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Iga **Magda**

David **Marsden**

Simone **Moriconi**

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Iga Magda[1], David Marsden[2] and Simone Moriconi[3]

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Abstract

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Keywords: Institutional change, unions, wages

JEL: J51, J31, P2

[1]Warsaw School of Economics and Institute for Structural Research (IBS), E-mail: iga.magda@ibs.org.pl

[2] Centre for Economic Performance, London School of Economics and Political Science. E-mail: d.marsden@lse.ac.uk.

[3] Dipartimento di Economia e Finanza, Università Cattolica di Milano and Centre for Research in Economic Analysis, Université du Luxembourg. Email: simone.moriconi@unicatt.it

1 Introduction

The extensive reforms of labor market institutions that occurred in Czech Republic, Poland and Hungary (the CE3) in preparation for accession to the European Union were widely expected to have a profound impact on the organizational strength and bargaining power of trade unions and employer organizations in these countries. From the early 1990s onward, the transition to a market economy had paved the way for a process of union "revitalization," which was signaled by the existence of union wage premia in newly established private enterprises (Magda *et al.*, 2012). Starting in the early 2000s, the prospect of accession to the EU triggered an extensive set of institutional reforms in the CE3. In its 1995 White Paper, the European Commission stated explicitly that the implementation of these reforms was a prerequisite for entry into the EU (European Commission 1995). The objective of these reforms was to improve the dialogue between the social partners, establishing a role for the government in a tripartite concertation mechanism, and enforcing labor standards comparable to those of the existing EU member states (EIRO 1998). In addition, the participation of CE3 policymakers in the EU's *Open Method of Coordination* in the area of labor market policy was also expected to help these countries reshape their national labor market institutions so that they more closely resembled the institutions of the EU15 member states. As these discussions and exchanges of good practice placed a strong emphasis on the involvement in policy-making of unions and employer organizations, it was anticipated that the influence and bargaining power of these social partners would be enhanced.

The effects of these extensive institutional reforms on the structure of wages in the former transition economies of central Europe are still largely unknown. Yet this issue appears to be important given the declining union density and collective bargaining coverage observed in the majority of new EU member states in the early 2000s (European Commission 2010). In this paper, we seek to shed new light on this question by analyzing the impact of collective agreements on wages in the Czech Republic, Poland, and Hungary in 2002 and 2006, two years before and two years after their accession to the EU in 2004. These countries are characterized by a model of collective bargaining which lies somewhere between the Anglo-Saxon and the western European models. It presents a form of national-level social dialogue comprised of worker and employer representative organizations, which deliberate on improvements in employment legislation and on the scope for national increases in pay. This system combines firm-level and industry-level pay agreements, a national minimum wage, and a labor inspectorate that oversees the enforcement of labor rights and employment contracts. Unlike in some western European countries, where individual firms may be subject to both industry- and firm-level agreements, (e.g., Italy, France, and Germany), in the CE3 model there is no overlap between these two types of agreement, and a large share of the workforce is employed in firms not covered by either type of agreement.

Among the former transition economies, the CE3 are of particular interest for at least two reasons. First, they are the earliest reformers among the post-socialist economies of central and eastern Europe, and they entered the 2000s with a collective bargaining system that was deemed sufficiently mature to implement the reforms required for EU accession. Second, they were the first post-socialist economies to join the European Union (in 2004). Thus, we can assume that the experiences of the CE3 provide a valid benchmark for future EU accessions.

We use data from the 2002 and 2006 waves of the European Structure of Earnings Survey (ESES), a unique cross-sectional linked employer-employee dataset provided by Eurostat. The contemporaneous availability of the 2002 and 2006 ESES waves allows us to compare the characteristics of union wage premia two years on either side of the EU accession year of 2004. It is reasonable to assume that any changes in the structure of the union wage premium which occurred during 2002-2006 were strongly associated with major institutional changes linked to the accession.

With this study, we are contributing to the literature which has analyzed the effect of institutional changes on the union wage premium and wage inequality. Existing research has focused on changes in western (mostly Anglo-Saxon) economies. Fortin and Lemieux (1997) analyzed the impact of institutional decline on the rise in wage inequality in the United States during the 1980s, and showed that these de-unionization and minimum wages cuts were responsible for about one-third of the increase in male and female wage inequality. Gosling and Machin (1994) and Machin and Manning (1994) analyzed the contribution of declining unionization to increasing wage inequality in Britain between 1980 and 1990. They showed that the decline in the share of plants with a recognized union accounted for around 15% of the rise in earnings inequality during the period. Koeniger *et al.* (2007) used aggregate data to investigate how the change in labor market institutions affected wage inequality in 11 OECD countries between 1973 and 1998. They found a consistent reduction in male wage inequality in countries (e.g., France) where minimum wages increased and employment protection became stricter, but increased inequality in countries (e.g., the United States and the United Kingdom) where unions became less powerful and minimum wages fell. To the best of our knowledge, this study is the first to look at the effect on the structure of wages in post-socialist economies of institutional changes which have had an impact on the power of unions. In particular, our focus on the years 2002 and 2006 allows us to concentrate on the wage effects of institutional changes that occurred during the accession of these countries to the European Union.

2. EU accession and the institutional setting of CEE countries

An essential element of the transition from a centrally planned to a market economy is the development of labor market institutions that determine how firms and workers negotiate employment contracts and revise employment terms. In the three countries examined in this paper, the transition to a market economy occurred in two main stages: the immediate institutional changes that came about after the fall of the Iron Curtain in 1989, followed by accession to full membership of the European Union in 2004. The first stage of the post-1989 transition involved a large-scale shift to privately owned enterprises, and the initial establishment of new social partner organizations. In contrast, EU accession involved more far-reaching changes to labor market institutions, in part to bring them into line with the EU employment legislation, and in part to adapt them to the European single market.

2.1. Collective bargaining at the beginning of the 2000s

Following a sharp decline in the 1990s, union coverage in the CE3 countries was low in the early 2000s. At that time, some firms were covered by firm- or industry-level agreements, but the majority were not covered at all. Bargaining mostly took place at a single level, and there was very little centralization or coordination (Table 1).[4] Industry-level agreements played a very minor role in these countries (EIRO, 2002a,b). To the extent they existed, these agreements generally took the form of multi-employer agreements signed by a number of individual employers and the relevant trade unions. These agreements lacked mandatory extension mechanisms. Thus, unless they were signed by employers with a dominant position in the market, the agreements covered only a small proportion of the sector. Furthermore, the weak institutional setting, as well as the low degree of mutual recognition by the social partners themselves, impeded the enforcement of industry-level agreements (EIRO 2002a). These private-sector agreements were therefore very weak.

At the beginning of the 2000s, the effective enforcement of firm-level agreements was relatively low as well, and there was a great deal of heterogeneity across firms even within the same country. First, as employers were not required to enter into such agreements, enterprise-level negotiations were entirely voluntary, and reflected a power relationship that mostly favored employers. The collective agreements signed during this period were strongly influenced by the rapid expansion of multinational companies (MNCs) during the late 1990s. MNCs generally applied to their subsidiaries industrial relations practices similar to those applied to the parent company, but they adapted the practices to the local socioeconomic environment (Meardi 2007b; Meardi *et al*. 2009). The strategic use by these MNCs of

[4] The measures of coordination centralization reported in table 1 refer to the 1-5 OECD Scale provided by OECD (1994a, 2004).

innovative systems of variable pay linked to performance and skills tended to benefit more qualified and managerial workers (EIRO 2009a, 2009b, and 2009c; Ost and Weinstein 1999; Aguilera and Dabu 2005; Hancké and Kurekova 2008). However, while they had some broad common features, the systems of collective bargaining in the CE3 also differed in some important respects at the beginning of the 2000s. Collective bargaining in the Czech Republic and Poland was more decentralized than it was in Hungary. Union power in these countries was concentrated in newly established firms and reflected the rapid expansion of MNCs, as described above (see Magda *et al.* 2012). The Hungarian model of collective bargaining was much closer to the western European model, with the predominance of sector-level agreements, a higher degree of union coverage, and better coordination of collective bargaining. Because Hungary embarked on the process of liberalization and restructuring earlier than the other two countries, its collective bargaining system underwent a more gradual evolution than the systems in the Czech Republic and Poland. For example, in Hungary embryonic systems of social concertation and rent-sharing were in place as early as in the 1980s (Zwass 1984; Neumann 1997). This process dates back to the introduction of market reforms in the late 1960s, which freed Hungarian firms from some of the rigid directives and surveillance associated with central planning in most of the Eastern Bloc. During the 1980s, liberal rules for the establishment of small firms and cooperatives were introduced in Hungary, along with regulations that allowed for foreign direct investment. These liberalization measures resulted in waves of spontaneous privatizations, which made Hungary the leader for FDI inflows and new firm creation among the CE3 countries during the pre-transition period.

2.2 Institutional changes after accession to the EU

By 2002, all three countries in our study had laid the foundations for a modern European system of labor market regulation. However, in order to create the conditions required for successful integration into the EU and to meet EU employment law standards, they still needed to consolidate this system.

The years immediately preceding EU accession represented a period of intense change. As we can see in Table 1, trade union densities and coverage were decreasing, which reflected general trends observed in the majority of EU countries (European Commission, 2010). However, unlike in the western EU countries, in the CE3 declining union density and coverage did not necessarily imply a weakening of the influence of pay bargaining institutions. Arguably, the strengthening of other parts of the institutional framework of pay determination in the CE3 through EU accession has enhanced pay bargaining power in these countries. Generally, the reinforced regulatory framework in the CE3 has enabled the employees who remained covered to demand wages closer to their objectives.

In the CE3 countries, the labor codes underwent major overhauls, new obligations under EU directives on social affairs were implemented, and the labor market administrations were reformed during this period. These changes built on the work of the previous decade, but also represented a significant shift in the environment of pay determination. Two areas of change were of particular importance: (i) direct actions aimed at strengthening the social partners' ability to bargain, and (ii) various reforms of the labor market institutions, which indirectly enhanced the power and the position of unions.

Among the direct actions taken in preparation for EU accession was a major effort to strengthen the organizational infrastructure of the social partners to enable them to engage in the European social dialogue and in the procedural regulation of labor markets. These actions represented a substantial reinforcement of the institutions for social dialogue and pay determination in the three countries, helping them move from being “transition economies” to being full economic and political participants in the EU. These processes continued after EU accession. For instance, shortly after accession, the CE3 countries implemented the 2002 Directive on Information and Consultation of Employees relating to works councils. As works councils were perceived by unions in the CE3 countries as being a "Trojan horse" which would compete for the loyalty of their members, the unions initially opposed the introduction of these councils. Later on, however, cooperation between works councils and trade unions improved in the three countries, as unions found they could work with councils to increase their influence and membership (or, rather, attenuate their decline), and trade union members actively participated in the councils (Krsgyorgy, Vamos 2001, Kohl 2009). Hungary was again the first of the CE3 to introduce changes in its national legislation to allow for councils: as early as in 1992 Hungary permitted a dual system of employee participation. In the Czech Republic, by contrast, a single-channel system guaranteeing employee representation through trade unions—to the extent that unions existed in a particular firm—was introduced in late 2001. Thus, the role of these councils remained marginal in the Czech Republic. The approach taken in Poland was between these two solutions (Skorupińska 2010). Again, although works councils initially played a rather marginal role in the social dialogue setting of the CE3, their introduction and development appear to have contributed—albeit indirectly—to the empowerment of trade unions. So far, however, there has been little research on this subject (EIRO 2009).

As was mentioned above, the accession itself brought about further changes in the social partners' duties and levels of policy engagement, even if a strengthening of their role was not directly intended. For instance, CE3 countries started to participate in the EU's "Open Method of Coordination" in the fields of labor and social policies. Although this involvement did not entail the passage of binding legislation, the process of participating in discussions, exchanging good practices, and preparing national employment plans required policy-makers in these countries to engage in extensive consultation with

the social partners about the draft guidelines and their annual assessment by the European Commission. Thus, this process indirectly increased trade unions' levels of policy engagement and policy-making know-how, and likely improved union bargaining power by reinforcing the procedural legitimacy of collective agreements (Garcia *et al*., 2004). Other changes in the labor market setting are likely to have triggered similar developments in unions' ability to negotiate and coordinate. For example, in Poland between 2002 and 2006, considerable emphasis was placed on enhancing the power of the labor inspectorate, an agency responsible for labor code and pay enforcement, through the participation and active engagement of the social partners. The Czech Republic also adopted a new Act on Labor Inspection in 2005, and Hungary issued a similar government decree in 2006. Yet even as these reforms were being introduced, the general trend of declining union density and collective bargaining coverage continued, driven by changes in the labor market structures and by lower rates of union membership in the expanding services sector, in small firms, and among workers with flexible employment contracts (European Commission 2010).

Furthermore, during the study period there were important changes in the laws and enforcement mechanisms related to the minimum wage, which is again likely to be reflected in the unions' bargaining power. In all three countries the minimum wage is set at the national level, but the social partners take part in the negotiations, which raises their policymaking profile. For instance, in Poland a new law on the minimum wage came into force in early 2003. This law shifted the power in the negotiations toward the social partners (under a tripartite framework) and away from the Minister of Labor, who was previously permitted to make a unilateral determination (EIRO 2002c). The enhanced role of the social partners may be expected to lead to collective agreements which make minimum wage enforcement more effective, by, for example, ensuring that minimum wage regulations are observed for covered workers, and facilitating spillover effects (Manning, 2011).[5] This is particularly likely for Hungary, where the minimum wage rose faster than average earnings between 2002 and 2006, putting pressure on the pay of workers in the bottom quintile of the wage distribution (EIRO 2003). While the minimum wage is unevenly enforced, it is more likely to be introduced in firms with a union presence that are covered by a collective agreement, due to the effective action of unions there. In the Czech Republic, minimum wage reforms have been less effective than in Poland and Hungary, as the minimum wage in that country is low relative to the median wage, and thus has a smaller effect. Between 2002 and 2006, the minimum wage was around 37%-39% of median earnings in the Czech Republic, compared to about 50% in Hungary and about 41% in Poland (OECD.Stat). In addition, the impact of the minimum wage appears to have been lower in the Czech Republic because of the country's lower wage dispersion. Conversely, the

[5] Spillover effects arise when the introduction of a minimum wage exerts upward pressure on the wages of those workers for whom the minimum wage is too low to be an actually binding restriction.

use of extension mechanisms was relatively widespread in the Czech Republic. In fact, the Czech government retained the power to mandate an extension throughout the period. Although this power was rescinded following a constitutional court decision in 2004, it was clarified and reinstated in the amended Collective Bargaining Act of 2005, (EIRO 2004; EIRO 2006). Because it makes the wage benefits of collective agreements available to non-covered workers, the greater use of mandatory extension mechanisms in the Czech Republic relative to in Hungary or Poland may have in practice provided an alternative form of protection of the minimum wage, and attenuated the differences between covered and non-covered workers.

Finally, in the period after the EU accession, the 2003 Working Time Directive was implemented at the national levels, again with the engagement of the social partners. The directive required the EU member states to guarantee workers a set of rights relating to, for example, the number of work hours, rest periods, and leave periods (Falkner and Treib, 2004). Again, the enforcement of these measures is likely to be higher in firms covered by agreements, and to have a positive impact on workers' wages.

In sum, there has been a substantial reinforcement of the institutions for social dialogue and pay determination in the CE3 since these countries joined the EU. It is also likely that accession has had an impact on the wages negotiated under collective bargaining; an issue we investigate in the next section.

3 Empirical Analysis

3.1 Data and descriptive statistics

We use data from The European Structure of Earnings Survey (ESES) 2002[6] and 2006 waves, a matched employer-employee dataset which includes information on salaries, personnel, jobs, and firm characteristics in the manufacturing, construction, and trade and service sectors. For convenience and comparability across countries and over time, we excluded from the sample establishments which had fewer than 10 employees and were covered by any other type of bargaining agreement, such as agreements with individual professional groups that fall within a wide range of economic activities (Eurostat, 2003). To reduce the "noise" created by the public sector and its non-market remuneration mechanisms, we have chosen to focus on private firms. We have also restricted our analysis to the manufacturing sector, as the economic transition in these countries led to the creation of a completely

[6] As since 2002 the data for Poland has not included information on collective bargaining, we use data from the Structure of Earnings Survey 2004 by the Polish Central Statistical Office. While 2004 is the year of the Polish accession to the EU, we can still interpret union wage premia in 2004 as pre-accession figures. In fact, it can be argued that the wage premia of collective agreements observed in 2004 are the result of collective negotiations carried out in the past (i.e., before the EU accession).

new service sector which was generally not covered by unions (Gardawski 2002). In addition, we excluded women from the analysis to avoid having to deal with selection issues and unexplained gender wage gaps which might bias our results. After these observations were excluded, the sample for the Czech Republic included 203,725 observations in 2002 and 349,324 observations in 2006. The sample for Hungary was comprised of 27,506 observations in 2002 and 28,689 observations in 2006. Finally, the sample for Poland consisted of 94,706 observations in 2004 and 102,298 observations in 2006. We have chosen to use as our wage measure a monthly wage definition which considers gross wages in the reference month, including bonuses and excluding overtime work.

Table 2 displays descriptive statistics for male workers in the manufacturing sector by type of collective agreement (industry- or firm-level agreement, or no agreement). The most striking difference between the three countries is in the types of contracts employees had. In 2002, 93% of workers in Hungary, 87% of workers in the Czech Republic, and 67% of workers in Poland had a permanent contract. In all three countries, the workers who were covered by a collective agreement (either at the firm or the industry level) were more likely to have had a permanent contract than the workers who were not covered by an agreement. There were also big differences in the composition of the workforce by type of coverage. In 2002, the firms covered by collective agreements in the Czech Republic and Poland had bigger and older workforces, while there were no significant compositional differences between the firms covered by firm-level or industry-level agreements. In Hungary, the workers covered by collective agreements, particularly at the industry level, tended to be less educated than their counterparts in the Czech Republic and Poland.

Between 2002 and 2006, the workforce composition of the firms in the Czech Republic covered by a collective agreement shifted towards prime-age males (both for firm- and industry-level coverage) with secondary education (particularly for firm-level agreements). Meanwhile, between 2004 and 2006 there was a marked change in the workforce composition of firms in Poland covered by an industry-level agreement: i.e., as there was a shift toward workers over age 50, employees of bigger firms, and workers with a university degree and a permanent contract. In Hungary in the period 2002-2006, we can observe an increase in the share of workers employed by firms with more than 250 employees, workers with a secondary or tertiary degree, and employees in managerial positions. This change in workforce composition was also relevant for firms covered by collective agreements.

Finally, it is very interesting to note that during the sample period all of the CE3 experienced declining collective bargaining coverage rates, particularly for firm-level agreements. For example, in Poland approximately 53% of the workers were covered by firm-level agreements in 2004, but by 2006 this share had decreased to 42%. The Czech Republic, which stood out as the country with the highest share

of workers covered by firm- and industry-level agreements (61.5% and 12.1%, respectively, in 2002), experienced the biggest drop in coverage by firm-level agreements; i.e., of 20 percentage points between 2002 and 2006. Hungary had the smallest share of workers covered by a firm-level agreement in 2002 (36%), and this share declined another seven percentage points between 2002 and 2006. The coverage rates by industry-level agreements remained fairly stable in all three countries between 2002 and 2006.

Table 3 presents the means and the standard deviations of the log monthly wages in the three countries. Columns [1]-[2], [5]-[6], and [9]-[10] show the unadjusted sample moments in the Czech Republic, Hungary, and Poland; while columns [3]-[4], [7]-[8], and [11]-[12] report the moments obtained by applying the re-weighting technique by Di Nardo *et al*. (1996) to re-adjust the distribution of the observed characteristics for each bargaining sector back to the overall distribution.[7] In the Czech Republic, workers covered by firm-level agreements had higher average wages and less wage variability than workers in firms covered by sectoral agreements or with no agreement. In Hungary, firm-level agreements were also associated with higher average wages in 2002; whereas in 2006 the highest wages were paid to workers covered by industry-level agreements. In Poland in both 2002 and 2006 higher wages were paid to workers in firms covered by sectoral agreements. For the Czech Republic, the application of the re-weighting technique by Di Nardo *et al*. (1996) increased the difference between the wages paid to workers covered by firm-level agreements and workers not covered by any agreement. For Poland and Hungary, the re-weighting technique also increased the difference between the wages paid to workers covered by industry-level agreements and workers not covered by an agreement. Finally, it is worth noting that between 2002 and 2006 in the Czech Republic, wage growth was similar for covered and non-covered workers. Conversely, in Poland and Hungary wage growth for workers covered by firm- and industry-level agreements was markedly higher than it was for uncovered workers.

3.2 Empirical framework

We assume the following model of earnings for male worker *i* at establishment *j*:

$$w_{ij} = \boldsymbol{X'_{ij}\beta} + \varphi_{ij} + \varepsilon_{ij} \qquad (1)$$

[7] Di Nardo et al. (1996) estimated the relative probability that a worker with given characteristics would employed in the overall sample and in a given sub-sector, and used this probability to re-weight workers who are under- or over-represented in the subsector. This same procedure was used by Card and de la Rica (2006).

where w_{ij} is the log hourly wage, $\boldsymbol{X_{ij}}$ is a set of individual characteristics (age, age squared, education), φ_{ij} represents the wage premium paid to worker *i* at workplace *j*, while ε_{ij} is a stochastic error component. We further assume that the wage premium is explained by the following model:

$$\varphi_{ij} = \gamma FA_j + \delta\, IA_j + \boldsymbol{Z'_j\lambda} + \boldsymbol{Y'_j\eta} \qquad (2)$$

Where FA_j and IA_j are two dummies that indicate that the lowest level where bargaining takes place is the firm or the industry, respectively. $\boldsymbol{Z_j}$ is a set of firm and job characteristics (type of contract, firm size, sector). $\boldsymbol{Y_j}$ is a vector of the average characteristics of the co-workers; i.e., the workers in the same workplace and occupational group as individual *i*. We assume that due to regularities in the recruitment behavior of firms within each broad occupational groups, the workers with higher unobserved skills tend to have co-workers with higher average skill levels. In this case, the average characteristics of the co-workers (i.e., the average age, the share who have a university degree, the share who are women, and the shares who are under age 30 and over age 55) control for the impact of the workers' unobserved skills on the wage premium (see, e.g., Card and de la Rica (2006)). Substitute (2) in (1) to obtain a model for individual wages, which we estimate separately for the years 2002 and 2006; i.e.:

$$w_{ij}^t = \boldsymbol{\Pi'_{ij}\rho^t} + \gamma^t FA_j^t + \delta^t IA_j^t + \epsilon_i^t, \quad t = 2002,\ 2006 \qquad (3)$$

where, for expositional simplicity $\boldsymbol{\Pi} \equiv [\boldsymbol{X}, \boldsymbol{Z}, \boldsymbol{Y}]$ **c**ollects all of the covariates into a single vector, and $\boldsymbol{\rho} \equiv [\boldsymbol{\beta}, \boldsymbol{\lambda}, \boldsymbol{\eta}]$ does the same for the corresponding coefficients. Under the assumption that FA_j and $IA_j$are uncorrelated with ϵ_{ij}^t, OLS estimates of γ^t and $\varphi^t$from equation (3) describe the causal impact of firm-level agreement and sectoral agreements on wages, at time t. The comparison of the estimate $\hat{\gamma}^{06}$, $\hat{\delta}^{06}$ with estimated $\hat{\gamma}^{02}$, $\hat{\delta}^{02}$ provides us with insights into the change in the wage premium of firm- and industry-level agreements between 2002 and 2006.

OLS regressions on the average wage level for 2002 and 2006 provide our baseline results, which we extend in several directions. We control for the part of the firms' unobserved heterogeneity which is associated with each firm's age. As Magda *et al*. (2012) have shown, older cohorts of firms established before the transition are generally less productive than newer companies founded in the more recent transition period. If these less productive firms which pay lower wages tend to self-select in the

unionized sector, the estimated impact of firm- and industry-level agreements on wages may be attenuated downward.[8]

It should also be noted that separate estimates of the wage structures of the model in (3) in 2002 and 2006 do not allow us to test whether the wage premia of firm- and industry-level agreements were statistically different in 2002 and 2006. Thus, we also estimate equation (3) on the combined 2002-2006 sample for each country and use these estimates to compute the change in the average wage premium of firm- and industry-level agreements between 2002 and 2006. In particular, the change in the wage premium can be decomposed using the Oaxaca-Blinder technique into a part that is explained by the different composition of the wage predictors in 2002 and 2006 (i.e., the endowments), and a part that is attributable to the different returns to these predictors (i.e., the coefficients), plus a residual interaction term. We then compute the following quantities:

$$\begin{aligned}\bar{w}^{06} - \bar{w}^{02} = {} & \hat{\gamma}^{02}(\overline{FA}^{06} - \overline{FA}^{02}) + (\hat{\gamma}^{06} - \hat{\gamma}^{02})\overline{FA}^{02} + \{(\overline{FA}^{06} - \overline{FA}^{02})(\hat{\gamma}^{06} - \hat{\gamma}^{02})\} + \\ & + \hat{\delta}^{02}(\overline{IA}^{06} - \overline{IA}^{02}) + \left(\hat{\delta}^{06} - \hat{\delta}^{02}\right)\overline{IA}^{02} + \left\{(\overline{IA}^{06} - \overline{IA}^{02})\left(\hat{\delta}^{06} - \hat{\delta}^{02}\right)\right\} + \\ & + \left(\bar{\boldsymbol{\Pi}}^{\mathbf{06}} - \bar{\boldsymbol{\Pi}}^{\mathbf{02}}\right)\hat{\boldsymbol{\rho}}^{\mathbf{02}} + \bar{\boldsymbol{\Pi}}^{\mathbf{02}}\left(\hat{\boldsymbol{\rho}}^{\mathbf{06}} - \hat{\boldsymbol{\rho}}^{\mathbf{02}}\right) + \left\{\left(\bar{\boldsymbol{\Pi}}^{\mathbf{06}} - \bar{\boldsymbol{\Pi}}^{\mathbf{02}}\right)\left(\hat{\boldsymbol{\rho}}^{\mathbf{06}} - \hat{\boldsymbol{\rho}}^{\mathbf{02}}\right)\right\}. \qquad (4)\end{aligned}$$

Equation (4) shows that the estimated differential between the average wages in 2002 and in 2006 (on the left-hand side) can be explained in terms of differences in endowments vs. the coefficients of firms covered by a firm-level agreement (first line, on the right-hand side), by an industry-level agreement (second line) as well as the remaining covariates (third line). If we look at the first line of equation (4), which decomposes the 2002-2006 change in the effect of coverage by a firm-level agreement, we can see that the first term describes the part of the wage differential explained by differences in the characteristics of the workers covered by a firm-level agreement between 2002 and 2006; i.e., the expected change in the average wage of workers covered by a firm-level agreement in 2002 if they had the same characteristics as workers covered by a collective agreement in 2006. The second term is the precise measure of the change in the wage premium of a firm-level agreement, net of the composition of characteristics; i.e., the expected change in the average wage of workers covered by a firm-level agreement in 2002, if coverage returned the same wage premium as in 2006. The third part is the residual; i.e., an interaction term accounting for the fact that differences in endowments and coefficients existed simultaneously in 2002 and 2006. The same reasoning can be used to decompose the 2002-2006 change in the wage effect of coverage by industry-level agreement, as well as the 2002-2006 change in the reward from other individual- and firm-level covariates.

[8] Note that the focus on private firms allows us to attenuate this selection issue, as firms in the private sector are less protected from market forces than firms in the public sector, and are thus likely to have a more efficient production structure.

Finally, estimating equation (3) on average wages does not give us any information about the impact of collective agreements for different group of workers. The heterogeneous effects of collective agreements on wages may reflect differences in union policies or a decision to target specific worker categories. Moreover, any change in these effects between 2002 and 2006 is most likely related to a change in the distribution of workers' bargaining power during this period. To tackle these issues, we first use quantile regressions (Koenker and Bassett, 1978) to uncover any differences in the effects of firm- and industry-level agreements along the conditional wage distribution, and then estimate equation (3) for workers belonging to different age groups.

4 Results

Table 4 presents the estimates of three different models for individual wages in the Czech Republic, Hungary, and Poland in 2002 (columns [1]-[3]) and in 2006 (columns [4]-[6]) The first model (columns [1], [3]) simply includes two dummies for firm-level and industry-level agreements. The second model (columns [2], [4]) adds personal characteristics (age, education, job contract) as well as firm characteristics (dummies for establishment size and occupation). In the third model (columns [3] and [6]) we control for unobserved workers' abilities by adding the average characteristics of the workers employed in the same firm and occupational group. It should be noted that all of the models are estimated by weighted least squares using the sampling weight for each worker as a weight; standard errors are clustered at the firm level.

The estimates for the Czech Republic show that there was a wage premium associated with firm-level agreements in 2006 only (column [4]). However, this premium disappeared after we accounted for individual and co-worker characteristics. Industry-level agreements did not produce a wage premium in the Czech Republic in 2002 or in 2006. In Poland, a wage premium associated with firm-level agreements emerged in both 2002 and 2006. However, this premium also disappeared in both years after we accounted for individual and co-worker characteristics. Interestingly, while we found no significant impact of industry-level agreements on wages in 2002, an industry-level wage premium emerged in Poland in 2006, which was statistically significant at the 1% level in all three specifications (compare Table 4. Columns [4]-[6]). Finally, estimates for Hungary show a wage premium associated with firm-level agreements in 2002, which became bigger and more significant in 2006. As in Poland, in Hungary evidence of a wage premium associated with industry-level agreements in Hungary in 2002 disappeared after the inclusion of individual and co-worker characteristics. However, a wage premium associated with industry-level agreements which was statistically significant at the 1% level in all three specifications was found in Hungary in 2006.

An obvious issue in the estimates reported in Table 4 is firms' unobserved heterogeneity. Less productive firms, which pay lower wages may self-select in the unionized sector, inducing a downward bias in the estimated impact of firm- and industry-level agreements on wages. Magda *et al*. (2012) showed that due to the restructuring of firms during the transition, a great deal of firms' unobserved heterogeneity in CE3 countries can be captured by the age of the firm: older companies established before the transition are generally less productive than newer firms founded after the transition. In Table 5, we control for the age of the firm (columns [1] and [4]), its interactions with the sectoral dummies (columns [2] and [5]), and its interactions with the firm's size (columns [2] and [6]). Our main set of results are unaffected. However, these estimates confirm that there is a selection of older and less productive firms with industry-level coverage in the Czech Republic, and with firm-level coverage in Poland. After controlling for the attenuation bias imposed by this selection mechanism, a wage premium associated with industry-level agreements emerged in the Czech Republic in 2006, and a wage premium associated with firm-level agreements emerged in Poland in 2006; both significant at the 10% level.

Table 4 and Table 5 present separate estimates for each country in 2002 and 2006. In Table 6 we report the results of the Oaxaca-Blinder decomposition of the 2002-2006 change in the average wages, after we estimate equation (3) on the combined 2002-2006 sample for each country. The estimates predict a significant wage increase between 2002 and 2006 in all three countries, which was driven primarily by changing returns to worker and firm characteristics (coefficients). In particular, the decomposition reveals increased returns to industry-level agreements as a statistically significant and positive (though small in size) contributor to the overall increase in the average wages in Poland and in Hungary. This suggests that these two countries experienced a significant increase in the wage premium associated with industry-level agreements between 2002 and 2006, net of the composition of characteristics of covered workers. Higher returns to firm-level agreements also account for a portion of the total rise in the average wage, although the relationship is not statistically significant in any of the countries. The results in Table 6 further suggest that changes in the composition of workers characteristics (endowments) played minor and mostly insignificant roles. In particular, changes in the composition of workers in terms of their coverage by collective agreements did not significantly change the average wage, with the exception of Hungary, where the decline in the percentage of employees covered by firm-level agreements drove the average wage down (though again, its role was rather small).

The results in Table 4 do not give us any information about the impact of collective agreements at different points of the wage distribution. In order to check whether the results described above hide different impact of unions at different points in the wage distribution, we now apply quantile regressions. We focus on the 10th, 25th, 50th, 75th, and 90th percentiles of the wage distribution. As in the OLS regressions, the sampling weights and the clustering of standard errors are accounted for. Table

7 reports the results from the regressions based on model 3, including the widest set of control dummies. In the Czech Republic, firm-level agreements had no positive impact in 2002, while a weakly significant wage premium emerged at the bottom of the wage distribution in 2006. A wage penalty of firm-level agreements emerged among the top earners in both 2002 and 2006, which is consistent with the idea that unions act to compress the structure of wages (see Bryson, 2007, for a review). The impact of industry-level agreements on wages was insignificant in the Czech Republic at all points of the earnings distribution, and on the average wages. The results for Poland show that there was a wage premium associated with firm-level agreements for workers in the first quintile of the wage distribution in 2002, and for workers in the first two quintiles of the distribution in 2006. These estimates also confirm that while industry-level agreements did not have any impact on wages in Poland in 2002, in 2006 there was an industry-level wage premium which applied to workers in the lower half of the wage distribution, and was strongest for those at the bottom. Finally, estimates for Hungary suggest that the firm-level and sectoral wage premia were mostly concentrated in the lower half of the wage distribution in 2002, but that they applied to workers along the entire distribution of wages in 2006.

Finally Table 8 reports results from estimates of equation (3) for workers under age 30 (columns [1],[4]), between ages 30 and 50 (columns [2],[5]), and over age 50 (column [3],[6]). Results for the Czech Republic show a wage premium associated with industry-level agreements for workers under age 30 in 2002, but which was no longer significant in 2006. Results for Poland show that a wage premium associated with both firm- and industry-level agreements appeared in 2006, but only for prime-age and older workers. Finally, the estimates for Hungary confirm that there was a wage premium associated with firm-level agreements in both 2002 and 2006, and a wage premium associated with industry-level agreements in 2006 which were distributed rather uniformly across the age groups.

5 Discussion and Conclusions

In the CEE countries, the process of integration into the EU structures continued after the initial set of reforms and adjustments, and were strengthened in many areas after the EU accession. Our aim in this paper was to investigate whether these processes changed the role and the position of collective bargaining among the 2004 accession countries. Based on the evidence for the Czech Republic, Hungary, and Poland, we found significant changes in the effects of collective agreements on workers' wages in a relatively short period of time; i.e., immediately before and after EU enlargement.

Our analyses shed light on an interesting phenomenon: although the presence of trade unions (measured by their density and collective bargaining coverage) continues to decline, the unions that still operate appear to have reinforced and increased their bargaining power, which is reflected in the

appearance of or increase in wage premia associated with collective agreements. The rising wage premia observed primarily in Hungary and Poland (and mostly in the lower part of the wage distribution), and to a lesser extent in the Czech Republic, suggest that the unions which were strong enough to maintain their position and presence—most likely because of their efficiency, with a benefit for employers as well—managed to achieve their goals in terms of wage agreements. We link these changes to the developments in the CE3's labor market institutional reforms and developments.

There was no single policy reform which resulted in a sudden increase in the bargaining power of trade unions. Rather, we have identified a series of small steps which together led to a higher degree of engagement of the social partners in policy-making, and thus to an improvement of their negotiating position (as well as of their negotiating skills). These steps included direct actions aimed at reforming the social dialogue (such as the EU working councils directive), as well as various changes in the CE3's labor market policy which required active involvement on the part of trade unions.

Relative to Hungary and Poland, the lack of statistical significance for the effects of collective agreements in the Czech Republic may reflect a combination of less effective reforms (e.g., to minimum wages) and the greater use of mandatory extension of agreements, which attenuates the difference between covered and non-covered workers.

Although the firms' restructuring during the transition allowed us to control for a great deal of firms' unobserved heterogeneity in the CE3 countries, some of our results may be affected by residual selection issues. In particular, the selection of bad firms into the unionized sector may attenuate any positive effect of unions on wages; however, the existence of a wage premium associated with firm-level bargaining at the bottom of the wage distribution seems to be a robust result since the selection of less productive firms into the unionized sector in this case would work in the opposite direction. Accordingly, our results are likely to underestimate the true effect of firm-level agreements on wages[9].

A number of questions about future institutional developments remain open. On the one hand, changing labor market structure and segmentation observed in several of the EU countries are likely to undermine the presence of trade unions. On the other hand, further changes could improve the relative position of the weaker unions in the CE3. For example, the Czech Republic introduced in 2006 changes to its labor code (effective as of 2007) which broadened the scope of issues which may fall under collective bargaining agreements (EC 2008).

[9] As we noted previously, this result may be driven by the self-selection of more productive firms under firm-level bargaining. However, such a conclusion would be more consistent with a wage premium at the top rather than at the bottom of the wage distribution.

Finally, we note that the experiences of the Czech Republic, Poland, and Hungary may shed an interesting light on the future developments of the collective bargaining institutions in countries such as Albania, or the countries of ex-Yugoslavia. These countries have political histories similar to those of the CE3, and have just started (or are about to start) the process of reforming these institutions in preparation for gaining EU membership.

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Table 1: Collective Bargaining Institutions in CE3 Countries, before and after accession to the EU

	Czech Republic		***Poland***		***Hungary***	
	before EU accession	*after EU accession*	*before EU accession*	*after EU accession*	*before EU accession*	*after EU accession*
Union Coverage	34,9%	33,8%	40%	38%	42%	36%
Union Density	22%	18%	14%	16%	20%	17%
characteristics of collective bargaining	uncoordinated; mixed firm/ industry level, mostly decentralised with limited scope for industry bargaining	=	uncoordinated; fragmented at the firm level; limited scope for industry bargaining	=	uncoordinated; mixed firm industry level, mostly decentralised with limited scope for industry bargaining	=
Government Intervention in Wage Bargaining	indirect intervention e.g. through minimum wages	weak influence e.g. through the institutional framework	weak influence e.g. through the institutional framework	indirect intervention e.g. through minimum wages	indirect intervention e.g. through minimum wages	indirect intervention e.g. through minimum wages
status and structure of work council (WC) representation, involvement in wage negotiations	WC do not exist	WC mandated by law, information and consultation right	voluntary WC, information consultation rights	WC mandated by law, rare involvement in negotiating agreements	WC mandated by law, union-based representation, advice on economic and social rights, no direct involvement in wage bargaining	=
effective enforcement (mutual recognition and Social Dialogue)	low	=	low	medium	medium	=
mandatory extension mechanisms	rather limited, in some industries only	no mandatory extensions	rather limited, in some industries only	=	rather limited, in some industries only	=
minimum wages enforcement	statutory national, set by the government with fixed rule	=	statutory national, set by the government without fixed rule	statutory national, set by the government (fixed rules) after tripartite consultations (non-binding)	statutory national, set by the government without fixed rule	statutory national, set by the government after tripartite consultations (binding)

Notes: Data drawn from EIRO 2002a, EIRO 2006, ICTWSS Database (2012). The sign "=" indicates that no significant institutional change occurred during the Accession

Table 2: Distribution of workers' characteristics by type of collective agreement (part 1)

	Czech Republic								***Poland***			
	2002				*2006*				*2004*			
level of agrement coverage:	all	firm	industry	no	all	firm	industry	no	all	firm	industry	no
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
Age Distribution												
under 30	25.3	24.6	32.5	28.7	25.6	23.5	25.4	33.6	28.6	23.8	26.3	34.2
30 -39	24.1	24.0	24.3	24.5	27.6	27.4	28.5	27.7	28.7	28.2	29.4	29.3
40-49	22.9	23.0	20.4	23.0	21.0	21.7	20.6	18.7	25.9	28.7	27.3	22.5
0ver 50	27.7	28.4	22.8	23.9	25.9	27.5	25.6	20.0	16.9	19.3	17.0	14.0
Education Distribution												
primary	9.6	9.8	8.7	8.4	9.2	8.2	12.9	11.3	10.0	10.5	8.7	9.5
secondary	77.1	76.8	79.3	79.2	81.0	81.6	78.7	79.9	79.0	78.5	83.0	79.5
university	13.3	13.5	12.0	12.4	9.8	10.2	8.4	8.8	11.0	11.0	8.4	11.0
share of permanent	87.4	88.5	81.0	80.0	85.4	87.5	83.6	78.8	67.9	73.9	69.4	60.9
establishment size distribution												
E10_49	0.8	0.1	0.7	7.1	0.7	0.1	0.6	3.1	20.8	10.4	17.6	33.0
E50_249	10.6	7.3	22.0	36.8	8.3	4.7	15.4	18.9	36.2	35.2	39.5	37.4
E250 and more	88.7	92.6	77.2	56.1	91.0	95.3	84.0	78.1	43.0	54.5	42.9	29.6
Occupation Distribution												
Managers and Technicians	26.2	26.2	26.2	25.8	24.9	25.6	21.0	23.8	19.3	19.9	17.1	18.6
Clerical Workers	1.3	1.2	2.1	2.5	1.7	1.3	1.3	3.3	4.2	4.0	3.9	4.5
Service Workers	1.0	1.1	0.6	0.4	0.7	0.8	0.6	0.4	0.7	0.6	3.7	0.8
Skilled manuals	67.6	67.7	66.7	67.5	68.7	68.9	72.9	66.5	69.6	69.4	68.8	69.8
Elementary occupations	3.9	3.8	4.5	3.9	4.0	3.5	4.3	5.9	6.3	6.2	6.5	6.4
Total of worker observations	*203725*	*175195*	*11421*	*17109*	*349324*	*251947*	*28649*	*68728*	*94 706*	*53 143*	*1 411*	*40 152*
% of workers by type of coverage		*61.5*	*12.1*	*26.4*		*43.0*	*11.3*	*45.7*		*53.1*	*1.3*	*45.6*

Table 2: Distribution of workers' characteristics by type of collective agreement (continued)

	Poland				*Hungary*							
	2004				**2002**				**2006**			
Level of agreement coverage	all	firm	industry	no	all	firm	industry	no	all	firm	industry	no
	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]	[21]	[22]	[23]	[24]
Age Distribution												
under 30	27.3	23.0	12.6	30.9	26.42	24.44	22.8	27.69	21.5	16.76	18.13	23.94
30 -39	28.9	27.7	19.3	30.1	24.95	26.21	25.84	24.23	29.55	30.66	27.63	29.15
40-49	23.5	26.3	26.9	21.3	26.58	26.57	28.15	26.48	23.06	24.12	26.25	22.36
0ver 50	20.3	23.0	41.2	17.7	22.05	22.79	23.21	21.59	25.89	28.46	27.98	24.56
Education Distribution												
primary	9.2	9.5	9.8	9.0	14.71	14.64	16.05	14.66	12.69	9.42	12.18	14.27
secondary	78.2	77.2	78.3	79.0	72.31	69.68	66.17	74.1	71.9	71.64	65.54	72.41
university	12.5	13.2	11.9	12.0	12.98	15.69	17.78	11.24	15.41	18.94	22.28	13.32
share of permanent	63.4	70.9	77.0	57.4	93.41	94.2	96.13	92.82	94.93	96.28	96.8	94.18
establishment size distribution												
E10_49	19.9	9.4	10.0	28.2	39.4	11.72	19.42	55.06	19.69	4.3	6.56	27.76
E50_249	37.3	34.5	14.8	40.0	21.85	18.12	15.39	24.23	31.26	17.21	20.47	38.55
E250 and more	42.8	56.1	75.3	31.8	38.75	70.16	65.19	20.71	49.05	78.5	72.97	33.69
Occupation Distribution												
Managers and Technicians	21.0	22.0	22.2	20.1	23.74	26.87	28.31	21.81	27.06	32.34	30.66	24.35
Clerical Workers	4.2	4.0	4.7	4.4	3.27	3.48	4.28	3.09	3.84	2.99	5.35	4.15
Service Workers	0.6	0.6	0.9	0.6	1.28	1.74	0.91	1.07	0.74	0.68	1.21	0.74
Skilled manuals	67.7	67.8	67.3	67.7	64.89	61.97	60.33	66.71	62.05	59.97	60.45	63.13
Elementary occupations	6.5	5.7	4.9	7.2	6.82	5.94	6.17	7.32	6.3	4.02	2.33	7.62
Total of worker observations	*102 298*	*48 895*	*1 108*	*52 295*	*27 506*	*8944*	*1215*	*17347*	*28689*	*8823*	*1158*	*18708*
% of workers by type of coverage		*42.9*	*1.3*	*55.8*		*36.3*	*5.9*	*57.8*		*29.08*	*5.8*	*65.1*

Notes: male workers in the manufacturing sector. Sources: ESES 2002, 2006, Polish SES, 2004, 2006

Table 3: log monthly wages by type collective agreement

	Czech Republic				Poland (Polish zloty)				Hungary			
	Mean log wage	*Standard deviation*	*standardized mean log wage*	*standardized standard deviation*	*Mean log wage*	*Standard deviation*	*standardized mean log wage*	*standardized standard deviation*	*Mean log wage*	*Standard deviation*	*standardized mean log wage*	*standardized standard deviation*
	[1]	[2]	[3]	[4]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]
	2002				**2004**				**2002**			
firm level agreement	9.748	0.409	9.791	0.409	7.484	0.548	7.592	0.594	11.732	0.577	11.816	0.568
industry level agreement	9.697	0.425	9.638	0.439	7.586	0.524	7.753	0.501	11.717	0.595	11.953	0.600
no agreement	9.740	0.480	9.653	0.437	7.450	0.560	7.384	0.561	11.408	0.540	11.281	0.496
	2006				**2006**				**2006**			
firm level agreement	9.942	0.415	9.971	0.404	7.741	0.540	7.872	0.512	12.187	0.586	12.256	0.563
industry level agreement	9.870	0.436	9.772	0.455	7.918	0.438	8.008	0.318	12.238	0.621	12.451	0.598
no agreement	9.883	0.459	9.835	0.479	7.581	0.561	7.509	0.573	11.778	0.596	11.579	0.543

Notes: Male workers in the manufacturing sector. Standardized mean and standard deviations are obtained using the technique from Di Nardo *et al*. (1996). Sources: ESES 2002, 2006, Polish SES.

Table 4 - Collective Bargaining and average wages of men in Czech Republic, Poland and Hungary (2002, 2006)

	2002[a]			2006		
	[1]	[2]	[3]	[4]	[5]	[6]
			Czech Republic			
firm level agreement	**0.035**	**--0.030**	**--0.014**	**0.097*** **	**--0.024**	**--0.011**
	(0.028)	(0.026)	(0.025)	(0.026)	(0.017)	(0.017)
industry level agreement	**0.034**	**0.028**	**0.019**	**0.043**	**0.044**	**0.042**
	(0.036)	(0.036)	(0.033)	(0.034)	(0.029)	(0.029)
R squared	*0.00*	*0.39*	*0.40*	*0.01*	*0.40*	*0.41*
Observations	*203725*	*203725*	*203725*	*349324*	*349324*	*349324*
			Poland			
firm level agreement	**0.163*** **	**0.008**	**0.011**	**0.160*** **	**0.022**	**0.026**
	(0.019)	(0.014)	(0.014)	(0.021)	(0.016)	(0.016)
industry level agreement	**0.082**	**--0.080***	**0.074**	**0.337*** **	**0.112*** **	**0.129*** **
	(0.054)	(0.046)	(0.047)	(0.073)	(0.038)	(0.039)
R squared	*0.02*	*0.44*	*0.45*	*0.02*	*0.42*	*0.43*
Observations	*111215*	*111215*	*111215*	*102298*	*102298*	*102298*
			Hungary			
firm level agreement	**0.273*** **	**0.061** **	**0.062** **	**0.318*** **	**0.129*** **	**0.127*** **
	(0.031)	(0.025)	(0.024)	(0.047)	(0.036)	(0.036)
industry level agreement	**0.317*** **	**0.055**	**0.057**	**0.436*** **	**0.183*** **	**0.183*** **
	(0.085)	(0.036)	(0.036)	(0.091)	(0.039)	(0.039)
R squared	*0.06*	*0.47*	*0.47*	*0.07*	*0.46*	*0.46*
Observations	*27506*	*27506*	*27506*	*28689*	*28689*	*28689*

Notes: in columns [2], [5] we control for individual characteristics (age, education, type of contract, occupation), firm size and its nace section. In columns [3], [6] we also control for the characteristics of coworkers (share of female coworkers, coworkers university degree, under 30 and over 50 years old). Estimated coefficients for the full set of controls are reported in Table A1. Robust standard errors, clustered at the firm level in parentheses. Significance levels: * p<0.10, ** p<0.05, ***p<0.01. [a] 2004 for Poland

Table 5: Collective bargaining and average wages, after controlling for firm age (by sector and size)

	2002			2006		
	[1]	[2]	[3]	[4]	[5]	[6]
			Czech Republic			
Firm level agreement	**--0.022**	**--0.022**	**--0.020**	**--0.002**	**--0.012**	**0.006**
	(0.024)	(0.025)	(0.025)	(0.019)	(0.019)	(0.018)
Industry level agreement	**0.019**	**0.013**	**0.011**	**0.037**	**0.044**	**0.048***
	(0.034)	(0.034)	(0.033)	(0.029)	(0.030)	(0.028)
			Poland			
Firm level agreement	**0.01**	**0.011**	**0.011**	**0.029***	**0.024**	**0.030***
	(0.014)	(0.014)	(0.014)	(0.016)	(0.016)	(0.017)
Industry level agreement	**0.074**	**0.076**	**0.074**	**0.152*****	**0.137*****	**0.143*****
	(0.047)	(0.047)	(0.046)	(0.042)	(0.041)	(0.041)
			Hungary			
Firm level agreement	**0.059****	**0.061****	**0.065****	**0.117*****	**0.088****	**0.105*****
	(0.026)	(0.025)	(0.026)	(0.037)	(0.036)	(0.041)
Industry level agreement	**0.058**	**0.034**	**0.061**	**0.154*****	**0.111****	**0.157*****
	(0.038)	(0.035)	(0.038)	(0.040)	(0.044)	(0.042)

Notes: OLS regressions. Specifications in columns [1], [4] include controls for firm age, age^2 , age^3 . Specifications in column [2], [5] include interactions between firm age and NACE. Specifications in columns [3], [6] include interactions between firm age and firm size. All specifications include individual characteristics, firm sector, size and characteristics of coworkers. Robust standard errors, clustered at the firm level in parentheses. Significance levels: *** 1%; ** 5%; * 10%

Table 6 - Oaxaca decomposition of predicted wage differentials and the wage premium of collective agreements between 2002[a] and 2006

	Czech Republic		Poland		Hungary	
	Coefs.	(Std. Err.)	Coefs.	(Std. Err.)	Coefs.	(Std. Err.)
Predicted Wage differential 2006-2002	*0.157****	*(0.013)*	*0.107****	*0.013352*	*0.368****	*(0.023)*
Endowments	*--0.014**	*(0.008)*	*0.016*	*(0.013)*	*0.081****	*(0.016)*
of which firm level agreement	**0.003**	**(0.005)**	**0.001**	**(0.002)**	**--0.004***	**(0.002)**
of which industry level agreement	**--0.000**	**(0.000)**	**0.001**	**(0.001)**	**0.000**	**(0.001)**
Coefficients	*0.176****	*(0.010)*	*0.149****	*(0.012)*	*0.283****	*(0.015)*
of which firm level agreement	**0.002**	**(0.018)**	**0.008**	**-0.012**	**0.024**	**(0.016)**
of which industry level agreement	**0.002**	**(0.004)**	**0.004*****	**(0.001)**	**0.006****	**(0.003)**
Interaction	*--0.005*	*(0.008)*	*--0.026***	*(0.010)*	*0.003*	*(0.006)*
of which firm level agreement	**--0.001**	**(0.006)**	**0.002**	**(0.003)**	**--0.004**	**0.000**
of which industry level agreement	**--0.000**	**(0.000)**	**0.001**	**(0.001)**	**(0.003)**	**(0.002)**
Observations	*553049*		*213513*		*56195*	

Notes: All specifications include individual characteristics, firm sector size and characteristics of coworkers. Robust standard errors, clustered at the firm level in parentheses. Significance levels: *** 1%; ** 5%; * 10% [a] 2004 for Poland

Table 7: heterogeneous effects of collective bargaining along the wage distribution

	2002[a]					2006				
	P10	**P25**	**P50**	**P75**	**P90**	**P10**	**P25**	**P50**	**P75**	**P90**
						Czech Republic				
Firm level agreement	**0.017**	**0.002**	**0.004**	**0.027**	**--0.063***	**0.038***	**0.009**	**0.009**	**0.022**	**--0.060****
	(0.032)	(0.024)	(0.027)	(0.03)	(0.035)	(0.022)	(0.018)	(0.02)	(0.026)	(0.029)
Industry level agreement	**0.025**	**0.034**	**0.047**	**0.022**	**0.019**	**0.048**	**0.054**	**0.034**	**0.029**	**0.003**
	(0.04)	(0.037)	(0.032)	(0.038)	(0.042)	(0.041)	(0.033)	(0.031)	(0.038)	(0.034)
R squared	*0.37*	*0.39*	*0.39*	*0.4*	*0.39*	*0.36*	*0.39*	*0.4*	*0.41*	*0.39*
Observations			*203725*					*349324*		
						Poland				
Firm level agreement	**0.033****	**0.025**	**0.019**	**0.012**	**0.004**	**0.043****	**0.036***	**0.018**	**0.02**	**0.028**
	(0.014)	(0.015)	(0.016)	(0.019)	(0.019)	(0.019)	(0.019)	(0.017)	(0.02)	(0.019)
Industry level agreement	**0.034**	**0.061**	**0.061**	**0.075**	**0.079**	**0.284****	**0.219*****	**0.159*****	**0.088***	**0.015**
	(0.041)	(0.062)	(0.049)	(0.056)	(0.053)	(0.115)	(0.04)	(0.036)	(0.05)	(0.058)
R squared	*0.42*	*0.43*	*0.44*	*0.45*	*0.42*	*0.4*	*0.42*	*0.43*	*0.43*	*0.41*
Observations			*111215*					*102298*		
						Hungary				
Firm level agreement	**0.088*****	**0.068*****	**0.069****	**0.048***	**0.024**	**0.156*****	**0.132*****	**0.128*****	**0.107****	**0.071****
	(0.022)	(0.022)	(0.031)	(0.028)	(0.03)	(0.036)	(0.034)	(0.042)	(0.047)	(0.035)
Industry level agreement	**0.155*****	**0.098*****	**0.091****	**0.031**	**0.006**	**0.279*****	**0.238*****	**0.194*****	**0.156*****	**0.116****
	(0.039)	(0.034)	(0.042)	(0.04)	(0.069)	(0.088)	(0.044)	(0.037)	(0.049)	(0.057)
R squared	*0.44*	*0.46*	*0.47*	*0.47*	*0.45*	*0.42*	*0.45*	*0.46*	*0.45*	*0.44*
Observations			*27506*					*28689*		

Notes: Conditional quintile regressions. All specifications include individual characteristics, firm sector size and characteristics of coworkers. Robust standard errors, clustered at the firm level in parentheses. Significance levels: *** 1%; ** 5%; * 10% [a] 2004 for Poland

Table 8: heterogeneous effects of collective bargaining across age groups

	2002			2006		
	[1]	[2]	[3]	[4]	[5]	[6]
	under 30	30 - 50	over 50	under 30	30 - 50	over 50
			Czech Republic			
Firm level agreement	**--0.003**	**--0.014**	**--0.016**	**0.001**	**--0.026**	**0.007**
	(0.026)	(0.029)	(0.026)	(0.018)	(0.019)	(0.022)
Industry level agreement	**0.078****	**0.006**	**--0.012**	**0.058**	**0.033**	**0.043**
	(0.039)	(0.035)	(0.035)	(0.035)	(0.029)	(0.034)
R squared	*0.29*	*0.42*	*0.41*	*0.33*	*0.42*	*0.42*
Observations	*51632*	*95636*	*56457*	*89419*	*169611*	*90294*
			Poland			
Firm level agreement	**0.005**	**0.013**	**0.016**	**0.001**	**0.032***	**0.035****
	(0.016)	(0.015)	(0.018)	(0.021)	(0.017)	(0.018)
Industry level agreement	**0.077**	**--0.080***	**0.068**	**0.019**	**0.136*****	**0.142*****
	(0.067)	(0.048)	(0.046)	(0.073)	(0.044)	(0.04)
R squared	*0.36*	*0.43*	*0.46*	*0.34*	*0.45*	*0.44*
Observations	*306317*	*635352*	*205631*	*327216*	*628690*	*243573*
			Hungary			
Firm level agreement	**0.070****	**0.042**	**0.087*****	**0.098*****	**0.158*****	**0.086*****
	(0.034)	(0.026)	(0.025)	(0.037)	(0.041)	(0.032)
Industry level agreement	**0.019**	**0.055**	**0.087***	**0.135*****	**0.197*****	**0.202*****
	(0.040)	(0.038)	(0.049)	(0.038)	(0.047)	(0.048)
R squared	*0.47*	*0.47*	*0.47*	*0.46*	*0.47*	*0.44*
Observations	*7267*	*14174*	*6065*	*6167*	*15093*	*7429*

Notes: OLS regressions by agre group. All specifications include individual characteristics, firm sector size and characteristics of coworkers. Robust standard errors, clustered at the firm level in parentheses. Significance levels: *** 1%; ** 5%; * 10%

Table A1 - Individual worker characteristics and average wages in Czech Republic, Poland and Hungary (p1)(2002, 2006)

	Czech Republic						Poland		
		2002			2006			2004	
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
education (secondary)		**0.111*** **	**0.109*** **		**0.097*** **	**0.088*** **		**0.414*** **	**0.361*** **
		(0.010)	(0.010)		(0.013)	(0.012)		(0.012)	(0.011)
education (tertiary)		**0.425*** **	**0.395*** **		**0.420*** **	**0.386*** **		**0.069*** **	**0.069*** **
		(0.018)	(0.015)		(0.020)	(0.017)		(0.007)	(0.007)
age (under 30)		**--0.124*** **	**--0.129*** **		**--0.144*** **	**--0.141*** **		**--0.130*** **	**--0.129*** **
		(0.007)	(0.005)		(0.009)	(0.007)		(0.006)	(0.005)
age (40-50)		**--0.005**	**0.002**		**--0.013***	**--0.006**		**0.030*** **	**0.031*** **
		(0.007)	(0.007)		(0.008)	(0.008)		(0.005)	(0.005)
age (over 50)		**--0.022*** **	**0.004**		**--0.041*** **	**--0.003**		**0.062*** **	**0.068*** **
		(0.007)	(0.006)		(0.010)	(0.008)		(0.007)	(0.006)
fixed-term contract		**--0.055*** **	**--0.053*** **		**--0.159*** **	**--0.153*** **		**--0.185*** **	**--0.182*** **
		(0.020)	(0.020)		(0.014)	(0.014)		(0.01)	(0.009)
occupation (managers,		**0.590*** **	**0.503*** **		**0.593*** **	**0.521*** **		**0.556*** **	**0.444*** **
		(0.015)	(0.033)		(0.032)	(0.037)		(0.015)	(0.023)
occupation (clerks)		**0.299*** **	**0.265*** **		**0.276*** **	**0.251*** **		**0.215*** **	**0.190*** **
		(0.026)	(0.029)		(0.048)	(0.046)		(0.014)	(0.015)
occupation (service workers)		**0.092***	**0.079***		**0.201** **	**0.179** **		**0.093*** **	**0.065** **
		(0.049)	(0.045)		(0.097)	(0.085)		(0.034)	(0.032)
occupation (skilled manuals)		**0.246*** **	**0.204*** **		**0.232*** **	**0.200*** **		**0.184*** **	**0.168*** **
		(0.013)	(0.013)		(0.031)	(0.028)		(0.012)	(0.012)
average characteristics of coworkers in the same firm and occupational group									
share with university degree			**0.206** **			**0.188** **			**0.326*** **
			(0.085)			(0.078)			(0.043)
share of under 30			**0.033**			**--0.103**			**0.003**
			(0.090)			(0.066)			(0.031)
share of over 50			**--0.266*** **			**--0.341*** **			**0.036**
			(0.073)			(0.067)			(0.056)
share of female			**--0.156*** **			**--0.095** **			**--0.165*** **
			(0.037)			(0.039)			(0.026)
constant	**9.678*** **	**9.215*** **	**9.378*** **	**9.813*** **	**9.360*** **	**9.554*** **	**7.454*** **	**7.305*** **	**7.364*** **
	(0.021)	(0.044)	(0.061)	(0.019)	(0.045)	(0.059)	(0.012)	(0.026)	(0.03)
NACE dummies (2 digit)	*no*	*yes*	*yes*	*no*	*yes*	*yes*	*no*	*yes*	*yes*
firm size dummies	*no*	*yes*	*yes*	*no*	*yes*	*yes*	*no*	*yes*	*yes*
Observations	*203725*	*203725*	*203725*	*349324*	*349324*	*349324*	*111215*	*111215*	*111215*

Table A1 - Individual worker characteristics and average wages in Czech Republic, Poland and Hungary (2002, 2006) (continued)

		Poland				Hungary			
		2006			2002			2006	
	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]
education (secondary)		**0.395*** **	**0.330*** **		**0.140*** **	**0.137*** **		**0.141*** **	**0.137*** **
		(0.014)	(0.011)		(0.011)	(0.010)		(0.015)	(0.014)
education (tertiary)		**0.054*** **	**0.053*** **		**0.540*** **	**0.488*** **		**0.569*** **	**0.478*** **
		(0.008)	(0.007)		(0.022)	(0.022)		(0.024)	(0.025)
age (under 30)		**--0.126*** **	**--0.118*** **		**--0.106*** **	**--0.113*** **		**--0.150*** **	**--0.135*** **
		(0.006)	(0.005)		(0.008)	(0.007)		(0.012)	(0.010)
age (40-50)		**0.015** **	**0.021*** **		**--0.010**	**--0.008**		**0.010**	**0.010**
		(0.006)	(0.005)		(0.010)	(0.009)		(0.015)	(0.014)
age (over 50)		**0.016** **	**0.047*** **		**0.013**	**0.030*** **		**0.006**	**0.024** **
		(0.008)	(0.005)		(0.012)	(0.009)		(0.016)	(0.011)
fixed-term contract		**--0.185*** **	**--0.180*** **		**--0.123*** **	**--0.122*** **		**--0.144*** **	**--0.141*** **
		(0.011)	(0.01)		(0.019)	(0.019)		(0.025)	(0.025)
occupation (managers,		**0.530*** **	**0.385*** **		**0.538*** **	**0.506*** **		**0.535*** **	**0.454*** **
		(0.016)	(0.024)		(0.019)	(0.025)		(0.025)	(0.032)
occupation (clerks)		**0.168*** **	**0.120*** **		**0.194*** **	**0.195*** **		**0.196*** **	**0.181*** **
		(0.017)	(0.018)		(0.023)	(0.023)		(0.027)	(0.027)
occupation (service workers)		**0.078** **	**0.039**		**0.001**	**--0.007**		**--0.006**	**--0.015**
		(0.037)	(0.036)		(0.035)	(0.035)		(0.038)	(0.039)
occupation (skilled manuals)		**0.169*** **	**0.144*** **		**0.156*** **	**0.157*** **		**0.174*** **	**0.173*** **
		(0.014)	(0.015)		(0.015)	(0.015)		(0.020)	(0.020)
average characteristics of coworkers in the same firm and occupational group									
share with university degree			**0.386*** **			**0.142*** **			**0.268*** **
			(0.043)			(0.045)			(0.052)
share of under 30			**--0.096** **			**0.028**			**--0.070***
			(0.041)			(0.029)			(0.037)
share of over 50			**--0.186*** **			**--0.051***			**--0.077** **
			(0.037)			(0.027)			(0.038)
share of female			**--0.199*** **			**--0.061***			**--0.058**
			(0.03)			(0.032)			(0.038)
constant	**7.581*** **	**7.501*** **	**7.614*** **	**11.425*** **	**11.148*** **	**11.176*** **	**11.790*** **	**11.405*** **	**11.457*** **
	(0.013)	(0.03)	(0.035)	(0.014)	(0.042)	(0.044)	(0.017)	(0.086)	(0.093)
NACE dummies (2 digit)	*no*	*yes*	*yes*	*no*	*yes*	*yes*	*no*	*yes*	*yes*
firm size dummies	*no*	*yes*	*yes*	*no*	*yes*	*yes*	*no*	*yes*	*yes*
Observations	*102298*	*102298*	*102298*	*27506*	*27506*	*27506*	*28689*	*28689*	*28689*

*Notes: Estimated coefficients of the main control variables used for estimates reported in Table 4, columns [1]-[6]. Reference category: male worker, with age 30-39, primary education employed with long-term contract in unskilled occupation for a firm with more than 250 employees in the manufacture of food products, beverages and tobacco. Significance: *** 1%; ** 5%; *10%*

Table A2 - Individual worker characteristics and 2002-2006 wage differentials in Czech Republic, Poland and Hungary

	Czech Republic		**Poland**		**Hungary**	
	Coefs.	(Std. Err.)	Coefs.	(Std. Err.)	Coefs.	(Std. Err.)
Predicted wage 2006	*9.861****	*(0.012)*	7.654***	(0.001)	*11.910****	*(0.019)*
Predicted wage 2002	*9.704****	*(0.012)*	7.547***	(0.008)	*11.542****	*(0.014)*
Predicted Wage differential 2006-2002	*0.157****	*(0.013)*	0.107***	*(0.013)*	*0.368****	*(0.023)*
Endowments:	***--0.014****	***(0.008)***	***0.016***	***-0.013***	***0.081****	***(0.016)***
education (secondary)	0.004***	(0.001)	0.005***	(0.001)	0.000	(0.001)
education (tertiary)	--0.013***	(0.002)	0.000	(0.000)	0.011***	(0.003)
age (under 30)	--0.001	(0.001)	0.001	(0.001)	0.005***	(0.001)
age (40-50)	--0.000	(0.000)	--0.001***	(0.000)	0.000	(0.000)
age (over 50)	--0.000	(0.000)	0.002***	(0.000)	0.001***	(0.000)
fixed-term contract	0.000	(0.001)	--0.013***	(0.002)	0.001	(0.001)
managers, professionals, technical workers	--0.007*	(0.004)	0.005**	(0.002)	0.017***	(0.004)
occupation (clerks)	0.001	(0.000)	0.000	(0.000)	0.001***	(0.001)
occupation (service workers)	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
occupation (skilled manuals)	0.003	(0.002)	--0.003***	(0.001)	--0.004***	(0.002)
share with university degree	--0.005**	(0.002)	0.005***	(0.001)	0.003**	(0.001)
share of under 30	0.000	(0.001)	0.000	(0.000)	--0.001	(0.001)
share of over 50	0.005**	(0.002)	0.005	(0.008)	--0.002*	(0.001)
share of female	0.007***	(0.002)	0.000	(0.001)	0.000	(0.001)
Coefficients:	***0.176****	***(0.010)***	***0.149****	***(0.012)***	***0.283****	***(0.015)***
education (secondary)	--0.016	(0.012)	--0.003**	(0.002)	0.000	(0.013)
education (tertiary)	--0.001	(0.003)	--0.013*	(0.008)	--0.001	(0.003)
age (under 30)	--0.003	(0.002)	0.003*	(0.002)	--0.006*	(0.003)
age (40-50)	--0.002	(0.002)	0.003	(0.002)	0.005	(0.005)
age (over 50)	--0.002	(0.003)	--0.004***	(0.002)	--0.001	(0.003)
fixed-term contract	--0.015***	(0.004)	0.001	(0.003)	--0.001	(0.002)
managers, professionals, technical workers	0.005	(0.013)	--0.012*	(0.007)	--0.009	(0.007)
occupation (clerks)	--0.000	(0.001)	--0.003***	(0.001)	--0.000	(0.001)
occupation (service workers)	0.001	(0.001)	0.000	(0.000)	--0.000	(0.001)
occupation (skilled manuals)	--0.002	(0.020)	0.017	(0.013)	0.011	(0.018)
share with university degree	--0.002	(0.012)	0.006	(0.007)	0.012*	(0.006)
share of under 30	--0.029	(0.023)	--0.024*	(0.013)	--0.025**	(0.012)
share of over 50	--0.022	(0.027)	--0.007**	(0.003)	--0.005	(0.010)
share of females	0.017	(0.014)	0.007	(0.008)	0.001	(0.010)
constant	0.176**	(0.080)	0.250***	(0.045)	0.280***	(0.103)
Interaction:	***--0.005***	***(0.008)***	***--0.026****	***(0.011)***	***0.003***	***(0.006)***
education (secondary)	--0.001	(0.001)	--0.000*	(0.000)	0.000	(0.000)
education (tertiary)	0.000	(0.001)	0.000	(0.000)	--0.000	(0.001)
age (under 30)	--0.000	(0.000)	0.000	(0.000)	0.001*	(0.001)
age (40-50)	0.000	(0.000)	0.000	(0.000)	--0.001	(0.001)
age (over 50)	0.000	(0.000)	--0.001**	(0.000)	--0.000	(0.001)
fixed-term contract	0.000	(0.001)	0.000	(0.001)	0.000	(0.000)
managers, professionals, technical workers	--0.000	(0.001)	0.001	(0.001)	--0.002	(0.001)
occupation (clerks)	--0.000	(0.000)	0.000	(0.001)	--0.000	(0.000)
occupation (service workers)	0.000	(0.000)	0.000	(0.001)	0.000	(0.000)
occupation (skilled manuals)	--0.000	(0.000)	0.000	(0.000)	--0.000	(0.001)
share with university degree	0.000	(0.003)	0.001	(0.000)	0.003*	(0.002)
share of under 30	--0.002	(0.002)	0.001	(0.000)	0.004**	(0.002)
share of over 50	0.001	(0.002)	--0.022**	(0.000)	--0.001	(0.002)
share of females	--0.003	(0.002)	0.000	(0.000)	--0.000	(0.000)
Observations	*553049*		*213513*		*56195*	

Notes: All specifications also include dummies for firm sector and size (not reported). Robust standard errors, clustered at the firm level in parentheses. Significance levels: *** 1%; ** 5%; * 10%

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