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Wage differentials and segmentation: The impact of institutions and changing economic conditions

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José M Arranz
Universidad de Alcalá, Spain

Enrique Fernández-Macías
European Commission – Joint Research Centre, Spain

Carlos García-Serrano
Universidad de Alcalá, Spain

Abstract

This paper uses data from the European Survey on Income and Living Conditions to offer new empirical evidence on how wage differentials are influenced by the changing economic conditions, that is, before and after the 2008–2010 recession, and shaped by the different institutional frameworks of European Union countries. We examine whether wage changes are homogeneous across groups of workers, as they are classified by their contractual relationship and working 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

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

Corresponding author:
Carlos García-Serrano, Departamento de Economía, Universidad de Alcalá, Plaza de la Victoria 2, 28802 Alcalá de Henares, Madrid, Spain.
Email: carlos.garcia@uah.es

Introduction

This paper investigates the impact of the Great Recession and the subsequent recovery on individual wages in countries of the European Union (EU) characterized by different labour market institutional settings. The study of several countries over time on a comparative basis allows for the potential identification of differences not only in wage levels but also in their evolution. Inequality in wages between and within different groups of workers has been one of the main foci of theoretical and empirical research in the social sciences for the last 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 (especially those that influence more or less directly the wage levels) and the impact of the business cycle, that is, the changing conditions of the economy and the labour market.

Temporary and part-time jobs have gradually been gaining importance in many labour markets, concentrating a large and increasing share of the workforce in EU members (Allmendinger et al., 2013). The expansion of temporary contracts in Europe was driven by labour market flexibilization reforms that in some cases go back to the 1980s (Spain) while in others are relatively recent (e.g. Germany). Nowadays, in most European countries more than 1 in 10 employees has a temporary contract, with an overall rate for the EU28 of 14 percent. The expansion of part-time work took place over a similar period, from the 1980s to the late 2000s, also with big differences in the timing and extent of the expansion. In some countries, like the Netherlands or Switzerland, part-time work is now a very common form of employment, especially for women (see data from Eurostat based on national Labour Force Surveys). But in many countries, a significant proportion of part-time employment is 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, especially in Italy, France, Portugal, Spain and Italy (the main exceptions are Germany and, to some extent, Denmark). According to many analysts (see Eurofound, 2019 for a recent review; also Eichhorst and Marx, 2020), these trends, that started with varying degrees in different countries in the 1980s, have brought about a segmentation that has adopted the form of a distinction between regular, permanent, full-time, employment and atypical, basically temporary, but also part-time, employment in most European countries.

Our contribution to the existing literature is threefold. First, 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 recovery that started at different points in time for the different European countries. Second, we investigate whether these changes were homogeneous across groups of workers, especially when distinguished by their contractual relationship and/or working time. Finally, we try to link the different developments observed to the heterogeneity in institutions that regulate and affect the labour market in different countries, that is, employment protection laws, wage-setting regimes and minimum wages.

The dataset used here is the European Survey on Income and Living Conditions (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 they represent different European institutional frameworks: Liberal (the UK), Continental (France and Germany), Nordic (Finland), Southern (Spain) and Eastern (Poland), as previous studies have highlighted (see, for example, Eurofound, 2017). The countries selected are also (except Finland) the largest ones, so that our analysis covers most of the European employment.

Literature review and working hypotheses

In the last three decades or so, the theoretical and empirical literature on wage differentials 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 together in the literature. First, whether the wage gap is cumulative, that is, do individuals working with temporary and part-time contracts suffer a double pay penalty? Second, whether the institutional environment is relevant, that is, 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, that is, 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.

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

Our first hypothesis deals with wage differences across workers according to their contractual relationship (permanent/temporary) and working time (full-time/part-time). Nowadays, most European economists would agree that labour markets are segmented and function according to some variant of segmentation theory. The basic idea behind this 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: 47).

In a recent review, four main segmentation theories were identified (Eurofound, 2019). The dual labour market theory (Doeringer and Piore, 1971) argues that the need of companies to respond to uncertainty in demand while retaining a core of highly skilled workers is the main cause behind a segmentation of labour markets between a primary sector of stable well-paid jobs and a secondary sector of low-paid precarious jobs. Radical segmentation theory (Edwards et al., 1975; Reich et al., 1973) instead explains segmentation mostly as the result of a corporate strategy of 'divide and conquer', breaking up working-class interests across segments and facilitating a better control of production. Insider-outsider theory (Lindbeck and Snower, 2001) blames institutions instead: according to this approach EPL, collective bargaining or trade unions increase the costs of replacing those already in employment (insiders) with outsiders, and thus tend to protect the former at the expense of the latter, creating a dual labour market (see Prosser,

2017, for an extension of this theory to European political economy). Finally, the Cambridge segmentation school (Grimshaw et al., 2017; Rubery, 1978) or 'comparative-institutional approach' are less univocal in their explanation and in their analysis: rather than a single causal mechanism, they consider segmentation a result of a multiplicity of factors, including social reproduction, discrimination, industrial relations systems and state regulation; and rather than dualism, they emphasize the multiple and overlapping segmentations of contemporary labour markets.

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; 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 education and occupation (Jepsen et al., 2005; Manning and Petrongolo, 2008). In other studies, a wage gap remains and this unexplained part shows considerable cross-country variation (Fernández-Kranz and Rodríguez-Planas, 2011; Gallie et al., 1998).[1] 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). Other authors associate the wage gap to investments in a lower amount of firm-specific training (Belot et al., 2007). 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.

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 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.

Collective bargaining systems differ considerably across countries (see OECD, 2017). The main building blocks of collective bargaining systems are the degree of coverage, the level of bargaining, the degree of flexibility and the role of wage co-ordination. Collective bargaining tends to affect wage dispersion, with greater dispersion in systems with no collective bargaining or where firms set wages independently (Blau and Kahn,

1999; OECD, 2004, 2018), but may produce different effects when a high level of labour market segmentation exists. In this case, union power and collective bargaining coordination could mostly play the expected role for 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 (Fervers and Schwander, 2015; Firpo et al., 2011).

Regarding the impact of employment protection legislation, 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 characterized 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).

The effect of minimum wages on earnings inequalities is similar to that of collective bargaining (Bruttel et al., 2018; Garnero et al., 2015), but their impact 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).

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 this 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 wage bargaining or led to the implementation of changes in the regulation of atypical employment (as in the Spanish reform of 2012, see Visser, 2016b), within a predominant, but not universal, long-term trend of weakening trade unions and collective bargaining (Meardi, 2018).

Data and descriptive analysis

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 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.

A key advantage of EU-SILC is that it provides consistent cross-sectional data on wages for the period 2006-2014. 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 the 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 Eurofound, 2015).[2] Therefore, we will use a measure of full-time equivalent wages rather than hourly wages, which should be very similar even if not identical. In addition, wages have been deflated by the European Harmonized 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. By comparing the results of EU-SILC with those obtained with the Structure of Earning Survey (SES), which has a very large sample and a good measure

of hourly wages despite being available in practice just once every four years (in this case, 2010), the distribution of wages and the amount of wage variance explained by occupations and other variables in 2010 in both sources is consistent (Eurofound, 2017).

The EU-SILC *longitudinal* data cannot be used for our purposes because it lacks some key variables and the sample size for any individual year is much smaller. Other sources such as the European Working Conditions Survey (EWCS) are also not suitable for the kind of detailed analysis of the wage distribution across countries because the sample for each country is too small (1000–1500 cases) and the variable of wages has many missing values. The SES has good data on wages and a big sample, but it does not cover key parts of the labour market (the public sector and small companies). So, with all its limitations, EU-SILC is the most adequate source for our purposes.

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. To provide some context for the analysis, Tables A.1 to A.6 of the Supplemental on-line Appendix provide the distribution of individuals considered in our analysis and their average full-equivalent gross monthly wages for employees over the years 2006 and 2014 for the selected countries separately.

As a consequence of the financial and economic crisis, 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 in all countries, while the shares of workers holding temporary contracts were lower (except in France and Poland). Moreover, the relative weight of individuals working in elementary occupations and clerical support jobs declined in all countries, while those in high-skilled white-collar occupations and service and sales jobs increased substantially. Finally, the presence of workers having a job in sectors such as manufacturing and construction reduced in 2014 compared with 2006.

Average real wages vary widely by socioeconomic and job characteristics, in ways that are similar across countries. In general, wages are higher for male, older and native-born individuals; workers with higher education, holding permanent contracts and in full-time employment; those employed as managers and professionals; and the ones working in certain industries, such as ‘Finance’, ‘Real estate and renting’ and ‘Manufacturing’.

Raw wage differentials and differences between temporary and part-time work

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 three 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; and the proportion of part-time workers who simultaneously are employed under temporary contracts.

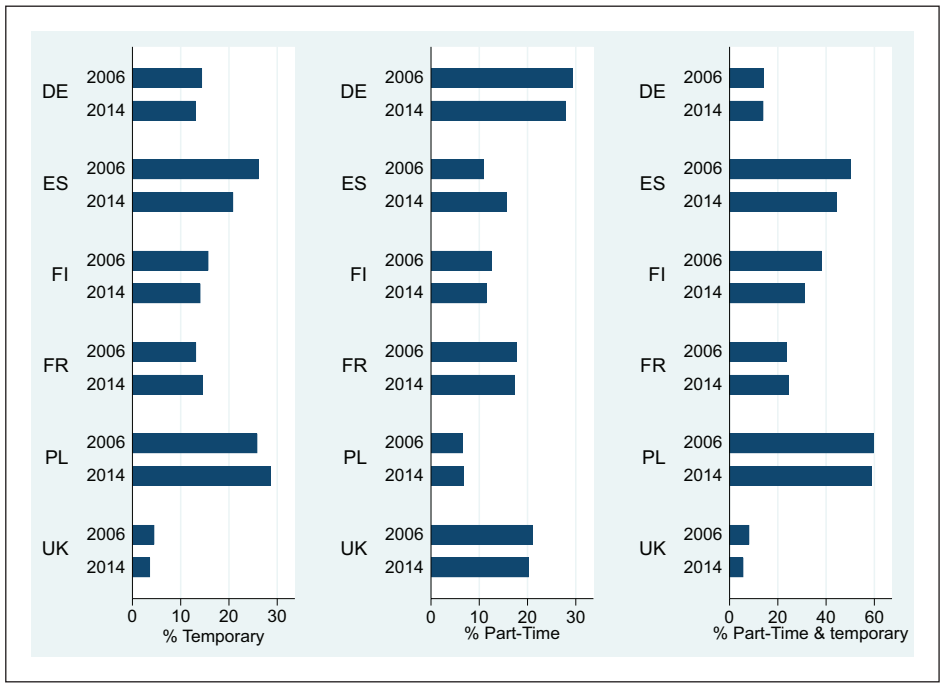


Figure 1. Share of temporary employment, share of part-time work and share of temporary employment within part-time work. Selected EU countries. EU-SILC, 2006 and 2014.

In Spain and Poland, the share of temporary employment is larger than average (above 20 percent) and that of part-time work smaller. On the contrary, the UK and Germany exhibit larger shares of part-time work (above 20 percent) and lower of temporary employment. France and Finland are situated in between. The incidence of part-time is higher among females, and highest among British and German women. The third indicator indicates that part-timers are likelier than average to be temporary workers in Spain and Poland, while the opposite is true for the UK and Germany. European countries appear therefore to differ substantially in their forms of labour market flexibility.

Next, Table 1 shows the average real gross monthly (full-time equivalent) 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, other countries exhibited either a minor (Spain and France, 5.9 percent) or null increase (Germany). By contrast, British workers suffered a wage decrease of 20 percent across the entire period. The conversion between pounds and euros, the depreciation of the pound in the period under consideration and the calculation through the EU-SILC exaggerates the fall in real wages in the UK, which was probably closer to 10 percent over that period (Romei, 2017). 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

Table 1. 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	1648	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

remained constant in the UK. Finally, the gap between full-time/part-time employment increased between 2006 and 2014 in Germany and Spain but decreased in the rest of countries.

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 Visser, 2016a), while the latter is constructed by the OECD. A description of these variables can be found in Table 2 of the Appendix 1.

The institutional characteristics of countries can contribute to explaining the observed differences in the share of part-time and temporary employment. 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 institutional indicators in 2 years, 2006 and 2014. Since institutions take time to become effective and produce effects on the labour markets, we use lagged values (2004 and 2012) of all indicators (the 2006 and 2014 EU-SILC data refer to the situation of the individuals in the previous year).

Figures 4 and 5 of the Appendix 1 show 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 2004–2005 and 2012–2013.

Coordination of collective bargaining ('*Coordination*') ranges from one (fragmented bargaining confined largely to individual firms or plants) to five (economy-wide bargaining). The level of wage coordination only changed in Spain, decreasing from 4 to 3 between 2004 and 2012, while 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 percent, 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.

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 except in Finland. There seems to be no correlation between unionization and temporary or part-time employment. However, collective bargaining coverage (*Coverage*), that is, employees covered by collective 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. In general, bargaining coverage is generally considered as a better indicator of union power than union density, especially in countries with multi-employer bargaining (Flanagan, 1999).

The minimum wage setting variable reflects the 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). Until 2015 Germany had no statutory minimum wages (except for some sectors), while in Finland minimum wages are set by national agreements between unions and employers. On the contrary, Spain, Poland and France are countries with high government intervention in the minimum wage. In France the government sets the minimum wages without consultations, while in Poland and Spain non-binding tripartite consultations were foreseen in 2004 but no longer in 2012. Finally, in the UK, the minimum wage was set by the Low Pay Commission, with consultations. The share of temporary and part-time employment is positively correlated with systems of government-imposed minimum wages.

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.

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 (see Mincer, 1974). 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 (9) and industries (11). 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 workers 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 2 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 (2017). 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 characterizes the distribution only at its mean. All the estimations are weighted.

Results

The results of the analysis of determinants on monthly full-time equivalent wages estimated by OLS are reported in Table 3 of the Appendix 1. The results of quantile regressions are available from the authors upon request.[3]

Figure 2 displays the adjusted wage gap between regular and atypical 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 percent 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 (see Da Silva and Turrini, 2015). As for the effect of part-time work on wages, the coefficients indicate that part-timers earned 14 percent less than full-timers in 2006 (model 1). This working time wage gap increased substantially during the period of analysis, reaching 19 percent overall.

The effect of gender is positive: men earn about 20 percent more than women, on average, once other attributes are controlled for. Moreover, the contract wage gap is larger for men (34 percent) than women (26 percent). The same happens with the working time wage gap, which also increased more for men than for women between 2006 and 2014 (15 percent vs 8 percent in 2006; 26 percent vs 13 percent in 2014).[4]

Regarding the differences along the wage distribution, the negative effects for both dummy variables are larger at the bottom 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 exacerbated during the crisis period for part-timers. Finally, although the interaction between temporary and part-time work turns out to be statistically significant and positive, the coefficient is really small (model 2).

Therefore, our findings point to the existence of significant wage penalties for temporary and part-time workers, and to 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, 2016b), 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,

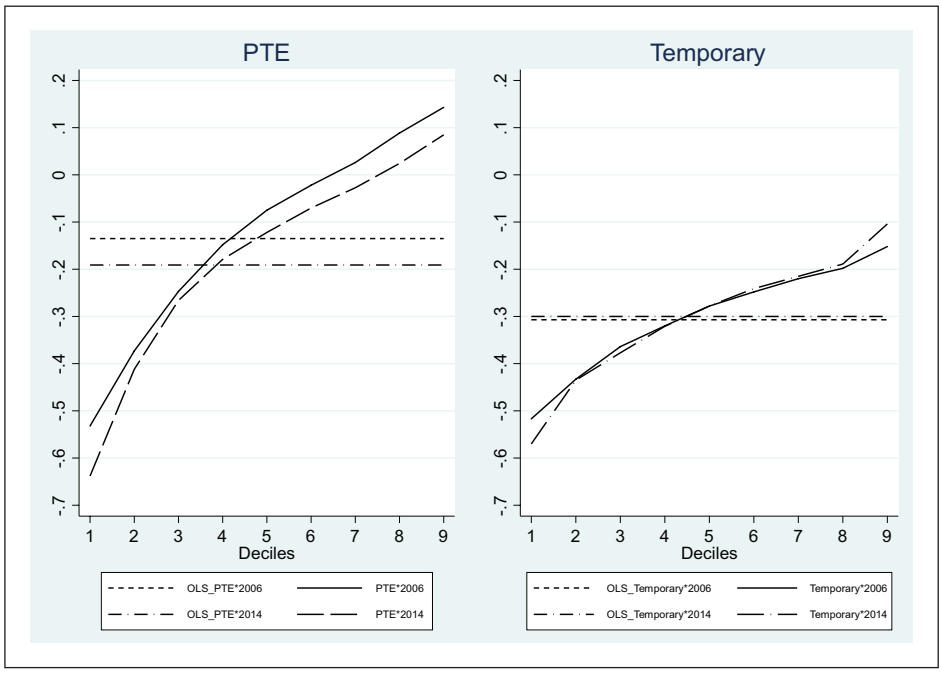


Figure 2. Impact of part-time and temporary employment on wage gaps. OLS and QR estimations. EU-SILC, 2006 and 2014.

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 3 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. Wage coordination is expected to favour low-skilled and low-wage workers, that is, 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 even 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

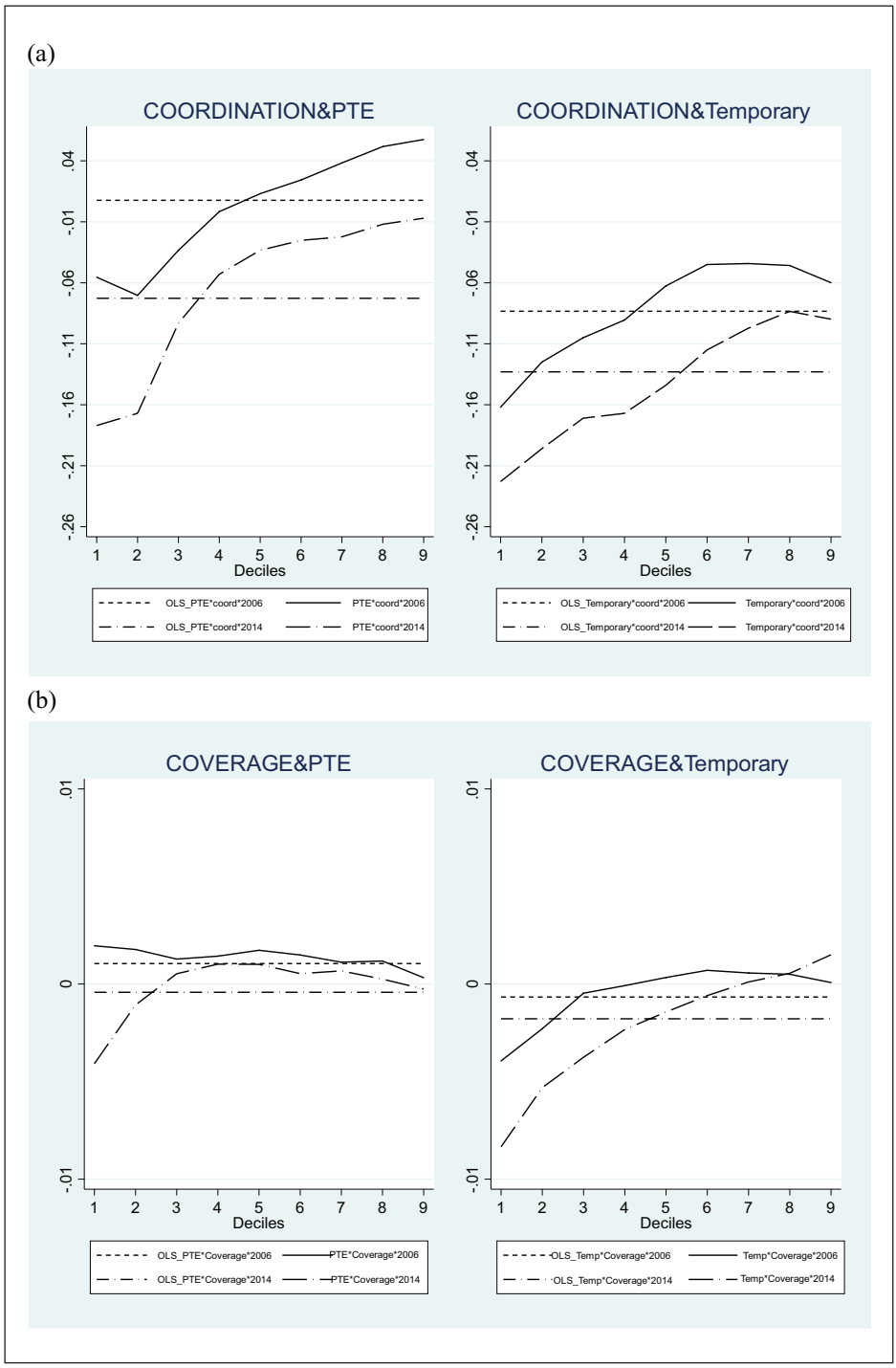
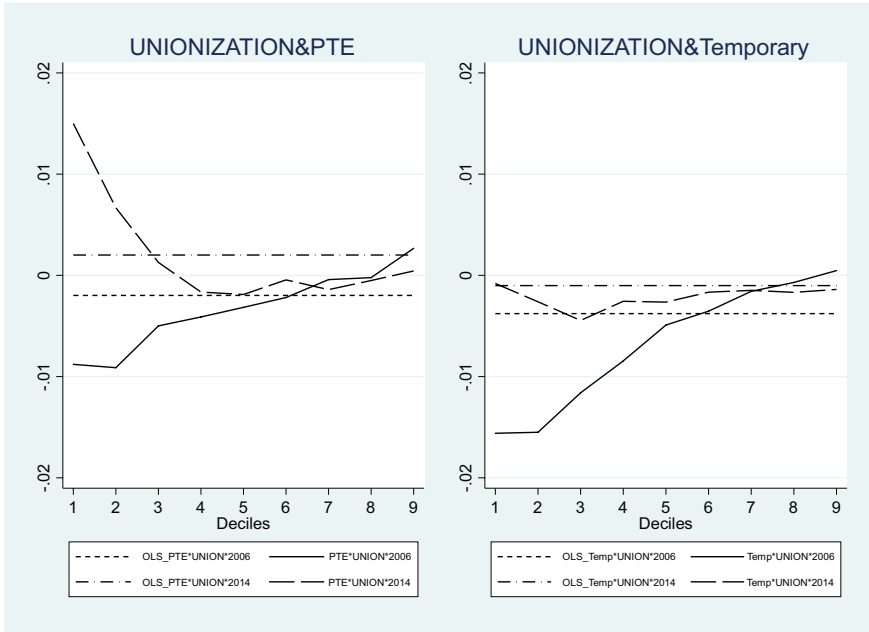


Figure 3. *(Continued)*

(c)



(d)

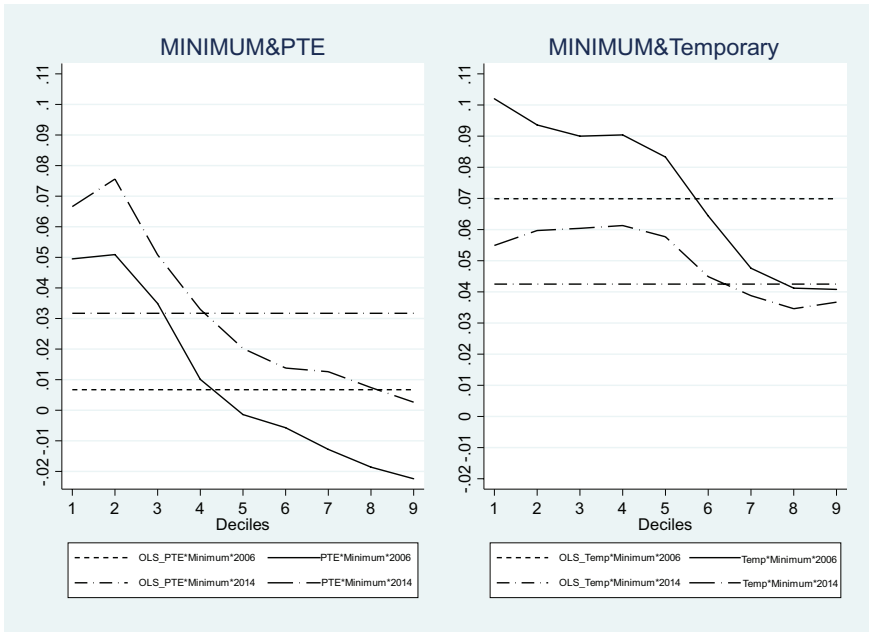


Figure 3. *(Continued)*

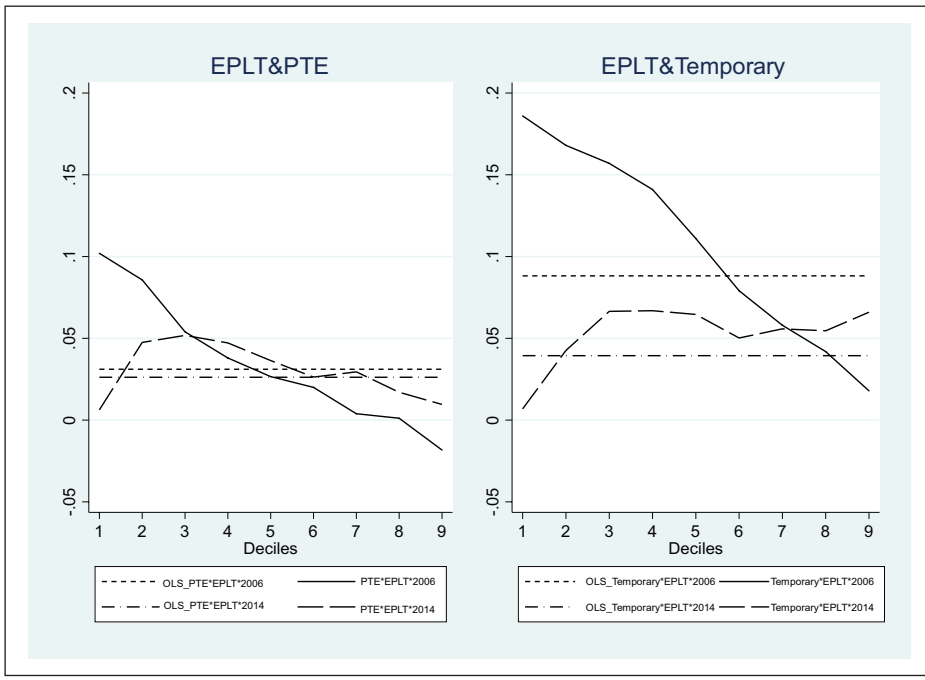


Figure 3. Impact of labour market institutions on wage gaps. OLS and QR estimations. EU-SILC, 2006 and 2014: (a) coordination of collective bargaining, (b) collective bargaining coverage, (c) union density, (d) system of minimum wage and (e) Employment Protection Legislation for part-time and temporary contracts.

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. They may even be associated with deeper labour market dualism, at the expense of low-wage workers, as it happened in 2006 although not in 2014.

In sum, the results for these variables 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. The effect of these institutional arrangements is negative for atypical workers at the bottom of the wage distribution, indirectly contributing to labour market dualism.

Thus, collective bargaining coordination and coverage remained most effective for the most protected workers. But as previously argued, the difficulties of trade unions in representing and protecting 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, making the effect of the crisis more asymmetrical (a very similar argument is made by Palier and Thelen, 2010). In the absence of trade unions, the negative impact of the crisis would probably be more homogeneous for all workers in the lower paid segments, and their wages would decline in a more generalized way. In other words, it is

precisely the absence of unions (or union power) that facilitates the downwards 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 are detected for minimum wages 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 wage gaps between typical and atypical employment. 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 quantile regressions confirm the gap-reducing role of these institutions. Accordingly, they affect 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 deregulation in these institutions did not contribute to alleviate the wage gaps between standard and atypical workers during the crisis, and this occurred in a context of downwards wages convergence and intense labour reallocation.

Conclusion

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 focus on pre/post-crisis is, while interesting to assess the business cycle effects, also a limitation as the effects may be different in periods when there is not such a big composition change in the observed population. 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 regular workers.

As regards the impact of labour market institutions (H2), we found that more government intervention 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.

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ORCID iD

Carlos García-Serrano https://orcid.org/0000-0002-5143-8278

Supplemental material

Supplemental material for this article is available online.

Notes

1. There are, however, some studies that find a part-time pay premium (Booth and Woods, 2008; Pissarides et al., 2005).
2. The EU-SILC variable used is annual cash gross earnings (in the previous year) divided by respondents' number of months in full-time jobs over the same year, plus the number of months in part-time jobs multiplied by a country–sex specific ratio of median hours of work in part-time jobs to median hours of work in full-time jobs (Eurofound, 2015).

3. We have checked the robustness of our results by repeating the estimations excluding one country at a time (running models such as those included in columns 2 and 3 of Table A.2). The results do not change significantly in those alternative country sample estimations. The only difference is seen when Germany is excluded, leading to smaller wage gaps and slightly more positive interaction effects. The results are provided in Tables A.7 and A.8 of the Supplemental online Appendix.
4. Regarding the institutions, we have estimated the models separately by gender (results not shown but available upon request) and found that, generally speaking, their impact was similar for both, although the coefficients of the interactions of the institutions with part-time work (temporary employment) tend to be larger in the case of women (men). These results suggest that the effects we identify may vary depending on the different gender composition of part-time and temporary employment.

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Author biographies

José M Arranz is Professor of Econometrics at the University of Alcalá, Spain.

Enrique Fernández-Macías is Researcher in the Joint Research Center of the European Commission, Seville, Spain.

Carlos García-Serrano is Professor of Economics at the University of Alcalá, Spain.

Appendix 1

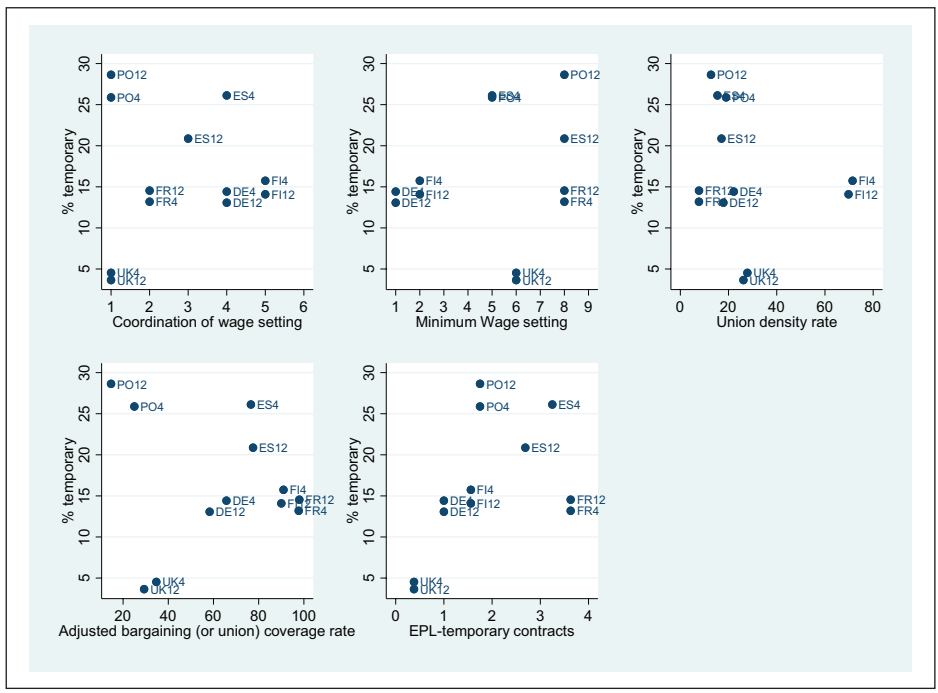

Figure 4. Share of temporary employment *versus* institutional variables. Selected EU countries (2004 and 2012).

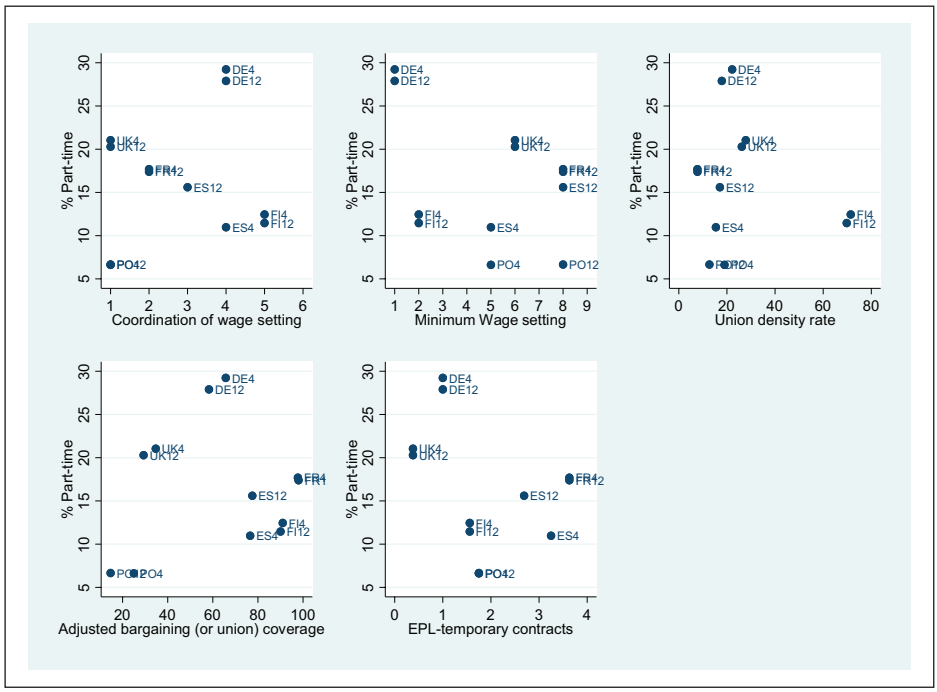

Figure 5. Share of part-time work *versus* institutional variables. Selected EU countries (2004 and 2012).

Table 2. 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 3. Estimates of determinants on wages. OLS estimations. EU-SILC, 2006 and 2014.

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

(Continued)

Table 3. (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Temporary*UNION*2014					−0.001		
					(0.001)		
PTE*UNION*2006					−0.002**		
					(0.001)		
PTE*UNION*2014					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)
N	99,738	99,738	99,738	99,738	99,738	99,738	99,738
adj. R^2	0.538	0.539	0.543	0.539	0.538	0.544	0.540

Temporary: temporary employment; PTE: part-time employment; Coordination: degree of coordination of collective bargaining; Coverage: bargaining coverage rate; Union: union density; Minimum: system of minimum wage; EPLT: Employment Protection Legislation of temporary contracts.
Standard errors in parentheses. Estimations also include dummy variables of age groups, education, citizenship, marital status, occupation, industry, country and interaction between country and years.
*$p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.