The impact of unionization on employment and wages*

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Abstract

Unions are relevant institutions in modern labor markets. They represent organized labor supply to bargain over wages and employment. Acting as a monopoly or as a collective institutional response, unions can increase wages, often at the cost of employment. However, firms can pay efficiency wages in order to deter union formation. With a comprehensive longitudinal dataset of Portuguese firms, we find that a larger share of union affiliates in a firm increases wages (up to 4.5%), but may decrease employment. Our results pass an IV strategy that uses political preferences, contract type and collective agreement type to untangle the potential endogeneity of union density. They are consistent with firms working in the labor demand schedule and a limited capacity of unions to bargain over wages. For workers on open-ended contracts unions do not impact wages; but workers on fixed-term contracts and in firms with low unionization have lower wages. We find differences across the services and manufacturing sectors, which traditionally have different union implementation.

Keywords: Unions; Wages; Employment; Labor demand

JEL Codes: J51; J31; J21

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''Trade unions are the principal institution
of workers in modern capitalistic societies.''
in What do unions do?
Freeman and Medoff (1984)

1 Introduction

Union representation in Portugal does not differ much from other Continental European countries, most notably, France. Since 1975, unions have a constitutional monopoly to bargain wages, although today's power is weaker than what used to be. Additionally, the impact of unions on the wage setting is reinforced by extensions of collective agreements to non-signing parts (so called *Portarias de Extensão*). These extensions are issued by the government at the request of a signing part. They are not automatic and non-signing firms may oppose the extension. Even when there is no extension, the collective agreement is used as a reference and extended informally to all workers in the firm.

There is a consensus that unions raise wages, possibly at the expenses of employment (Blanchflower and Bryson 2004). We estimate the impact of union membership on wages and employment at the firm level. We do not have access to individual union membership, but we have a 3-year panel with the share of unionized workers in each firm. We use *Quadros de Pessoal*, 2010-2012, a comprehensive employer-employee administrative dataset, to estimate a firm-fixed effect model and identify the impact of changing firm union density. The firm-fixed effects model allows us to control for non time-varying features of the firm, which may have an impact on wages, but that are not related with unions. These include rents in the product market that arise due to public monopolies or other market imperfections.

Shares of union affiliates in a firm above 50% are associated with slightly higher base wages (0.1%), but have no impact on total wages. They are also associated with lower employment, through a lower hiring probability (0.15%). This is consistent with firms working in the labor demand schedule and unions having a limited scope to bargain. There is heterogeneity in the results. For instance, workers on open-ended contracts do not have higher base wages associated with union density; but workers on fixed-term contracts and in firms with low unionization have lower wages. Larger levels of unionization in the services sector are associated with a wage premium. The opposite is true in the manufacturing sector. With the exception of the services sector for firm with low union rates, there is no association between union incidence

and total wages.

These results must be interpreted with caution. Despite the inclusion of firm (and worker) fixed-effects, we may fail to fully account for selection issues. Firms with a larger union density may attract a pool of workers that have unobserved characteristics different from those less unionized. If firms pay a premium, they select a better workforce. This drives low-quality workers away from more unionized firms. The combined effects of the worker's and firm's behavior will result in the allocation of the best workers to the less unionized firms (Farber 1983). A second source of concern comes from the endogeneity between wages and the rate of unionization. Union wage rent may induce an increase in firm union density. Therefore, union density may be considered an endogenous variable (Duncan and Stafford 1980).

To address endogeneity, we explore an instrumental variable strategy. We instrument the unionization rate with three variables: the general elections results; a dummy for contract type (fixed-term or open-ended contract); and the collective bargaining coverage (defined by five types of coverage). We hypothesize that more left-leaning districts in general elections are associated with a higher union density. We assume that there is no reason to expect that party preferences influence wages directly at the firm level. The type of contract has also an impact on unionization as it reflects the degree of commitment in the firm-worker relationship.

All instruments are statistically significant and with the expected economic interpretation. The IV results confirm our previous results, but with stronger impacts. For instance, the impact of union density on total wages are not only statistically significant for union densities above 50%, but also with economic significance – the impacts range between 1.2% and 3.8% for the monthly measure and between 1.3% and 4.5% for the hourly measure.

The right-to-manage model emerges as a major description of the results. Unions bargain over wages and firms retain the prerogative to decide on hirings and separations. The existence of a union wage premium comes at the cost of a lower probability of hiring, as firms do not adjust their separation probabilities.

2 What do unions do?

Theoretically, the role of unions in the labor market is somewhat controversial. They are the more common form of workers' representation in the bargaining process. Workers are believed to be the weakest part in this process and unions create a monopoly that collects the benefits

from the role of being the sole supply side player in the labor market. Monopoly union power extracts rents and as such may impose a cost on society, when compared with the situation in which there are no other imperfections (market power) in the product and labor markets.

In practice, a perfect competition environment does not exist and unions may end up generating a bargaining environment that increases efficiency and productivity (McDonald and Solow 1981). Most studies find that unions increase members' wages at the cost of profits for firms (Blanchflower and Bryson 2004).

However, it is not so obvious how unions affect firms. Friedman (1950) states that workers would reject substantially above-market wages because that would adversely affect job security. It is also possible for firms to react to higher wage pressure with an upgrade in qualifications minimizing the market impact of unions in wages Hirsch (2004).

Another possibility is for the union threat to generate efficiency wages that prevent union entering. This model was first presented in Dickens (1986) and can explain the results in DiNardo and Lee (2004), who found generally small differences in wages, employment and output between unionized and otherwise comparable firms.

Taking the two faces of unions, as defined by Freeman and Medoff (1984), monopoly and voice, we have a broad approach that allows the consideration of a large array of union effects in the workplace. This approach has been extended to more complicated modeling settings in the context of bargaining theory that are summarized in Cahuc and Zylberberg (2004).

Most of the empirical evidence on the wage impact deals with the United States. The main conclusion is that there is a wage differential between unionized and non-unionized workers. Building upon the Lewis and Lewis (1986) literature review, Blanchflower and Bryson (2002) confirm the average figures from hundreds of studies: the union wage gap is close to 15%, with some signs of reduction in more recent studies. For the United Kingdom, Booth (1995) reports smaller gaps (on average 8%), and for Italy Dell'Aringa and Lucifora (1994) estimate the gap to be even smaller. In general, countries in which union settlements spill over to the nonunion sector the wage differentials are smaller or nonexistent.

A clear estimate of the unions' impact on employment is more difficult to obtain. The available results point to a negative impact of negotiated wages on employment, supporting the right-to-manage model, where the solution of the bargaining process lies on the labor demand (Nickell and Andrews 1983). The firm bargains over wages, but it retains the prerogative to decide on hires and separations.

Our empirical exercise addresses these two questions, using the change in union membership rate as a supply shift to identify changes in wages and employment, uncovering a labor demand elasticity.

3 Data

Our data come from *Quadros de Pessoal* (QP), an administrative dataset collected on an annual basis (reported to October of each year) by the Portuguese Ministry of Employment. Coverage is mandatory for firms with at least one salaried worker, except for civil servants, entities that employ non-permanent rural workers, and domestic workers. The QP is a source of information of great importance in the microeconomic analysis of employment in Portugal. This dataset has been used to study different aspects of the Portuguese labor market, among which wage inequality in Machado and Mata (2001) and Cardoso (2006) and employment and wages segmentation (Centeno and Novo 2012).

Information on union coverage at the firm level became available only in 2010. Because of this restricton, we limit our study to the 2010 to 2012 period. For the purpose of this study, we collect worker, firm and match information including the monthly wages, hours worked, age, education, type of contract, sector of activity and occupation. In 2010, the data cover nearly 3 million employees.

QP registers different wage components. We use the base wage measure, which corresponds to the monthly wage of regular working hours. Additionally, we consider a total wage measure that includes, besides the base wage, subsidies and premiums paid on a monthly basis (e.g. seniority subsidies) and overtime pay. Finally, we also consider a measure of hourly wages.

The distribution of union membership is quite concentrated. There are union members in only 5.2% of the firms, but those without union members are very small firms: 87% of them have less than 10 workers. These small firms employ only 13% of all workers.

This means that the average size of firms with union members is rather large, they employ almost 38% of all workers.

It is also important to note that firms with union members employ a more stable workforce. They employ 39% of all open-ended contracts and only 30% of all fixed-term contracts. More relevant, the share of fixed-term contracts in these firms is 15%, whereas this share in firms without union members is 21% (slightly higher for larger firms).

These statistics point to the importance of introducing firm fixed-effects when estimating the union wage premium, as union and non-union firms seem quite different and we would not be able to control for all factors that determine these differences. In addition, some form of instrumental variable approach is also warranted, but we do not include it in this version of the paper.

4 Unions in practice

Better wages and employment stability are aims pursued by unions. To some extent, firms have the same objectives: they pay efficiency wages to reduce worker turnover. Therefore, it remains an empirical question whether unions add to these worker benefits. Also, in pursuing these objectives, unions may be self-centered in their members, hampering the employment and wages of non-affiliated. With worker-level data, we study the relationship between the firm-level union membership and: (i) wages and (ii) worker flows – probability of separation or hiring. We also explore the different degrees of employment protection of open-ended and fixed-term contracts, to understand how union membership impacts labor market outcomes.

We use worker-level data merged with firm level information to conduct our empirical analysis. We estimate the following specification:

$$y_{ijt} = \psi_1 Union_{jt} + \psi_2 Union_{jt}^2 + X_{ijt}\beta + \varepsilon_{ijt}, \tag{1}$$

where y_{ijt} is one of four possible outcomes for the wage of worker i in firm j at time t: (a) monthly base wage; (b) hourly base wage; (c) monthly total wage; (d) hourly total wage, or two worker flows: (e) separation; (f) hiring (both as binary variables). The variable $Union_{jt}$ measures the percentage of workers in firm j with union membership; we consider a quadratic polynomial to account for a possible non-linear relationship. Additionally, we include a dummy variable that identifies firms without unionized workers. To control for elements of heterogeneity, matrix X_{ijt} includes a set of firm, worker and match characteristics. The firm characteristics included are: (i) the logarithm of the number of workers as a proxy for firm size, (ii) the firm age (indicator variables: 1, 2, ..., 10, 11-15, 16-20, and more than 20 years), (iii) the sector of activity (at 2-digits), (iv) the region (the 23 Portuguese districts), and (v) an indicator of foreign ownership majority. On the worker side, we control for: (vi) gender, (vii) nationality, (viii) age, entering as a quadratic polynomial, and also for (ix) five levels of education (4 or less

years; 6 years; 9 years; high school; and college degree). In terms of match characteristics, we control for: (x) white and blue collar positions, (xi) workers on a (regulated) minimum wage, with an indicator variable, and for (xii) tenure, entering as a quadratic polynomial.

We use a firm fixed effects in the estimation of equation (1) (TO BE DONE we also test the robustness of the results to the options of match or worker fixed effects). This estimator assumes that the error term $\varepsilon_{it} = \alpha_i + u_{it}$, where the match unobserved component α_i is not orthogonal to X_{it} and u_{it} is the idiosyncratic error. Reported inference statistics account for firm clustering.

Table 1 reports the results for both wages (columns (1)-(4)) and flows (columns (5)-(6)). However, because of the non-linear relationship with union membership, the exact marginal impact depends on its level, which we plot in Figure 1 with 90% confidence intervals drawn around the local impacts.

[TABLE 1 (see page 14)]

[FIGURE 1 (see page 18)]

A first assessment of the results shows that union membership has an impact on base wages and worker flows, but not on total wages. For base wages, the results are marginal statistically non-significant at the 10% significance level; but there's no significant impact on total wages. These results confirm that unions influence the base labor income, but firms still have leeway to determine the overall wages. Given that unions negotiate basic standards, including different levels of minimum wages conditional on jobs characteristics, these results are not surprising. From the perspective of the worker, only union memberships above 50% result in higher base wages, both monthly or hourly – up to 0.064%. For lower memberships, the negative impact reaches a maximum of -0.077%. The results in terms of labor market flows show also a dichotomy around the 50% membership level. For low levels of membership, both the probability of being hired and separating increase, with a positive net impact on the probability of employment. For higher levels of union membership, there is no impact on the individual probability of losing a job, while the probability of being hired decreased, up to minus 0.18%.

Overall, the higher the union membership in the firm, the higher the premium the worker takes home and higher the probability that ends up losing the job.

4.1 Employment protection, unions and labor market outcomes

In this section, we split the sample in two groups of workers: those with an open-ended contract, more likely to be on a stable matching and also more likely to be unionized, and those on fixed-term contracts, less stable and less likely to be unionized. We think of these two groups as insiders (protected by unions) and outsiders. Table 2 presents the same set of results as before, but by contract type.

[TABLE 2 (see page 15)]

The results are in line with the previous evidence. For instance, for both type of contracts there is no association between total wages and the incidence of union membership at the firm; see Figure 2. For base wages, the association is restricted to fixed-term contracts; with lower wages – up to less 0.076% – paid to these workers in firms with lower union incidence, again with unionization rates lower than 50%. In terms of labor market flows, there is a higher probability of separation for workers on open-ended contracts in firms with low union incidence, up to 0.055%. For fixed-term contracts, there is on association between the probability of separation and union rates. In terms of the probability of hiring, at the 10% significance level, there is no association with union incidence; however, we may tempted to conclude that there is a higher probability of hiring in firms with incidence rates below 40% for both types of contracts and maybe a lower probability for hiring on open-ended contracts in firms with high union incidence.

[FIGURE 2 (see page 19)]

4.2 Manufacturing, construction, and services

Unions incidence is stronger in sectors like manufacturing, where the use of more flexible forms of employment, namely fixed-term contracts, is less common than in the services sector. In this section, we split the sample in three sectors: manufacturing, construction, and services. Table 3 presents the same set of results as before.

[TABLE 3 (see page 16)]

The impact of union incidence in the worker wage and employment stability varies across sectors. For wages, the services sector is the only one where there is a significant association

with unions; see Figure 3. For low membership rates, there is a negative impact and, for high membership rates, a positive premium. Interestingly, in the services sector even total wages are affected by union rates; in particular, for low memberships, total wages can be up to 0.10% lower. Labor market flows in the services sector are not associated with the union rates. However, in the manufacturing sector, there is a higher probability of separations occurring in firms with low union incidence. In complementarity, manufacturing firms with low union incidence are also more likely to hire. But with membership rates above 50%, firms are less likely to hire.

[FIGURE 3 (see page 20)]

4.3 Endogeneity issues

The above results point to a small positive impact of union density at the firm level on wages. These results must be interpreted with caution, as the estimation method runs against potential difficulties. Despite the inclusion of firm (and worker) fixed-effects, we may fail to fully account for selection issues.

In the first place, firms with a larger union density may attract a pool of workers that have unobserved characteristics different from those of less (or non) unionized ones. If unions reduce the wage dispersion, the most productive workers would prefer to work in less unionized firms. At the same time, if firms have to pay a premium, they have an incentive to select a better quality workforce. This drives low quality workers away from more unionized firms. The combined effects of the worker's and firm's behavior will result in the allocation of the best and worth performimg workers to the less unionized firms (Farber 1983).

The second source of concern comes from the endogeneity between wages and the rate of unionization. The wages rent that a union obtains due to high productivity may increase in turn the union density in the firm. Therefore, union density may be considered an endogenous variable (Duncan and Stafford 1980).

In this section, we explore an instrumental variable strategy. We instrument the unionization rate with three variables: the general elections results; a dummy for contract type (fixed-term or open-ended contract); and the collective bargaining coverage (defined by five types of coverage).

We hypothesize that districts more left-leaning would be associated with a higher union

density, and assume that there is no reason to expect that party preferences influence the wage level directly. We instrument with the share of votes in left parties in the general elections measured at the district level. There are 24 districts in Portugal. We also tried with results at the municipality level and the results are qualitatively the same. We prefer the district results to prevent the problems posed by commuting work as people could live and vote in a different municipality from where the firm is located. This is reduced, although not eliminated, at the district level.

The type of contract has also an impact on unionization as it reflects the degree of commitment in the firm-worker relationship. Union density tends to be higher in more stable and permanent workforces.

The type of collective bargaining agreement is measured by five dummies: collective contract; collective agreement; firm level agreement; administrative coverage; and no coverage. In principle, we expect contracts covered by collective agreement coverage to be associated with higher union density. However, the free-riding effect of extended coverage to all workers in the firm regardless of union membership, might act in the opposite way.

We estimate a two-stage model (Table 4). The estimates of the key variables in the first stage regression are presented at the bottom of the table. All instruments are statistically significant and with the expected economic interpretation. Overall, a higher share of votes in left parties is positively associated with a higher union density. Workers on fixed-term contracts are less likely to be in firms with higher union density. The results on the type of collective bargaining also suggest that union density is positively associated with collective agreements. Although, relatively to the category of collective contract (a small percentage among all workers), workers without coverage have higher probability of being in firms with higher union density.

[TABLE 4 (see page 17)]

The second stage results, presented at the top of Table 4, confirm our previous results, but with stronger impacts. For instance, compare the impacts of union density on total wages depicted in the middle row of Figure 4 with those depicted in Figure 1. While the latter are not statistically significant and never exceed 0.1 p.p. the IV results are not only statistically significant for union densities above 50%, but also with economic significance – the impacts range between 1.2% and 3.8% for the monthly measure and between 1.3% and 4.5% for the hourly measure.

[FIGURE 4 (see page 21)]

5 Conclusion and discussion

We contribute to the literature on the role of unions in the labor market. We use a dataset recently made available with information on the union membership rate for all Portuguese firms. The longitudinal characteristic of the dataset allows us to identify the impact of changes in the unionization density after controlling for both observable firm and worker characteristics, but also for firm unobservable characteristics with the inclusion of firm-fixed effects. We devise an instrumental variables strategy to further account for endogeneity issues.

We find evidence of a small union density impact on wages, 1% to 4%, for firm union rates above 50%. We find also a tiny negative impact on the probability of hires, which might result in lower employment.

These results are consistent with the evidence from other countries in which wage bargaining is highly concentrated (at the sectoral or qualification level). The results for other European countries in Blanchflower and Bryson (2002) confirm the dichotomy between the U.S. and most European countries, with the U.K., Canada and Australia in-between.

Our results are also compatible with a substantial degree of wage differentiation taking place at the firm level. In Portugal, firms are able to introduce wage differentiation above the wages set at the collective bargaining level (as in showed Cardoso and Portugal (2005)). The inability of unions to extract a substantial wage premium is further evidence of the high flexibility exhibited by the Portuguese labor market, in which the marginal worker is in a temporary job, that lasts less than one year, not covered by any form of collective bargaining protection and with a small probability of entering into a permanent contract.

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Table 1: Unionization and workers' wages and flows

	Wages				Flows	
	Base		Total			
	Monthly	Hourly	Monthly	Hourly	Separ	Hires
	(1)	(2)	(3)	(4)	(5)	(6)
Union rate	-0.079	-0.081	-0.043	-0.049	-0.005	0.108
	(0.115)	(0.103)	(0.163)	(0.109)	(0.956)	(0.067)
Union rate^2	0.001	0.001	0.000	0.000	0.000	-0.001
	(0.105)	(0.094)	(0.171)	(0.127)	(0.739)	(0.062)
Log firm size	1.054	1.166	3.142	3.154	10.205	8.377
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Dummy minimum wage	-13.797	-13.834	-12.615	-12.608	1.293	0.361
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.013)
Log age	47.328	47.908	70.897	70.430	-184.783	-21.035
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log age^2	-3.960	-4.030	-7.385	-7.288	26.086	3.228
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log tenure	-3.076	-3.675	-1.481	-2.140	-8.692	-55.507
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log tenure^2	1.019	1.101	0.783	0.878	0.515	5.343
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Schooling:						
4 or less years	-32.317	-34.228	-27.501	-29.888	-0.041	-0.095
	(0.000)	(0.000)	(0.000)	(0.000)	(0.793)	(0.489)
6 years	-27.273	-28.990	-22.582	-24.747	-0.209	0.355
	(0.000)	(0.000)	(0.000)	(0.000)	(0.120)	(0.002)
9 years	-22.752	-24.274	-18.523	-20.416	0.039	0.501
	(0.000)	(0.000)	(0.000)	(0.000)	(0.757)	(0.000)
High school	-17.172	-18.365	-14.140	-15.543	-0.398	1.074
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
No. of observations	6052110	6052110	6052110	6052110	4131881	6052110

Notes: Firm fixed effects estimates in percentage points with p-values in parentheses adjusted for clustering. Sample period: 2010-2012. Besides the variables reported in the Table, the control variables included in the regressions are: (i) Female indicator; (v) Immigrant indicator; (vii) Foreign ownership majority indicator; lix) Firm age dummies: 1,2,...,10, 11-15, 16-20 years, with the reference group, 21 or more years; (x) District indicators; and (xi) sector of activity (at 2-digits) indicators.

Table 2: Unionization and workers' wages and flows

	Wages								Flows			
	Base				Total							
	Month		Hour		Month		Hour		Separ		Hires	
	OEC	FTC	OEC	FTC	OEC	FTC	OEC	FTC	OEC	FTC	OEC	FTC
Union rate	-0.076	-0.054	-0.073	-0.066	-0.028	-0.049	-0.029	-0.065	0.055	0.075	0.095	0.164
	(0.178)	(0.070)	(0.168)	(0.064)	(0.365)	(0.189)	(0.335)	(0.100)	(0.117)	(0.311)	(0.133)	(0.109)
Union rate^2	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000	-0.001	-0.001	-0.001	-0.002
	(0.174)	(0.107)	(0.165)	(0.081)	(0.413)	(0.370)	(0.407)	(0.205)	(0.187)	(0.243)	(0.110)	(0.125)
No. of observations	4226693	1012985	4226693	1012985	4226693	1012985	4226693	1012985	4055001	846385	4226693	1012985

Notes: Firm fixed effects estimates in percentage points with p-values in parentheses adjusted for clustering. Sample period: 2010-2012. Besides the variables reported in the Table, the control variables included in the regressions are: (i) Female indicator; (v) Immigrant indicator; (vii) Foreign ownership majority indicator; lix) Firm age dummies: 1,2,. . . ,10, 11-15, 16-20 years, with the reference group, 21 or more years; (x) District indicators; and (xi) sector of activity (at 2-digits) indicators.

Table 3: Unionization and workers' wages and flows

	Wages						Flows					
		Base			Total			Separ			Hires	
	Manuf	Const	Serv	Manuf	Const	Serv	Manuf	Const	Serv	Manuf	Const	Serv
Union rate	0.020	-0.023	-0.182	-0.012	0.084	-0.124	0.042	0.610	-0.169	0.194	0.019	0.143
	(0.249)	(0.726)	(0.061)	(0.734)	(0.260)	(0.028)	(0.668)	(0.105)	(0.068)	(0.013)	(0.753)	(0.111)
Union rate^2	-0.000	0.000	0.002	0.000	-0.001	0.001	-0.000	-0.005	0.001	-0.002	-0.000	-0.002
	(0.108)	(0.791)	(0.038)	(0.538)	(0.301)	(0.045)	(0.914)	(0.240)	(0.078)	(0.017)	(0.490)	(0.097)
No. of observations	1486633	546527	2677077	1486633	546527	2677077	1006308	397368	1808916	1486633	546527	2677077

Notes: Firm fixed effects estimates in percentage points with p-values in parentheses adjusted for clustering. Sample period: 2010-2012. Besides the variables reported in the Table, the control variables included in the regressions are: (i) Female indicator; (v) Immigrant indicator; (vii) Foreign ownership majority indicator; lix) Firm age dummies: 1,2,...,10, 11-15, 16-20 years, with the reference group, 21 or more years; (x) District indicators; and (xi) sector of activity (at 2-digits) indicators.

Table 4: Instrumental variable estimation: Unionization and workers' wages and flows

	Wages				Flows	
	Base		Total			
	Monthly	Hourly	Monthly	Hourly	Separ	Hires
	(1)	(2)	(3)	(4)	(5)	(6)
Union rate	-0.972	-1.300	-1.398	-2.129		-1.967
	(0.651)	(0.585)	(0.572)	(0.420)		(0.397)
Union rate^2	0.020	0.025	0.026	0.033		0.004
	(0.309)	(0.262)	(0.236)	(0.161)		(0.835)
Log firm size	1.114	1.160	2.912	2.830		7.472
	(0.125)	(0.152)	(0.000)	(0.001)		(0.000)
Dummy minimum wage	-13.823	-13.834	-12.745	-12.706		0.322
	(0.000)	(0.000)	(0.000)	(0.000)		(0.036)
Log age	50.732	51.235	73.610	73.204		-9.440
	(0.000)	(0.000)	(0.000)	(0.000)		(0.004)
Log age^2	-4.390	-4.454	-7.731	-7.644		1.630
	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)
Log tenure	-3.305	-3.883	-1.806	-2.453		-56.973
	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)
Log tenure^2	1.052	1.133	0.834	0.929		5.540
	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)
Schooling:						
4 or less years	-32.722	-34.656	-27.903	-30.289		0.248
	(0.000)	(0.000)	(0.000)	(0.000)		(0.044)
6 years	-27.588	-29.320	-22.904	-25.059		0.610
	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)
9 years	-22.977	-24.506	-18.755	-20.636		0.717
	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)
High school	-17.306	-18.505	-14.297	-15.697		1.170
	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)
No. of observations	5743284	5743284	5743284	5743284		5743284
			First stage			
			Union rate	Union rate^2		
Left parties vote			-5.278	108.9		
			(0.000)	(0.187)		
Left parties vote^2			3.138	215.3		
			(0.000)	(0.000)		
Fixed-term contract			-0.027	-3.788		
			(0.020)	(0.001)		
Collective bargain						
Collective agreement			1.285	177.2		
			(0.000)	(0.000)		
Firm level agreement			1.297	179.9		
			(0.000)	(0.000)		
Administrative coverage			4.119	477.4		
			(0.000)	(0.000)		
No coverage			1.175	178.8		
			(0.000)	(0.000)		
F test of excluded instruments			314.98	423.35		
			(0.000)	(0.000)		

Notes: Firm fixed effects estimates in percentage points with p-values in parentheses adjusted for clustering. Sample period: 2010-2012. Besides the variables reported in the Table, the control variables included in the regressions are: (i) Female indicator; (v) Immigrant indicator; (vii) Foreign ownership majority indicator; lix) Firm age dummies: 1,2,. . . ,10, 11-15, 16-20 years, with the reference group, 21 or more years; (x) District indicators; and (xi) sector of activity (at 2-digits) indicators.

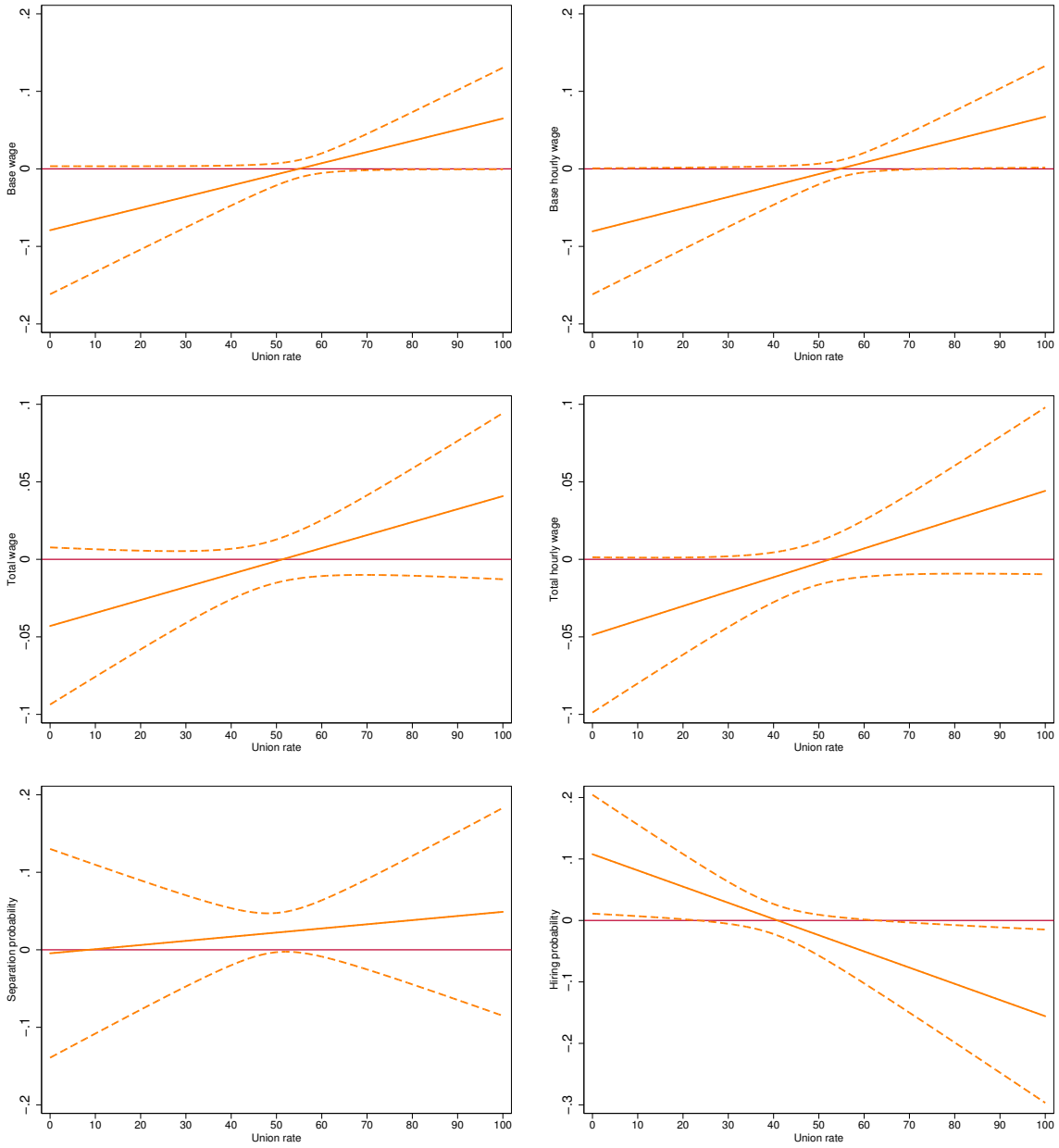

Figure 1: Marginal impact (in percentage points) of union membership level on: base wages (top left panel); base hourly wages (top right panel); total wages (mid left panel); total hourly wages (mid right panel); probability of separation (bottom left panel); and probability of hiring (bottom right panel). Dashed lines are 90% confidence intervals drawn around point estimates (solid line).

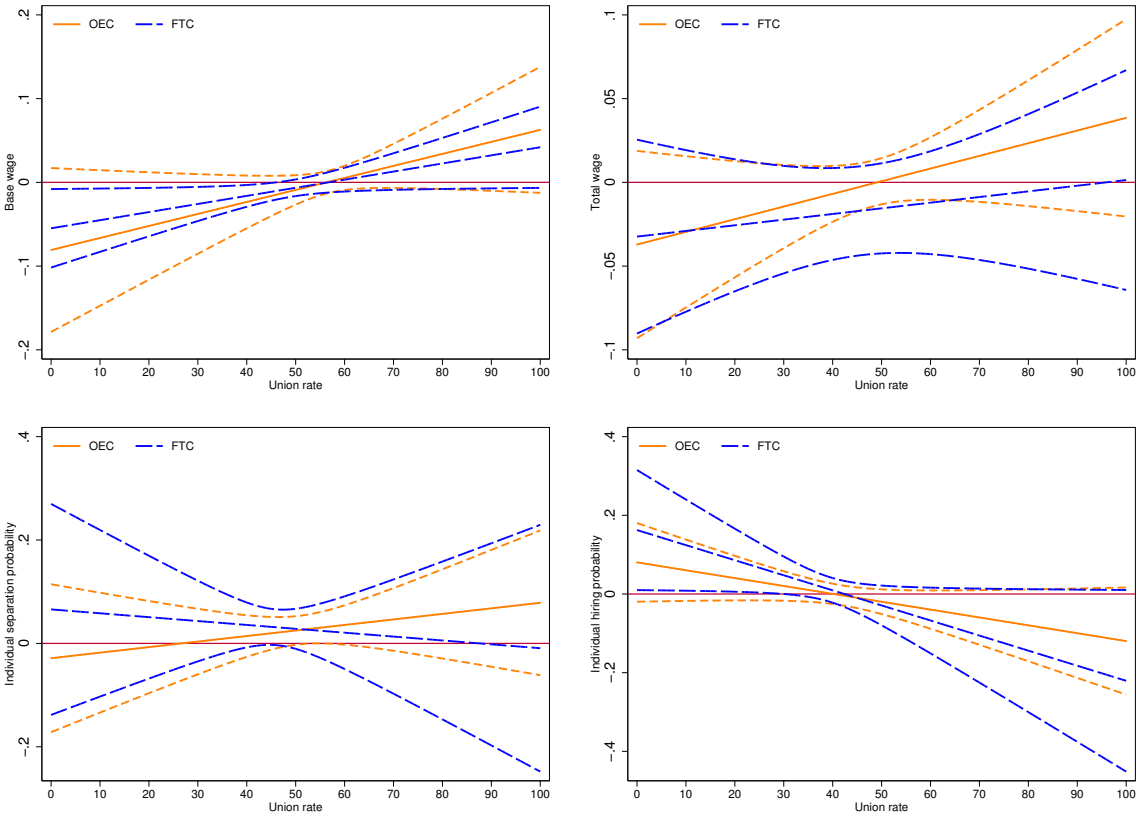

Figure 2: Marginal impact (in percentage points) of union membership level by contract type on: base wages (top left panel); total wages (top right panel); probability of separation (bottom left panel); and probability of hiring (bottom right panel). Dashed lines are 90% confidence intervals drawn around point estimates (solid line).

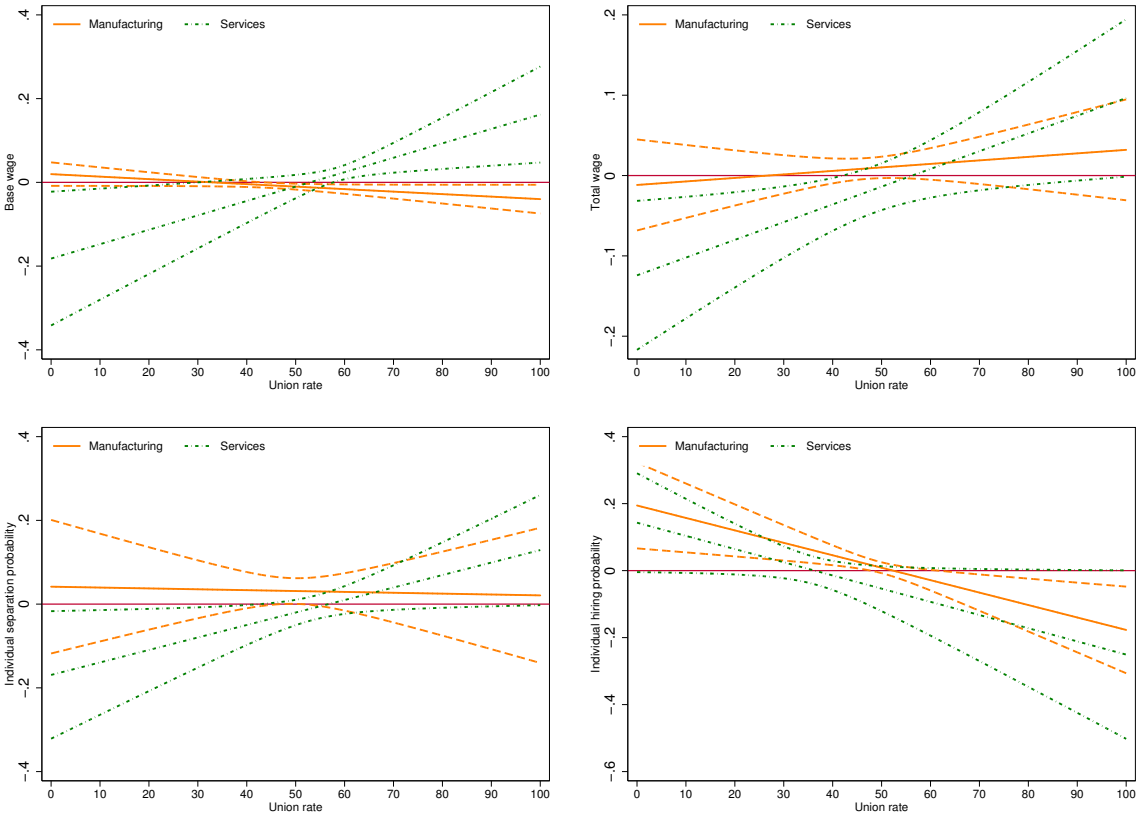

Figure 3: Marginal impact (in percentage points) of union membership level by sector on: base wages (top left panel); total wages (top right panel); probability of separation (bottom left panel); and probability of hiring (bottom right panel). Dashed lines are 90% confidence intervals drawn around point estimates (solid line).

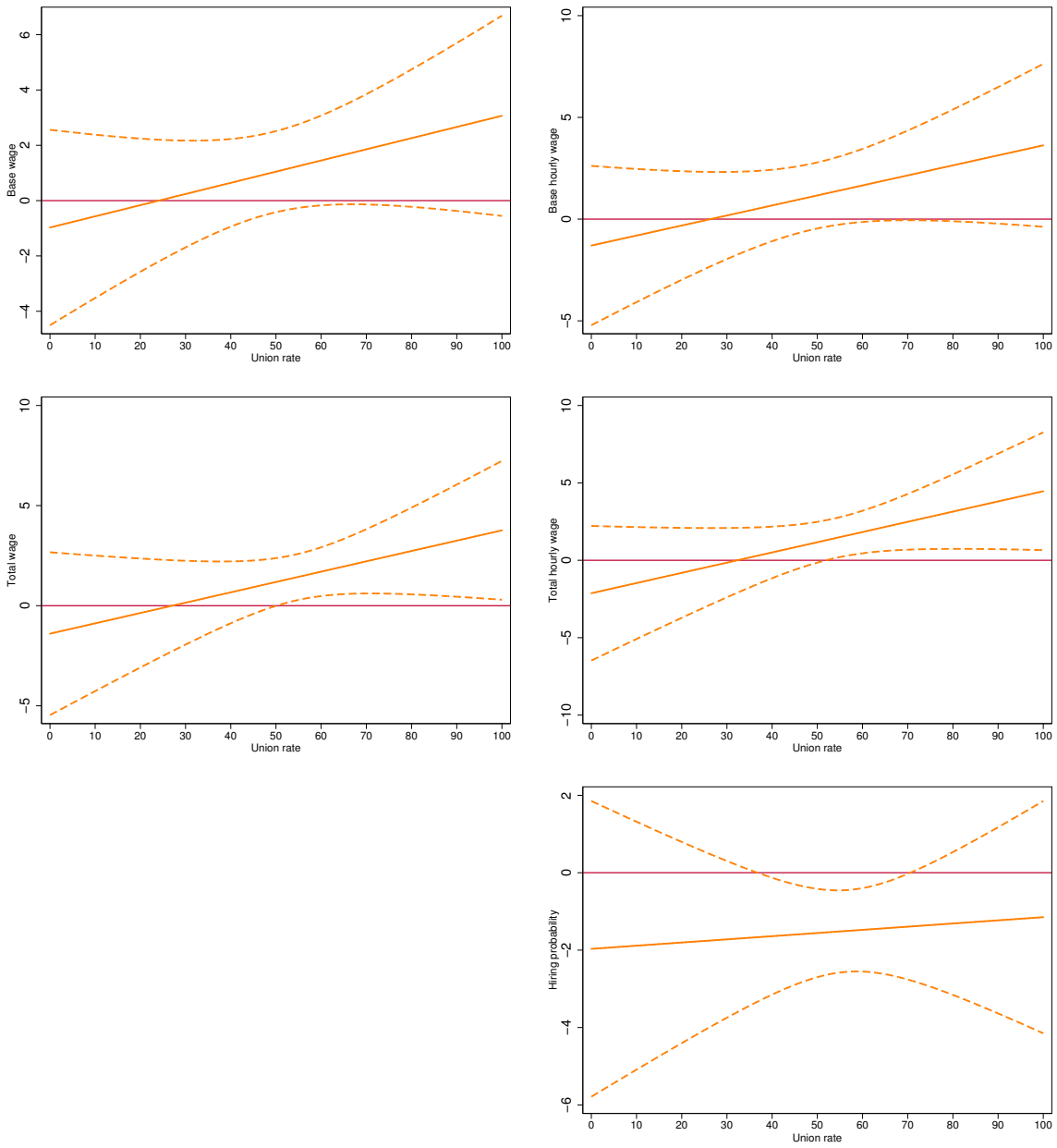

Figure 4: Instrumental variables estimation: Marginal impact (in percentage points) of union membership level on: base wages (top left panel); base hourly wages (top right panel); total wages (mid left panel); total hourly wages (mid right panel); and probability of hiring (bottom right panel). Dashed lines are 90% confidence intervals drawn around point estimates (solid line).