Temporary jobs, institutions and wage inequality within education groups in Central-Eastern Europe

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Abstract

In this paper we investigate the drivers of wage inequality within education groups in Central-Eastern European Countries by employing EU-SILC microdata before (2007) and after (2012) the crisis. Our main focus is on the variability of temporary/permanent workers wage gap and on the role of institutions (labour market deregulation, union density, and wage coordination) in shaping the gap across education groups and along the wage distribution. Results, obtained by means of OLS and quantile regression methods, confirm that holding a temporary position corresponds to a statistically significant negative wage gap with respect to permanent jobs, especially for low paid jobs and tertiary educated workers. The impact of institutional settings on the wage gap varies remarkably across education groups and wage levels, and strongly depends on the macroeconomic conditions.

Labour market deregulation and weaker minimum wage provisions reduce the wage gap; this could be related to the fact the these institutional features reduce the duality on the labour market, triggering a downward convergence of permanent wages towards the lowest level of the temporary employed, especially in the context of labour reallocation and declining wages typical of recession. Stronger wage setting institutions, on the contrary, seem to reinforce duality in the labour market, although to different extents depending on the group of workers and on the part of the wage distribution concerned.

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1 Introduction

This paper aims at investigating the drivers of wage inequality within education groups in Central-Eastern European Countries (CEECs), focusing on individual, economic, employment and demographic characteristics of dependent workers and on countrywide institutional settings. While inequality between education groups in Europe has traditionally been one of the main focus of theoretical and applied research, relatively little effort has been devoted to analyse the size of within group disparities and their drivers. However, especially under certain structural and institutional conditions, which may favour labour market segmentation and persistence into low-pay traps, this dimension of inequality may be relevant. The geographical scope of our analysis adds further interest to our study, since the countries considered here are still experiencing, to varying degrees, processes of institutional change related to their transition towards full market economies.

In this paper, for the reasons explained in the next section, we focus on the importance of employment status (particularly temporary/permanent positions) in connection with three labour market institutional settings: (i) labour market deregulation on the side of fixed-tem contracts, (ii) union density, and (iii) wage coordination. The contribution of the paper to the existing literature, as extensively explained in the next section, is: (i) to provide a comparative descriptive picture of hourly earnings inequality in Central-Eastern EU countries by education and employment status before and after the 2008-2010 crisis; (ii) to show and explain the importance of institutional factors in shaping the wage disadvantage observed for temporary workers compared to permanent ones, in each education group; (iii) to provide evidence on the variability of temporary/permanent gap and of the role of institutions along the wage distribution of each education group. The paper is structured as follows: the next section provides the literature-based conceptual framework of our working hypotheses, along with a discussion of the main alternative views and the description of

our original contribution. Section 3 presents the data and the descriptive evidence. In Section 4 the econometric approach is described, while in section 5 the outcomes of our empirical analysis are reported and commented. Section 6 concludes.

2. Literature-based conceptual framework, working hypotheses and contribution of our analysis

In the last years, the theoretical and empirical literature on wage differences between permanent and temporary jobs has been flourishing. In order to limit here the discussion to those contributions that are relevant to our empirical analysis, we structure this section around the four working hypotheses *(WH)* we want to test empirically, which correspond to the main dimensions of our empirical analysis. Although for a better and clearer presentation they are kept separate here, we are aware that many aspects dealt with are overlapping and intertwined and this will be accounted for when commenting the results. For each WH we provide here the literature-based conceptual framework that in our perspective underpins it, a discussion of possible alternative views and the explanation of the original contribution of our analysis.

2.1 Permanent/temporary workers wage gap between education levels

Our first working hypothesis deals with wage gap differences in job positions across education levels: *the permanent/temporary wage gap may remarkably vary across education levels due to the different intensity with which formal education and unobservable informal abilities are combined together (WH1).*

Generally speaking there is a well-documented theoretical and empirical evidence of a prevailing and systematic negative wage gap between temporary and regular workers (Jovanovic, 1979; Rebitzer and Taylor, 1991; Guell, 2000; Brown and Session, 2005; Booth et al., 2002; Picchio, 2008, Bosio, 2014; Da Silva and Turrini, 2015). Some explanations rely on contract theory

and asymmetric information. The employer has an information disadvantage at the moment of hiring and the worker-firm match is regarded as an "experience good" (Jovanovic, 1979); in such a context, fixed-term contracts allow firms monitoring the matching quality without having to incur separation costs. Another reason explaining the wage penalty for temporary workers is based on the efficiency wage theory (Rebitzer and Taylor, 1991; Guell, 2000), with the contract renewal used as an effort-incentive device instead of wages. Thus, fixed-term workers accept lower wages because firms link their performance to the promise of a contract renewal or to their employment on a permanent basis.

These arguments, however, do not explain the long-term persistence of individuals into temporary positions that lead workers into traps of repeated short-duration/low-productivity/low-pay positions (Nickell and Layard, 1999; Belot et al., 2007). Along this line of research, some authors associate the wage gap between temporary and permanent workers to investments in a lower amount of firm-specific training (Booth et al., 2002; Belot et al., 2007; Bosio, 2014). Due to their high turnover, temporary workers have less incentive to accumulate firm-specific skills that boost productivity. The lower productivity is, the lower will be the wages they get compared to permanent workers[1]. In this paper we take a step forward by analysing the wage gap heterogeneity across education groups in combination with the evidence provided by the large literature on educational wage premia and returns to training (Arulampalam et al., 2010; Peracchi, 2006; Ashenfelter and Lalonde, 1996). Our working hypothesis (WH1) is that if complementarities between unobservable firm-specific human capital and formal education exist (Arias et al., 2001), then it is plausible to

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[1] Kleinknecht et al. (2014) report other reasons besides training investments that explain why flexible labour, by causing low-productivity/low-innovative potential, is associated to lower remunerations. Among other factors, precarious jobs do not foster investments in trust, loyalty and commitment that would help managers in receiving critical feedback from the shop floor and would allow firms reducing costs for monitoring, control and leakage of trade secrets to competitors.

hypothesize a greater accumulation (and economic potential) of this informal knowledge for workers with tertiary education. Therefore, if temporary workers with higher formal education are not allowed to accumulate firm-specific human capital (due to their fixed-term contracts), the wage gap with respect to regular workers increases relatively more than for lower educated employees. To corroborate our conjecture, in our empirical analysis we employ a measure of knowledge specificity; based on Kleinknecht et al. (2014) and Vergeer et al. (2015), who investigated the relationship between flexible labour and innovation/productivity, we test the idea that in job contexts with high knowledge specificity the position of flexible workers tends to further deteriorate compared to permanent workers.

2.2 Permanent/temporary workers wage gap along the wage distribution

The second working hypothesis is related to the heterogeneity of the wage gap along the wage distribution: *the existing heterogeneity, within each education group, of the permanent/temporary wage gap may to some extent depend on position of the worker along the wage distribution; this heterogeneity could be explained by differences in terms of skills mix that temporary and permanent workers are able to accumulate (WH2).*

As underlined by the literature on returns to training (Arulampalam et al., 2010), heterogeneity could still be important along the conditional wage distribution, once education and other personal, economic and socio-demographic characteristics of workers are taken into account. Our WH2 basically relies on this point and on the evidence supporting the idea of a *sticky floor effect* for temporary workers, in which the highest wage penalty is charged on the lowest paid jobs (Bosio,

2014; Mertens et al., 2007; Comi and Grasseni, 2009, for Eastern European countries)[2]. Our contribution to the literature here rests on analysing the variability in temporary/permanent wage gap along the wage distribution of the various education groups, to our knowledge still unexplored so far.

The wage distribution within education groups might reflect heterogeneity in the mix of specific/general skills that workers accumulate during their working life (Stevens, 1994; Lazear, 2003; Kessler and Lülfesmann, 2006). Again, if there are complementarities between this skill mix and formal education, we can hypothesize that educated temporary workers employed in high-paid jobs are more able to arrange a skill mix in which general competences become more important compared to specific skills. If this is the case, a high job turnover is no longer necessarily harmful to the graduate temporary worker, who is now better able to exploit his bargaining power and outside option, by anticipating the contract renewal and by exerting a choice among better-paid jobs. As a result, the wage gap at the top of distribution for highly educated workers might significantly drop. On the other side, for secondary and primary educated workers, for whom weaker complementarities exist between formal education and informal skills, the chances to translate their general knowledge into higher productivity and wages are lower. As a consequence, a sizeable wage gap along the whole distribution emerges and smaller heterogeneity could be observed. Also with regards to WH2 we implement a corroborative empirical test by using the proxy for knowledge-specificity: if specific knowledge prevails in the skill mix, the wage gap should be larger, independently of the position occupied by the worker along the wage distribution.

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[2] Based on the gender pay gap literature, we use the expression "sticky floor" to describe a situation in which the pay gap widens at the bottom of the wage distribution (see Arumpalam et al., 2007); its existence indicates that the same working status shows different returns along the wage distribution, hence an heterogeneous profile emerges.

2.3 Permanent/temporary workers wage gap and labour market institutions

The third working hypothesis is focused on the role of labour market institutions in shaping the wage gap: *wage-setting institutions, that normally reduce wage dispersion, may produce different effects when remarkable labour market segmentation exists. In such conditions unions'power and wage bargaining coordination could only play the expected role for the insiders (permanent workers), while exacerbating downwards wage flexibility for the outsiders (temporary workers); deregulation of temporary jobs, by affecting the accumulation of skills and increasing labour market segmentation, exacerbates the wage gap (WH3).*

It is well known that in the presence of an asymmetric coverage of wage setting institutions for different job positions (with permanent workers being typically more unionised and better organised), between-group (unionized/non-unionized workers) effects might prevail over within-group ones, leading to an increase in inequality (Firpo et al., 2010). The common explanation for this evidence is based on the insider/outsider models (Booth et al., 2002), where permanent workers are largely employed in sectors traditionally covered by collective bargaining and with high union density. In such circumstances, the duality is exacerbated, with consequent large gaps in terms of remunerations. In addition, if unions and wage coordination mostly affect low educated workers (Boeri and van Ours, 2013; Checchi and Garcia Penalosa, 2010), the influence of labour market institutions will only materialise for this group of workers or for the weakest segments of workers, i.e., the lowest paid ones. Most of these studies focused on western EU countries; our attempt and contribution here is to provide new evidence for the CEECs, by disentangling the effects across education levels and along the wage distribution. If strong institutional asymmetries also characterise Eastern Europe, weaker unions' power and wage coordination are expected to foster a wage gap reduction (see Ponzellini et al., 2010, for Hungary). For the reasons mentioned above, this could especially be the case for the lowest education levels and the lowest paid jobs.

Employment protection for temporary workers and minimum wage legislation compose the third institutional dimension we consider here. As explained in detail in the next section, we have to consider these two aspects jointly, since the institutional measure we employ here (from the Fraser database) combines temporary employment protection and minimum wage levels in the same indicator. As regards employment protection legislation, the existing literature suggests that low protection and deregulation of temporary contracts (i.e., weaker limitations on the purposes for which fixed-term contracts can be used and lower restrictions on their maximum cumulative duration) increase wage disparities. Especially for Western EU countries, this occurs because lower restrictions in hiring temporary workers favour a short-term increase in employment that negatively reflects on productivity and consequently on wages (Boeri and Garibaldi, 2007). The long-term outcome is characterised by a return of the employment to the pre-reform level (Boeri and Garibaldi, 2007), but the larger proportion of temporary jobs in the economy determines poor accumulation of firm-specific skills that is detrimental for innovation, productivity and, ultimately, for workers' welfare and wages (Blanchard and Landier, 2002; Belot et al. 2007; Kleinknecht et al., 2014; Vergeer and Kleinknecht, 2014). We contribute empirically to this literature by testing here whether the same effect of lower protection of temporary contracts on the temporary/permanent wage gap exists in Central-Eastern Europe.

We have to keep in mind that our measure of deregulation includes information on minimum wages. Weaker provisions are in general expected to impact on the temporary/permanent gap by reducing it, unless they are symmetrically applied to the two segments. It is largely documented that employment protection legislations rarely fully comply with the Council Directive 1999/70/EC of 28 June 1999 on fixed-term work, requiring that legally binding wage floors apply equally to workers with permanent and fixed-term contracts. As a consequence, a weakening of minimum wage provisions only affects permanent workers, therefore reducing the wage gap (Da Silva and Turrini, 2015). Summing up, the observable effect for this third block of institutions could be the

result of two opposite forces: stronger deregulation of hiring systems exacerbates the gap, whereas lower minimum wage alleviates it. Our empirical analysis provides information on the relative strength of the two forces.

2.4 Permanent/temporary workers wage gap and the crisis

Our fourth working hypothesis deals with the evolution of the wage gap during the crisis. *The process of labour reallocation generated by the 2008-2010 recession might have weakened the relative advantage of the permanent workers (WH4) due to: (i) an increase in the relative demand for temporary labour; (ii) a decrease in the importance of specific skills accumulation; (iii) a weakening of the role of collective organisations.*

Our attempt here, and our original contribution, is to introduce a dynamic perspective into the analysis by comparing two cross-sectional waves: before (2007) and after (2012) the 2008-2010 recession. During this period (particularly in 2008 and 2009) a disproportionate reduction in the number of temporary jobs has been followed by a relative increase in their number (period 2010-2012), indicative of employers' reluctance to create permanent jobs in a climate of economic uncertainty and of the re-emergence of the interest in traineeships and probationary periods (Eurofound, 2013a). Given the large unemployment pool and the fierce competition for jobs, the crisis might have endowed employers with even more bargaining power, especially over the labour supply segments (such as those employed with fixed-term contracts) less covered by wage setting institutional arrangements, leading to the enlargement of temporary/permanent wage differences. At the same time, the bulk of jobs destroyed during the crisis belonged to manufacturing and constructions (Eurofound, 2013b). The huge reallocation from industry to service sectors that followed might have weakened the building of those firm-specific skills that normally explain higher productivity and wages for permanent workers. Therefore, the crisis and the process of labour reallocation could have undermined the importance of specific-skill accumulation discussed in

sections 2.1 and 2.2 and further weakened the role of collective organisations considered in section 2.3, since they operate in a more segmented labour market. For example, if uncertainty on aggregate demand during a recession boosts enterprises to mostly hire temporary workers, the share of precarious jobs in the economy sharply increases. In countries where the share of temporary workers was negligible before 2008, an important labour market segment characterised by these jobs could have emerged over the last years. At least in five CEECs, such as the Czech Republic, Estonia, Hungary, Slovakia and Slovenia, there was an increase in the proportion of temporary jobs above the EU average between 2007 and 2012, especially within young workers (Eurofound, 2013a). As a consequence, after the crisis the same institutions might operate in a significantly more segmented labour market and reinforce the context in which our arguments hold.

3. Data and preliminary descriptive evidence

Our empirical analysis relies on the 2008 and 2013 releases of the EU-Silc (European Union Statistics on Income and Living Conditions) cross-section samples. The corresponding reference years (2007 and 2012) allow comparing wage levels and drivers before and after the outburst of the global crisis. Geographically, our analysis covers the ten CEECs that joined the EU between 2004 and 2007.

The number of individuals, aged between 16 and 65 years, included in the two samples is 122,067 (for 2007) and 116,905 (for 2012). Of them, 65,992 and 59,978, respectively, are employed as dependent workers and are the object of our empirical analysis of wage drivers. The remaining individuals (not in employment, in education, self-employed or retired) are used in the estimates to account and correct for sample selection bias. Given the focus of the paper (temporary jobs and the role of institutions on the temporary/permanent gap), we did not include self-employment in the analysis, which would anyhow pose the additional and well-known data availability and reliability challenges.

Employees' income (variable PY010G) is defined as the gross total (yearly) remuneration, in cash or in kind, payable by an employer to an employee in return for the work done in the reference period. It includes wages and salaries paid in cash, holiday payments, thirteenth month and overtime payments, profit sharing, bonuses and productivity premia, allowances paid for transport or for working in remote locations, as well as the social contributions and income taxes payable by employees. The use of gross wages is common in the literature that considers within-countries wage and earnings inequality (Antonczyk et al., 2010). Brandolini et al. (2010) explain in detail why the use of gross wages is, in fact, the only alternative when EU-Silc data are employed for the countries of interest here. In order to account for differences in hours worked, we computed all earning measures on hourly basis using the information on the number of hours usually worked per week in the main job and the number of months spent at work. Top and bottom 1% of the hourly wage distributions in each country and year were trimmed in order to avoid distortions by outliers. All monetary values are expressed in 2005 Euro PPPs.

In order to investigate the drivers of wage differentials within education levels, we have split the sample into three subsamples corresponding to primary, secondary and tertiary educated workers, corresponding to the ISCED classification levels 0-2, 3-4, and 5-6, respectively. As explanatory variables, besides the employment status (permanent or temporary) which is the main variable of interest here, we used a large set of individual information which include gender, age (and its square), marital status, self-reported health status (on a 1-very good to 5-very bad scale), localisation (urban/non-urban region), presence of a second job, control for part-time employment, type of occupation, sector and size of the firm in which the individual is employed[3].

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[3] EU-Silc database provides a 2 digits detail of the ISCO classification of occupations. We have rearranged them into six categories: 1. Managers & Senior Officials, 2. Professional & Technicians, 3. Clerks, 4. Skilled agricultural & Craft workers, 5. Machine Operators, 6. Elementary Occupations. Industry breakdown has been limited to eight sectors: 1.

To corroborate results related to WH1 and WH2, we looked for a way to identify those jobs in which the accumulation of specific-knowledge is more important. The first best would have been re-arranging industries according to different levels of firm-specific knowledge cumulativeness, by following the Peneder (2010) taxonomy and using the same strategy of Kleinknecht et al. (2014) and Vergeer et al. (2015). In these last two interesting studies, a larger R&D investment/productivity gap has been found for firms predominantly employing flexible personnel in sectors with strong knowledge cumulativeness. Unfortunately, the version of EU-Silc dataset we use does not provide the industry breakdown necessary to map them into different knowledge cumulativeness regimes. As a second best, we employ a measure of occupation-specific human capital relying on the evidence provided by Sullivan (2010), who finds that human capital is primarily occupation-specific in occupations such as craftsmen, other skilled manual workers, professionals and associate professionals[4]. In such occupations workers enjoy a stronger increase in their wage, compared to workers who change occupation, after five years of occupation-specific experience[5]. In the

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Agriculture, 2. Industry, 3. Constructions, 4. Trade, 5. Transports, 6. Hotels & Restaurants, 7. Business services, 8. Other services. As regards firm size, we have considered three classes of employees: 0-10, 11-49, 50 and over.

[4] In his study, Sullivan (2010) employs the 1970 US Census classification of occupations. Therefore, as a preliminary step, we had to match the 2 digits ISCO occupation categories provided by Eu-Silc with the 1970 US Census codes. Then, following Sullivan, we classified the following occupations as those in which specific human capital is more important: 2.1 & 3.1 science professionals and science associates; 2.2 & 3.2 life science and health professionals and life science and health associates; 2.3 & 3.3 teaching professionals and associates; 2.4 & 3.4 other professionals and associates; 6.1 skilled agricultural and fishery workers; 7.1 extraction and building trades workers; 7.2 metal, machinery and related trades workers; 7.3 precision, handicraft and related trades workers, 7.4 other crafts and related trades workers.

[5] Since Sullivan (2010) focuses on the United States, we also tested the robustness of our results by building an occupation-specific human capital variable based on the ISCO-08 skill levels of occupations (ILO, 2012). ILO (2012) reports that the higher the skill level, the higher is the informal on-the-job training (or the previous experience in a

framework of our analysis, this means that if specific knowledge prevails in the workers' skill mix, the permanent/temporary wage gap should increase, especially for workers in which complementarities between formal and informal education are stronger, i.e., the highly educated workers. Of course, an assumption implicit in this conjecture is that temporary workers frequently change occupations, also as a consequence of changing the employer. That seems to be the case, as a report commissioned by the European Commission shows: within the sub-group of workers that changed their employer during their career, the share of workers with occupational mobility is always higher than the percentage of workers that changed employer but not occupation (Danish Technological Institute, 2008).

As regards the analysis of the impact of labour market institutional variables (WH3), we consider the following three indicators: *(i)* Hiring regulations and minimum wage from the Fraser Institute Economic Freedom World (EFW) database, which is essentially a summary indicator of labour market deregulation, particularly on the side of temporary jobs, and of the strength of minim wage provisions; *(ii)* Union density from the Amsterdam Institute for Advanced Labour Studies (AIAS) database; *(iii)* the level of Coordination of wage bargaining, also from the AIAS (see Visser, 2013)[6]. These institutional indicators guarantee (compared to OECD labour market institutions indicators) a full coverage of the CEECs and their employment has become a common practice in the empirical research on Central-Eastern Europe (e.g., Babos, 2014; Perugini and Selezneva,

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related occupation) needed to perform the required tasks and duties. On this basis, we consider as knowledge specific occupations those with skill level 3 and 4 (for the mapping table see ILO, 2012, p. 14). Results are available upon requests.

[6] The indicator of the Fraser database (5bi) ranges from 1 to 10 and countries with higher difficulty of hiring and higher minimum wage levels are given lower ratings. The union density rate is calculated as the net union membership as a proportion of wage and salary earners in employment. Wage coordination ranges from 5 (economy-wide bargaining) to 1 (fragmented bargaining, mostly at the company level).

2015). However, as a robustness check we report in the appendix also specifications in which the OECD employment protection indicator for temporary workers (EPL_t) replaces the Fraser indicator. This comes at the cost of restricting our sample to the only four countries (Czech republic, Slovakia, Hungary and Poland) for which the OECD indicator is available in the two years[7].

As shown in the first two columns of Table 1, average hourly wages (in 2005 Euro PPPs) vary remarkably across countries, with Romania and Bulgaria being positioned at the bottom of the distribution and Slovenia at the top. Some authors observed that the catching up with Western wage levels stopped with the beginning of the crisis in 2008 (Eurofound, 2015). As expected, in all countries under scrutiny higher levels of education correspond to higher wages. It is also worth noting that, on the whole, hourly wages (all ISCED levels) slightly declined between 2007 and 2012 (from 5.71 to 5.61 Euros per hour). This particularly occurred in 5 countries (the Czech Republic, Hungary, Latvia, Lithuania and Romania). In Bulgaria the hourly wage lowered only for workers with primary education, whereas in Slovenia the wage slump took place only for the highly educated workers. The persistent unemployment after the 2008 crisis is indicated as the responsible for this downward pressure on the aggregate hourly wages (OECD, 2014; Cristescu et al., 2015).

[TABLE 1 ABOUT HERE]

Table 1 Mean hourly wage by education group (2005 Euro ppp), 2007 and 2012
Source: own elaborations on EU-Silc data.

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[7] EPL_t describes the conditions under which workers can be hired on fixed-term or temporary work agency contracts. These rules usually concern the type of jobs and activities in which these contracts are allowed, their maximum duration, and the conditions for their renewal or termination. Data range from 0 to 6 with higher scores representing stricter regulation (see http://www.oecd.org/els/emp/oecdindicatorsofemploymentprotection.htm, for more information). In the interpretation of results, we have to bear in mind that this indicator, contrary to the Fraser one, grows with stronger regulation.

As regards wage inequality, Table 2 shows the unadjusted wage gap (ratio between permanent/temporary workers' hourly wage), calculated not controlling for other variables (such as gender, age, etc.) or job (sector, occupation, etc.) characteristics that may affect wage levels. The last two rows of Table 2 indicate a common trend in the narrowing of wage gap between 2007 and 2012, both for Eastern and Western EU countries. The overall reduction of wage levels discussed in Table 1 probably played some role in mitigating these gaps. However, by singling out countries we can identify 5 out 10 Central-Eastern UE members with an increase of the permanent/temporary workers' wage gap. This especially occurred both for workers with primary education (in Bulgaria, Latvia, Romania, Slovenia and Slovakia) and for employees with tertiary education (in Bulgaria, the Czech Republic, Estonia, Lithuania and Slovakia).

[TABLE 2 ABOUT HERE]

Table 2 Permanent/Temporary hourly wage gap, by education group, 2007 and 2012
Source: own elaborations on EU-Silc data.

The transformation triggered by the crisis (i.e. the important labour reallocation processes, the institutional change, or simply different reactions of labour markets to the same institutions in time of crisis) can contribute to explaining the pattern over time of the permanent/temporary workers' wage gap across countries. The indicators describing labour market institutions under scrutiny in this paper are plotted in Figures 1, 2 and 3. Since institutions take time to become effective and produce effects on the labour markets, we used lagged variables of our three indicators[8].

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[8] Data for the variables drawn from the Visser database for the year 2011 are not available at the time of writing, so we used data referring to 2010. Due to the strong persistence of institutional settings, at least over the short time, we can rule out that this impacts in any way our analysis.

As regards labour market deregulation for temporary workers, Figure 1 shows that in 6 out of 10 countries significant changes occurred between 2006 and 2011. More precisely, two countries relaxed limitations to hire temporary workers (Romania and Lithuania), whereas four countries increased fixed-term jobs regulations (Hungary, Bulgaria, Slovakia and Latvia). However, if we consider the average level of deregulation across Central-Eastern EU countries, the change did alter their relative positions: only 3 countries (Romania, Slovenia and Latvia) remained in an area of low deregulation, i.e. below the average level of deregulation in both 2006 and 2011 and below the average of Western EU countries too. The bulk of CEECs are located in the Northeast quadrant, signalling a persistent high deregulation, in any case larger than that of Western EU.

[FIGURE 1 ABOUT HERE]

Figure 1. Labour Market Deregulation in 2006 and 2011

Source: Hiring regulations and minimum wage from the Fraser Institute Economic Freedom World (EFW) database

Union density remained quite stable between 2006 and 2010 (Figure 2) and, traditionally, it is very low for Central-Eastern EU countries. For only three of them the presence of unions is above the Western EU average level. Two out of the three countries with low deregulation of temporary contracts (Slovenia and Romania) also show the highest union density. With the exception of Slovenia, that shows collective bargaining coverage levels very similar to those of the Western EU countries (90%), in the rest of Central-Eastern Europe the indicator is always below 40% and proportional to the union density (Boeri and van Our, 2013; European Commission, 2015). Due to this positive correlation we omitted the collective bargaining coverage indicator and use union density in the econometric analysis.

Figure 3 charts the levels of wage bargaining coordination across Central-Eastern Europe. Generally speaking, the crisis induced more fragmentation in the wage setting (on average, the level

of wage coordination decreased from 2.2 to 1.7 between 2006 and 2010). For three countries (North-West quadrant), the level of wage coordination did not change over the period considered (Romania, the Czech Republic, and Hungary). The three countries (Slovakia, Slovenia and Bulgaria) with a relatively high coordination (also above the benchmark of Western countries) remarkably reduced their wage coordination level over the period under investigation. Poland and the Baltic countries fall in an area of persistently low wage coordination.

[FIGURE 2 ABOUT HERE]

Figure 2. Union Density in 2006 and 2010

Source: Amsterdam Institute for Advanced Labour Studies

[FIGURE 3 ABOUT HERE]

Figure 3. Coordination of wage bargaining in 2006 and 2010

Source: Amsterdam Institute for Advanced Labour Studies

4. Empirical models and methods

In order to estimate an empirical microeconomic model of the determinants of wage levels (expressed as log hourly wages - *lhwage*), we rely on the human capital approach as the theoretical basis for the earnings function (Becker, 1964; Mincer, 1958). Higher labour income levels are therefore associated, first of all, to accumulated formal (education) and informal (experience) skills. The latter are approximated with age, as the work experience measure (PL 200 – number of years spent in paid work) in EU-Silc is not available for all countries and has many missing values. Other explanatory variables, already mentioned, are gender (*male*), marital status (*married*), health status (*health*); urban/non-urban region of residence (*urb*); second job (*secjob*); part-time job position (*part*); sector of employment (*sec*); occupation (*occ*); size of the firm (*size*). The variable of our main interest here is permanent/temporary employment status (coded as *temp=1* if the contract is

temporary and 0 otherwise); the coefficient of this dummy variable can therefore be interpreted as the (otherwise) unexplained wage gap (in per cent) due to the employment contract.

As explained in the previous sections, we used the information about occupations to build a dummy variable that identifies high occupation-specific human capital (*OccSpec*). This variable is then interacted with employment status (*temp*) in order to test whether the disadvantage of holding a temporary job is exacerbated in occupations in which specific knowledge prevails in the skill mix.

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. Relying on Bryan and Jenkins (2013) and as done in Perugini and Selezneva (2015) we opt here for a fixed effect (FE) model, i.e., pooling the country surveys and including distinct country intercepts. Additional country level variables (the institutional ones) can be interacted with individual level variables, so to obtain the effect that a country level factor produces on the main (individual level) effect. This is what is needed for the purposes of our analysis, i.e., estimating the effects of country-level institutional settings on the temporary/permanent workers pay gap.

We estimate our empirical models pooling the data for the ten CEECs and the years 2007 and 2012. This pooling allows estimating the effect of the crisis on the condition of being temporary by means of interaction terms between *temp* and the dummy variables for the two years (2007 and 2012). The inclusion of both interactions (instead of the main effect – *temp* – plus one interaction) has the advantage of directly providing the estimates of *temp* in the two years.

Our baseline (all education levels) pooled (by country and by year) empirical model takes therefore the following form:

$$lhwage_{ic} = cons_{ic} + \omega_1 temp_{ic} \cdot Year07 + \omega_2 temp_{ic} \cdot Year12 + \vartheta_1 temp_{ic} \cdot INST_c \cdot Year07 + \vartheta_2 temp_{ic} \cdot INST_c \cdot Year12 +$$

$$\alpha_1 male_{i,c} + \alpha_2 married_{i,c} + \alpha_3 age_{ic} + \alpha_4 age_{ic}^2 + \alpha_5 health_{i,c} + \alpha_6 urb_{ic} + \sum_{e=1}^{2} \beta_e educ_{ic,e} + \varphi_1 sec\,job_{ic} + \varphi_2 part_{ic} +$$

$$+ \sum_{s=1}^{2} \vartheta_s size_{ic,s} + \sum_{n=1}^{7} \upsilon_n sec_{ic,n} + \sum_{r=1}^{5} \xi_r occ_{ic,r} + u_c + u_c \cdot Year12 + \varepsilon_{ic}$$

where subscripts i and c stand for individuals and countries, respectively and the acronyms indicate the explanatory variables described above; u_c represent unobservable country-specific effects and ε_{ic} is the individual error term. The country specific effects are also interacted with the year 2012 dummy in order to model the country-specific effects of the crisis on individuals' pays.

As customary in the literature (Bassanini et al., 2009; Bourlès et al., 2012), the three institutional variables (*INST*: (i) Hiring regulations and minimum wage - *DEREG*; (ii) Union density - *UD*; (iii) Wage bargaining coordination - *WC*) are lagged one period in order to alleviate endogeneity issues and to account for the fact that *de jure* institutional reforms take time to become effective. As already explained, the last two indicators, limited to the second period of analysis (2012) were lagged two periods (so data refer to 2010), since no data for 2011 were available at the time of writing. Given the strong persistence of institutional settings over time, this is expected to affect very marginally our results.

The baseline empirical model described in equation 1 is then estimated for each subsample of workers with primary, secondary and tertiary education. It is worth noting that this single equation allows testing all working hypotheses we presented in section 2. We deal with WH1 by performing OLS regressions across and within the different education levels; by running quantile regressions we instead test WH2. Lastly, by means of interactions of *temp* with country-level institutions and years dummies (for 2007 and 2012) we address WH3 and WH4, respectively. As for the corroborative analysis on the role of occupation-specific human capital, we simply replace in equation 1 the country level variable *INST* with the individual level variable *OccSpec*, while keeping the country-specific effects u_c. This regression is performed on the whole sample but, based on our

conjectures in section 2, we also test whether the effect is statistically different for tertiary educated workers (results in Table A5 in the appendix).

A last important empirical aspect that needs to be carefully addressed refers to a possible estimation bias due to sample selection. If selection of individuals into employment is non-random, the direction in which it may affect the level of earnings is a concern (De la Rica et al., 2008; Heckman, 1979; Buchinsky, 1998). All our empirical models are therefore estimated using a correction based on a standard Heckman two-stage method. In order to estimate the first stage participation equation, in addition to the personal characteristics used in equation 1, we add variables related to household structure that we were able to build considering the information available in EU-Silc. They refer to the number of household components, of children (less than 3, 4-6 and 7-15 years old) and of elderly (65-74 and over 75 years old).

5. Results

The results of the baseline specification are reported in Figure 4, which shows the adjusted wage gap between temporary and regular workers estimated by both OLS and quantile regressions. Complete results of the quantile estimations are available in Tables A1-A4 in the Appendix[9]. It is worth noting that, once all other observable drivers of wages are controlled for, temporary workers always earn a significantly lower wage compared to regular workers. This holds for all groups of

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[9] More precisely, Figure 4 shows the estimated coefficients of the variables Temp*2007 and Temp*2012 for OLS (dashed line) and quantile regression (solid line). The same holds for the interaction terms Temp*INST*YEAR in the following figures. The advantage of representing outcomes graphically (Figure 4, 5, 6, 7 and A1) is that we can observe the coefficients of interest along all 99 percentiles of the distribution (the smoothed solid line). In contrast, in the Tables in the Appendix (A.1-A.5) we limit, for obvious reasons, the presentation of numerical outcomes to three significant quantiles (10th, median and 90th). Detailed OLS results are available upon request.

workers classified by educational attainment. The diagrams also show that a statistically significant wage gap exists in every point of the wage distribution, even though its size varies remarkably.

[FIGURE 4 ABOUT HERE]

Figure 4. Impact of temporary contract on hourly wage, all Isced levels and by education groups (2007 and 2012)

Source: own elaboration on EU-Silc data

Overall, according to the OLS coefficients, temporary workers earned 14% less than regular workers, both in 2007 and 2012[10]. These values are in the range of the country-by-country estimations previously provided for all ten (Da Silva and Turrini, 2015) and for only four Central Eastern European countries (Comi and Grasseni, 2009)[11]. However, this does not mean that the crisis played no role on the wage gap, since its average size masks an asymmetric effect across the education groups. The gap increased significantly for the low educated workers (from -11.2 to -12.8%), remained stable for the medium educated (from -13.0 to -13.2%) and decreased for the highly educated (from -15.6 to -13.4%). Despite with the crisis the average wage gap for the three groups tended to converge, the highest levels remains in 2012 the one for the most educated workers. This provides a first hint that the mechanism we hypothesised (WH1) could be at work. If complementarities between unobservable firm-specific human capital and formal education exist, it is plausible to hypothesize major accumulation of this informal knowledge in workers with tertiary education. Thus, if temporary workers with higher formal education are not allowed to

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[10] The difference in the two years is not statistically significant. All Wald tests concerning the significance of differences between coefficients over time and across the wage distributions are available upon request.

[11] Da Silva and Turrini (2015) used microdata from the Structure of Earnings Survey, another Eurostat database, that refers to 2010. The overall adjusted wage gap they found for 26 EU countries was 13.9 %.

accumulate this firm-specific human capital, the wage gap with respect to regular workers increases relatively more for them compared to lower educated employees.

However, the focus of this study is also on temporary/regular workers' wage differences along the wage distribution, and Figure 4 clearly shows that a strong heterogeneity exists in all three education levels. The negative coefficients for the dummy "temporary worker" are again larger at the bottom of the distribution and they gradually decrease for higher quantiles. This evidence is consistent with the findings of other studies reported in section 2.2 and suggests that a sticky floor effect exists for temporary workers, with the highest wage penalty being charged on the lowest-paid jobs (Bosio, 2014; Comi and Grasseni, 2009, Mertens et al., 2007).

What we add to previous literature with our investigation on WH2 is that, despite the sticky floor effect evolved between 2007 and 2012 towards a convergence of the wage gap across the education groups, we still observe in 2012 the largest distance of the wage gaps between the tails of the distribution within the group of workers with tertiary education[12]. In this last year, at the 10th percentile the wage gap for this group was -16.1%, 6.2% points higher than at the 90th percentile (-9.9%). The corresponding differences for secondary and primary educated were 2.4 and 3.6 percentage points, respectively. The larger "spread" of the wage gap for highly educated workers across the wage distribution could be explained resorting to the considerations provided in Section 2.2 and related to the complementarities between the skills mix (general/specific competences) and formal education. If the graduate temporary workers holding high-paid jobs are those better able to arrange a skill mix in which general competences become more important than specific skills, they

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[12] As regards this convergence across education groups in the sticky floor effects between 2007 and 2012, we recall here our discussion in section 2.4. The labour reallocation processes generated by the crisis probably affected the accumulation of firm-specific skills negatively, even for permanent workers. For this reason, the temporary/permanent wage gap at the bottom of distribution remarkably decreased, compared to the pre-crisis level, for workers with tertiary education (from 25.4% in 2007 to 16.1% in 2012).

are also better able to exploit their bargaining power and their outside option by anticipating the contract renewal and by exerting a choice among better-paid jobs. Hence, their wage gap with regular workers might significantly drop. In contrast, for low-paid jobs the skill mix formation of temporary workers, biased towards general competences, becomes a disadvantage, because for this kind of jobs (probably more routinary and firm-specific) skills accumulated with experience and permanent positions are relatively more rewarding. As a result, the temporary/permanent wage gap is larger.

In order to support this conjecture, we make use of the dummy variable *OccSpec*, which identifies those occupations that require accumulation of specific knowledge. Consistent with our expectations, results in Table A5 in the Appendix show that in specific human capital occupations (interaction terms with *OccSpec*) temporary workers are even more penalised[13]. The negative and significant coefficients for these interaction terms are larger for the tertiary educated workers (see columns 5-8 of Table A5). Only for the highest paid jobs (90th percentile) the knowledge specific effects seems to be not significant, even though in 2012 it is within this position and within the highly educated workers that we find the largest negative wage gap (-0.116). This means that if we isolate those highest paid jobs in which specific skills are more important than general skills, the difference in rewards for temporary and permanent workers widens even further.

The next focus is on the effects of labour market institutions on the temporary/permanent jobs wage gap (WH3). To correctly interpret the results we have to bear in mind that the institutional variables are included as interactions with the dummy variable *temp* and the main effect of the latter

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[13] Results in Table A5 are based on the occupation-specific human capital variable derived from Sullivan (2010). The use of the ISCO-based measure of occupation-specific knowledge provides very similar results, which are available upon request.

is always negative, as reported above. Therefore, a negative value of the coefficient of the institutional variable means that this factor exacerbates the gap, and *viceversa*.

Figure 5 reports the impacts of the deregulation of fixed-term contracts and dismissal of minimum wage provisions (*DEREG*) on the wage gap. Results show that the only statistically significant effects occurred in the year following the crisis. On average (OLS coefficients – dashed line), higher deregulation reduced the temporary/permanent gap in 2012 only, both for the pooled sample and for the three education subgroups. These results could be related on one hand to the labour reallocation processes caused by the crisis (see section 2.4 and WH4); on the other hand to the effect of weaker minimum wage provisions (our DEREG indicator includes information on minimum wage levels, as explained in section 3). The first years of the crisis (2008 and 2009) saw a deterioration of quantitative labour market performance in all countries, with large amounts of workers falling into unemployment and a consequent weakening also of the position of protected jobs and their representatives (unions). As discussed in section 2.4, the process of labour reallocation triggered by the crisis started to materialise in terms of employment already with the (weak) economic recovery of 2010; however, due to the very high existing uncertainty, the flow into employment was mainly fed by temporary contracts (Eurofound, 2013a). In this context, a lower regulation on fixed-terms contracts (for example in terms of constraints on the number of renewal, on the tasks of the workers, on the duration of the contract) probably facilitated the reallocation processes and somehow limited the fall of remunerations for temporary workers, at least compared to the decrease observed for permanent ones (WH4).

The results shown in Figure 5 are to some extent also driven by the reduction (in Czech Republic, Bulgaria and Estonia) or the very low level (Czech Republic, Estonia and Romania)[14] of the national minimum wage provisions in the region, which hit proportionally more the pool of

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[14] The level of minimum wage provisions (as a % of the median wage) in 2012 is available in Schulten (2014).

regular workers. Despite a national-wide minimum wage should apply to all workers in all countries covered here (Schulten, 2014), in 6 of them (Bulgaria, Estonia, Poland, Slovakia, Romania and Hungary) it is determined by collective agreements, which means that the wage floor is more binding for protected permanent workers. Therefore, as we hypothesised (WH3), a reduction in the official national minimum wage probably led to a downward convergence of the regular workers' wage to the level of the temporary ones and a consequent decrease of the wage gap. This complex dynamic could help explaining the reduction of the temporary/permanent gap produced by labour market deregulation in 2012.

[FIGURE 5 ABOUT HERE]

Figure 5. Impact of the deregulation on temporary jobs (Hiring Regulation and Minimum Wage indicator, Fraser Institute) on the disadvantage of holding a temporary position (all Isced levels and by education groups, 2007 and 2011)

Source: own elaboration on EU-Silc data

The outcomes of quantile regressions (solid lines in Figure 5) confirm that the gap-reducing role of labour market deregulation in 2012 hit symmetrically all parts of the wage distribution of tertiary educated workers. For the remaining groups this effect was limited to the bottom part of the distribution (see the coefficients of the 10th decile), producing an important and statistically significant reduction in the sticky floor effect. Again, weaker minimum wage provisions and those labour reallocation processes that rendered firm-specific skills less important for the protected low-paid jobs, are probably the drivers of this evidence. Therefore, it seems that deregulation alleviated

the temporary/permanent workers' wage gap during the crisis, and this occurred in a context of downward wages convergence and turbulent labour reallocation[15].

As far as the role of union density is concerned, results reported in Figure 6 (and again in Tables A1-A4 in the appendix) show that its impact on the wage gap was not univocal. Both OLS and quantile coefficients are significant (with negative sign) only for highly educated temporary workers, mainly for 2012, and limited to low and medium paid jobs. Results in Figure 6 tell us that unions, in the context in which they are stronger, are still able to protect educated but low-paid permanent workers, sheltering them from the danger of unemployment and labour churning. This comes at the cost of deepening the duality on the labour market, at the expenses of graduate temporary workers. The reasons why unions seem not to impact on the gap for other groups of workers (primary and secondary educated) deserve further research efforts.

[FIGURE 6 ABOUT HERE]

Figure 6. Impact of Union Density (UD) on the disadvantage of holding a temporary position (all Isced levels and by education groups, 2007 and 2012)
Source: own elaboration on EU-Silc data

Lastly, Figure 7 reveals that the impact of wage bargaining coordination changed significantly over the period considered. A positive role of bargaining coordination in reducing the wage gap in

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[15] A robustness check, in which the Fraser indicator (DEREG) is replaced by the OECD employment protection indicator for temporary workers (EPL_t), is reported in Figure A1 in the Appendix. Although a remarkable number of observations and countries are dropped because OECD statistics on EPL does not cover all CEECs, we observe a perfect consistence in the outcomes for 2012. Bearing in mind that the OECD_EPL indicator is increasing with the intensity of the hiring restrictions, results in Figure A1 reveal that the higher the protection, the larger is the wage gap. However, different from the case of DEREG, with EPL_t we also obtain a significant widening of the wage gap in 2007. This result deserves further investigation in future research.

2007 can be observed in the pooled sample, but this result is driven by what happens in the subsamples of workers with primary and secondary level of education and is particularly significant for medium and high-paid jobs. As explained earlier, wage coordination is normally expected to favour low educated workers and is very often positively correlated to union density (Visser, 2013). Especially in those countries where tripartite agreements were signed and implemented (European Commission, 2015), strong wage coordination allowed anchoring wages to a certain level for both temporary and permanent workers and this contributed to reduce the gap. However, after the outbreak of the crisis, unemployment and subsequent growth in the proportion of temporary jobs changed the picture. The effect of wage coordination is no longer significant for low-educated workers, but negative for temporary employees with intermediate and high education, especially at the bottom of the wage distribution. Probably, in the contexts where wage coordination was stronger, it remained effective at least for the most protected workers, so restoring a segmentation between temporary and permanent educated employees (WH4). Hence, this institutional arrangement seems to feed a duality in the labour market and to generate again a sticky floor effect that labour reallocation processes and the destruction of previous firm-specific skills had instead alleviated (see also the discussion of Figure 4).

[FIGURE 7 ABOUT HERE]

Figure 7. Impact of Wage Coordination (WC) on the disadvantage of holding a temporary position (all Isced levels and by education groups, 2007 and 2012)

Source: own elaboration on EU-Silc data

6. Final remarks

This paper investigated on the drivers of the heterogeneity of wages within education groups in Central-Eastern EU countries before and after the crisis. The analysis for the three groups of

primary, secondary and tertiary educated workers confirmed the importance of some individual attributes (such as age/experience, gender, health status, location, job and employers' characteristics) in shaping labour remunerations. However, our attention has been focused on the temporary/permanent employment status of workers. Results reveal that, consistent with ex-ante expectations and the existing empirical evidence, holding a temporary position corresponds to a statistically significant negative wage gap with respect to permanent jobs. This gap is, on average, relatively low if compared to the one in Western Europe (see Perugini and Pompei, 2015). The extent of the gap also varies across education groups and along the wage distribution. As hypothesized in WH1, the gap is larger for higher levels of education. This result has been interpreted in the light of complementarities existing between informal firm-specific skills and formal education. Among the highly educated, only those workers holding a permanent position can take advantage of this complementarity and translate it into higher productivity/wages; temporary workers do not have the chance to accumulate this firm-specific human capital and suffer a productivity/wage penalty. For lower levels of education the economic potential of the skill/education mix is weaker and this translates into a smaller temporary/permanent gap. Our results also confirm that larger wage gaps are found at the bottom of the wage distributions. More interestingly, the larger sticky floor effect for temporary workers emerges for the group of tertiary educated workers, although its size decreases with the crisis (so in 2012 compared to 2007). If the first result can again be related to the importance of skill complementarities (so confirming our WH2), the pattern of the gap over time suggests that the crisis and the huge sectoral reallocation processes that took place probably weakened the position of permanent workers relatively more compared to those of temporary workers, the only dynamic segment of the labour market when employment started to recover in 2010.

As far as labour market institutions are concerned, we found that more labour market deregulation and weaker minimum wage provisions reduce the wage gap. Especially for labour

market deregulation on the side of temporary workers, this evidence contradicts the effect that is normally expected and we conjectured (WH3). A possible explanation of this evidence, already illustrated in sections 2.3 and 5, is that these institutional features could reduce the duality on the labour market, triggering a downward convergence of permanent workers wages towards the lowest level of the temporary employed, especially in the context of labour reallocation and declining wages typical of recession. Similarly, weaker wage setting institutions (union density and wage coordination), seem to have reduced duality in the labour market especially in 2012, although to different extents depending on the group of workers and on the part of the wage distribution concerned.

It is worth noting that the crisis itself appears to have played a crucial role in all these results. As conjectured in WH4, the recession, overall, caused a wage inequality reduction by mainly altering the accumulation of those firm-specific skills favoured by tenure (labour reallocation processes that affected permanent workers) and by changing the context in which wage-setting institutions operate (i.e., emergence of an important segment of temporary jobs in the labour markets that creates asymmetries in the institutional setting).

Policy makers should pay attention to this fall in wage inequality, essentially based on a far from desirable downward wage convergence. Besides considerations concerning the direct impact on welfare, long term depressing effects of low wages on labour productivity (Vergeer and Kleinknecht, 2014) and on the deflation that heavily affected the CEECs after the crisis (European Commission, 2016), should be of major concern.

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Appendix

[TABLE A1 ABOUT HERE]

Table A1 Determinants of hourly wages, pooled sample (quantile regressions, 2007 and 2012)

Notes: Robust (OLS) standard errors in parentheses. ***, ** and * denote significance at the 1, 5 and 10 per cent level, respectively. Institutional variables (Labour market deregulation, Union density and Wage coordination) lagged one year

[TABLE A2 ABOUT HERE]

Table A2 Determinants of hourly wages, primary education (quantile regressions, 2007 and 2012)

Notes: Robust (OLS) standard errors in parentheses. ***, ** and * denote significance at the 1, 5 and 10 per cent level, respectively. Institutional variables (Labour market deregulation, Union density and Wage coordination) lagged one year

[TABLE A3 ABOUT HERE]

Table A3 Determinants of hourly wages, secondary education (quantile regressions, 2007 and 2012)

Notes: Robust (OLS) standard errors in parentheses. ***, ** and * denote significance at the 1, 5 and 10 per cent level, respectively. Institutional variables (Labour market deregulation, Union density and Wage coordination) lagged one year

[TABLE A4 ABOUT HERE]

Table A4 Determinants of hourly wages, tertiary education (quantile regressions, 2007 and 2012)

Notes: Robust (OLS) standard errors in parentheses. ***, ** and * denote significance at the 1, 5 and 10 per cent level, respectively. Institutional variables (Labour market deregulation, Union density and Wage coordination) lagged one year

[TABLE A5 ABOUT HERE]

Table A5. Determinants of hourly wages: temporary jobs and occupations with high intensity of specific knowledge (pooled sample, OLS and QR, 2007 and 2012)

Notes: Robust (OLS) standard errors in parentheses. ***, ** and * denote significance at the 1, 5 and 10 per cent level, respectively.

[FIGURE A1 ABOUT HERE]

Figure A1. Impact of Employment protection legislation on temporary jobs (EPLt) on the disadvantage of holding a temporary position (all Isced levels and by education groups, 2007 and 2012)

Notes: Bootstrapped standard errors in parentheses; ***, ** and * denote significance at the 1, 5 and 10 per cent level, respectively; *EPLt* lagged one year

Source: own elaboration on EU-Silc data.

TABLES

Table 1 Mean hourly wage by education group (2005 Euro ppp), 2007 and 2012

	All Isced levels		Primary		Secondary		Tertiary	
	2007	2012	2007	2012	2007	2012	2007	2012
BG	2.89	3.12	2.40	2.34	2.78	2.91	3.73	3.93
CZ	6.31	6.24	4.49	4.48	5.99	5.80	8.96	8.45
EE	5.10	5.25	4.42	4.60	4.73	4.79	6.09	6.27
HU	4.58	4.27	3.08	2.96	3.98	3.84	7.15	6.03
LT	5.20	4.44	3.78	3.06	4.38	3.60	6.99	5.78
LV	4.79	4.16	3.61	2.96	4.16	3.48	7.03	5.67
PL	6.06	6.53	4.21	4.43	5.30	5.59	8.97	8.97
RO	2.72	2.29	1.79	1.67	2.44	2.07	4.28	3.19
SI	9.80	9.97	6.90	7.08	8.81	8.49	14.73	13.85
SK	4.67	5.39	3.40	4.05	4.40	5.02	6.04	6.57
Total	*5.71*	*5.61*	*4.25*	*4.02*	*5.14*	*4.94*	*8.18*	*7.62*
Total (West EU)	*14.72*	*15.04*	*10.73*	*10.66*	*13.85*	*13.80*	*18.95*	*18.79*

Source: own elaborations on EU-Silc data.

Table 2 Permanent/Temporary hourly wage gap, by education group, 2007 and 2012

	All Isced levels		Primary		Secondary		Tertiary	
	2007	2012	2007	2012	2007	2012	2007	2012
BG	1.17	1.26	1.01	1.17	1.18	1.12	1.17	1.27
CZ	1.15	1.22	1.07	1.01	1.14	1.22	1.09	1.24
EE	0.92	1.18	1.68	0.96	0.95	1.20	0.93	1.17
HU	1.22	1.35	1.20	1.17	1.18	1.23	1.15	1.14
LT	1.08	1.10	1.31	0.76	1.07	0.99	1.01	1.11
LV	1.28	1.21	1.20	1.24	1.13	1.07	1.11	1.00
PL	1.45	1.41	1.24	1.15	1.33	1.28	1.43	1.38
RO	1.44	1.25	1.13	1.21	1.21	1.06	1.70	1.46
SI	1.35	1.37	1.07	1.20	1.28	1.26	1.57	1.50
SK	1.16	1.18	1.06	1.15	1.14	1.19	1.06	1.14
Total	*1.26*	*1.21*	*1.23*	*1.23*	*1.19*	*1.12*	*1.22*	*1.17*
Total (West EU)	*1.53*	*1.47*	*1.41*	*1.36*	*1.49*	*1.46*	*1.48*	*1.42*

Source: own elaborations on EU-Silc data.

Table A1 Determinants of hourly wages, pooled sample (quantile regressions, 2007 and 2012)

	q (.10) (1)	q (.50) (2)	q (.90) (3)	q (.10) (4)	q (.50) (5)	q (.90) (6)	q (.10) (7)	q (.50) (8)	q (.90) (9)	q (.10) (10)	q (.50) (11)	q (.90) (12)
Temp*2007	-0.161 ***	-0.146 ***	-0.098 ***	-0.161 ***	-0.126 ***	0.006	-0.155 ***	-0.158 ***	-0.177 ***	-0.211 ***	-0.200 ***	-0.227 ***
	(0.009)	(0.007)	(0.011)	(0.035)	(0.024)	(0.039)	(0.037)	(0.026)	(0.043)	(0.020)	(0.014)	(0.023)
Temp*2012	-0.159 ***	-0.140 ***	-0.134 ***	-0.342 ***	-0.197 ***	-0.302 ***	-0.054	-0.135 ***	-0.110 **	-0.052 *	-0.138 ***	-0.161 ***
	(0.010)	(0.007)	(0.011)	(0.039)	(0.027)	(0.044)	(0.038)	(0.027)	(0.044)	(0.027)	(0.019)	(0.030)
Temp*DEREG*2007				-0.000	-0.003	-0.013 ***						
				(0.004)	(0.003)	(0.005)						
Temp*DEREG*2012				0.030 ***	0.010 **	0.028 ***						
				(0.006)	(0.005)	(0.007)						
Temp*UD*2007							-0.000	0.001	0.004 *			
							(0.002)	(0.001)	(0.002)			
Temp*UD*2012							-0.006 ***	-0.000	-0.001			
							(0.002)	(0.002)	(0.003)			
Temp*WC*2007										0.025 ***	0.028 ***	0.068 ***
										(0.009)	(0.007)	(0.011)
Temp*WC*2012										-0.064 ***	-0.001	0.016
										(0.015)	(0.011)	(0.017)
Male	0.121 ***	0.201 ***	0.250 ***	0.121 ***	0.201 ***	0.248 ***	0.121 ***	0.201 ***	0.250 ***	0.121 ***	0.201 ***	0.250 ***
	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)
Married	0.010 **	0.027 ***	0.031 ***	0.011 **	0.027 ***	0.030 ***	0.010 **	0.027 ***	0.031 ***	0.009 **	0.027 ***	0.031 ***
	(0.004)	(0.003)	(0.005)	(0.004)	(0.003)	(0.005)	(0.004)	(0.003)	(0.005)	(0.004)	(0.003)	(0.005)
Age	-0.031	0.206 ***	0.304 ***	-0.027	0.205 ***	0.302 ***	-0.032	0.205 ***	0.301 ***	-0.029	0.205 ***	0.305 ***
	(0.044)	(0.031)	(0.051)	(0.045)	(0.031)	(0.050)	(0.044)	(0.031)	(0.051)	(0.044)	(0.031)	(0.050)
Age2	0.008	-0.020 ***	-0.032 ***	0.007	-0.020 ***	-0.031 ***	0.008	-0.020 ***	-0.032 ***	0.007	-0.020 ***	-0.032 ***
	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)
Health status	-0.030 ***	-0.047 ***	-0.052 ***	-0.031 ***	-0.047 ***	-0.053 ***	-0.031 ***	-0.047 ***	-0.052 ***	-0.030 ***	-0.047 ***	-0.053 ***
	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)
Secondary Educ	0.025 **	0.112 ***	0.165 ***	0.027 **	0.111 ***	0.165 ***	0.025 **	0.112 ***	0.165 ***	0.024 **	0.112 ***	0.166 ***
	(0.011)	(0.007)	(0.017)	(0.011)	(0.007)	(0.012)	(0.011)	(0.007)	(0.012)	(0.011)	(0.007)	(0.012)
Tertirary Educ	0.193 ***	0.382 ***	0.516 ***	0.196 ***	0.381 ***	0.515 ***	0.193 ***	0.382 ***	0.515 ***	0.192 ***	0.382 ***	0.516 ***
	(0.015)	(0.011)	(0.017)	(0.015)	(0.011)	(0.017)	(0.105)	(0.011)	(0.017)	(0.015)	(0.011)	(0.011)
Part-time	-0.091 ***	0.011	0.175 ***	-0.091 ***	0.011	0.173 ***	-0.092 ***	0.011	0.175 ***	-0.093 ***	0.012 *	0.175 ***
	(0.010)	(0.007)	(0.012)	(0.010)	(0.007)	(0.011)	(0.010)	(0.007)	(0.012)	(0.010)	(0.007)	(0.011)
Second Job	-0.034 ***	-0.007	-0.002	-0.034 ***	-0.007	-0.002	-0.034 ***	-0.007	-0.002	-0.034 ***	-0.008 *	-0.000
	(0.006)	(0.005)	(0.008)	(0.007)	(0.005)	(0.007)	(0.007)	(0.005)	(0.008)	(0.007)	(0.005)	(0.007)
Firm size (11-49)	0.130 ***	0.094 ***	0.060 ***	0.130 ***	0.095 ***	0.060 ***	0.130 ***	0.094 ***	0.060 ***	0.130 ***	0.094 ***	0.060 ***
	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)
Firm size (over 50)	0.225 ***	0.190 ***	0.145 ***	0.225 ***	0.190 ***	0.146 ***	0.225 ***	0.190 ***	0.145 ***	0.225 ***	0.190 ***	0.146 ***
	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)
Urban	0.040 ***	0.078 ***	0.093 ***	0.039 ***	0.078 ***	0.094 ***	0.040 ***	0.078 ***	0.094 ***	0.039 ***	0.077 ***	0.094 ***
	(0.005)	(0.003)	(0.005)	(0.005)	(0.003)	(0.005)	(0.005)	(0.003)	(0.005)	(0.005)	(0.003)	(0.005)
Constant	0.866 ***	0.873 ***	1.174 ***	0.090	-0.006	0.334 ***	0.098	-0.007	0.332 ***	0.544 ***	0.446 ***	0.757 ***
	(0.108)	(0.077)	(0.125)	(0.110)	(0.077)	(0.123)	(0.108)	(0.076)	(0.125)	(0.109)	(0.077)	(0.124)
Sector/occup/country/country*2012 dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Sample-selection correction	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Obs	125970	125970	125970	125970	125970	125970	125970	125970	125970	125970	125970	125970
Pseudo R-sq.	0.357	0.378	0.345	0.360	0.378	0.345	0.360	0.378	0.345	0.360	0.378	0.345

Notes: Bootstrap standard errors in parentheses. ***, ** and * denote significance at the 1, 5 and 10 per cent level, respectively. Institutional variables (Labour market deregulation, Union density and Wage coordination) lagged one year

Table A2 Determinants of hourly wages, primary education (quantile regressions, 2007 and 2012)

	q (.10) (1)	q (.50) (2)	q (.90) (3)	q (.10) (4)	q (.50) (5)	q (.90) (6)	q (.10) (7)	q (.50) (8)	q (.90) (9)	q (.10) (10)	q (.50) (11)	q (.90) (12)
Temp*2007	-0.108 ***	-0.098 ***	-0.094 ***	-0.044	-0.042	-0.033	-0.177 **	-0.177 ***	-0.256 **	-0.182 ***	-0.154 ***	-0.227 ***
	(0.021)	(0.018)	(0.029)	(0.060)	(0.050)	(0.084)	(0.075)	(0.063)	(0.102)	(0.044)	(0.037)	(0.060)
Temp*2012	-0.160 ***	-0.130 ***	-0.124 ***	-0.338 ***	-0.039	-0.287 **	-0.207 **	-0.150 **	-0.042	-0.074	-0.095	-0.155
	(0.024)	(0.020)	(0.032)	(0.084)	(0.070)	(0.116)	(0.084)	(0.070)	(0.114)	(0.074)	(0.062)	(0.101)
Temp*DEREG*2007				-0.009	-0.008	-0.009						
				(0.008)	(0.007)	(0.011)						
Temp*DEREG*2012				0.028 **	-0.015	0.028						
				(0.014)	(0.011)	(0.019)						
Temp*UD*2007							0.003	0.004	0.008			
							(0.004)	(0.003)	(0.005)			
Temp*UD*2012							0.003	0.001	-0.004			
							(0.005)	(0.004)	(0.006)			
Temp*WC*2007										0.032 *	0.024	0.067 ***
										(0.018)	(0.015)	(0.025)
Temp*WC*2012										-0.051	-0.022	0.022
										(0.041)	(0.034)	(0.055)
Male	0.073 ***	0.155 ***	0.237 ***	0.070 ***	0.159 ***	0.236 ***	0.073 ***	0.158 ***	0.233 ***	0.076 ***	0.159 ***	0.239 ***
	(0.014)	(0.012)	(0.019)	(0.014)	(0.012)	(0.019)	(0.014)	(0.012)	(0.019)	(0.014)	(0.012)	(0.019)
Married	0.020 *	0.041 ***	0.053 ***	0.021 *	0.043 ***	0.053 ***	0.021 *	0.042 ***	0.051 ***	0.022 *	0.042 ***	0.053 ***
	(0.011)	(0.010)	(0.015)	(0.011)	(0.009)	(0.016)	(0.011)	(0.010)	(0.016)	(0.011)	(0.010)	(0.016)
Age	-0.297 ***	-0.007	0.135	-0.310 ***	0.029	0.126	-0.286 ***	0.018	0.111	-0.249 **	0.026	0.150
	(0.108)	(0.091)	(0.146)	(0.107)	(0.089)	(0.149)	(0.108)	(0.091)	(0.148)	(0.108)	(0.091)	(0.147)
Age2	0.037 ***	0.002	-0.015	0.038 ***	-0.002	-0.014	0.035 ***	-0.000	-0.012	0.031 **	-0.001	-0.017
	(0.013)	(0.011)	(0.017)	(0.012)	(0.010)	(0.017)	(0.013)	(0.011)	(0.017)	(0.013)	(0.011)	(0.017)
Health status	-0.026 ***	-0.045 ***	-0.056 ***	-0.027 ***	-0.046 ***	-0.057 ***	-0.027 ***	-0.045 ***	-0.054 ***	-0.030 ***	-0.045 ***	-0.060 ***
	(0.009)	(0.008)	(0.012)	(0.009)	(0.008)	(0.013)	(0.009)	(0.008)	(0.013)	(0.009)	(0.008)	(0.013)
Part-time	-0.085 ***	0.078 ***	0.216 ***	-0.079 ***	0.073 ***	0.217 ***	-0.086 ***	0.072 ***	0.216 ***	-0.094 ***	0.070 ***	0.219 ***
	(0.021)	(0.018)	(0.029)	(0.021)	(0.018)	(0.029)	(0.021)	(0.018)	(0.029)	(0.021)	(0.018)	(0.029)
Second Job	-0.059 ***	-0.023 *	-0.028	-0.060 ***	-0.023 *	-0.032	-0.058 ***	-0.023 *	-0.032	-0.058 ***	-0.023 *	-0.031
	(0.016)	(0.014)	(0.022)	(0.016)	(0.013)	(0.022)	(0.016)	(0.013)	(0.022)	(0.014)	(0.013)	(0.022)
Firm size (11-49)	0.111 ***	0.109 ***	0.075 ***	0.107 ***	0.109 ***	0.074 ***	0.109 ***	0.109 ***	0.074 ***	0.107 ***	0.110 ***	0.073 ***
	(0.013)	(0.011)	(0.018)	(0.013)	(0.011)	(0.018)	(0.013)	(0.011)	(0.018)	(0.013)	(0.011)	(0.018)
Firm size (over 50)	0.171 ***	0.181 ***	0.134 ***	0.165 ***	0.181 ***	0.137 ***	0.170 ***	0.181 ***	0.133 ***	0.169 ***	0.180 ***	0.135 ***
	(0.014)	(0.012)	(0.020)	(0.014)	(0.012)	(0.020)	(0.014)	(0.012)	(0.020)	(0.015)	(0.012)	(0.020)
Urban	0.033 **	0.077 ***	0.117 ***	0.034 **	0.080 ***	0.114 ***	0.032 **	0.080 ***	0.114 ***	0.031 **	0.076 ***	0.115 ***
	(0.014)	(0.012)	(0.019)	(0.014)	(0.012)	(0.020)	(0.014)	(0.012)	(0.019)	(0.014)	(0.012)	(0.019)
Constant	1.630 ***	1.435 ***	1.629 ***	1.682 ***	1.288 ***	1.531 ***	1.622 ***	1.314 ***	1.560 ***	1.268 ***	1.320 ***	1.719 ***
	(0.270)	(0.228)	(0.367)	(0.259)	(0.215)	(0.359)	(0.261)	(0.219)	(0.357)	(0.268)	(0.224)	(0.363)
Sector/occup/country/country*2012 dummies	yes	yes	yes	yes	yes	yes	yes	yes		yes	yes	
Sample-selection correction	yes	yes	yes	yes	yes	yes	yes	yes	yes		yes	yes
Obs	11914	11914	11914	11914	11914	11914	11914	11914	11914	11914	11914	11914
Pseudo R-sq.	0.407	0.423	0.328	0.408	0.423	0.382	0.407	0.423	0.328	0.407	0.423	0.328

Notes: Bootstrap standard errors in parentheses. ***, ** and * denote significance at the 1, 5 and 10 per cent level, respectively. Institutional variables (Labour market deregulation, Union density and Wage coordination) lagged one year

Table A3 Determinants of hourly wages, secondary education (quantile regressions, 2007 and 2012)

	q (.10) (1)	q (.50) (2)	q (.90) (3)	q (.10) (4)	q (.50) (5)	q (.90) (6)	q (.10) (7)	q (.50) (8)	q (.90) (9)	q (.10) (10)	q (.50) (11)	q (.90) (12)
Temp*2007	-0.147 ***	-0.140 ***	-0.086 ***	-0.104 ***	-0.125 ***	0.040	-0.182 ***	-0.162 ***	-0.167 ***	-0.183 ***	-0.182 ***	-0.192 ***
	(0.010)	(0.008)	(0.012)	(0.039)	(0.030)	(0.048)	(0.042)	(0.032)	(0.052)	(0.022)	(0.017)	(0.027)
Temp*2012	-0.145 ***	-0.130 ***	-0.121 ***	-0.285 ***	-0.173 ***	-0.217 ***	-0.074 *	-0.157 ***	-0.118 **	-0.066 **	-0.139 ***	-0.119 ***
	(0.011)	(0.008)	(0.013)	(0.043)	(0.033)	(0.053)	(0.043)	(0.032)	(0.053)	(0.029)	(0.022)	(0.036)
Temp*DEREG*2007				-0.005	-0.002	-0.016 ***						
				(0.005)	(0.004)	(0.006)						
Temp*DEREG*2012				0.023 ***	0.007	0.016 *						
				(0.007)	(0.005)	(0.009)						
Temp*UD*2007							0.002	0.001	0.004			
							(0.002)	(0.002)	(0.003)			
Temp*UD*2012							-0.004 *	0.002	-0.000			
							(0.003)	(0.002)	(0.003)			
Temp*WC*2007										0.019 *	0.021 ***	0.054 ***
										(0.010)	(0.008)	(0.013)
Temp*WC*2012										-0.048 ***	0.005	-0.002
										(0.017)	(0.013)	(0.021)
Male	0.117 ***	0.214 ***	0.285 ***	0.117 ***	0.214 ***	0.285 ***	0.116 ***	0.214 ***	0.285 ***	0.117 ***	0.214 ***	0.285 ***
	(0.006)	(0.005)	(0.008)	(0.006)	(0.005)	(0.008)	(0.006)	(0.005)	(0.008)	(0.006)	(0.005)	(0.008)
Married	0.007	0.026 ***	0.034 ***	0.008	0.026 ***	0.034 ***	0.007	0.026 ***	0.033 ***	0.007	0.026 ***	0.034 ***
	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)
Age	-0.076	0.145 ***	0.309 ***	-0.080	0.147 ***	0.297 ***	-0.080	0.142 ***	0.306 ***	-0.085 *	0.142 ***	0.310 ***
	(0.052)	(0.039)	(0.064)	(0.052)	(0.039)	(0.064)	(0.052)	(0.039)	(0.064)	(0.052)	(0.040)	(0.064)
Age2	0.012 **	-0.014 ***	-0.034 ***	0.012 **	-0.014 ***	-0.032 ***	0.012 **	-0.014 ***	-0.033 ***	0.013 **	-0.014 ***	-0.034 ***
	(0.006)	(0.005)	(0.007)	(0.006)	(0.005)	(0.007)	(0.006)	(0.005)	(0.007)	(0.006)	(0.005)	(0.007)
Health status	-0.026 ***	-0.041 ***	-0.048 ***	-0.026 ***	-0.041 ***	-0.048 ***	-0.026 ***	-0.040 ***	-0.048 ***	-0.025 ***	-0.040 ***	-0.048 ***
	(0.004)	(0.003)	(0.005)	(0.004)	(0.003)	(0.005)	(0.004)	(0.003)	(0.005)	(0.004)	(0.003)	(0.005)
Part-time	-0.083 ***	0.005	0.174 ***	-0.084 ***	0.004	0.174 ***	-0.083 ***	0.006	0.175 ***	-0.082 ***	0.005	0.175 ***
	(0.011)	(0.008)	(0.014)	(0.011)	(0.008)	(0.014)	(0.011)	(0.008)	(0.014)	(0.011)	(0.008)	(0.014)
Second Job	-0.015 **	0.004	-0.006	-0.015 **	0.004	-0.007	-0.015 **	0.004	-0.007	-0.015 **	0.003	-0.005
	(0.007)	(0.005)	(0.009)	(0.007)	(0.005)	(0.009)	(0.007)	(0.005)	(0.009)	(0.007)	(0.005)	(0.009)
Firm size (11-49)	0.114 ***	0.090 ***	0.061 ***	0.115 ***	0.090 ***	0.061 ***	0.115 ***	0.090 ***	0.061 ***	0.115 ***	0.090 ***	0.060 ***
	(0.005)	(0.004)	(0.007)	(0.005)	(0.004)	(0.007)	(0.005)	(0.004)	(0.007)	(0.005)	(0.004)	(0.007)
Firm size (over 50)	0.208 ***	0.180 ***	0.142 ***	0.209 ***	0.180 ***	0.142 ***	0.209 ***	0.181 ***	0.142 ***	0.209 ***	0.181 ***	0.141 ***
	(0.006)	(0.004)	(0.007)	(0.006)	(0.004)	(0.007)	(0.006)	(0.004)	(0.007)	(0.006)	(0.004)	(0.007)
Urban	0.045 ***	0.081 ***	0.102 ***	0.046 ***	0.081 ***	0.102 ***	0.045 ***	0.081 ***	0.102 ***	0.045 ***	0.081 ***	0.102 ***
	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)
Constant	0.286 **	0.306 ***	0.449 ***	0.680 ***	0.655 ***	0.904 ***	0.855 ***	1.032 ***	1.362 ***	0.304 ***	0.310 ***	0.442 ***
	(0.119)	(0.089)	(0.145)	(0.118)	(0.089)	(0.145)	(0.119)	(0.090)	(0.147)	(0.117)	(0.090)	(0.145)
Sector/occup/country/country*2012 dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes		yes	yes
Sample-selection correction	yes	yes	yes	yes	yes	yes	yes	yes		yes	yes	
Obs	82850	82850	82850	82850	82850	82850	82850	82850	82850	82850	82850	82850
Pseudo R-sq.	0.352	0.357	0.290	0.352	0.357	0.290	0.352	0.357	0.290	0.352	0.357	0.290

Notes: Bootstrap standard errors in parentheses. ***, ** and * denote significance at the 1, 5 and 10 per cent level, respectively. Institutional variables (Labour market deregulation, Union density and Wage coordination) lagged one year

Table A4 Determinants of hourly wages, tertiary education (quantile regressions, 2007 and 2012)

	q (.10) (1)	q (.50) (2)	q (.90) (3)	q (.10) (4)	q (.50) (5)	q (.90) (6)	q (.10) (7)	q (.50) (8)	q (.90) (9)	q (.10) (10)	q (.50) (11)	q (.90) (12)
Temp*2007	-0.254 ***	-0.163 ***	-0.062 **	-0.410 ***	-0.227 ***	-0.086	-0.015	0.031	0.007	-0.273 ***	-0.208 ***	-0.105 *
	(0.029)	(0.018)	(0.027)	(0.114)	(0.068)	(0.103)	(0.119)	(0.070)	(0.107)	(0.064)	(0.038)	(0.059)
Temp*2012	-0.161 ***	-0.145 ***	-0.099 ***	-0.412 ***	-0.381 ***	-0.389 ***	0.145	-0.028	-0.044	0.028	-0.126 ***	-0.309 ***
	(0.027)	(0.017)	(0.025)	(0.106)	(0.063)	(0.095)	(0.107)	(0.063)	(0.096)	(0.073)	(0.043)	(0.067)
Temp*DEREG*2007				0.022	0.008	0.003						
				(0.014)	(0.008)	(0.013)						
Temp*DEREG*2012				0.043 **	0.043 ***	0.048 ***						
				(0.018)	(0.011)	(0.016)						
Temp*UD*2007							-0.012 *	-0.011 ***	-0.004			
							(0.006)	(0.004)	(0.006)			
Temp*UD*2012							-0.018 ***	-0.007 *	-0.003			
							(0.006)	(0.004)	(0.006)			
Temp*WC*2007										0.011	0.022	0.023
										(0.030)	(0.017)	(0.027)
Temp*WC*2012										-0.111 ***	-0.013	0.122 ***
										(0.042)	(0.024)	(0.038)
Male	0.099 ***	0.151 ***	0.176 ***	0.104 ***	0.152 ***	0.179 ***	0.101 ***	0.151 ***	0.177 ***	0.099 ***	0.152 ***	0.178 ***
	(0.013)	(0.008)	(0.012)	(0.013)	(0.008)	(0.012)	(0.014)	(0.008)	(0.012)	(0.014)	(0.008)	(0.012)
Married	-0.006	0.022 ***	0.024 **	-0.005	0.021 ***	0.022 **	-0.007	0.021 ***	0.023 **	-0.008	0.022 ***	0.024 **
	(0.011)	(0.006)	(0.010)	(0.011)	(0.007)	(0.010)	(0.011)	(0.007)	(0.010)	(0.011)	(0.006)	(0.010)
Age	-0.166	0.351 ***	0.623 ***	-0.106	0.359 ***	0.648 ***	-0.148	0.354 ***	0.629 ***	-0.180	0.349 ***	0.632 ***
	(0.114)	(0.069)	(0.106)	(0.117)	(0.070)	(0.106)	(0.120)	(0.070)	(0.107)	(0.119)	(0.069)	(0.108)
Age2	0.029 **	-0.031 ***	-0.063 ***	0.022	-0.032 ***	-0.066 ***	0.027 *	-0.031 ***	-0.064 ***	0.031 **	-0.031 ***	-0.064 ***
	(0.013)	(0.008)	(0.012)	(0.014)	(0.008)	(0.012)	(0.014)	(0.008)	(0.012)	(0.014)	(0.008)	(0.013)
Health status	-0.011	-0.045 ***	-0.048 ***	-0.012	-0.047 ***	-0.049 ***	-0.014	-0.046 ***	-0.048 ***	-0.010	-0.045 ***	-0.048 ***
	(0.009)	(0.005)	(0.008)	(0.009)	(0.006)	(0.008)	(0.009)	(0.006)	(0.008)	(0.009)	(0.005)	(0.009)
Part-time	-0.111 ***	0.021	0.168 ***	-0.095 ***	0.020	0.168 ***	-0.107 ***	0.022	0.167 ***	-0.113 ***	0.021	0.183 ***
	(0.028)	(0.017)	(0.026)	(0.029)	(0.017)	(0.026)	(0.029)	(0.017)	(0.026)	(0.029)	(0.017)	(0.026)
Second Job	-0.064 ***	-0.023 **	-0.012	-0.066 ***	-0.023 **	-0.012	-0.071 ***	-0.023 **	-0.012	-0.064 ***	-0.023 **	-0.014
	(0.017)	(0.011)	(0.016)	(0.018)	(0.011)	(0.016)	(0.018)	(0.011)	(0.016)	(0.018)	(0.011)	(0.016)
Firm size (11-49)	0.208 ***	0.114 ***	0.048 ***	0.212 ***	0.114 ***	0.049 ***	0.209 ***	0.114 ***	0.048 ***	0.207 ***	0.114 ***	0.048 ***
	(0.014)	(0.008)	(0.013)	(0.014)	(0.008)	(0.013)	(0.014)	(0.008)	(0.013)	(0.014)	(0.008)	(0.012)
Firm size (over 50)	0.312 ***	0.224 ***	0.157 ***	0.318 ***	0.223 ***	0.160 ***	0.312 ***	0.223 ***	0.157 ***	0.314 ***	0.223 ***	0.156 ***
	(0.014)	(0.008)	(0.013)	(0.014)	(0.008)	(0.013)	(0.014)	(0.008)	(0.013)	(0.014)	(0.008)	(0.013)
Urban	0.011	0.067 ***	0.061 ***	0.014	0.068 ***	0.062 ***	0.013	0.068 ***	0.061 ***	0.010	0.067 ***	0.062 ***
	(0.011)	(0.007)	(0.010)	(0.011)	(0.007)	(0.010)	(0.012)	(0.007)	(0.010)	(0.012)	(0.007)	(0.011)
Constant	0.598 **	-0.065	-0.119	0.642 **	0.035	-0.018	0.749 ***	0.044	0.043	0.714 **	0.063	-0.005
	(0.275)	(0.167)	(0.255)	(0.281)	(0.168)	(0.253)	(0.287)	(0.168)	(0.257)	(0.284)	(0.166)	(0.258)
Sector/occup/country/country*2012 dummies	yes	yes	yes	yes	yes	yes	yes	yes		yes	yes	
Sample-selection correction	yes	yes	yes	yes	yes	yes	yes	yes		yes	yes	
Obs	31206	31206	31206	31206	31206	31206	31206	31206	31206	31206	31206	31206
Pseudo R-sq.	0.283	0.327	0.319	0.284	0.327	0.318	0.284	0.327	0.318	0.284	0.327	0.318

Notes: Bootstrap standard errors in parentheses. ***, ** and * denote significance at the 1, 5 and 10 per cent level, respectively. Institutional variables (Labour market deregulation, Union density and Wage coordination) lagged one year

41

Table A5 Determinants of hourly wages: temporary jobs and occupations with high intensity of specific knowledge (pooled sample, OLS and QR, 2007 and 2012)

	OLS (1)	q (.10) (2)	q (.50) (3)	q (.90) (4)	OLS (5)	q (.10) (6)	q (.50) (7)	q (.90) (8)
Temp*2007	-0.146 ***	-0.148 ***	-0.153 ***	-0.094 ***	-0.146 ***	-0.147 ***	-0.153 ***	-0.096 ***
	(0.008)	(0.011)	(0.008)	(0.013)	(0.008)	(0.011)	(0.008)	(0.013)
Temp*2012	-0.150 ***	-0.165 ***	-0.150 ***	-0.158 ***	-0.150 ***	-0.163 ***	-0.151 ***	-0.158 ***
	(0.007)	(0.011)	(0.008)	(0.013)	(0.007)	(0.011)	(0.008)	(0.013)
Temp*OccSpec*2007	-0.029 **	-0.050 ***	-0.038 ***	-0.032	-0.024 *	-0.032 *	-0.036 ***	-0.024
	(0.012)	(0.017)	(0.013)	(0.020)	(0.013)	(0.018)	(0.014)	(0.022)
Temp*OccSpec*2012	-0.025 **	-0.034 *	-0.034 **	0.006	0.000	-0.003	-0.013	0.036
	(0.012)	(0.018)	(0.014)	(0.022)	(0.014)	(0.021)	(0.016)	(0.025)
Temp*OccSpec*Tertiary*2007					-0.022	-0.084 ***	-0.007	-0.030
					(0.023)	(0.029)	(0.022)	(0.035)
Temp*OccSpec*Tertiray*2012					-0.077 ***	-0.101 ***	-0.068 ***	-0.116 ***
					(0.022)	(0.031)	(0.024)	(0.037)
Male	0.177 ***	0.103 ***	0.181 ***	0.232 ***	0.177 ***	0.103 ***	0.181 ***	0.231 ***
	(0.003)	(0.005)	(0.004)	(0.006)	(0.003)	(0.005)	(0.004)	(0.006)
Married	0.031 ***	0.012 ***	0.032 ***	0.038 ***	0.031 ***	0.012 ***	0.032 ***	0.038 ***
	(0.003)	(0.004)	(0.003)	(0.005)	(0.003)	(0.004)	(0.003)	(0.005)
Age	0.171 ***	-0.052	0.195 ***	0.345 ***	0.169 ***	-0.059	0.194 ***	0.339 ***
	(0.029)	(0.042)	(0.031)	(0.050)	(0.029)	(0.041)	(0.031)	(0.050)
Age2	-0.016 ***	0.010 **	-0.018 ***	-0.035 ***	-0.015 ***	0.011 **	-0.018 ***	-0.035 ***
	(0.003)	(0.005)	(0.004)	(0.006)	(0.003)	(0.005)	(0.004)	(0.006)
Health status	-0.050 ***	-0.037 ***	-0.052 ***	-0.057 ***	-0.050 ***	-0.036 ***	-0.052 ***	-0.057 ***
	(0.002)	(0.003)	(0.003)	(0.004)	(0.002)	(0.003)	(0.003)	(0.004)
Secondary Educ	0.130 ***	0.050 ***	0.151 ***	0.216 ***	0.130 ***	0.049 ***	0.150 ***	0.215 ***
	(0.007)	(0.010)	(0.007)	(0.012)	(0.007)	(0.010)	(0.007)	(0.012)
Tertirary Educ	0.485 ***	0.292 ***	0.517 ***	0.667 ***	0.486 ***	0.293 ***	0.518 ***	0.668 ***
	(0.010)	(0.014)	(0.010)	(0.017)	(0.010)	(0.014)	(0.011)	(0.017)
Part-time	0.006	-0.104 ***	-0.013 *	0.156 ***	0.006	-0.104 ***	-0.014 *	0.154 ***
	(0.008)	(0.010)	(0.007)	(0.011)	(0.008)	(0.009)	(0.007)	(0.011)
Second Job	-0.023 ***	-0.028 ***	-0.009 **	-0.004	-0.023 ***	-0.029 ***	-0.009 *	-0.005
	(0.004)	(0.006)	(0.005)	(0.007)	(0.004)	(0.006)	(0.005)	(0.007)
Firm size (11-49)	0.096 ***	0.125 ***	0.089 ***	0.063 ***	0.097 ***	0.126 ***	0.088 ***	0.063 ***
	(0.003)	(0.005)	(0.004)	(0.006)	(0.003)	(0.005)	(0.004)	(0.006)
Firm size (over 50)	0.195 ***	0.223 ***	0.190 ***	0.146 ***	0.195 ***	0.224 ***	0.190 ***	0.146 ***
	(0.003)	(0.005)	(0.004)	(0.006)	(0.003)	(0.005)	(0.004)	(0.006)
OccSpec	0.117 ***	0.131 ***	0.122 ***	0.095 ***	0.117 ***	0.131 ***	0.121 ***	0.095 ***
	(0.003)	(0.004)	(0.003)	(0.005)	(0.003)	(0.004)	(0.003)	(0.005)
Urban	0.074 ***	0.045 ***	0.084 ***	0.095 ***	0.074 ***	0.045 ***	0.084 ***	0.095 ***
	(0.003)	(0.004)	(0.003)	(0.005)	(0.003)	(0.004)	(0.003)	(0.005)
Constant	0.154 **	0.554 ***	0.437 ***	0.655 ***	0.159 **	0.568 ***	0.441 ***	0.670 ***
	(0.072)	(0.104)	(0.077)	(0.123)	(0.072)	(0.102)	(0.077)	(0.123)
Sector/country/country*2012 dummies	yes	yes	yes	yes	yes	yes	yes	yes
Sample-selection correction	yes	yes	yes	yes	yes	yes	yes	yes
Obs	125970	125970	125970	125970	125970	125970	125970	125970
Adjusted/Pseudo R-sq.	0.553	0.348	0.361	0.327	0.553	0.349	0.361	0.327

Notes: Bootstrap standard errors in parentheses. ***, ** and * denote significance at the 1, 5 and 10 per cent level, respectively.
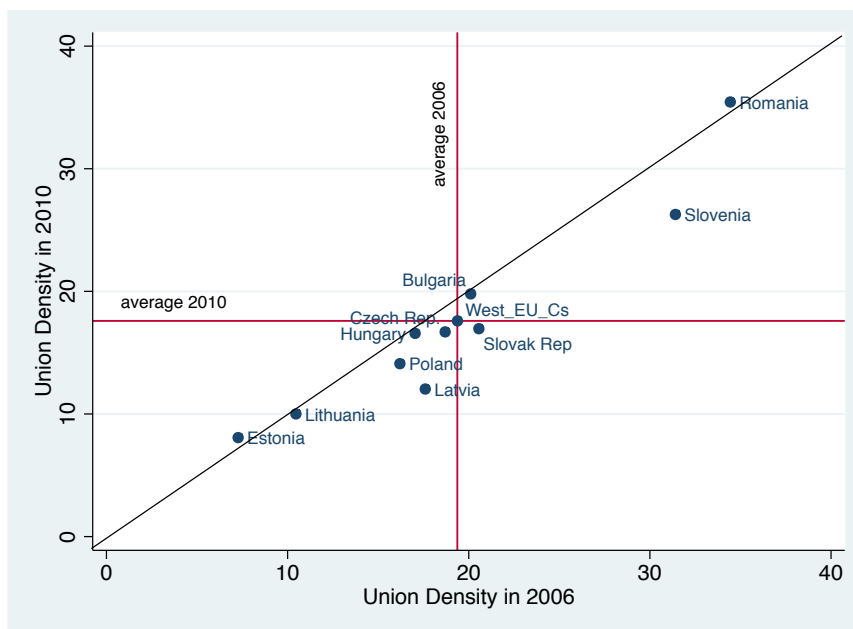
42

FIGURES

Figure 1. Labour Market Deregulation in 2006 and 2011
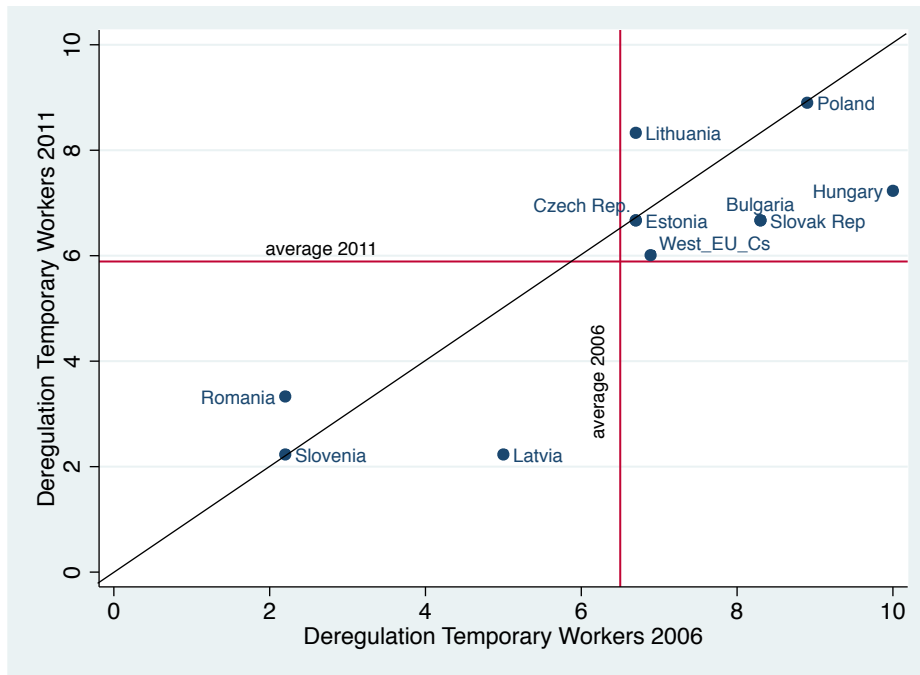
Source: Hiring regulations and minimum wage from the Economic Freedom World (EFW) database
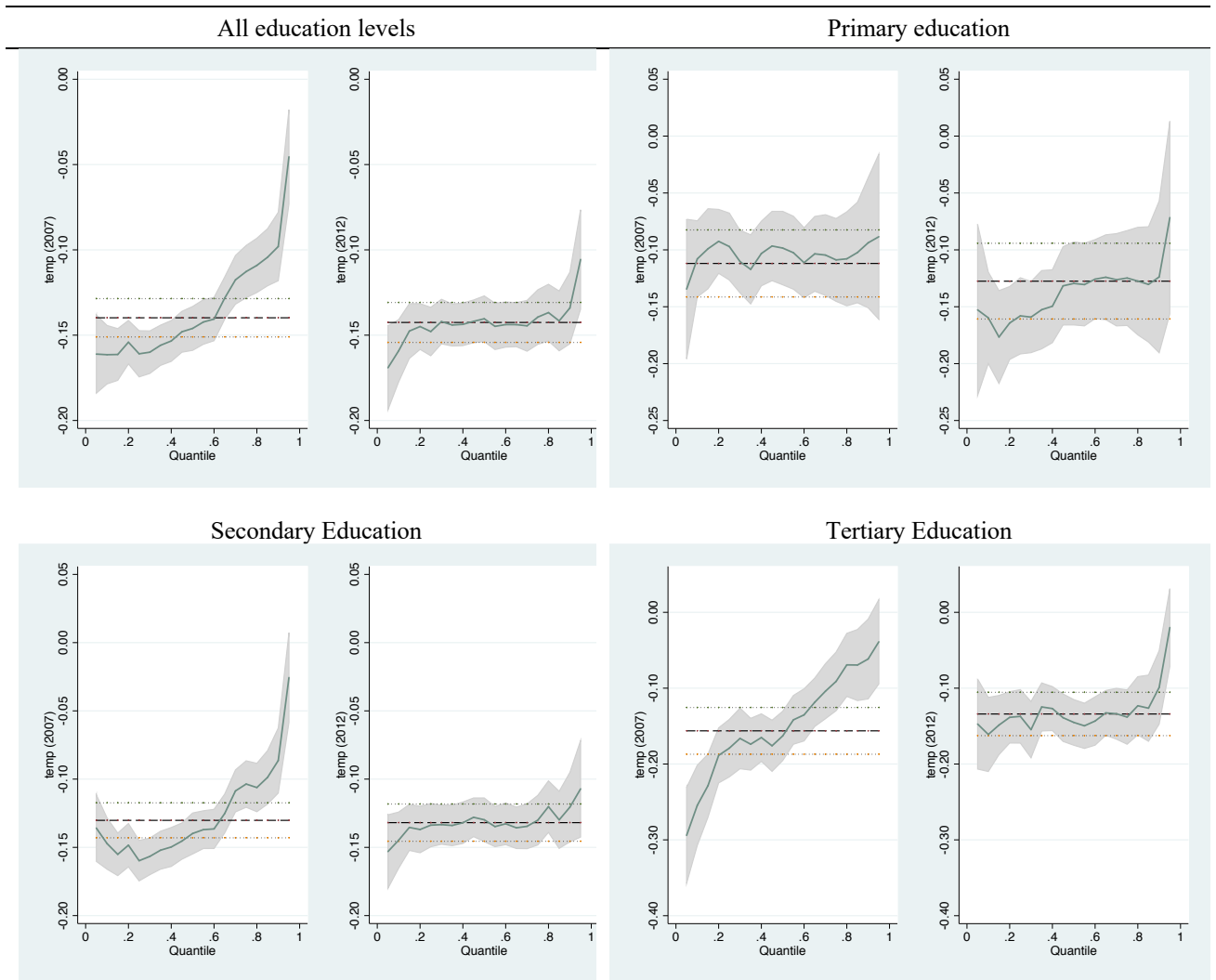
Figure 2. Union Density in 2006 and 2010

Source: Visser Institute for Advanced Labour Studies

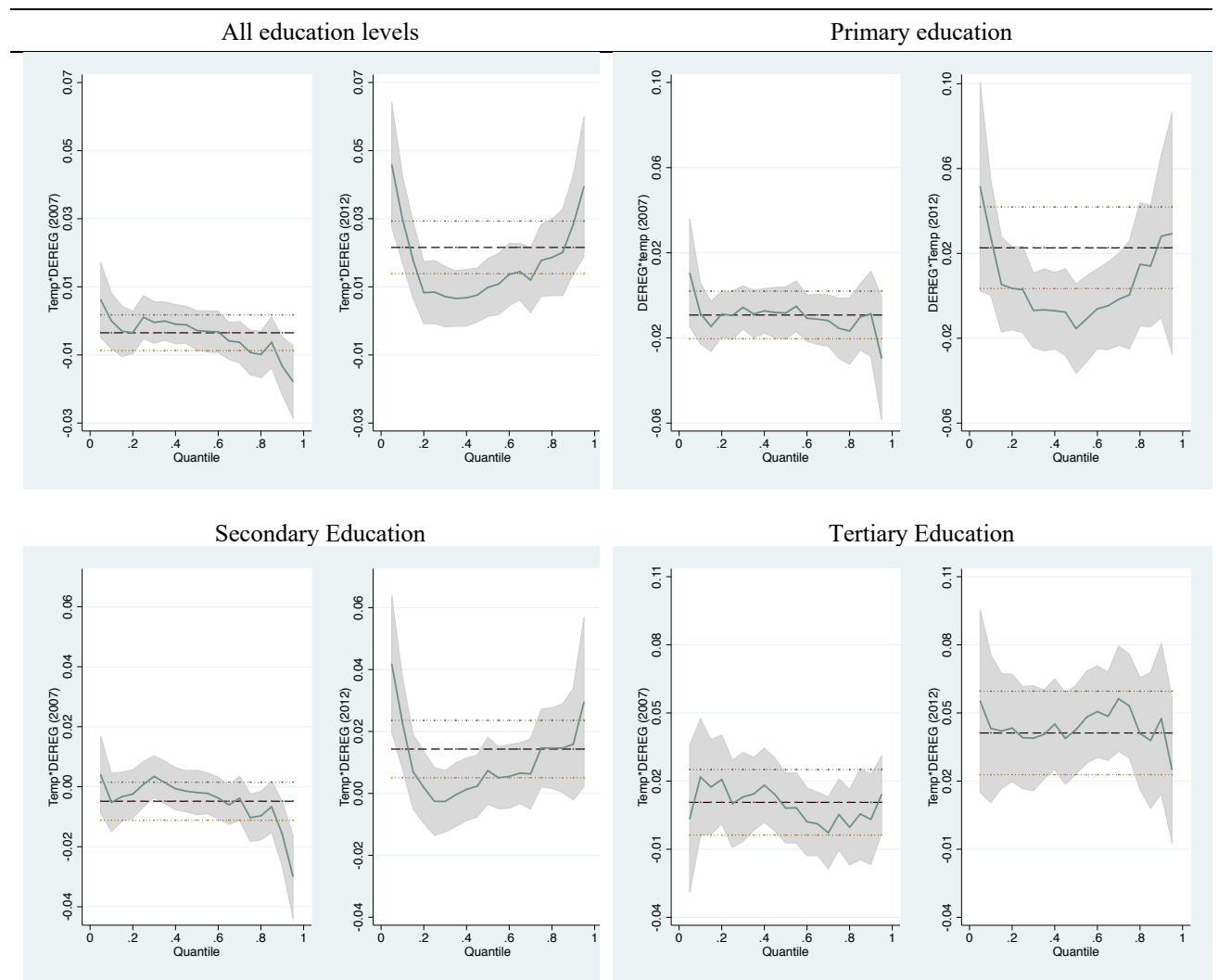Figure 3. Coordination of wage bargaining in 2006 and 2010

Source: Visser Institute for Advanced Labour Studies

Figure 4. Impact of temporary contract on hourly wage (all Isced levels and by education groups, 2007 and 2012)

Source: own elaboration on EU-Silc data
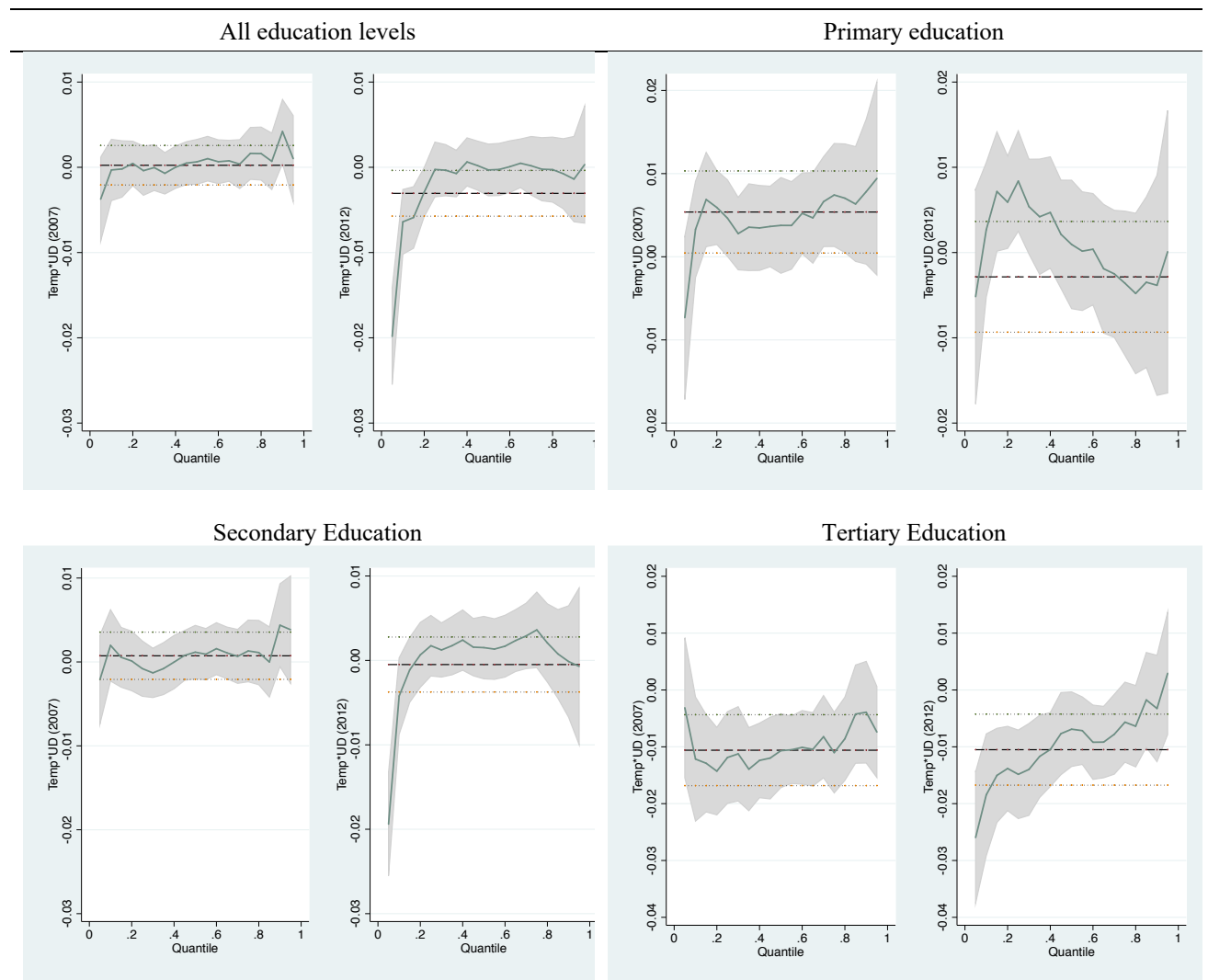
Figure 5. Impact of Labour Market Deregulation on temporary jobs (DEREG) on the disadvantage of holding a temporary position (all Isced levels and by education groups, 2007 and 2012)
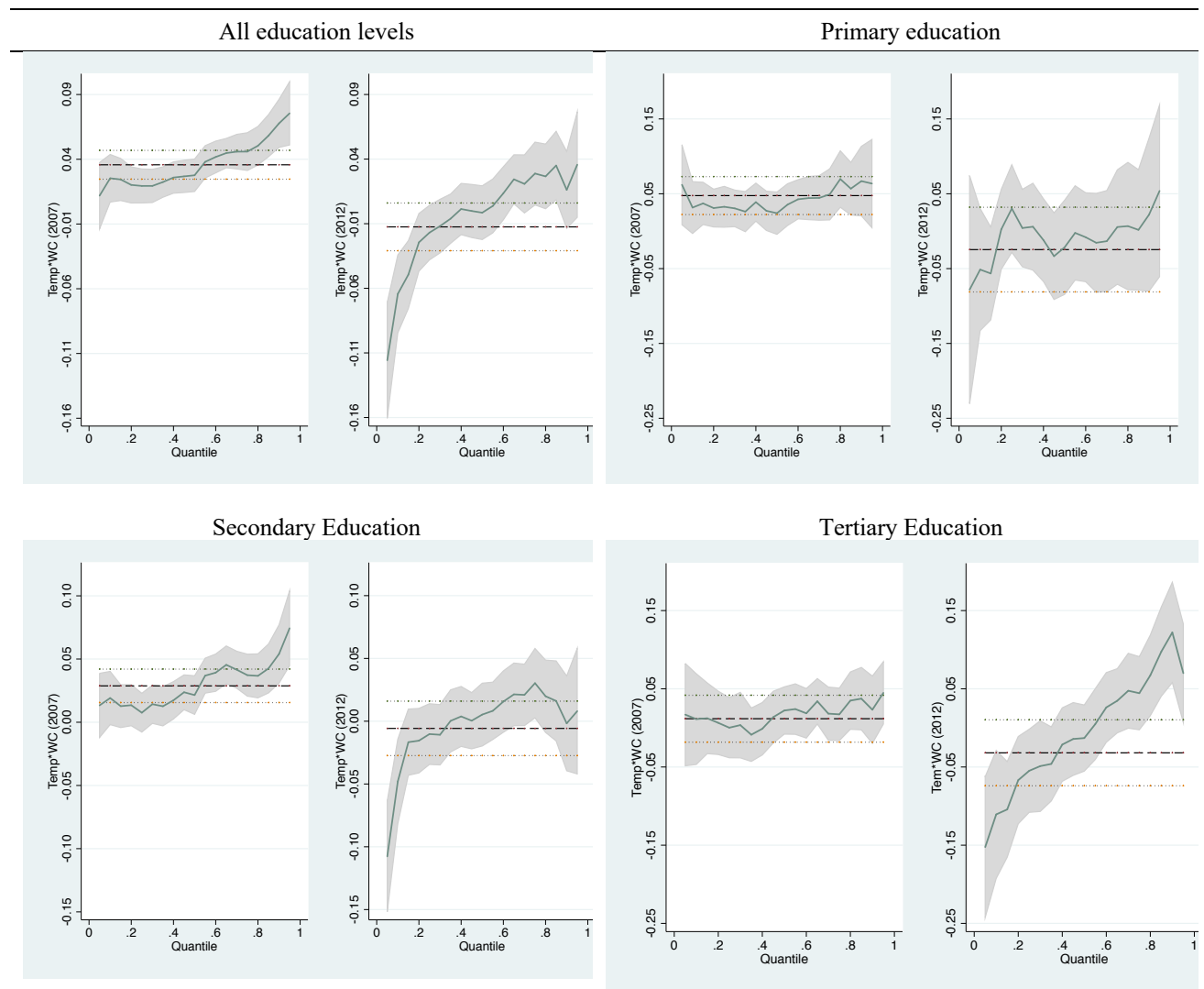

Source: own elaboration on EU-Silc data

46

Figure 6. Impact of Union Density (UD) on the disadvantage of holding a temporary position (all Isced levels and by education groups, 2007 and 2012)
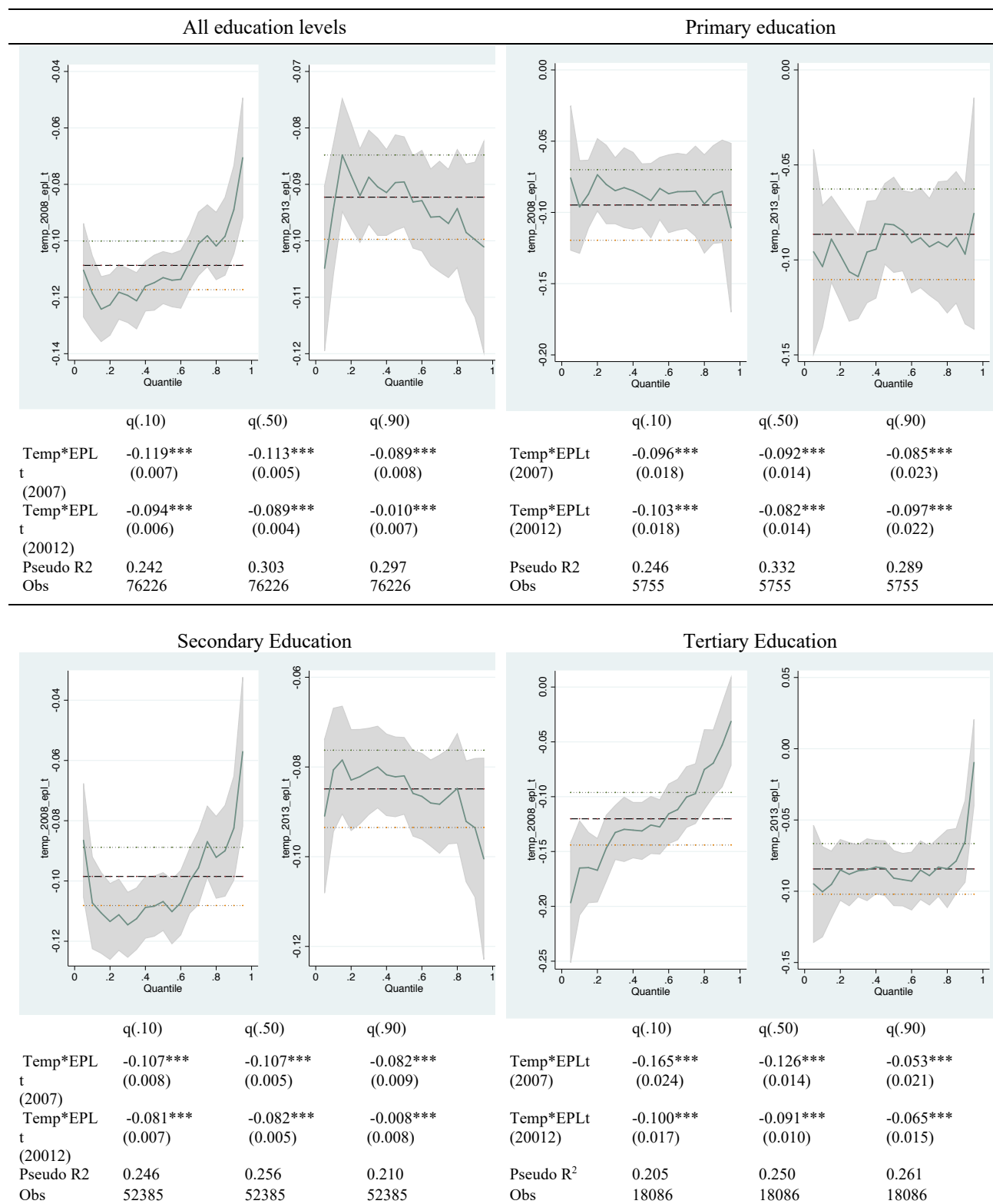
Figure 7. Impact of Wage Coordination (WC) on the disadvantage of holding a temporary position (all Isced levels and by education groups, 2007 and 2012)

Figure A1. Impact of Employment protection legislation on temporary jobs (EPLt) on the disadvantage of holding a temporary position (all Isced levels and by education groups, 2007 and 2012)

All education levels	q(.10)	q(.50)	q(.90)
Temp*EPLt (2007)	-0.119*** (0.007)	-0.113*** (0.005)	-0.089*** (0.008)
Temp*EPLt (20012)	-0.094*** (0.006)	-0.089*** (0.004)	-0.010*** (0.007)
Pseudo R2	0.242	0.303	0.297
Obs	76226	76226	76226

Primary education	q(.10)	q(.50)	q(.90)
Temp*EPLt (2007)	-0.096*** (0.018)	-0.092*** (0.014)	-0.085*** (0.023)
Temp*EPLt (20012)	-0.103*** (0.018)	-0.082*** (0.014)	-0.097*** (0.022)
Pseudo R2	0.246	0.332	0.289
Obs	5755	5755	5755

Secondary Education	q(.10)	q(.50)	q(.90)
Temp*EPLt (2007)	-0.107*** (0.008)	-0.107*** (0.005)	-0.082*** (0.009)
Temp*EPLt (20012)	-0.081*** (0.007)	-0.082*** (0.005)	-0.008*** (0.008)
Pseudo R2	0.246	0.256	0.210
Obs	52385	52385	52385

Tertiary Education	q(.10)	q(.50)	q(.90)
Temp*EPLt (2007)	-0.165*** (0.024)	-0.126*** (0.014)	-0.053*** (0.021)
Temp*EPLt (20012)	-0.100*** (0.017)	-0.091*** (0.010)	-0.065*** (0.015)
Pseudo R^2	0.205	0.250	0.261
Obs	18086	18086	18086

Notes: Bootstrapped standard errors in parentheses; ***, ** and * denote significance at the 1, 5 and 10 per cent level, respectively; *EPLt* lagged one year
Source: own elaboration on EU-Silc data.