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THE IMPACT OF INSTITUTIONS AND
CHANGING ECONOMIC CONDITIONS

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WAGE DIFFERENTIALS AND SEGMENTATION: THE IMPACT OF INSTITUTIONS AND CHANGING ECONOMIC CONDITIONS

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Abstract:

This paper uses data from the European Survey on Income and Living Conditions (EU-SILC) to offer new empirical evidence on how wage differentials are influenced by the changing economic conditions (before and after the 2008-2010 recession) and shaped by the different institutional frameworks of EU countries. We examine whether wage changes are homogeneous across groups of workers, in particular as they are classified by their contractual relationship (temporary/permanent) and working time (full-time/part-time), and by the heterogeneity in institutions that regulate and affect the labour market. Results obtained by estimating ordinary least squares and quantile regressions confirm the existence of contract and working time wage gaps, and allow to estimate their different magnitudes along the wage distribution, and their rise during the recession. The impact of labour market institutions on shaping them is diverse, with more intervention of the government in the setting of the minimum wage and stricter regulation for atypical contracts reducing the wage gaps and producing larger positive effects for low-wage employees.

Keywords: wage differentials, work contracts, working time, institutions, business cycle, European countries, EU-SILC data, quantile regression

JEL Classification: H24, J31, J60

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1. Introduction

This paper investigates the impact of the Great Recession and the subsequent recovery on individual wages in countries of the European Union characterised by different labour market institutional settings. The study of several countries on a comparative basis allows for the potential identification of differences not only in wage levels but also in their evolution. Inequality between and within different groups of workers has been one of the main foci of theoretical and empirical research in Social Sciences for the last two-three decades. However, relatively little has been done to understand the importance of employment status (temporary/permanent positions) and working time (part-time/full-time) in connection with labour market institutional settings (in particular, those that influence more or less directly the wage levels) and the impact of the business cycle (the changing conditions of the economy and the labour market).

Although a number of different strategies have been pursued to improve the competitiveness of firms, increase labour market flexibility and fight persistent and high unemployment, one of the most ubiquitous has been to favour the use of atypical forms of employment. Therefore, temporary and part-time jobs have gradually been gaining importance in many labour markets, concentrating a large and increasing share of the workforce in European Union members (De Grip et al., 1997; Allmendinger 2013).¹ According to many economists, this trend (that started with varying degrees in different countries in the 1970s and 1980s) has brought about a segmentation that has adopted the form of a distinction between regular (permanent and full-time) and atypical employment (basically temporary contracts, but also part-time jobs) in most European countries.

Our contribution to the existing literature is threefold. Firstly, this paper attempts to offer new empirical evidence on how wage differentials were influenced by changing economic conditions, first when the Great Recession hit hard in 2008 and then during the ensuing

¹ In some countries, like the Netherlands or Switzerland, part-time work is the typical form of employment for women. However, this is not the case for the majority of European countries. Moreover, part-time employment is often involuntary (as measured by the share of part-timers who declared that they would prefer working full time but were unable to find a full-time job). In the EU, involuntary PTE has increased during the recession. This has happened in nearly all European countries with the exception of Germany and, to some extent, Denmark. The rise has been relatively large in Italy, France, Portugal, Spain and Italy (in the last two countries, the proportion of involuntary part-time work has increased from about one third in 2006 to nearly two thirds in 2014, with larger rises among men than women).

recovery that started at varying moments of time for the different European countries. Secondly, we investigate whether these wage changes were homogeneous across groups of workers, in particular when they are distinguished by their contractual relationship and/or working time in different countries. Finally, we try to link the potential varying responses to the heterogeneity in institutions that regulate and affect the labour market in different countries (employment protection laws, wage-setting regimes and minimum wages).

The dataset used here is the EU-SILC for the years 2006 and 2014. The selected countries are Germany, Spain, United Kingdom, France, Poland and Finland. These countries have been selected because their samples are the largest in the EU-SILC and because they represent different European institutional families: Liberal (the UK), Continental (France and Germany), Nordic (Finland), Southern (Spain) and Eastern (Poland).

2. Literature review and working hypotheses

In the last three decades or so, the theoretical and empirical literature on wage differences has increased substantially. In order to focus our discussion, we structure this section around three working hypotheses we want to test empirically. They are salient features that are relevant in their own right but have been seldom studied in the literature. First, whether the wage gap is cumulative, i.e. do individuals working with temporary and part-time contracts suffer a double pay penalty? Second, whether the institutional environment is relevant, i.e. do the labour market institutions influence the wage gaps between permanent/temporary workers and full-/part-timers? And third, whether the wage differences are sensitive to economic conditions, i.e. how does the changing labour market and macroeconomic situation affect the wages received by atypical workers? Although they are interconnected in some aspects, they are kept separate here for a clearer presentation.

a) Wage differentials by type of contract and working time (H1)

Our first hypothesis deals with wage differences across workers grouped according to their contractual relationship (permanent/temporary) and working time (full-time/part-time). Most European economists would agree that labour markets are segmented and function according

to some variant of segmentation theory.² According to one of these variants, the dual labour market theory (Doeringer and Piore, 1971), a dichotomy has developed over time between a high-wage primary segment ('good jobs') with better conditions and possibilities for a working career through internal labour markets and a low-wage secondary segment ('bad jobs') with poor working conditions and no career prospects. The explanation given by Doeringer and Piore for this dualistic pattern was primarily technological: the primary or most technologically advanced sectors of the economy require a stable supply of highly skilled labour, so it is in their interest to create internal (non-competitive, protected) labour markets for their core workforces; while on the other hand, the secondary or more technologically backward sectors generally require less specific skills and have to deal with more uncertainty (providing the flexibility that the primary sector lacks), so they typically generate less stable employment relations. This argument was later complemented by other theories of the mechanisms behind segmentation, from discrimination to industrial relations systems (Muñoz de Bustillo et al., 2011: 54-56), but there is a general agreement that segmentation is a key feature of most European labour markets. From this perspective, labour market segmentation has mainly adopted the form of a distinction between regular (permanent and full-time) and atypical employment (basically temporary contracts, but also part-time jobs) in most European countries.

There is a large literature on the wage penalty suffered by temporary and part-time workers. Wages of workers holding fixed-term contracts are lower than the earnings of workers holding open-ended contracts and part-timers earn less than their full-time counterparts do. The existence of significant wage differentials between temporary and permanent workers even after controlling for personal, job and employer attributes is well documented (Booth et al., 2002; Davia and Hernanz, 2004; Bosio, 2014; Da Silva and Turrini, 2015). In the case of part-time work, most studies find a negative unadjusted wage gap, the magnitude of which differs substantially across countries. In some studies, this part-time pay penalty vanishes or becomes small when controlling for differences in workers and job characteristics, especially

² The basic idea behind segmentation theory is that (contrary to the assumption of neoclassical economic models) there is not a single labour market functioning according to the rules of supply and demand, but different (segmented) labour markets which function with different rules and with limited porosity between them. "The competitive form is only one mode of labour market organization, coexisting along other modes of organization" (Peck 1996, p. 47).

education and occupation (Jepsen et al., 2005; Muñoz de Bustillo et al., 2008; and Manning and Petrongolo, 2008). In other studies, a wage gap remains and this unexplained part shows considerable cross-country variation (Gallie et al., 1998; Fernández-Kranz and Rodríguez-Planas, 2011).³ However, most of this literature focuses either on temporary or part-time status as factors affecting the distribution of wages, without a specific focus on the possibility of the wage penalties of both conditions being cumulative.

Some explanations for the negative wage gap between temporary, part-time workers, on the one hand, and regular, full-time workers, on the other hand, have relied on contract theory and asymmetric information (Jovanovic, 1979) but also on efficiency wage arguments (Rebitzer and Taylor, 1991; Güell, 2000). Other authors associate the wage gap to investments in a lower amount of firm-specific training (Belot et al., 2007; Bosio, 2014). If temporary and part-time workers are not allowed to accumulate firm-specific human capital (due to their fixed-term contracts and/or reduced working time), the wage gap with respect to regular, full-time workers will remain (especially if they are trapped in low-productivity/low-pay positions), being even higher for lower educated employees and/or workers in the lowest paid jobs. This is underlined by the literature on returns to training (Arulampalam et al., 2010) that stresses the importance of heterogeneity along the conditional wage distribution, once education and other personal characteristics are taken into account.

b) Wage differentials and labour market institutions (H2)

The second hypothesis refers to whether the pay gap by type of contract and working time is sensitive to the institutional environment, namely whether the labour market institutions influence the wage gaps between permanent/temporary workers and full-/part-timers. The main labour market institutions to be considered when assessing their role in shaping the wage gap are the system of collective bargaining, employment protection legislation and minimum wages.

Wage-setting institutions normally reduce pay dispersion (Blau and Kahn, 1999; OECD, 2004) but may produce different effects when a high level of labour market segmentation

³ There are, however, some studies that find a part-time pay premium (Pissarides et al., 2005; Pagán, 2007; Booth and Woods, 2008).

exists. In this case, unions' power and collective bargaining coordination could mostly play the expected role for the insiders (permanent, full-time workers), while the wages of outsiders (atypical workers) would be more directly determined by market conditions and thus more likely to suffer downwards adjustments in the context of a crisis. In this context, the deregulation of atypical contracts, by affecting the accumulation of skills and increasing labour market segmentation, may exacerbate the wage gap. For instance, when there is asymmetric coverage of wage-setting institutions for different types of workers/jobs, between-group effects might prevail over within-group ones, leading to an increase in inequality (Firpo et al., 2011).

Regarding the impact of employment protection legislation, the low protection and/or the deregulation of atypical contracts (for instance, through weaker limitations on the purposes for which these contracts can be used) can increase wage differentials. This may occur because lower restrictions in hiring using atypical contracts (especially, temporary contracts) favour a short-term increase in employment that negatively reflects on productivity and, consequently, wages. Therefore, although there may be an initial 'honeymoon effect' after deregulatory reforms, the long-term outcome is characterised by a return of employment to the 'pre-reform' level, but the larger proportion of atypical jobs determines poor accumulation of firm-specific skills that may be detrimental for innovation, productivity and workers' welfare and wages (Blanchard and Landlier, 2002; Boeri and Garibaldi, 2007; Belot et al., 2007; Dolado et al., 2016).

The effect of minimum wages on the wage gap between regular and atypical workers can be different depending on the symmetry of its enforcement. If minimum wages are equally enforced to regular and atypical workers, they can have the effect of reducing the wage gap, since they are more likely to increase the wages of atypical workers. However, it is documented, for instance, that employment regulations rarely fully comply with the Council Directive 1999/70/EC of 1999 on fixed-term work, requiring that legally binding wage floors apply equally to workers with permanent and fixed-term contracts. In this case, asymmetric non-enforcement would lead to an increased wage gap; in fact, in this case a weakening of minimum wage provisions would mostly affect permanent workers, therefore reducing the wage gap (Da Silva and Turrini, 2015).

c) Wage differentials and the business cycle (H3)

The third hypothesis refers to how the changing labour market and macroeconomic situation affects the wages received by atypical workers. Here, one should consider how the process of labour reallocation generated by a sharp but relatively long crisis (such as the 2008-2010 recession) might have affected the relative advantage of permanent, full-time workers over temporary, part-time workers. In this regard, the crisis could have had contradictory effects. On the one hand, the wage gap may be reduced due to an increase in the relative demand for atypical labour and a fall in the importance of specific skills accumulation. In fact, many EU countries saw a dramatic fall of atypical (in particular, temporary) employment in 2008-2009, but it was followed by a sharp increase in their number in the ensuing recovery, indicative of employers' reluctance to create permanent jobs in a climate of economic uncertainty (Eurofound, 2013). Furthermore, the large-scale labour reallocation from industry (and construction) to service sectors during the crisis might have weakened the accumulation of firm-specific skills that are normally associated to higher productivity and wages for regular workers. On the other hand, the crisis may have increased the wage gap simply because temporary and part-time workers are more vulnerable in the labour market, and thus more likely to suffer the effects of the crisis, not only in terms of employment opportunities but also in terms of lower wages. For instance, wage reductions are easier to implement for new (temporary) hires than for ongoing contracts, even in the context of a crisis. Therefore, the effect of the crisis on the wage gap between regular and atypical jobs is relatively uncertain. This uncertainty is exacerbated by the mediating role played by institutions, which could be themselves affected in very different ways by the crisis. For instance, in many cases the crisis weakened the role of collective bargaining, or led to the implementation of changes in the regulation of atypical employment, as in the Spanish reform of 2012 (see Visser, 2016a).

Given the changes in employment that countries have exhibited in the last decade or so and the differences in the economies' institutional framework, it is important to assess whether atypical jobs have offered workers a way not only to enter and stay in employment in good times as well as in hard times, but also to earn wages which move in accord to the rest of workers.

3. Data and descriptive analysis

3.1. Data

In order to analyse the period 2006-2014, this paper uses data from the “European Survey on Income and Living Conditions” (EU-SILC) for the years 2006 and 2014. The EU-SILC is a cross-sectional and longitudinal database elaborated by Eurostat, with data drawn from different sources at the national level. It is a reasonably large dataset representative of all private households and individual members residing in the territory of the corresponding countries at the time of data collection, with information about demographic and socioeconomic characteristics and income earned in the previous year. For those in employment, it offers information on the attributes of respondents’ jobs at the time of the interview, among others the types of contractual relationship and working time status: permanent or temporary contracts, and full-time or part-time job.

The EU-SILC provides a measure of wages that has to be computed on the basis of annual labour earnings information. We use an approximation to hourly wages obtained from dividing annual labour income in the year before the survey by the number of months worked, taking into account whether they were full-time or part-time, and adjusting for people with more than one job (for more details see Fernández-Macías and Vacas, 2015). Therefore, in practice we will have a measure of full-time equivalent wages rather than hourly wages, which should be equivalent even if not identical. In addition, wages have been deflated by the European Harmonised indices of consumer prices using 2005 as the base year, so we are using a measure of wages corrected by differences in purchasing parity power.

To provide some context for the analysis, Table 1 provides the distribution (1st column) of individuals considered in our analysis and their average gross monthly wages (2nd column) for employees over the years 2006 and 2014 for the selected countries: Spain, Germany, the UK, Finland, France and Poland. These countries have been selected because their samples are relatively large in the EU-SILC and because they are exemplary cases of different institutional frameworks. The subsample of individuals considered in our analysis is made up of those aged 16-64, excluding self-employed workers and the agricultural sector. The number of workers included in the two samples is 51,971 in 2006 and 47,767 in 2014.

Table 1. Distribution and average monthly wages in real terms (in euro of 2005) by socio-demographic characteristics. Selected EU countries. EUSILC, 2006 and 2014. Weighted data.

	Distribution (%)		Average monthly wages (euros)	
	2006	2014	2006	2014
All	100	100	2245	2178
Gender				
Male	52.9	51.0	2475	2446
Female	47.1	49.0	1986	1899
Age groups				
16-30 years old	24.3	21.2	1654	1640
31-45 years old	43.6	40.0	2372	2241
+45 years old	32.1	38.7	2520	2407
Citizenship				
Other EU25 country	0.8	2.2	2300	2077
Same as country of residence	94.4	92.9	2236	2170
Other non-EU	4.8	4.8	2417	2376
Education				
Low	19.1	15.7	1613	1576
Med	50.0	46.7	2037	1899
High	30.5	37.0	2984	2789
Missing	0.4	0.6	1843	1860
Type of contract				
Permanent	84.9	86.1	2407	2309
Temporary	15.1	13.9	1326	1362
Working day				
Full time	80.3	80.0	2284	2258
Part time	19.7	20.0	2083	1854
Occupation				
Managers	6.5	6.6	4052	3765
Professionals	14.1	18.9	3177	2951
Technicians and associate professionals	18.9	19.6	2559	2407
Clerical support workers	14.5	12.2	2068	1984
Service and sales workers	13.9	16.1	1575	1492
Skilled agricultural, forestry & fishing ws.	0.4	0.5	1670	1789
Craft and related trades workers	13.1	10.1	1744	1766
Plant and machine operators	8.2	8.0	1841	1639
Elementary occupations	10.5	8.3	1403	1265
Industry				
Mining, manufacture & utilities	20.1	16.9	2281	2264
Construction	7.4	5.7	1946	1988
Commerce	13.9	13.5	1832	1791
Hospitality & restaurants	3.1	5.4	1480	2034
Transport & communications	6.5	3.7	2294	1519
Finance	4.4	3.5	3179	3037
Real estate & renting	8.1	4.1	2732	3308
Pubic Administration	11.1	9.2	2514	2271
Education	7.9	9.0	2385	2410
Health	10.1	8.8	2251	2208
Other services	6.7	17.3	1825	1943
Missing	0.7	3.0	2066	2624
Sample	51,971	47,767	51,971	47,767

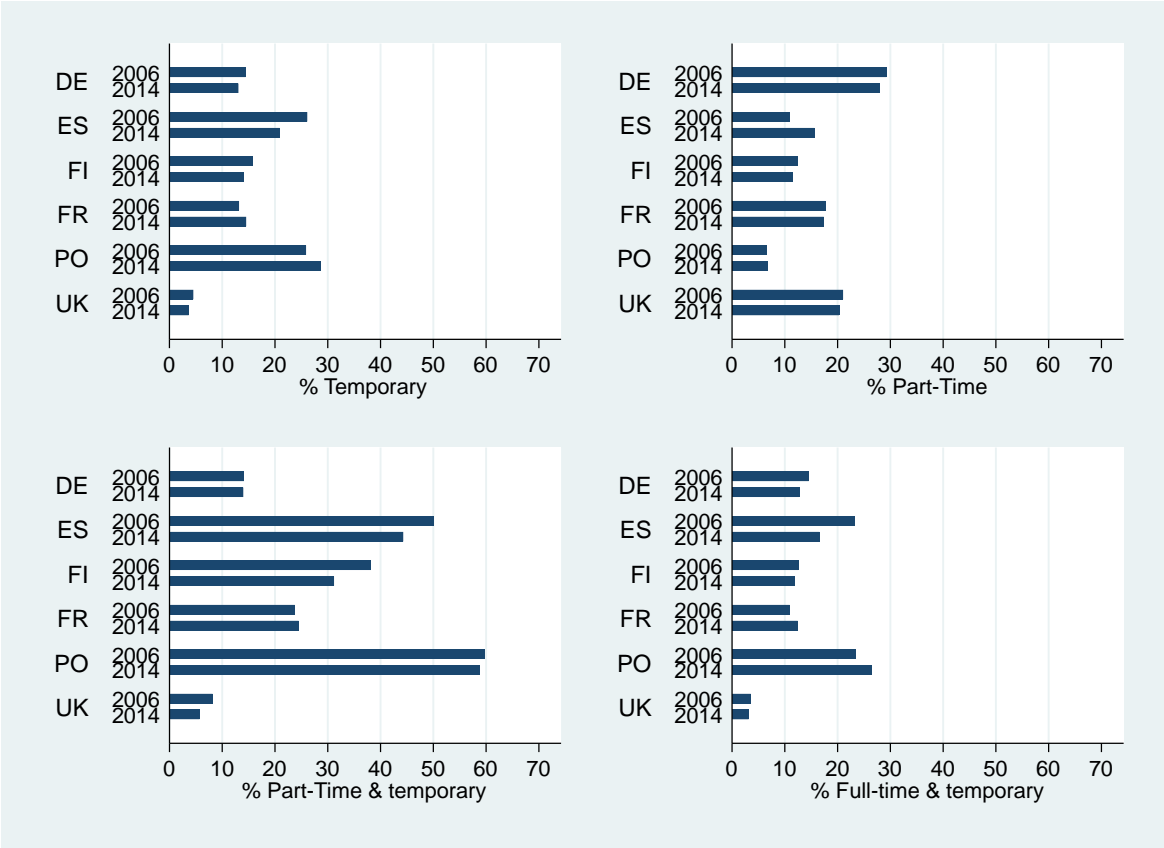
Looking at the first column for both years, we observe that workers are mainly men (51-53%), natives (93-94%), with medium level of education (46-50%), aged 31-45 years old (40-44%), employed in the manufacturing sector (18-21%) and in occupations as technicians and associate professionals (17-18%), working full time (80%), with a permanent contract (85-86%), and in Germany (21%), Poland (20-21%), Spain (16-19%), France (16-18%), the UK (15-16%) and Finland (8-9%). As a consequence of the economic crisis starting at the end of 2007, there were changes in the composition of salaried employment across EU selected countries, reflecting alterations in the labour supply and demand. The shares of women and individuals aged more than 45 were higher in 2014 compared with 2006, while the corresponding to workers holding temporary contracts, working in elementary occupations and clerical support jobs, and having a job in most sectors except 'Other services', 'Tourism' and 'Education', were lower in 2014 compared with 2006.

Looking at the second column, the country with the lowest average real wage is Poland (548 euros in 2006 and 636 in 2014 euros on average) followed by Spain (1,649 and 1,729 euros) and France (2,165 and 2,293 euros). Then, there is a homogenous cluster of countries with higher wages: Germany (2,552 and 2,547 euros), the UK (3,145 and 2,498 euros) and Finland (2,553 and 2,800 euros). These average wages hide quite a lot of diversity for groups of workers defined in terms of socioeconomic and job characteristics. Wages are higher for male, older and native-born individuals; workers with higher education, holding permanent contracts and in full-time employment; managers and professionals and the ones working in certain industries ('Finance and insurance and real estate').

3.2. Raw wage differentials

Given the focus of the paper in the effect of the type of contract (temporary/permanent), working time (full time versus part-time) and the role of institutions, we investigate those factors and their effects on wage differentials. Figure 1 displays four indicators concerning atypical employment for 2006 and 2014 in the selected countries: the share of workers holding temporary contracts; the share of part-time work; the proportion of part-time workers who simultaneously are employed under temporary contracts; and the proportion of full-timers who hold a temporary contract.

Figure 1. Share of temporary employment, share of part-time work, share of temporary employment within part-time work, and share of temporary employment within full-time work. Selected EU countries. EU-SILC, 2006 and 2014.



In Spain and Poland, the importance of temporary employment is larger than the average (above 20%) and the one of part-time work lower (around 10% or less). On the contrary, the UK and Germany exhibit larger shares of part-time work (above 20%) and lower of temporary employment (below 15%). France and Finland are situated in between, showing somewhat ‘balanced’ shares of both types of employment (around 15%). Part-time is specially concentrated in females (30% in UK and around 50% in Germany). The third indicator summarizes both, indicating that a large portion of part-timers are also temporary workers in Spain and Poland, while the opposite is true for the UK and Germany. In addition, the share of temporary contracts within full-time employment is more than 20% in Spain and Poland, around 10% in France, Finland and Germany and lower than 5% in the UK. Overall, these findings point to distinct institutional and policy strategies followed by European

countries in order to increase the flexibility of labour markets and favour the participation of workers and employment creation.

Next, Table 2 shows the average real gross monthly wage in euros by country and the wage gaps by types of contract/working time. While real wages increased substantially between 2006 and 2014 in Poland (16.1%) and Finland (9.7%), other countries exhibited either a minor increase (Spain, 4.9%, and France, 5.9%) or null (Germany). By contrast, the British workers suffered a stronger wage decrease of 20% across the entire period.⁴ In relation to the gap between permanent/temporary contracts, it is positive in all the countries except the UK. We can identify that the gap decreased during the crisis in Germany, France and Finland and increased in Spain, while it remained constant in the UK. Finally, the gap between full-time/part-time employment increased between 2006 and 2014 in Germany and Spain while decreased in the rest of countries.

Table 2. Average monthly wage (in euro of 2005) by country, and type of contract and working time wage gaps. Selected EU countries. EUSILC, 2006 and 2014.

Countries	Wages			Permanent/temporary gap		Full-time/part-time gap	
	2006	2014	Ratio Y14/Y06	2006	2014	2006	2014
Germany	2552	2547	0.998	2.02	1.85	1.19	1.44
Spain	16489	1729	1.049	1.39	1.51	1.22	1.42
Finland	2553	2800	1.097	1.37	1.32	1.18	1.16
France	2165	2293	1.059	1.49	1.31	1.26	1.23
Poland	548	636	1.161	1.56	1.42	1.23	1.15
UK	3145	2498	0.794	0.92	0.92	1.32	1.27

3.3. Institutional variables

The five indicators describing the labour market institutional setting of the selected economies we have considered are the following: (1) coordination of wage bargaining; (2) coverage bargaining rate; (3) union density; (4) system of minimum wages; and (5) strictness of employment protection legislation (EPL) for temporary workers. The first four indicators come from the Amsterdam Institute for Advanced Labour Studies (AIAS) database (see

⁴ It may be that the conversion between pounds and euros and the calculation through the EU-SILC exaggerates the fall.

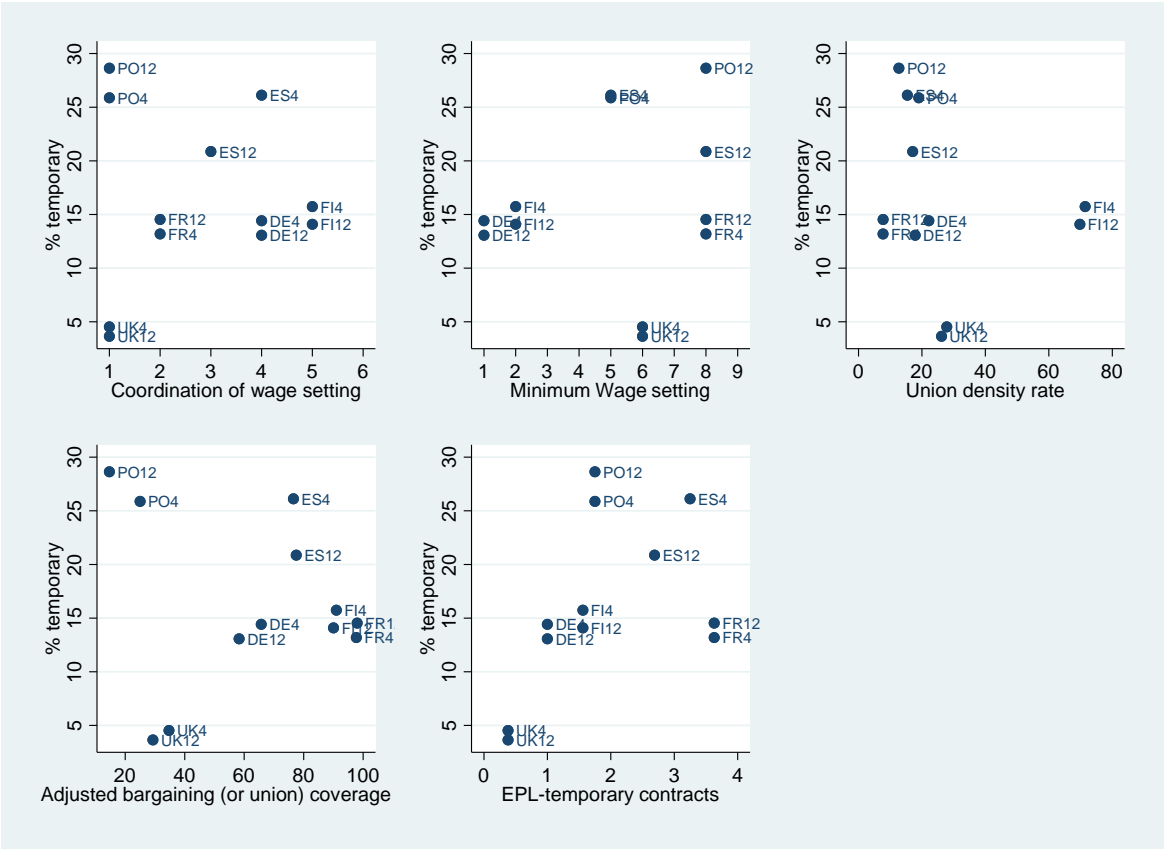
Visser, 2016b), while the latter is constructed by the OECD. A description of these variables can be found in Table A.1 of the Appendix.

The institutional characteristics of countries can contribute to explaining the share of part-time and temporary employment across countries. To provide an exploratory analysis of this issue, the values of the share of part-time and temporary contracts over total salaried employment are plotted against the previous indicators in two years, 2006 and 2014. Since institutions take time to become effective and produce effects on the labour markets, we use lagged values of all indicators. In fact, we use lagged institutional variables indicators as of 2004 and 2012 because the information contained in the EU-SILC in 2006 and 2014 for employed workers corresponds to the information of the individuals in the previous year.

Figures 2 and 3 display the potential relationships between temporary/part-time work and the institutional variables. In these figures, the vertical line measures the percentage of temporary and part-time employment and the horizontal line the corresponding institutional indicator for all selected countries in 2004-05 and 2012-13.

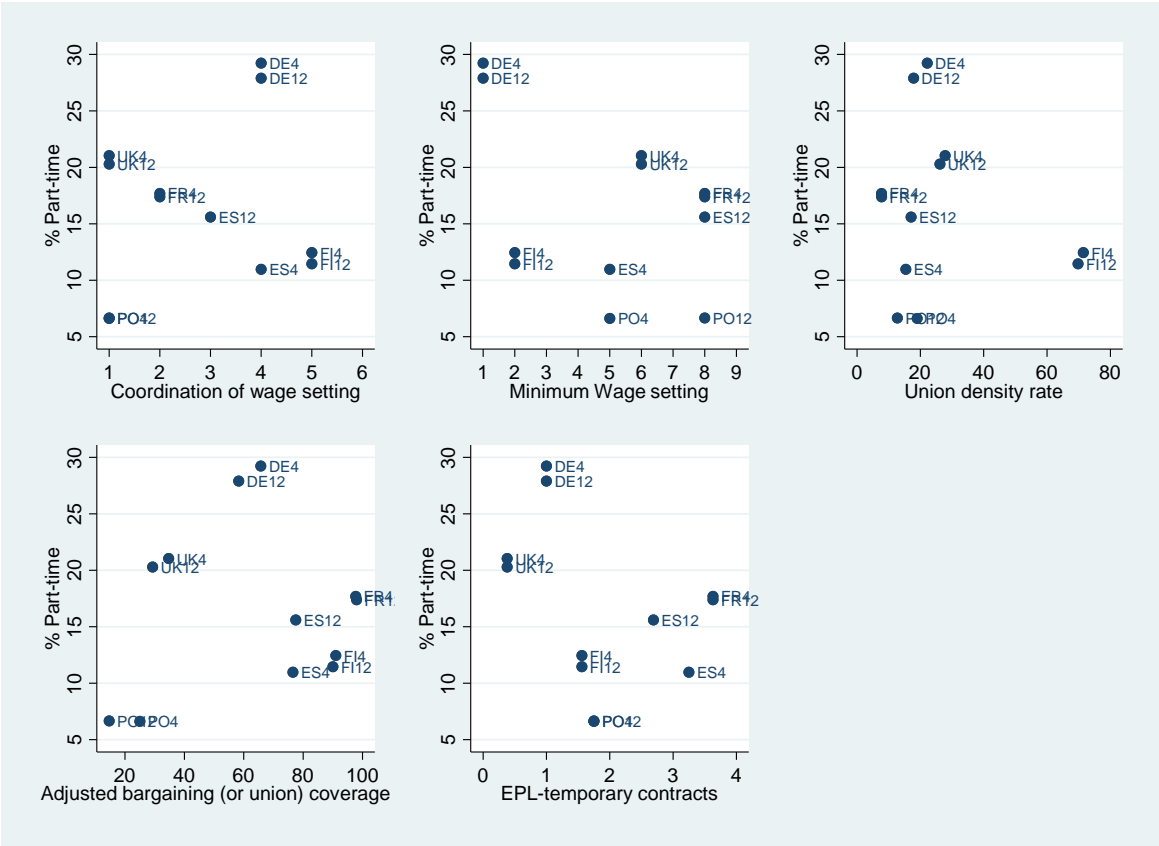
Wage coordination (“*Coordination*”) ranges from one (fragmented bargaining confined largely to individual firms or plants) to five (economy-wide bargaining). The level of wage coordination only changes in Spain (it decreased from 4 to 3 between 2004 and 2012), remaining stable in the rest of the countries during the crisis. There is an apparent positive correlation between the level of wage coordination and the percentage of temporary contracts, except in Poland that has the highest percentage of temporary contracts (more than 25%) and the lowest level of wage coordination. In contrast, there is a negative correlation between part-time employment and the level of wage coordination (except in Poland and Germany).

Figure 2. Share of temporary employment *versus* institutional variables. Selected EU countries (2004 and 2012).



Union density (“*Unionization*”) measures union membership as a proportion of wage and salary earners in employment. This indicator is quite stable but low in all the countries during the period 2004-2012, except in Finland, who exhibit the highest union density and wage coordination. There seems to be no correlation between unionization and temporary or part-time employment. However, the bargaining coverage rate (“*Coverage*”), which is measured as employees covered by collective bargaining agreements as a proportion of all wage and salary earners in employment with the right to bargaining, shows a positive correlation with temporary employment (except in Poland) and with part-time work.

Figure 3. Share of part-time work *versus* institutional variables. Selected EU countries (2004 and 2012).



The minimum wage setting variable reflects the (increasing) degree of government intervention and discretion in setting the minimum wage or reversely the degree to which the government is bound in its decisions by unions and employers, and/or fixed rules. This variable (“*Minimum*”) ranges from zero (no statutory minimum wage, no sectoral or national agreements) to eight (minimum wage is set by government, without fixed rule). Two countries, Finland and Germany, have a lower and stable degree of government intervention in the minimum wage setting in both years (South-west quadrant). Germany have a minimum set by collective agreement, while Finland by a national agreement between unions and employers. On the contrary, Spain, Poland and France are countries with high government intervention in the minimum wage. Traditionally, France is the country with the highest government intervention in the minimum wage because the government sets it without fixed rule. In Poland and Spain, the government sets the minimum wage but after (non-binding)

tripartite consultations (in 2004) or without consultations (in 2012). Finally, in the UK the minimum wage is set by judges or expert committee in the period of study. It seems that the share of temporary and part-time employment is positively correlated with systems of minimum wage where governments have more power or influence (with the exception of the UK).

Finally, in relation to the regulation on temporary forms of employment (“EPLT”), this indicator remained stable in most of the countries, except in Spain where the level was reduced during the recession. Four countries (UK, Germany, Finland and Poland) remained in the area of weak regulation of temporary contracts. On the contrary, Spain and France exhibit a high strictness compared to the rest of countries. All in all, there seems to exist a positive correlation of EPLT with temporary employment, while no correlation is observed with part-time work.

4. Econometric model

As we are interested in analysing the magnitude of wage differentials (expressed as log gross monthly wages) across individuals, our strategy rests upon the estimation of a Mincer-type wage equation. We estimate our empirical models pooling the data for the selected countries and the years 2006 and 2014. The baseline pooled (by country and by year) empirical model takes the following form:

$$\begin{aligned}
 Y_{ij} = & \beta X_{ij} + \gamma_1 Temp_{ij} Y2006 + \gamma_2 Temp_{ij} Y2014 + \delta_1 PTE_{ij} Y2006 \\
 & + \delta_2 PTE_{ij} Y2014 + \mu_1 Temp_{ij} Inst_j Y2006 + \mu_2 Temp_{ij} Inst_j Y2014 \\
 & + \vartheta_1 PTE_{ij} Inst_j Y2006 + \vartheta_2 PTE_{ij} Inst_j Y2014 + u_j + u_j Y2014 + \varepsilon_{ij}
 \end{aligned}
 \tag{1}$$

where i and j stand for individuals and countries, respectively, X_{ij} is a vector of covariates, u_j represents unobservable country-specific effects, and ε_{ij} is the individual error term. The models control for a range of personal and work related characteristics. Regarding socio-demographics, we include gender, age (three dummy variables for age groups: 16-30, 31-45 and 46-64), three dummies for educational level (low, medium and high), a dummy variable for marital status (1 married, 0 otherwise), and dummies for nationality (same as country of residence, other EU-country, or non-EU country). Regarding job and employer related

attributes, we include dummy variables for occupations (nine) and industries (eleven). The country-specific effects are also interacted with the year 2014 dummy in order to model the country-specific effect of the crisis on the worker's wages.

The pooling allows estimating the effect of the business cycle on the conditions of temporary and/or part-time worker by means of the interaction terms between the variables capturing employment status ($Temp=1$ if temporary, 0 if permanent) and working time status ($PTE=1$ if part-time, 0 if full-time), on the one hand, and the dummy variables for the two years ($Y2006$ and $Y2014$), on the other hand. The inclusion of all three interactions (instead of the main effect –being temporary and being part-timer- plus two additional interactions in each case) has the advantage of directly providing the estimates of being a temporary worker and a part-timer in both years. This allows us to test H3.

Furthermore, the presence of country-level institutional factors originates a multilevel structure of data, in which observations at the individual level are nested within the country level, so after pooling the country data we include distinct country intercepts. In fact, we choose a fixed effect model pooling the country data and including country intercepts following Bryan and Jenkins (2016) and Perugini and Pompei (2016). Additional country-level variables (the institutional ones, $Inst$) are interacted with individual-level variables ($Temp$ and PTE) in order to obtain the effect that a country-level factor produces on the individual-level outcome. This allows us to estimate the effects of country-level institutional settings on the temp/perm and part-/full-time workers pay gap to test H2. As mentioned previously the institutional indicators are the coordination of wage bargaining, minimum wage settings, union density, the bargaining coverage rate, and the strictness of hiring and firing for temporary contracts. These variables are lagged one period in order to alleviate endogeneity issues and to give time to institutional reforms to become effective.

A more extended specification of the model includes additional interactions between employment status and working time status and of this interaction with the yearly dummies and with the institutional variables. The objective is to obtain estimates of the impact of holding a fixed-term contract and simultaneously being a part-timer (a category of workers that has increased over time) and the effect that country-level variables bring about on the pay gap, thus allowing to test H1 and H2.

The empirical models are estimated by performing Ordinary Least Squares (OLS) regressions. As we are also interested in analysing the way the wage distribution has evolved between 2006 and 2014, we use a quantile regression of wages as functions of socio-demographics and job variables. Quantile Regression (QR) provides information on the relationship between wages and the regressors at different points of the distribution (at the bottom, median and top of the distribution), whereas OLS regression characterises the distribution only at its mean. All the estimations are weighted.

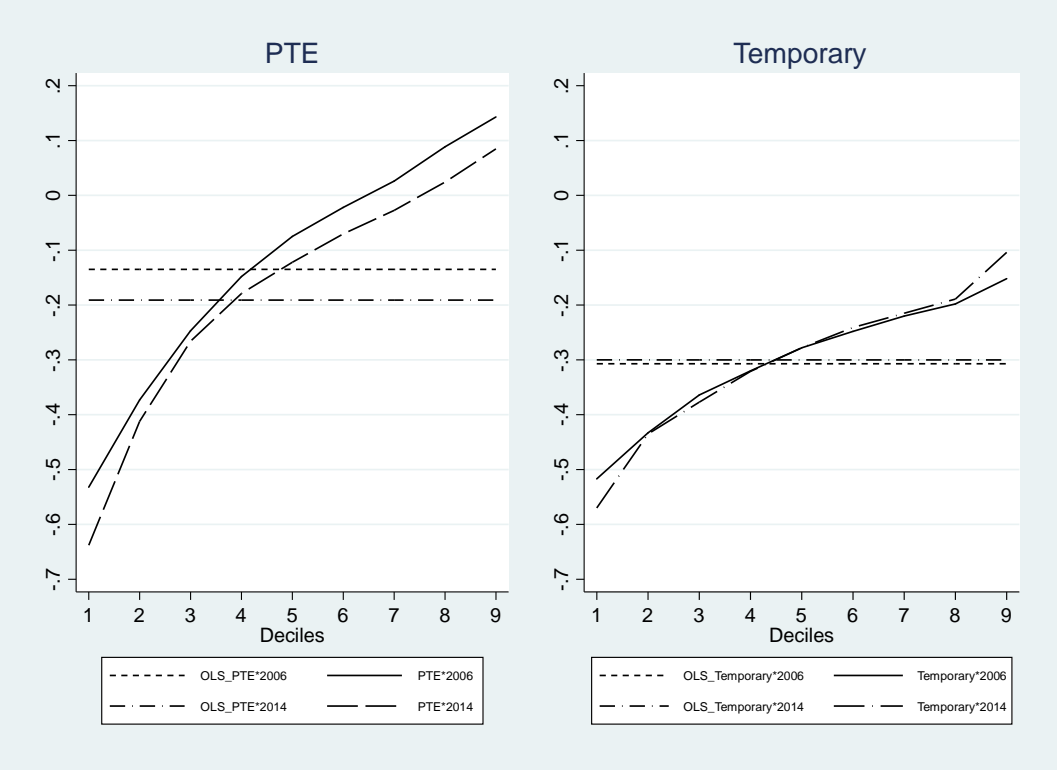
5. Results

The results of the specifications of determinants on monthly wages estimated by OLS are reported in Table A.2 of the Appendix. The results of QR regressions are available from the authors upon request.

Figure 4 displays the adjusted wage gap between regular (permanent and full-time) and atypical (temporary and part-time) workers. Once all other observable factors influencing wages are controlled for, atypical workers always earn a significantly lower wage compared to regular workers. This holds for all model specifications included in the tables. According to the OLS coefficients, temporary workers earned about 30% less than permanent workers, both in 2006 and 2014 (model 1). This value is in the range of the country-by-country estimations available in the empirical literature (Da Silva and Turrini, 2015).

Regarding the effect of part-time work on wages, the coefficients indicate that part-timers earned 14% less than full-timers in 2006 (model 1). This working time wage gap increased substantially during the period of analysis, reaching 19% overall. Regarding the differences along the wage distribution, the negative effects for both dummy variables are larger at the bottom of the distribution and gradually decrease (becoming positive) for higher quantiles. This evidence suggests that there is a sticky floor effect for atypical workers, with the highest wage penalty being suffered by the lowest-paid workers. This feature has exacerbated during the crisis period for part-timers. Finally, although the interaction between temporary and part-time work turns out to be statistically significantly positive, the coefficient is really small (model 2).

Figure 4. Impact of temporary and part-time employment on wage gaps. OLS and QR estimations. EU-SILC, 2006 and 2014.



Therefore, our findings point to the existence of significant contract and working time wage gaps and a negative impact of the crisis and the subsequent recovery on the wages of atypical workers (in particular part-timers) and, therefore, on the wage gap (H1 and H3). The increase of involuntary atypical work on several European countries during the last decade or so might be behind this outcome. Another potential reason may be that these workers are more vulnerable, particularly in a period in which unionization, bargaining coverage and the scope of collective bargaining have diminished (Visser, 2016a), so employers may find it easier to implement wage reductions, especially for new hires.

Accordingly, we now focus on the examination of the effects of labour market institutions on the contract and working time wage gaps (H2). To correctly interpret the results, it is important to bear in mind that the institutional variables are included as interactions with the dummy variables *Temp* and *PTE*. As the main effect of the latter are always negative, as reported above, a negative value of the coefficients of the institutional variable means that

this factor exacerbates the gap and *viceversa*. Figure 5 displays the impacts of the institutions on the wage gaps by both OLS and QR.

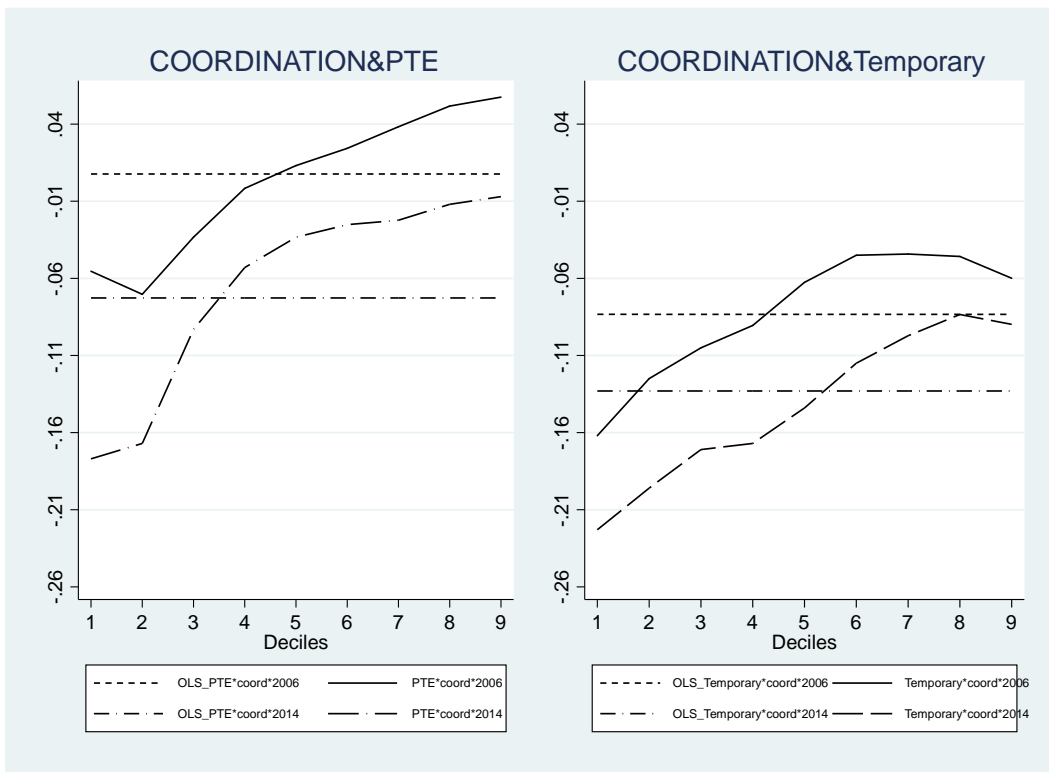
The impact of wage bargaining coordination changed significantly over the period considered. The neutral (in the case of part-time work) or slightly negative (in the case of temporary employment) effect of bargaining coordination in 2006 gave way to a more negative role in both cases, increasing the wage gap in 2014. Moreover, wage coordination is expected to favour low-skilled and low-wage workers, i.e. those situated at the bottom of the wage distribution, because strong coordination allows to anchor wages to a certain level for both regular and atypical workers and this contributes to reduce the gap. However, our results suggest that this was not the case in 2006 and much less in 2014.

The results are similar if we use the bargaining coverage rate to measure the role of trade unions in influencing labour market outcomes. In this case, the estimated impact changed from slightly positive to null for part-time work and from null to slightly negative for temporary employment. Here again we find that the workers located at the bottom of the wage distribution seem to be negatively impacted by the institution. This happened especially in 2014 and for temporary workers. The picture is not much different when we employ the union density variable, as the coefficients would indicate that unions, even in the contexts in which they are stronger, were not able to protect atypical workers and reduce the wage gap neither in 2006 nor in 2014. This occurs even deepening the duality on the labour market, at the expense of low-wage workers, something that is present in 2006 although not in 2014.

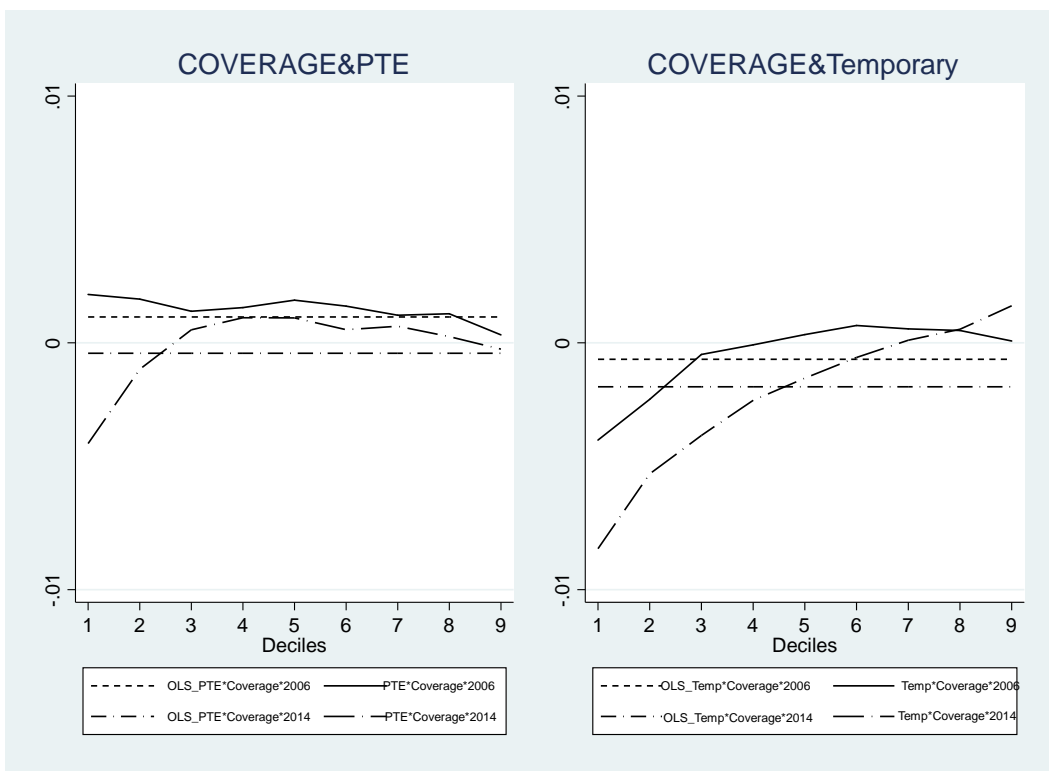
As there are authors (for instance, Flanagan, 1999) who question whether the membership rate is a good indicator of union power and consider that the coverage rate is conceptually better for capturing the potential impact of trade unions on the economy (this distinction being crucial in continental European countries), it seems safer to focus on the effects of the first two variables. In sum, they would suggest that, after the outbreak of the crisis, unemployment and the subsequent growth of the share of temporary and part-time jobs changed the picture of the impact of institutions related to wage bargaining and union power, so the effect of this institutional arrangement is not significant for atypical workers at the bottom of the wage distribution, indirectly contributing to the duality in the labour market.

Figure 5. Impact of labour market institutions on wage gaps. OLS and QR estimations. EU-SILC, 2006 and 2014.

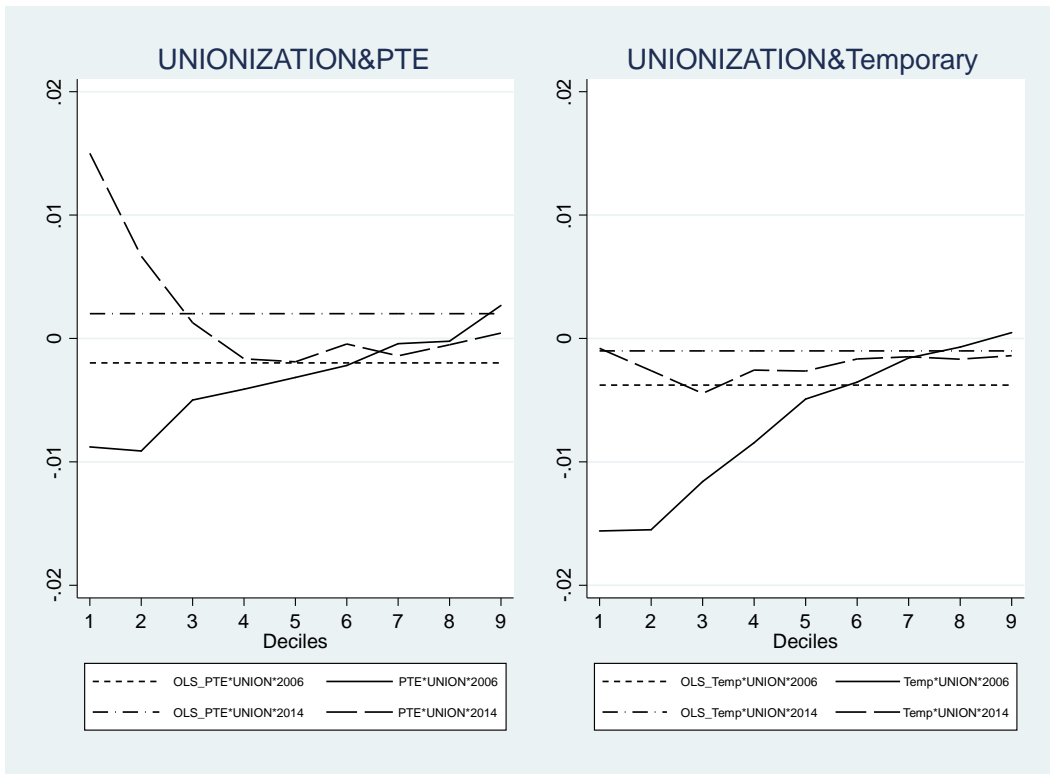
(a) *COORDINATION*



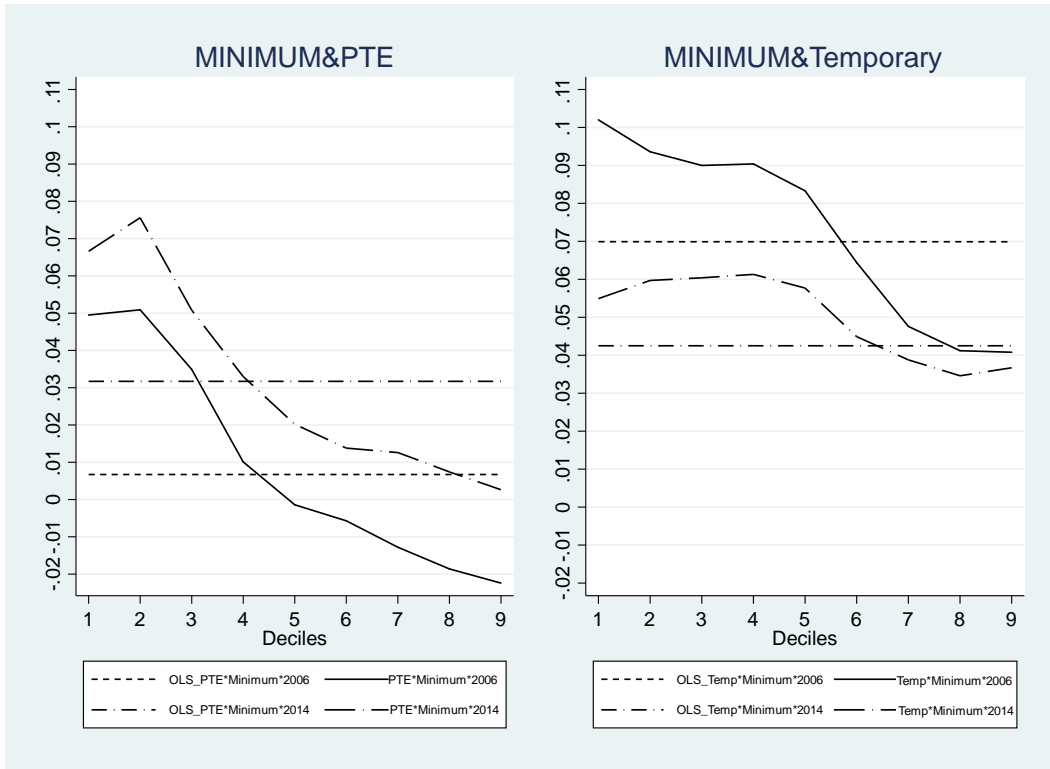
(b) *COVERAGE*



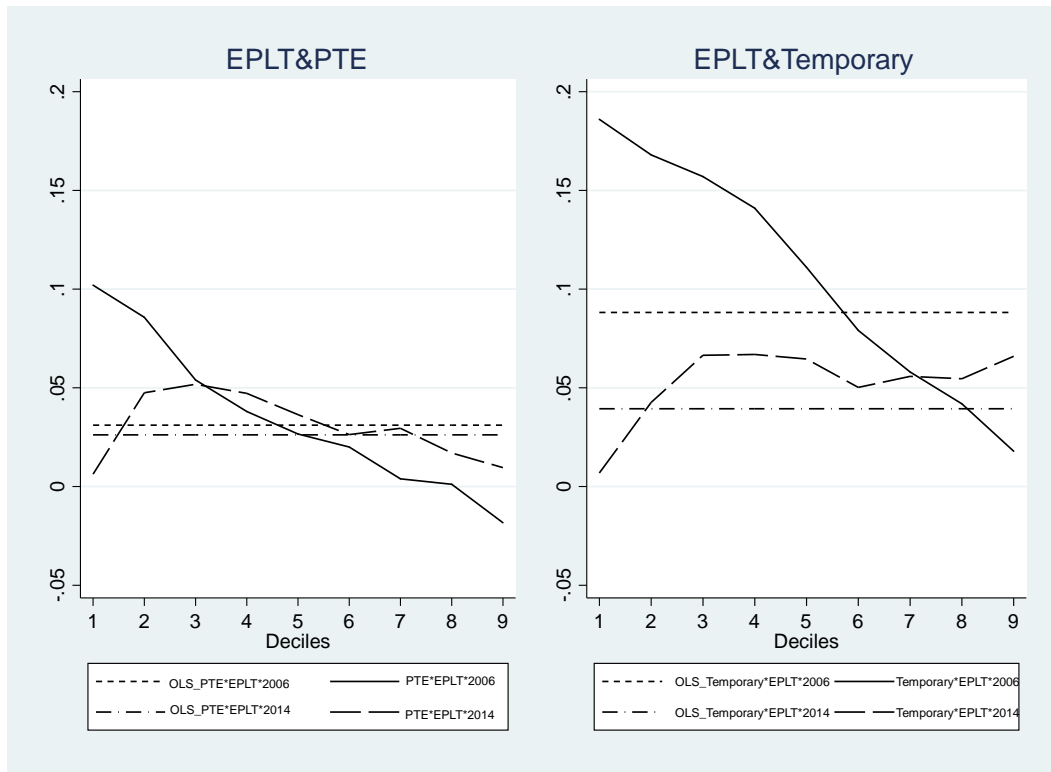
(c) UNIONIZATION



(d) MINIMUM WAGE



(e) *EPLT*



Thus, in the contexts where the wage coordination and coverage are stronger (although with reduced bargaining power of workers due to the impact of the employment crisis), they remained most effective for the most protected workers. As previously argued, the difficulties of trade unions in representing and protecting the labour market situation of atypical workers (while retaining some capacity to defend the interest of typical workers) means that in the context of a crisis they can indirectly contribute to a widening gap in labour market outcomes between typical and atypical employees, because the effect of the crisis becomes more asymmetrical. In the absence of trade unions, the (negative) impact of the crisis would probably be more homogenous for all workers in the lower paid segments, and their wages would decline in a more generalised way. In other words, it is precisely the absence of unions (or union power) that facilitates the downward adjustment of the wages of outsiders, not their presence (or their power) in the ranks of insiders. The contribution of unions to segmented labour outcomes is indirect and results from their asymmetric presence, not from their action. The opposite effects to those commented on for union power are detected for the minimum wage system and employment protection legislation. The estimates indicate that on average

more intervention of the government in the setting of the minimum wage and stricter regulation for atypical contracts were associated with lower type of contract and working time wage gaps. These positive impacts, detected in an expansionary year such as 2006, have remained after the crisis, although the magnitude of the effects has diminished slightly (except in the case of part-time work). These changes could be related to two facts. On the one hand, the labour reallocation processes caused by the crisis and the ensuing recovery. On the other hand, the effect of weaker EPL and minimum wage provisions. Due to the existing uncertainty, the employment inflow was concentrated into temporary and part-time jobs. In this context, a reduction of the strictness of EPL could have facilitated the reallocation process and contributed to the reduction of the wage gaps, although with a lessened intensity. The outcomes of the QR confirm the gap-reducing role of these institutions. Accordingly, they hit more the bottom part of the wage distribution, producing larger positive effects for low-wage employees and bringing about a statistically significant reduction in the sticky floor effect. However, this effect, that was especially relevant in 2006, had disappeared in 2014. In sum, it seems that labour market deregulation contributed marginally to alleviate the wage gaps between standard and atypical workers during the crisis, and this occurred in a context of downward wages convergence and intense labour reallocation.

6. Conclusions

The objective of this article was to investigate the impact of the business cycle and labour market institutional settings on wage gaps in several countries of the European Union. The business cycle (the changing conditions of the economy and the labour market) and the institutional framework (in particular, those elements that influence the wage levels) are important factors in shaping labour remunerations and, thus, wage differentials, either in the short-run or in the long-run. Our attention has been focused on the employment and working time status of workers.

The results indicate that holding an atypical (temporary/part-time) position corresponds to a significant negative wage gap with respect to a regular (permanent/full-time) position (so confirming our H1). This finding is consistent with a large empirical literature that documents the wage penalty suffered by temporary and part-time workers. Our results also confirm that larger wage gaps are found at the bottom of the wage distribution. Moreover, the impact of

the crisis and the subsequent recovery on the wages of atypical workers (in particular part-timers) was negative, increasing the wage gap especially for the lowest-paid workers (as hypothesized in H3). Therefore, the pattern of the wage gap over time suggests that the employment crisis weakened the position of atypical workers when compared to the one of regular workers.

As regards the impact of labour market institutions (H2), we found that more intervention of the government in the setting of the minimum wage and stricter regulation for atypical contracts are associated with lower wage gaps, producing larger positive effects for low-wage employees. However, the impact of institutions related to wage bargaining and union power (coordination, bargaining coverage and union density) was neutral or slightly negative, so they did not contribute to reduce the wage gaps. The fact that workers located at the bottom of the wage distribution are typically less protected by these institutions means that their wages are more directly affected by a crisis, and thus the gap in outcomes relative to those of protected workers is maintained or even grows.

It is worth noting that these effects have changed over time, so it appears that the crisis itself has played a crucial role in combination with the evolving institutions. Accordingly, the positive impacts of the minimum wage and the EPL on reducing the wage gaps remained after the outburst of the employment crisis, although with reduced intensity. At the same time, the weakening of bargaining-related institutions may have contributed to maintain or even widen the wage gaps, because the asymmetry of power between the protected and unprotected segments of the labour market tends to increase, with wage adjustments mostly falling on outsiders. This is likely to be related to the decline of unionization, coverage and scope of collective bargaining observed during the recession in many European countries. Policymakers should pay attention to the effects on inequality of labour market reforms that affect the institutional setting, especially the ones that reduce unions' power, collective bargaining coverage and wage coordination, since wage-setting institutions normally reduce pay dispersion.

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Appendix

Table A.1. Description of the indicators on institutional variables.

Variable	Value	Label
Coordination of wage setting	1	Fragmented wage bargaining, confined largely to individual firms or plants
	2	Mixed industry and firm-level bargaining, with no or little pattern bargaining and relatively weak elements of government coordination through minimum wage setting or wage indexation
	3	Negotiation guidelines based on (a) centralized bargaining by peak associations with or without government involvement; (b) informal centralisation of industry-level bargaining; or (c) government arbitration or intervention
	4	Wage norms or guidelines (recommendations) based on (a) centralized bargaining by peak associations with or without government involvement; (b) informal centralisation of industry-level bargaining by a powerful and monopolistic union confederation; or (c) extensive, regularized pattern setting coupled with high degree of union concentration
	5	Maximum or minimum wage rates/increases based on (a) centralized bargaining by peak association(s); (b) informal centralization of industry-level bargaining by a powerful and monopolistic union confederation; or (c) extensive, regularized pattern setting and highly synchronized bargaining coupled with coordination of bargaining by influential large firms
Adjusted bargaining coverage rate	0-100	Employees covered by collective (wage) bargaining agreements as a proportion of all wage and salary earners in employment with the right to bargaining, expressed as percentage, adjusted for the possibility that some sectors or occupations are excluded from the right to bargain
Union density rate	0-100	Net union membership as a proportion of wage and salary earners in employment
Minimum wage setting	0	No statutory minimum wage, no sectoral or national agreements
	1	Minimum wages are set by (sectoral) collective agreement or tripartite wage boards in (some) sectors
	2	Minimum wages are set by national (cross-sectoral or inter-occupational) agreement (“autonomous agreement”) between unions and employers
	3	National minimum wage is set by agreement (as in 1 or 2) but extended and made binding by law or Ministerial decree
	4	National minimum wage is set through tripartite negotiations
	5	National minimum wage is set by government, but after (non-binding) tripartite consultations
	6	Minimum wage set by judges or expert committee, as in award-system
	7	Minimum wage is set by government but government is bound by fixed rule (index-based minimum wage)
8	Minimum wage is set by government, without fixed rule	
Employment Protection Legislation	0-6	The OECD indicator of employment protection for temporary employment is a synthetic indicator of the strictness of regulation on the use of temporary contracts. It is compiled from eight items covering different aspects of employment protection regulations as they were in force on January 1st of each year, in a scale from 0 (least restrictions) to 6 (most restrictions)

Table A.2. Estimates of determinants on wages. OLS estimations. EU-SILC, 2006 and 2014.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Temporary_2006	-0.307*** (0.011)	-0.340*** (0.011)	-0.070*** (0.021)	-0.264*** (0.025)	-0.239*** (0.020)	-0.618*** (0.026)	-0.499*** (0.027)
Temporary_2014	-0.300*** (0.013)	-0.335*** (0.014)	0.037 (0.026)	-0.192*** (0.023)	-0.284*** (0.026)	-0.548*** (0.028)	-0.382*** (0.029)
PTE_2006	-0.135*** (0.012)	-0.161*** (0.011)	-0.161*** (0.021)	-0.203*** (0.026)	-0.096*** (0.022)	-0.174*** (0.020)	-0.190*** (0.0177)
PTE_2014	-0.191*** (0.012)	-0.216*** (0.012)	-0.002 (0.024)	-0.166*** (0.027)	-0.228*** (0.027)	-0.343*** (0.021)	-0.233*** (0.019)
Men	0.202*** (0.005)	0.199*** (0.005)	0.199*** (0.005)	0.202*** (0.005)	0.202*** (0.005)	0.199*** (0.005)	0.202*** (0.005)
Year2014	0.010 (0.009)	0.010 (0.009)	0.052*** (0.009)	0.010 (0.009)	0.007 (0.009)	0.027*** (0.009)	-0.001 (0.009)
PTE*Temporary*2006		0.001*** (0.000)					
Temporary*COORD*2006			-0.0833*** (0.007)				
Temporary*COORD*2014			-0.133*** (0.010)				
PTE*COORD*2006			0.008 (0.007)				
PTE*COORD*2014			-0.073*** (0.008)				
Temporary*COVERAGE*2006				-0.001* (0.000)			
Temporary*COVERAGE*2014				-0.002*** (0.000)			
PTE*COVERAGE*2006				0.001*** (0.000)			
PTE*COVERAGE*2014				-0.001 (0.001)			
Temporary*UNION*2006					-0.004*** (0.001)		
Temporary*UNION*2014					-0.001 (0.001)		
PTE*UNION*2006					-0.002**		

PTE*UNION*2014						(0.001)	
						0.002	
						(0.001)	
Temporary*MINIMUM*2006							0.070***
							(0.00473)
Temporary*MINIMUM*2014							0.043***
							(0.004)
PTE*MINIMUM*2006							0.007*
							(0.004)
PTE*MINIMUM*2014							0.0317***
							(0.004)
Temporary*EPLT*2006							0.088***
							(0.010)
Temporary*EPLT*2014							0.039***
							(0.014)
PTE*EPLT*2006							0.031***
							(0.007)
PTE*EPLT*2014							0.026***
							(0.010)
Constant	7.411***	7.422***	7.442***	7.412***	7.416***	7.477***	7.438***
	(0.020)	(0.019)	(0.019)	(0.020)	(0.019)	(0.019)	(0.019)
<i>N</i>	99,738	99,738	99,738	99,738	99,738	99,738	99,738
adj. <i>R</i> ²	0.538	0.539	0.543	0.539	0.538	0.544	0.540

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Estimations also include dummy variables of age groups, education, citizenship, marital status, occupation, industry, country and interaction between country and years.