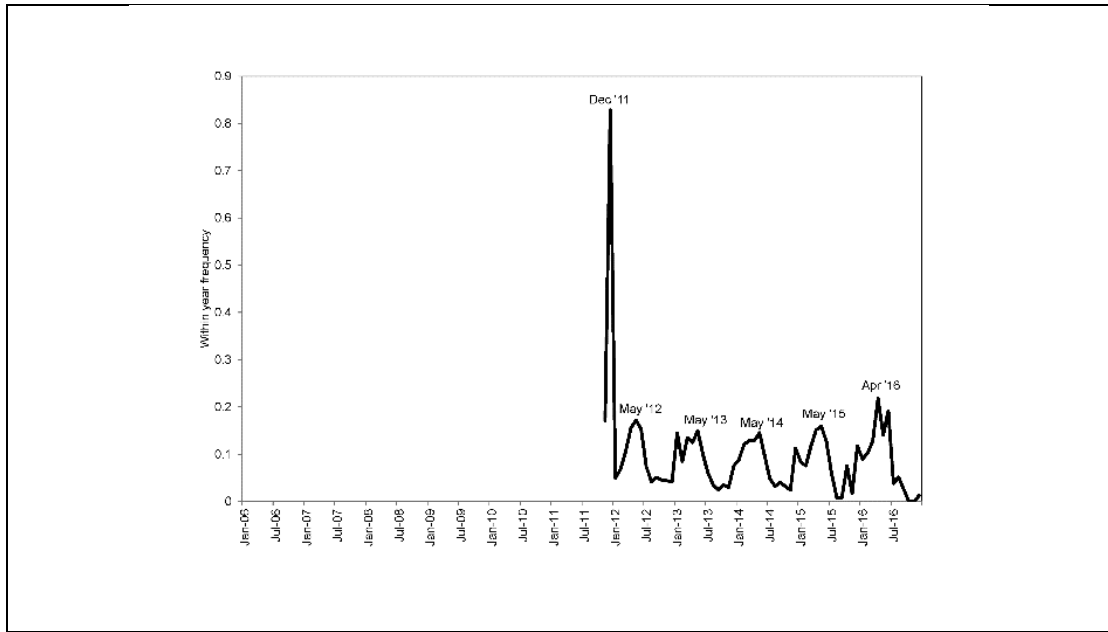
(a) All firm-level contracts



(b) Base wage-setting contracts signed by trade unions

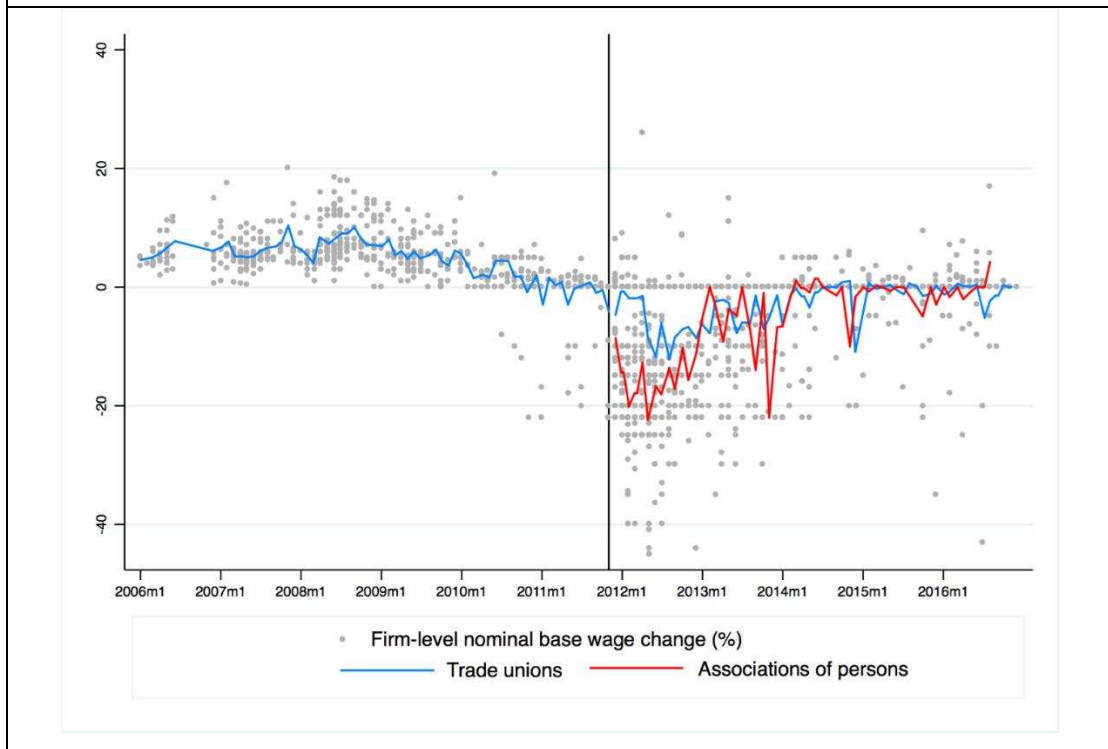


(c) Base wage-setting contracts signed by associations of persons



Source: Ministry of Labor, Social Security and Welfare and OMED (authors' calculations).

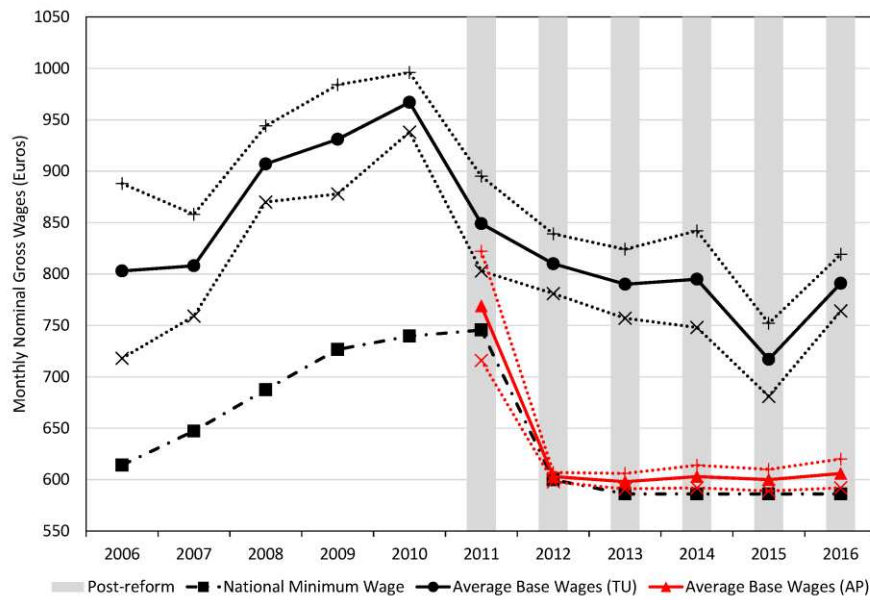
Figure 4 Nominal base wage changes by type of workers' representation before and after the reform



Source: Ministry of Labor, Social Security and Welfare and OMED (authors' calculations).

Notes: Black vertical line specified at 2011m1 indicates the introduction of Law 4024/2011. The blue line is a fitted local polynomial for base wage changes signed in firms with trade unions. The red line is a fitted local polynomial for base wage changes signed in firms with associations of persons.

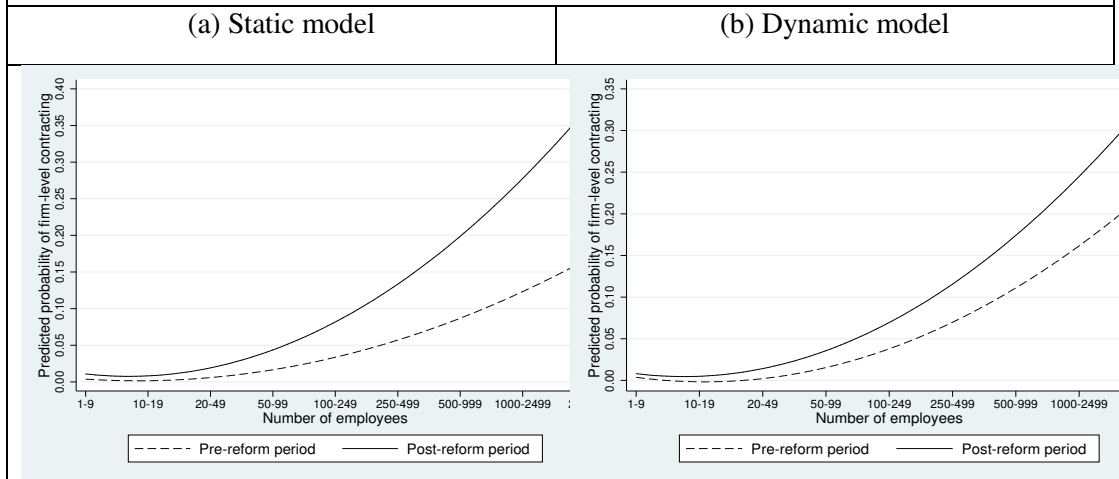
Figure 4 National minimum wage and base wages by type of workers' representation



Source: Ministry of Labor, Social Security and Welfare and OMED (authors' calculations).

Notes: Data on the National Minimum Wage are derived by the official documents of the national collective bargaining agreements. Regarding firm-level contracts, lines correspond to the unconditional mean estimates of nominal base wages for contracts signed by trade unions (TU) or associations of persons (AP). Data are weighted by the firm size as measured by the number of employees. Dotted lines refer to the lower and upper 95% CIs.

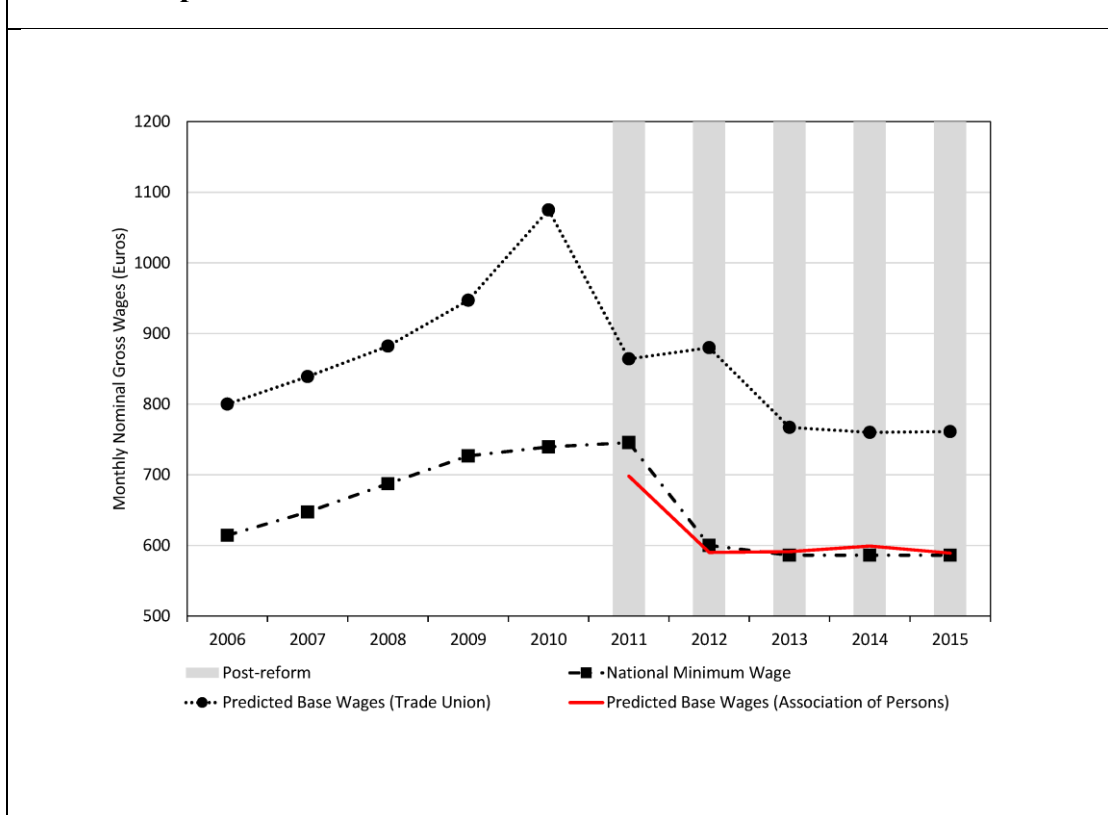
Figure 5 Predicted probability of firm-level contracting across the firm-size distribution before and after the reform



Source: Ministry of Labor, Social Security and Welfare and OMED (authors' calculations).

Notes:

Figure 6 National minimum wage and predicted base wage levels by type of workers' representation before and after the reform



Source: Ministry of Labor, Social Security and Welfare and OMED (authors' calculations).

Notes:

Table 1 Frequencies of firm-level contracts by period, worker representation type and firm-level characteristics

	Pre-reform sub-periods		Post-reform period	
	2006m1-2010m4	2010m5-2011m10	2011m11-2016m12	
	TU ¹		TU	AP ¹
Contract duration				
1 year or less	57.7	69.8	48.8	35.3
More than 1 year - 2 years or less	32.1	14.3	28.2	21.0
More than 2 years - 3 years or less	3.4	7.2	11.6	27.1
More than 3 years - 4 years or less	1.6	1.1	0.9	5.5
More than 4 years	5.1	7.6	10.5	11.3
Firm size				
1-49 employees	4.9	45.7	22.5	79.5
50-249 employees	36.9	23.0	30.7	12.0
≥250 employees	48.0	29.8	41.7	1.4
Unknown	10.2	1.5	5.2	7.0
Firm age				
0-5 years	4.7	5.6	2.7	8.5
6-10 years	19.9	10.9	4.6	17.3
≥11 years	73.4	72.4	85.8	59.3
Unknown	2.0	10.9	6.9	14.9
Ownership status				
Private	58.5	83.0	71.9	94.7
Government/State control	22.6	5.6	10.9	0.2
Local authority	12.6	7.2	4.4	0.9
Other	6.3	4.1	12.7	4.2
Legal form				
Sole proprietorship	0.0	10.6	4.9	9.4
Sector				
Mining & quarrying	.08	1.1	2.2	0.4
Manufacturing	32.8	61.2	43.9	24.4
Electricity, gas & water supply	10.7	6.0	5.6	0.1
Constructions	0.8	0.7	1.0	2.6
Wholesale & retail trade	5.9	4.6	9.5	27.5
Hotels & restaurants	2.6	1.4	5.9	29.1
Transportations	16.2	7.1	9.7	4.0
Financial institutions	6.5	2.5	4.7	0.7
Real estate	5.3	4.6	7.5	5.7
Public administration	2.2	1.4	1.2	0.0
Education	3.0	1.8	1.5	0.6
Health	4.1	3.2	4.1	3.4
Other community services	8.9	4.3	3.0	1.3
Region				
East Macedonia & Thrace	4.7	5.3	5.4	6.4
Central Macedonia	15.2	8.9	15.0	29.6
West Macedonia	0.0	0.4	0.7	0.2
Thessaly	2.8	2.5	5.0	6.9
Epirus	1.2	0.4	1.7	5.2
Ionian Islands	0.4	0.7	0.7	0.3
West Greece	6.5	4.6	5.9	2.9
Central Greece	5.5	2.5	4.5	1.9
Peloponnese	4.9	3.2	3.4	1.3
Attica	51.7	67.8	48.4	27.4
North Aegean	0.4	0.0	1.4	0.5
South Aegean	2.2	1.1	0.6	9.4
Crete	4.5	2.5	7.2	8.0

Source: Ministry of Labor, Social Security and Welfare and OMED (authors' calculations).

Notes: Raw frequencies (%) calculated using the unweighted sample of firm-level contracts. ¹ AP: Association of persons, TU: Trade union.

Table 2 Firm-level negotiated nominal base-wage adjustments: Summary statistics by worker representation type before and after the reform

	Pre-reform sub-periods		Post-reform period				
	2006m1-2010m4	2010m5-2011m10	2011m11-2016m1				
	TU ¹		All contracts	TU	AP ¹	Diff: AP-TU	t-stat
Extensive Margin (%)							
Downward adjustment	0.0	6.0	36.3	23.2	50.3	27.1***	11.3
Unchanged	1.8	24.7	56.3	67.0	45.0	-21.9***	-8.7
Upward adjustment	98.2	69.3	7.4	9.9	4.7	-5.1***	-3.8
Number of contracts	498	251	1,480	760	720	-	-
Intensive Margin (%)							
Mean	6.6	2.1	-5.2	-2.7	-8.3	-5.5***	-10.3
Median	5.7	2.7	0.0	0.0	0.0	-	-
Standard deviation	4.4	4.7	10.2	7.6	11.9	-	-
Number of contracts	454	244	1,349	748	601	-	-
Monthly nominal base wage (€)							
Mean	894.0	1149.2	696.1	894.3	605.4	-288.9***	-24.9
Median	585.6	1339.8	568.1	820.0	586.1	-	-
Standard deviation	230.3	243.8	205.1	262.6	62.7	-	-
Number of contracts	239	201	1,679	527	1,152	-	-

Source: Ministry of Labor, Social Security and Welfare and OMED (authors' calculations).

Notes: Raw estimates calculated using the unweighted sample of firm-level contracts with base wage provisions. ¹ AP: Association of persons, TU: Trade union.

Table 3 Determinants of firm-level contracting

Independent variable	[1]	[2]	[3]	[4]
Sign year: 2002	-1.942***(0.326)	-2.200***(0.329)	-2.199***(0.331)	-
Sign year: 2003	-2.052***(0.232)	-2.310***(0.232)	-2.332***(0.233)	-2.348***(0.230)
Sign year: 2004	-1.850***(0.358)	-2.106***(0.349)	-2.131***(0.352)	-1.829***(0.382)
Sign year: 2005	-2.033***(0.447)	-2.348***(0.438)	-2.341***(0.440)	-2.168***(0.481)
Sign year: 2006	-1.810***(0.393)	-2.126***(0.386)	-2.131***(0.389)	-1.956***(0.404)
Sign year: 2007	-1.907***(0.360)	-2.222***(0.357)	-2.218***(0.360)	-2.056***(0.369)
Sign year: 2008	-1.751***(0.391)	-2.120***(0.376)	-2.111***(0.378)	-1.913***(0.395)
Sign year: 2009	-2.079***(0.409)	-2.449***(0.393)	-2.440***(0.395)	-2.356***(0.409)
Sign year: 2010	-1.911***(0.579)	-2.280***(0.565)	-2.272***(0.567)	-2.321***(0.465)
Sign year: 2011	-1.520***(0.394)	-1.878***(0.384)	-1.879***(0.387)	-1.584***(0.427)
Sign year: 2012	1.212***(0.254)	0.852***(0.243)	0.862***(0.246)	1.079***(0.311)
Sign year: 2013	0.259(0.257)	-0.101(0.256)	-0.0910(0.257)	-0.789***(0.260)
Sign year: 2014	-0.127(0.216)	-0.141(0.220)	-0.137(0.222)	-0.336(0.321)
Firm size: 1-9 employees	-5.115***(0.587)	-4.690***(0.613)	-4.694***(0.610)	-3.764***(0.455)
Firm size: 10-19 employees	-3.660***(0.580)	-3.501***(0.605)	-3.506***(0.601)	-2.839***(0.450)
Firm size: 20-49 employees	-3.735***(0.612)	-3.483***(0.631)	-3.487***(0.628)	-2.808***(0.486)
Firm size: 50-99 employees	-2.958***(0.688)	-2.704***(0.685)	-2.706***(0.683)	-2.008***(0.528)
Firm size: 100-249 employees	-2.354***(0.638)	-2.106***(0.659)	-2.107***(0.657)	-1.621***(0.534)
Firm size: 250-499 employees	-2.419***(0.763)	-1.894***(0.698)	-1.894***(0.697)	-1.525***(0.630)
Firm size: 500-999 employees	-0.564(0.793)	-0.370(0.819)	-0.366(0.819)	-0.327(0.649)
Firm size: Unknown	-10.85***(0.706)	-9.800***(0.734)	-	-
Region: East Macedonia & Thrace	1.690***(0.285)	1.603***(0.255)	1.612***(0.255)	1.419***(0.195)
Region: Central & West Macedonia	1.224***(0.201)	1.200***(0.181)	1.204***(0.181)	1.132***(0.160)
Region: Thessaly	0.758***(0.378)	0.865***(0.344)	0.873***(0.345)	0.832***(0.306)
Region: Epirus	1.468***(0.270)	1.427***(0.293)	1.431***(0.293)	1.336***(0.185)
Region: West Greece & Ionian Islands	-0.201(0.609)	-0.199(0.595)	-0.191(0.596)	-0.251(0.587)
Region: Central Greece	0.963***(0.397)	0.876***(0.341)	0.882****(0.342)	1.050****(0.332)
Region: Peloponnese	0.477(0.346)	0.435(0.329)	0.444(0.328)	0.536(0.326)
Region: Aegean Islands	1.035****(0.206)	0.923****(0.191)	0.927****(0.191)	0.819****(0.177)
Region: Crete	0.409*(0.214)	0.318(0.197)	0.322(0.197)	0.561****(0.177)
Sector: Manufacturing	1.356****(0.279)	1.414****(0.278)	1.412****(0.279)	0.988****(0.211)
Sector: Electricity, gas & water supply	2.253****(0.395)	2.271****(0.467)	2.337****(0.474)	1.666****(0.472)
Sector: Wholesale & retail trade	0.322*(0.169)	0.542****(0.156)	0.543****(0.156)	0.467****(0.152)
Sector: Hotels & restaurants	2.115****(0.208)	2.199****(0.206)	2.229****(0.206)	1.642****(0.201)
Sector: Transportation	1.017****(0.271)	1.218****(0.284)	1.234****(0.284)	0.932****(0.267)
Sector: Financial institutions	2.010****(0.495)	2.270****(0.508)	2.305****(0.507)	1.572****(0.422)
Sector: Real estate	1.347****(0.297)	1.324****(0.315)	1.311****(0.317)	1.023****(0.262)
Sector: Health, education	1.722****(0.240)	1.601****(0.246)	1.578****(0.250)	1.095****(0.253)
Sector: Other community services	1.674****(0.349)	1.925****(0.360)	1.937****(0.360)	1.314****(0.323)
Legal form: Sole proprietorship	0.647***(0.253)	2.520****(0.255)	2.503****(0.257)	0.986***(0.414)
Herfindahl-Hirschman index	0.567***(0.232)	0.689***(0.335)	0.683***(0.333)	0.615****(0.214)
Asset Turnover Ratio <25%	-0.487***(0.227)	-0.802****(0.215)	-0.834****(0.215)	-0.535****(0.182)
Asset Turnover Ratio >75%	-0.0351(0.156)	-0.221(0.151)	-0.241(0.152)	-0.191(0.132)
Firm-level contract in previous year	-	-	-	4.000****(0.276)
Constant	-2.169****(0.630)	-1.624***(0.649)	-1.625***(0.647)	-2.583****(0.557)
Observations	1,412,052	458,267	253,340	236,216

Source: OMED, iMentor

Notes: Parameter estimates from weighted logit regressions using the number of firms by 4-digit sector of economic activity as weights. Standard errors in parentheses are corrected for heteroskedasticity and clustering by region (NUTS-II) and 2-digit sector of economic activity (NACE Rev.1). ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively. For groups of variables, the base categories are as follows: 2005, more than 1,000 employees, Attica, Constructions, $\geq 25\%$ Asset Turnover Ratio <75% (sales and assets are CPI deflated, 2015=100).

Table 4 Determinants of firm-level contracting in the post-reform period: Estimates from a fully interacted model

Independent variable	Estimated coefficient	Standard error
Law 4024/2011	2.640**	(1.196)
Firm-level contract in previous year	4.692***	(0.363)
Law4024/11×Firm-level contract in previous year	-1.717***	(0.425)
Law4024/11×Firm size: 1-9 employees	0.400	(0.751)
Law4024/11× Firm size: 10-19 employees	0.430	(0.748)
Law4024/11× Firm size: 20-49 employees	-1.086	(0.710)
Law4024/11× Firm size: 50-99 employees	-2.186***	(0.681)
Law4024/11× Firm size: 100-249 employees	-1.431*	(0.801)
Law4024/11× Firm size: 250-499 employees	-1.282*	(0.733)
Law4024/11× Firm size: 500-999 employees	-1.202	(0.735)
Law4024/11×Region: East Macedonia & Thrace	1.662***	(0.600)
Law4024/11×Region: Central & West Macedonia	1.109***	(0.351)
Law4024/11×Region: Thessaly	1.046	(0.666)
Law4024/11×Region: Epirus	2.092**	(0.932)
Law4024/11×Region: West Greece & Ionian Islands	-0.360	(0.366)
Law4024/11×Region: Central Greece	0.592	(0.692)
Law4024/11×Region: Peloponnese	-1.775***	(0.382)
Law4024/11×Region: Aegean Islands	3.210***	(0.909)
Law4024/11×Region: Crete	0.850***	(0.322)
Law4024/11×Sector: Manufacturing	-1.117	(0.684)
Law4024/11×Sector: Electricity, gas & water supply	-0.886	(0.959)
Law4024/11×Sector: Wholesale & retail trade	-0.560	(0.700)
Law4024/11×Sector: Hotels & restaurants	0.594	(0.729)
Law4024/11×Sector: Transportation	-1.710**	(0.687)
Law4024/11×Sector: Financial institutions	-0.642	(0.984)
Law4024/11×Sector: Real estate	-1.579**	(0.656)
Law4024/11×Sector: Health, education	-1.300**	(0.643)
Law4024/11×Sector: Other community services	-1.925***	(0.661)
Law4024/11×Legal form: Sole proprietorship	-0.665	(0.934)
Law4024/11×Herfindahl-Hirschman index	-0.201	(0.123)
Law4024/11×Asset Turnover Ratio <25%	-0.581	(0.444)
Law4024/11×Asset Turnover Ratio >75%	0.323	(0.397)
Law4024/11×Time trend	0.053	(0.089)
Constant	-5.244***	(0.772)
Observations	236,216	

Source: OMED, iMentor

Notes: Parameter estimates from weighted logit regressions using the number of firms by 4-digit sector of economic activity as weights. The model includes the same set of independent variables as in Column 4 of Table 3 (except year dummies). Standard errors in parentheses are corrected for heteroskedasticity and clustering by region (NUTS-II) and 2-digit sector of economic activity (NACE Rev.1). ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

Table 5 Nominal base wage adjustments in firm-level collective bargaining

Independent variable	[1]		[2]		[3]		[4]	
	<i>Association of persons (interaction with year effects)</i>							
Sign year: 2011	-2.632	(3.394)	-2.498	(2.395)	-2.945	(2.430)	-2.849	(2.710)
Sign year: 2012	-7.518***	(2.724)	-7.120***	(1.690)	-7.541***	(1.707)	-6.091***	(1.834)
Sign year: 2013	0.269	(2.998)	0.517	(1.853)	0.109	(1.871)	0.081	(1.999)
Sign year: 2014	1.360	(3.097)	1.397	(1.945)	0.955	(1.953)	0.673	(2.054)
	<i>Adoption of National Minimum Wage (interaction with year effects)</i>							
Sign year: 2011	-5.729	(4.137)	-5.845**	(2.512)	-5.206**	(2.538)	-5.069*	(2.761)
Sign year: 2012	-5.800**	(2.713)	-5.855***	(1.693)	-5.187***	(1.709)	-5.980***	(1.857)
Sign year: 2013	-1.775	(3.027)	-1.824	(1.872)	-1.186	(1.891)	-1.740	(2.021)
Sign year: 2014	-0.672	(3.103)	-0.665	(1.951)	-0.178	(1.958)	0.311	(2.073)
Mills' ratio (lambda)	-33.117	(25.739)	-19.145	(12.330)	-17.942	(11.929)	-0.742***	(0.272)
Wald chi-squared	432.86***		1140.43***		1193.78***		1444.25***	
Total observations	1,007,665		337,697		184,803		184,493	
Censored observations	1,005,942		335,974		183,085		183,085	
Uncensored observations	1,723		1,723		1,718		1,408	

Source: OMED, iMentor

Notes: Estimations are based on a two-step Heckman selection model. Model specifications [1]-[4] correspond to those of Table 3. Robust standard errors in parentheses.