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**Collective Agreements, Wages and
Restructuring in Transition**

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Abstract

Using a large matched employer-employee dataset, the authors investigate the relationship between collective agreements, wages and restructuring in transition in three former centrally planned economies (Czech Republic, Hungary and Poland). They adopt a natural experiment approach and capture the restructuring process triggered by the launch of transition by means of cohort effects among firms founded before or at different stages of this process which enable them to control for the heterogeneity of firms in different cohorts. They find that the wage premium associated with different levels of collective agreements depends on restructuring and its timing in the transition. In early-middle transition firms, industry level agreements protect low skilled wages; whereas in late transition ones, firm level agreements increase medium and especially high skilled wages. Some cross country differences emerge in the structure of the wage premium as a result of country specific features of restructuring.

Keywords: Collective agreements, wages, transition economy, restructuring

JEL Classifications: J31, J51, P2

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1 Introduction

Transition to a free market radically changed wage determination in former ‘Socialist economies’. Compared with West European and Anglo-Saxon models of collective bargaining, in the Socialist model unions merely sustained a labor market equilibrium with artificially full employment and compressed wage distributions (Blanchflower and Freeman 1997; Basu et al. 2005). Economic restructuring in transition, by which we mean the restructuring of previously state-owned enterprises (SOEs) and the creation of new firms, created productivity gains to be enjoyed by the private sector. This process had a two fold impact on collective bargaining; on the one hand, the lack of credibility of the Socialist unions triggered de-unionization and the creation of a large uncovered sector. On the other hand, the restructuring process encouraged the reform of collective bargaining institutions in order to foster negotiations between firms and workers over the distribution of the productivity gains. In two companion papers, Basu et al. (2005), (2004), took a first step to evaluate these processes showing that the development of rent-sharing mechanisms between employers and employees is more effective in newly established firms than in former SOEs in four Central East European (CEE) countries.

The present paper builds on these insights and makes an original contribution to the literature as it investigates how restructuring and its timing at different stages during the transition process have affected the wage premium associated with collective agreements in CEE3. We assess separately the wage premium for firm and industry level agreements, using non-covered firms in these countries as a benchmark. The transition process provides the basis for a natural experiment approach as we treat the restructuring of a firm at a given point of the transition process as its response to an exogenous shock, namely, the launch of the transition. This approach enables us to control for the characteristics of firms that determine their bargaining status. Owing to the uneven pace of reform, the timing of the ‘shock’ for different firms and sectors was spread over a ten year period. During that period, the wage-setting institutions evolved and became more adapted to the workings of a market economy, and firms which restructured at different stages along this path in effect were faced with different models. In the early stages, the predominant model was that of industry bargaining with old-style socialist unions mainly concerned about low skilled wages. As a result of subsequent changes in labor market institutions, firms which restructured later had additional

options including firm-level bargaining which by then had become an effective means of providing a flexible process of wage determination, advantageous for medium and high skilled workers (EIRO 2002a, 2005; Hancké and Kurekova 2008; Blanchflower and Freeman 1997; Boeri and Terrell 2002). Once they have adopted a bargaining system, firms are often reluctant to switch because of the investments made in the design of wage-setting arrangements, and the managerial and labor skills required to operate them, which would need to be made afresh. Thus the regime adopted by a firm at the moment of restructuring is likely to remain in operation for a considerable period of time.

Our quasi-experimental approach uses restructuring in transition additionally to capture productivity differences between firms in their initial conditions and the distribution of efficiency gains that are unobserved in our data but which potentially influence the wages they pay. The timing of restructuring is an important indicator also in this respect because in many cases it was largely correlated with efficiency differences among the individual firms in our sample, and with internal distributional issues. For example, early restructuring involved many firms that needed an immediate bail-out because of widespread inefficiencies not anymore covered by governmental subsidisation, or it could be the result of factors such as FDI inflows reflecting new market opportunities seen by foreign firms, and more general exposure to international competition and patterns of trade liberalization (Hughes and Hare 1994; Estrin et al. 2008; Sacco and Scarpa 2000).

We use a unique cross sectional matched employer -employee dataset for Czech Republic, Hungary and Poland (CEE3)¹ and deal with restructuring during the transition by means of *firm cohort effects* which capture both the establishment of new firms and the complete restructuring of existing ones.² Because this information is not readily available in the data, we reconstruct it from the tenure of workers within the firm³ to distinguish firms established before the launch of transition (i.e. *pre-transition firms*) from those established in *early-middle transition* and *late*

¹The European Structure of Earnings Survey (ESES) allows us to observe collective agreements long enough after the launch of transition for a sufficiently stable institutional setting to emerge in these countries. Czech and Hungarian data are collected in 2002 while Polish data refer to 2004. We thus observe collective bargaining institutions in these countries respectively 11, 12 and 14 years after the launch of transition. Due to its high degree of cross-country comparability, ESES data also enable us to carry out the analysis in a comparative perspective.

²For our purposes, the distinction between these two categories is irrelevant, as both ‘de novo’ and fully restructured old firms reflect the structural change in firms’ internal organization which provides the source of variation we exploit in the analysis.

³For simplicity of writing, in this paper we use the term ‘firms’ to refer to ‘establishments’ (which are the unit of analysis of ESES data) rather than units of ownership and control. Moreover many small establishments are also firms and even more so as a consequence of economic restructuring which led to the disintegration or downsizing of big firms in smaller operational units.

transition (see also Sabirianova et al. 2005). Finally, we control for the degree of labor turnover, or workforce restructuring, among low, medium and high skilled workers in the pre-transition cohort. We hypothesize that firms characterized by a high turnover of medium and high skilled workers pursued a fundamental rationalization of key areas of economic activity; conversely those which only replaced their low skilled labour merely introduced short-run adjustments in the production process (see Estrin et al. 1995).

Our empirical results confirm that restructuring during the transition exerts a strong influence on the variation of individual wages associated with different collective bargaining models. We find that the existence of a wage premium for collective agreements in these former centrally planned economies critically depends on restructuring and its timing in transition. Although most of the pre-transition firms are covered by collective agreements, the wage premium is concentrated mostly in transition firms and presents different features in the two transition cohorts: in early-middle transition firms collective agreements operate mainly at the industry level and protect low skilled wages whereas in late transition firms they also operate at the firm level and increase medium and high skilled wages. Finally, we observe some cross-country differences in the structure of the wage premium that are to be related to the country specific features of the restructuring process.

The paper proceeds as follows. In the next section we describe the main changes in collective bargaining during transition in the three countries. In section 3 we present the data with some descriptive statistics, describe the empirical strategy and the results of the empirical analysis. Section 4 presents the sensitivity analyses. Section 5 concludes.

2 Collective Bargaining and Transition

Political and economic turbulence during transition to a market economy have brought about important changes in collective bargaining institutions in former Socialist economies. Basu et al. (2004, 2005) describe the typical Socialist model of wage and employment determination as one characterized by full appropriation of rents by the State which artificially maintains a compressed wage distribution and ensures full employment in the economy. While this system prevailed in CEE countries before transition, market liberalization favored the development of new models with the shift of bargaining power, away from the State and towards firms and workers. The ensuing

post-transition settings of wage determination in Central Europe differ from country to country while being based on common broad features.

The Czech Republic, Hungary and Poland have experienced a dramatic decline in unionization, falling threefold over one decade (Table 1) to levels much lower than in most Western European countries. Coverage has also declined, from more than 70% at the beginning of 1990s in Poland and Hungary (55% in the Czech Republic) to below 50% (30% in the Czech Republic). Furthermore, already at the beginning of 1990s, the three countries were characterized by low levels of centralization and coordination of the bargaining process (Table 1). The structure of union coverage has also changed due to restructuring and the establishment of new enterprises. In general, foreign investors have not favored collective agreements and workers in firms with foreign capital are much less likely to be covered, especially in small firms (Gardawski 2002, Kollo and Mickiewicz 2005). Nevertheless, some multinational enterprises from Western Europe were under pressure to apply to their CEE subsidiaries the same industrial relations standards they use domestically, thus de facto exporting models of unionization which prevail in established market economies (Aro et al. 1996, Hancké and Kurekova 2008).

This evolutionary process renders the contemporary system of collective bargaining in CEE countries quite different from Western Europe and the Anglo-Saxon countries. Collective agreements are signed mostly at the firm level whereas industry level agreements generally take a multi-employer form i.e. are signed by employers' organizations and the relevant trade unions. These agreements are not subject to extension mechanisms and cover only a small segment of the sector unless they are signed by employers with a dominant position in the market.⁴ Accordingly, CEE3 countries present a system where a firm may be covered by an agreement at the industry or the firm level or may not be covered at all; this makes it possible to compare wage outcomes under firm-level and industry-level coverage with those in uncovered firms. A similar system is described by Güertzen (2007) for East-Germany in contrast to continental Western Europe where we observe multiple levels of coverage while extension mechanisms de facto limit the number of workers who are not covered (Dell'Aringa and Lucifora 1994; Card and de la Rica 2006). It differs also from the Anglo-Saxon model where we observe either firm level or no coverage (Bryson 2007).

⁴Conventional sectoral agreements with extension mechanisms analogous to those prevailing in Western Europe, are generally negotiated by firms that used to be under public control.

3 Empirical Analysis

3.1 Data and main variables

We use data from the European Structure of Earnings Survey (ESES) for the Czech Republic, Hungary and Poland.⁵ This is a matched employer-employee dataset with information on employee earnings, personal, job and establishment characteristics. Use of shared statistical definitions and agreed norms of data collection established by Eurostat mean that the data are well suited for inter-country comparisons. Nevertheless, the average number of observations per establishment by employment size is substantially higher in the Czech Republic as compared with Poland and Hungary (see Table 1) due mostly to differences in sampling procedure.⁶ The Czech, Hungarian and Polish samples include respectively 1,030,982, 479,009 and 609,764 employee observations for establishments with 10 or more employees in the manufacturing, construction, trade and service sectors. For simplicity of exposition, we focus on male full-time employees in private firms in the manufacturing sector⁷ and exclude establishments covered by ‘any other type of bargaining’ such as agreements of individual professional groups that fall within a wide range of economic activities (Eurostat, 2003). Our final sample includes 203,725 employee observations for the Czech Republic, 26,086 for Hungary and 94,706 for Poland.

Our wage measure relates to gross monthly earnings in the reference month which include bonuses and exclude overtime pay.⁸ ESES measures coverage at the lowest level where collective agreements are signed by the representatives of employers and employees i.e. the level of the firm, the industry or not signed at all. ESES data do not contain any information on the establishment’s age, internal organization or labor allocation. We measure restructuring in the transition by means of two indicators. The first is the cohort to which individual firms belong, based on the date of their

⁵Remote access to the Czech and Hungarian samples of the European Structure of Earnings Survey (ESES) was granted by Eurostat within the LEED project, while the Polish Structure of Earnings Survey was made available to us by the Polish Ministry of Labor and Social Policy; Czech and Hungarian data refer to 2002 while the Polish data refer to 2004.

⁶A two stage sampling procedure, of both firms and workers with the firm is carried in Poland and Hungary as opposed to single stage sampling of firms, with full coverage of workers within the firm in the Czech Republic. We account for this difference by using sampling weights in the regression analysis.

⁷The focus on males enables us to avoid a potential bias resulting from the characteristics of women’s labor supply. In a similar vein we exclude from the sample state owned firms since these may be very different from private firms in terms of productivity. We also exclude firms in services and construction to minimize the noise due to the creation of entirely new areas of economic activity during transition in these sectors.

⁸We preferred a monthly wage to a hourly wage definition (which is the one most widely used in the union literature) because of a likely problem of under-reporting of actual working hours in the data.

establishment. We compute this information using the tenure of individual workers within the firm. In particular, we identify the tenure of the first worker hired by each firm (i.e. the longest tenured worker within the establishment, *LTW*) making the implicit assumption that a firm is established when its first worker is hired. Next, we use this information to assign each firm to one of three cohorts, basing on the classification by Sabirianova et al. (2005). In particular, we assign a firm to a *pre-transition cohort* of employers if the *LTW* was hired before the launch of transition (i.e. before 1990 in Hungary and Poland and 1991 for Czech Republic), a *early-middle transition cohort* if the *LTW* was hired between the launch of transition and 1996 or a *late transition cohort* if the *LTW* was hired after 1996 and before the survey year (i.e. 2002 for Hungary and Czech Republic and 2004 for Poland).⁹ Our second measure relates to the extent of workforce restructuring within pre-transition firms that accompanied the internal reorganizations associated with the transition. Our measure is based on the proportion of the current workforce that was hired after the transition. Thus a 'low turnover' firm undertook relatively little employment restructuring after the transition and contains a relatively high percentage of its original workforce, whereas a 'high turnover' one has a relatively low percentage of its original workforce. To calculate this we identify those workers hired in the year after the launch of the transition, and compare the proportions of the current workforce hired before or after this group. We identify three categories of turnover, low, intermediate and high, for all workers and by skill level. Details are given in Appendix 2.

3.2 Descriptive statistics

Table 3 shows the average tenure of workers by type of coverage and occupational group. In all countries, workers in firms which are not covered by any agreement display tenure rates up to 50% lower than for workers in firms covered by a firm or an industry level agreement (5 years against 8-10 years), this difference being distributed rather uniformly across occupational categories.

The pattern evidenced in Table 3 lends some support to the idea that workers not covered by any agreement are selected in transition firms. This interpretation is reinforced by evidence in Table 4, which displays the distribution of workers according to the characteristics of firms in each

⁹Sabirianova et al. (2005) keep the early cohort distinct from the middle transition one. We merge the two in one transition cohort to have a higher number of observations in each cohort. However, nothing changes in the results if we split the transition cohort in the two sub-cohorts (cfr. Section 4).

cohort. In all countries, pre-transition firms are mostly covered by a collective agreement (mainly at the firm level) while coverage of transition firms is considerably lower. Interesting cross-country differences emerge between the two transition cohorts: a relatively high share of late transition firms in the Czech Republic is covered by firm level agreements; in Hungary the share of covered workers decreases as we move towards the most recent cohorts while in Poland it remains fairly stable. Note also that in all countries, transition firms are smaller on average than pre-transition ones, which is consistent with restructuring in transition being associated with the breaking up of pre-transition big firms into smaller operational units (Brada et al. 1997; Hughes and Hare 1994). Finally, sectoral composition, based on an OECD classification of industries by technology regime (OECD; 2001), shows that the Czech Republic has a greater share of firms in medium-high and high tech sectors than Hungary and Poland, particularly in the late transition cohort.

3.3 Empirical framework

We investigate the impact of restructuring during the transition on the wage premium associated with collective agreements by estimating the following model of earnings for worker i at establishment j :

$$w_{ij} = \alpha \mathbf{COHO}_j + \beta \mathbf{COHO}_j * \mathbf{AGREE}'_j + \mathbf{X}'_{ij} \gamma + \mathbf{Y}'_j \delta + \mathbf{Z}'_j \lambda + v_{ij} \quad (1)$$

w_{ij} is the log monthly wage of individual i in firm j . \mathbf{COHO}_j is a vector of dummies for firm j belonging to the pre-transition, early-middle transition, or the late transition cohort. \mathbf{AGREE}_j is a vector of dummies for firm j being covered by a collective agreement at the firm or the industry level. Vector \mathbf{X} includes individual workers' and job characteristics. Vector \mathbf{Y} includes the average characteristics of co-workers i.e. workers in the same firm and in the same skill group; these capture unobserved workers' ability under the assumption that workers with higher unobserved skills tend to have co-workers with higher average skill levels (see also Card and de la Rica 2006). Finally, vector \mathbf{Z} includes a set of firm characteristics obtained by augmenting the observed information on the sector and the size of the establishment with those on the restructuring cohort in the transition and the labor turnover in the pre-transition firms.

We add simultaneously in equation (1) the three cohort dummies and their interactions with *AGREE* while we omit the constant term. In this way, *the estimated β s measure the wage premium of collective agreements in each cohort while their comparison reveals how restructuring and its timing in the transition affect the impact of collective agreements on wages.* Provided that the set of ‘restructuring-augmented’ firm characteristics¹⁰ accounts for unobserved heterogeneity of firms in the different cohorts, the OLS produces consistent estimates of the true β coefficients.

We proceed as follows: first, we check for any impact of collective agreements on wages without considering the effect of the restructuring process reflected by the three cohorts. Then we include restructuring in the transition by estimating equation (1) on average wages including the cohort dummies. We finally estimate equation (1) separately for low, medium and high skilled workers in order to check whether collective agreements favor specific groups of workers and whether restructuring in the transition changes the characteristics of the wage premium by skill group.

3.4 Estimates for average wages

We start by estimating the impact of firm and industry level agreements on average wages without considering restructuring. We present two sets of estimates: the first includes only controls for individual and work characteristics (age, tenure, ISCED-education, ISCO-occupation, having a short-term contract) and the observed firm characteristics (size and NACE2-sector); in the second set of estimates, we also add the characteristics of coworkers and their interactions. The estimated coefficients of the collective agreement dummies in Table 5 are never significant (see Table A1 in Appendix 1 for the coefficients of individual and coworkers characteristics). At a first sight, this seems to suggest the absence of any impact of collective bargaining on wages in CEE3 in contrast to the main findings from the union bargaining literature which typically points to the existence of a wage premium for collective agreements in continental European and Anglo-Saxon countries (see Bryson, 2007 for a review).

As extensively discussed before, estimates in Table 5 are likely to be biased by firms’ unobserved heterogeneity; we therefore carry out the analysis considering restructuring in transition and estimate equation (1). We present three sets of country estimates; each set includes cohort

¹⁰This includes over 120 cohort specific sectoral, size dummies and interactions between labor turnover and size.

specific size and sectoral dummies and controls for individual characteristics and characteristics of coworkers. In the first set (Table 6, col. [1], [4], [7]) we add only cohort effects. In the second set of estimates (col. [2], [5], [8]) we add dummies for labor turnover in pre-transition firms. In the third set (col. [3], [6], [9]) we add interactions between the dummies for labor turnover and firm size.

Table 6 reports the estimated coefficients of the collective agreement dummies in each cohort (see Table A2 in Appendix 2 for a discussion of the impact of restructuring in transition on average wages). A first look at the results reveals that, with respect to the previous estimates, the inclusion of ‘restructuring augmented’ firm characteristics increases the explained variance of individual wages as measured by the R^2 . More importantly, we now find a wage premium of collective agreements whose magnitude and significance critically depend on restructuring, its timing in transition and country specific characteristics. In the Czech Republic and Poland there is a strongly significant wage premium of firm level agreements in late transition firms (of magnitude 18% and 8%, respectively) while there is no evidence of a wage premium in the pre-transition and early-middle transition cohort. In contrast, in Hungary, we observe a weakly significant wage premium of firm level agreements (of magnitude 5%-7%) only in the pre-transition and early-middle transition cohort; we also find evidence of a wage premium for industry agreements in the pre-transition cohort which disappears however once we add the interactions between labor turnover and size.

3.5 Average wages by skill

Finally we analyze the impact of firm and industry level agreements on average wages by skill group in the presence of restructuring in transition. Table 7 reports the estimated coefficients of the collective agreement dummies: for each country, columns [LS], [MS] and [HS] show results for low, medium and high skilled workers, respectively. The estimated coefficients show that the premium for firm level agreements previously found in late transition firms in the Czech Republic and Poland is in fact concentrated among the medium and high skilled workers; Czech estimates also reveal a wage premium for industry level agreements for the low skilled both in early-middle and late transition firms which did not emerge from the estimates for average wages. In Hungary, firm level agreements have a roughly uniform impact on wages along the skill distribution in pre-transition firms. As in the case of the Czech Republic, in Hungary we also observe a wage premium

for industry level agreements for the low skilled in early-middle transition firms while we find no evidence of an impact of collective agreements on wages in late transition firms.

To summarize, estimates by skill group highlight additional features of the wage premium for collective agreements in CEE3 and its relationship with restructuring in transition; first of all, they show that in countries where we can compare wage levels under coverage by industry and firm level agreements with an uncovered sector, the former protect low skilled wages while firm specific agreements mostly increase medium and high skilled wages. Moreover they confirm the importance of the timing of restructuring: in fact while in early-middle transition firms' collective agreements are most effective at increasing wages when they operate at the industry level, in late transition firms a new role emerges for firm level agreements. As a relevant exception, in Hungary firm level agreements already operate in the pre-transition cohort as a likely consequence of a more gradual transition process.

4 Sensitivity Analysis

We checked the robustness of our results against alternative definitions of restructuring in transition. For the cohort effect we adopted the exact same definition as Sabirianova et al. (2005) and maintained the distinction between the early transition cohort of firms (i.e. 1990(1)-1993) and the middle transition one (i.e. 1994-1996). The results show that the estimated coefficients for the collective agreement dummies in the two cohorts are not significantly different suggesting that merging them into a single early-middle transition cohort does not introduce any bias in the result. Regarding the definition of the thresholds for labor turnover in pre-transition firms, we substituted the set of dummies for low, medium and high turnover by skill group with just one variable describing the occurrence of (any level of) labor turnover by skill group. We also modified the definition of labor turnover to base it on the percentages of workers hired after the launch of transition by skill group rather than on the position of the transitional worker on the skill specific tenure distribution. Results once again confirm the robustness of the model specification to the particular definition of labor turnover.

Finally, we verified the robustness of the results to the inclusion of the information on the regional location of firms. We thus added 16 regional dummies on NUTS-2 level for Poland, the

only country for which these data are available. The analysis shows that size and significance of coefficients for the collective agreement dummies is not affected by the inclusion of local labor market effects. Results also show that these have an impact on wages only in the case of metropolitan areas.¹¹

5 Conclusions

This paper has studied how restructuring in the course of the transition from a centrally planned to a market economy has affected the wage premium for firm and industry level agreements in Czech Republic, Hungary and Poland. We adopted a natural experiment approach and described the occurrence of restructuring and its timing (in early-middle or late transition) as firms' responses to an exogenous shock (i.e. the launch of transition). We built on the idea that collective bargaining covering a firm which restructured in early-middle or late transition represents a different approach to industrial relations compared with the collective agreements covering pre-transition firms. Our approach has also enabled us to neutralize the effect of the heterogeneity among firms (in both initial conditions and in the distribution of efficiency gains) due to economic restructuring, and thus to obtain a more accurate measure of the effect of bargaining structure on wages.

Our results contrast sharply with the existing literature on unions and wages highlighting that the existence of a wage premium for collective agreements in former centrally planned economies critically depends on the cohort to which firms belong in the restructuring process associated with the transition. The premium is mostly concentrated in firms of the early-middle and later transition cohorts; this suggests that bargaining institutions in transition firms may provide workers with greater power to negotiate compared with their counterparts in pre-transition firms. The characteristics of the wage premium also differ in the two cohorts: in early-middle transition firms, industry level agreements are effective and protect low skilled wages. In late transition firms, firm level agreements play a role as well and increase wages for medium and high skilled workers. The exception in our study is Hungary, where it is only in pre-transition and early-middle transition firms that firm level agreements operate, having a roughly uniform impact along the skill distribution. We interpret this finding as the result of a more gradual process of transition and

¹¹All tables with the detailed results of sensitivity analyses are available from the authors upon request.

economic restructuring, which started earlier in Hungary than in the Czech Republic and Poland.

A possible caveat for our conclusions is that cohort effects allow us to control for unobserved heterogeneity of firms in different cohorts but do not allow controlling for firms' heterogeneity within each cohort. The use of control functions as in Card and de la Rica (2006) provides a potentially interesting way to address this issue. Finally notice also that our estimates by skill suggest a relationship between restructuring in transition, collective agreements and the skill wage premium which would merit further investigation.

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Table 1: Collective bargaining institutions in CEE countries

	union density		coverage		centralisation	coordination
	1990	2001	1990s	2002	1990-2000	1990-2000
Czech Republic	78.8	27	55%	21-30%	1	1
Hungary	63.4 (i)	19.9	>70%	31-40%	1	1
Poland	53.1 (ii)	14.7	>70%	41-50%	1	1

Various Sources: CESiFO and ILO databases; ILO World Labor Report; EIRO 2005; Riboud et al. 2002, Eurostat

ⁱrefers to 1989

ⁱⁱrefers to 1995

Table 2: Average number of individual observations within the firm by firm size

no. of employees	Czech Republic	Hungary	Poland
10-49	29	25	22
50-249	155	14	52
250 - 499	329	36	98
500-999	682	75	144
1000	4342	113	253
Total	2349	45	108

Sources: authors' calculations on SES 2002 data

Table 3: Average workers' tenure by occupation and type of coverage

	Czech Republic			Hungary			Poland		
	<i>bargaining coverage</i>	<i>industry</i>	<i>firm</i>	<i>none</i>	<i>industry</i>	<i>firm</i>	<i>none</i>	<i>industry</i>	<i>firm</i>
Managers and Techn.	7.8	13.6	7.1	11.9	11.2	6.8	9.7	11.6	6.2
Clerical workers	3.9	10.2	5.2	11.1	8.9	5.5	8.3	9.4	5.2
Service workers	5.0	9.6	3.6	9.3	6.4	3.6	2.1	7.7	3.9
Skilled manuals	7.1	12.1	6.0	9.8	8.9	4.9	9.2	10.3	5.5
Elementary workers	5.7	9.1	5.7	4.2	6.4	3.7	6.9	8.0	4.5
all	5.9	10.9	5.5	9.2	8.4	4.9	8.9	10.3	5.6

Sources: authors' calculations on SES 2002 data

Occupational categories based on the International Standard Classification of Occupations.

Table 4: Workforce composition (%) in pre, early-middle and late transitional firms

transition cohort	Czech Republic			Hungary			Poland		
	pre <i>(pre91)</i>	early-middle <i>(91-96)</i>	late <i>(97-02)</i>	pre <i>(pre90)</i>	early-middle <i>(90-96)</i>	late <i>(97-02)</i>	pre <i>(pre90)</i>	early-middle <i>(90-96)</i>	late <i>(97-04)</i>
industry agreement	7.85	15.15	8.05	8.15	2.10	2.59	1.51	0.91	1.58
firm agreement	80.71	27.33	55.48	55.81	27.53	14.83	75.29	37.82	37.44
no agreement	11.44	57.52	36.47	36.04	70.37	82.58	23.2	61.27	60.98
size 10 - 49	4.67	30.46	20.85	10.19	30.50	44.09	5.61	31.08	31.80
size 50 - 249	34.17	47.19	54.15	22.17	29.48	34.60	26.08	41.70	46.31
size 250 - 499	15.03	6.55	10.35	20.03	10.57	10.72	21.59	11.23	10.05
size 500 - 999	23.21	6.90	5.63	22.34	13.29	7.75	20.4	7.32	5.66
size 1000	22.92	8.89	9.02	25.27	16.16	2.84	26.31	8.67	6.18
low, low-medium tech	55.36	55.46	54.53	65.23	53.15	69.04	65.82	77.11	70.88
medium-high, high tech	44.64	44.54	45.47	34.77	46.5	30.96	34.18	22.88	29.13
<i>Observations</i>	<i>173,037</i>	<i>24,835</i>	<i>5,853</i>	<i>11,488</i>	<i>9,694</i>	<i>4,904</i>	<i>43,078</i>	<i>33,758</i>	<i>17,870</i>
<i>% of Obs.</i>	<i>84.94</i>	<i>12.19</i>	<i>2.87</i>	<i>44.04</i>	<i>37.16</i>	<i>18.80</i>	<i>45.49</i>	<i>35.65</i>	<i>18.87</i>

Source: authors' calculations on SES 2002 data

Table 5: The impact of collective agreements on average wages

	Czech Republic		Hungary		Poland	
	[1]	[2]	[3]	[4]	[5]	[6]
firm level	-0.050 [†]	-0.030	0.022	0.024	-0.007	0.005
	(0.026)	(0.025)	(0.024)	(0.023)	(0.014)	(0.014)
industry level	0.027	0.015	0.009	0.004	-0.023	-0.0016
	(0.036)	(0.033)	(0.034)	(0.032)	(0.050)	(0.051)
personal, job ch.*	yes	yes	yes	yes	yes	yes
sector, size dummies	yes	yes	yes	yes	yes	yes
co-workers charact.*	no	yes	no	yes	no	yes
Observations	203725	203725	26086	26086	94706	94706
Rsqr	0.47	0.50	0.50	0.51	0.49	0.51

Standard errors (in parentheses) clustered by firm; significance levels: † 10%, * 5%, ** 1%

*coefficients reported in Table A1.

Table 6: The impact of collective agreements on average wages with restructuring in transition

	CZ [1]	CZ [2]	CZ [3]	HU [4]	HU [5]	HU [6]	PL [7]	PL [8]	PL [9]
<i>impact of firm level agreements on wages (in pre, early-middle and late transition firms)</i>									
pre	-0.031 (0.028)	-0.029 (0.027)	-0.030 (0.026)	0.052 (0.032)	0.054 [†] (0.031)	0.051 [†] (0.028)	0.005 (0.025)	0.015 (0.024)	0.017 (0.025)
early-middle	-0.099* (0.041)	-0.100* (0.041)	-0.099* (0.041)	0.071 (0.038)	0.067 [†] (0.038)	0.067 [†] (0.038)	-0.018 (0.021)	-0.018 (0.021)	-0.017 (0.021)
late	0.177* (0.085)	0.185* (0.088)	0.181* (0.088)	-0.045 (0.039)	-0.046 (0.039)	-0.046 (0.039)	0.085** (0.027)	0.084** (0.027)	0.084** (0.027)
<i>impact of industry level agreements on wages (in pre, early-middle and late transition firms)</i>									
pre	-0.017 (0.038)	-0.020 (0.038)	-0.023 (0.037)	0.071 (0.044)	0.086* (0.044)	0.070 (0.043)	0.062 (0.076)	0.083 (0.074)	0.093 (0.068)
early-middle	0.065 (0.056)	0.066 (0.056)	0.067 (0.056)	-0.083 (0.054)	-0.082 (0.053)	-0.082 (0.053)	-0.127 (0.079)	-0.129 (0.080)	-0.130 [†] (0.079)
late	-0.028 (0.164)	-0.010 (0.168)	-0.016 (0.167)	-0.089 (0.066)	-0.090 (0.066)	-0.090 (0.066)	-0.013 (0.075)	-0.012 (0.075)	-0.012 (0.075)
workers, coworkers	yes	yes	yes	yes	yes	yes	yes	yes	yes
cohort ⁱ	yes	yes	yes	yes	yes	yes	yes	yes	yes
turnover ⁱ	no	yes	yes	no	yes	yes	no	yes	yes
nace2*cohort	yes	yes	yes	yes	yes	yes	yes	yes	yes
size*cohort	yes	yes	yes	yes	yes	yes	yes	yes	yes
size*turnover	no	no	yes	no	no	yes	no	no	yes
Obs	203725	203725	203725	26086	26086	26086	94706	94706	94706
Rsq [◇]	0.52	0.52	0.53	0.53	0.53	0.54	0.52	0.52	0.53

OLS estimates without the constant; standard errors (in parentheses) clustered by firm: † : 10% * : 5% ** : 1%

◇Rsq refers to the same estimates with the constant (ref. pre - transition firms)

ⁱcoefficients reported in Table A2.

Table 7: The impact of collective agreements on average wages by skill with restructuring in transition

	Czech Republic			Hungary			Poland		
	LS	MS	HS	LS	MS	HS	LS	MS	HS
<i>impact of firm level agreements on wages by skill group (pre, early-middle and late)</i>									
pre	0.071 [†]	-0.022	-0.063	0.079*	0.042	0.079*	-0.048	0.011	0.044
	(0.041)	(0.027)	(0.043)	(0.036)	(0.030)	(0.039)	(0.046)	(0.025)	(0.036)
early-middle	-0.085	-0.084*	-0.170**	-0.087	0.090*	0.019	-0.028	-0.004	-0.066*
	(0.057)	(0.041)	(0.057)	(0.062)	(0.043)	(0.049)	(0.041)	(0.023)	(0.033)
late	0.080 [†]	0.195*	0.215*	0.019	-0.036	-0.066	0.049	0.078**	0.117**
	(0.043)	(0.080)	(0.109)	(0.067)	(0.043)	(0.075)	(0.040)	(0.029)	(0.040)
<i>impact of industry level agreements on wages by skill group (pre, early-middle and late)</i>									
pre	0.049	0.014	-0.126*	0.043	0.079 [†]	0.070	0.112	0.097	-0.080
	(0.046)	(0.041)	(0.050)	(0.062)	(0.047)	(0.072)	(0.147)	(0.078)	(0.059)
early-middle	0.154**	0.070	0.024	0.173*	-0.004	-0.340**	-0.392**	0.083	-0.180**
	(0.054)	(0.057)	(0.076)	(0.076)	(0.050)	(0.089)	(0.073)	(0.079)	(0.060)
late	0.260**	-0.012	0.074	-0.076	-0.051	-0.255 [†]	0.018	-0.044	0.126
	(0.100)	(0.152)	(0.243)	(0.152)	(0.060)	(0.145)	(0.087)	(0.061)	(0.156)

Standard errors (in parentheses) clustered by firm: † : 10% * : 5% ** : 1%

LS: low skilled workers, MS: medium skilled workers; HS: high skilled workers.

Appendix 1

Table A1 displays the estimated coefficients for individual characteristics, complementing Table 5. Education, age, tenure and a long-term contract have a positive and significant impact on wages in all countries. Coworkers' characteristics (Table A1, col. [2] [4] [6]), reduce the measured effect of the corresponding individual variables. The negative signs for the shares of women and young workers signal unobserved skills below average or occupational segregation in less productive firms; however the positive coefficients (mostly significant) of the interactions with the share of workers with a university degree also suggests above average unobserved skills of young and female workers in the presence of a highly skilled workforce.

Table A1: The impact of personal, job and coworkers characteristics on average wages (see Table 5)

	Czech Republic		Hungary		Poland	
	[1]	[2]	[3]	[4]	[5]	[6]
Intercept	8.868**	9.294**	10.987**	11.131**	6.323**	6.615**
	(0.060)	(0.517)	(0.061)	(0.226)	(0.037)	(0.227)
secondary educ.	0.107**	0.107**	0.133**	0.130**	0.074**	0.065**
	(0.010)	(0.009)	(0.011)	(0.010)	(0.007)	(0.006)
tertiary educ.	0.385**	0.340**	0.406**	0.346**	0.331**	0.269**
	(0.018)	(0.015)	(0.027)	(0.027)	(0.013)	(0.011)
age	0.022**	0.020**	0.018**	0.016**	0.027**	0.024**
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
age squared	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
tenure	0.012**	0.014**	0.011**	0.011**	0.008**	0.012**
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
tenure squared	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
fixed term contract	-0.030	-0.023*	-0.117**	-0.097**	-0.143**	-0.115**
	(0.020)	(0.010)	(0.020)	(0.015)	(0.012)	(0.010)
characteristics of coworkers						
(%) tertiary educ.		0.103		-0.010		0.208**
		(0.119)		(0.053)		(0.053)
age		0.019		0.002		0.002
		(0.021)		(0.010)		(0.011)
age squared		0.000 [†]		0.000		0.000
		(0.000)		(0.000)		(0.000)
tenure		-0.006		-0.006*		-0.006**
		(0.006)		(0.002)		(0.006)
tenure squared		-0.001		0.000		-0.001**
		(0.000)		(0.000)		(0.000)
(%) under 30		-0.442*		-0.073		-0.599**
		(0.184)		(0.047)		(0.169)
(%) over 55		0.468**		0.081		-0.150 [†]
		(0.166)		(0.056)		(0.089)
(%) females		-0.261**		-0.103*		-0.827**
		(0.069)		(0.044)		(0.140)
(%) fixed term		-0.024		-0.065		-0.204**
		(0.075)		(0.050)		(0.035)
fixed term*under 30		0.075		0.022		0.484**
		(0.230)		(0.079)		(0.076)
females*under 30		0.334		-0.023		-0.056
		(0.246)		(0.100)		(0.100)
tertiary educ.*under 30		0.328		0.351**		0.113
		(0.304)		(0.094)		(0.074)
tenure*over 55		-0.008		0.002		0.036**
		(0.010)		(0.003)		(0.007)
females*tertiary educ.		0.661**		0.614**		0.354**
		(0.230)		(0.155)		(0.069)

Standard errors (in parentheses) clustered by firm; significance levels : † : 10% * : 5% ** : 1%
coefficients in this Table refer to controls in the set of estimates presented in Table 5.

Appendix 2

Definition of labor turnover (by skill group)

Using the same information on workers' tenure that enabled us to assign firms to the three cohorts, we construct a set of variables to gauge the extent of restructuring in pre-transition firms. We first identify the hires of each firm that occurred in the first year of transition¹² (the 'transitional workers') separately for low, medium and high skilled workers (*ls*, *ms* and *hs*); we then locate these 'transitional workers' within each skill group according to its tenure distribution within each firm. Next, we define a firm as a 'low turnover' one for a given skill group (*low*, *medium*, *high*) if their 'transitional workers' in that skill group are all located between the 25th and the 50th percentile of its skill specific tenure distribution (i.e. if only a minority of workers in that skill group was hired during transition). We define a firm as an 'intermediate turnover one' in a given skill group if the firm has at least one transitional worker positioned above the median whereas it does not have any transitional workers positioned above the 75th percentile of the tenure distribution in the corresponding skill group (i.e. if the majority of workers in that skill group was hired during transition). Finally a 'high turnover' firm in a given skill group has its transitional worker positioned above the 75th percentile of the skill specific tenure distribution (i.e. almost all workers in that skill group were hired during transition). This classification assigns to the reference group of firms characterized by 'absence of turnover' those that have their transitional workers positioned just below the 25th percentile of each (skill specific) tenure distribution thus allowing some rate of turnover to be 'natural' within the firm (e.g. due to workers' sickness, retirement, death) i.e. not strictly related to any strategy of employment restructuring.

The advantage of this approach is that it allows us to capture non-linear returns from alternative turnover strategies pursued by firms. To give a practical example, a (pre-transition) firm presenting high turnover for low skilled workers only (i.e. whose restructuring strategy entailed its main changes in the production process) probably presents different characteristics (in terms of initial conditions or distribution of efficiency gains) with respect to a firm which introduced a high turnover of medium and high skilled workers (as this probably carried out a structural restructuring of key

¹²i.e. a hire occurred in 1990 in Poland and Hungary and 1991 for Czech Republic

areas of its economic activity).

Cohort effects, labor turnover and average wages

Table A2 extends the set of coefficients presented in Table 6 (obtained from the estimates on average wages). In more detail, the first set of coefficients (for each country) completes the results presented in columns [2], [5], [8] - Table 6 referring to estimates that include cohort specific sectoral and size dummies. The second set of coefficients for each country supplements the results in columns [3], [6], [9] where we also add interactions between labor turnover and size.

In terms of interpretation, the coefficients of the three cohort dummies compare average wages paid by (uncovered) firms in each cohort.¹³ The results show that in the Czech Republic pre-transition and early-middle transition firms pay higher average wages than late transition ones (difference significant at 5% level). This is also the case in Poland (particularly for pre-transition firms) while wage differences between cohorts in Hungary are only weakly significant. This evidence suggests that, once we control for differences in sector and size within each cohort, productivity and wages increase with the age of the firm. Moreover the coefficients for labor turnover in pre-transition firms show that the latter is associated with efficiency gains but these are distributed unevenly across firm size in each country.¹⁴

¹³After accounting for all other characteristics of firms, workers and coworkers.

¹⁴For simplicity, we do not report here the entire set of coefficients, including interactions between labor turnover and size, which are available from the authors upon request. These suggest that in Czech Republic and (to a lesser extent) Poland big firms which restructured in transition were probably forced to do so by bad initial conditions (not yet recovered) as opposed to Hungary where big firms enjoy the main efficiency gains. In all countries medium sized firms (250-999 employees) enjoy some efficiency gains and these are generally higher in the Czech Republic than in Hungary and Poland.

Table A2: Restructuring in transition and average wages (completes Table 6.)

	CZ [1]	CZ [2]	HU [3]	HU [4]	PL [5]	PL [6]
pre ⁱⁱ	9.749**	9.741**	10.860**	10.715**	7.162**	7.118**
	(0.514)	(0.510)	(0.213)	(0.211)	(0.232)	(0.228)
early-middle ⁱⁱ	9.736**	9.752**	10.889**	10.886**	7.053**	6.978**
	(0.514)	(0.501)	(0.206)	(0.205)	(0.229)	(0.226)
late ⁱⁱ	9.368**	9.420**	10.661**	10.671**	6.993**	6.920**
	(0.558)	(0.562)	(0.227)	(0.225)	(0.235)	(0.232)
low turnover of low skilled	-0.028	-0.180*	0.190**	0.223	-0.115**	-0.046
	(0.055)	(0.075)	(0.065)	(0.188)	(0.042)	(0.095)
low turnover of medium skilled	-0.063	-0.213**	0.062†	0.181**	-0.037	0.003
	(0.042)	(0.059)	(0.034)	(0.061)	(0.028)	(0.066)
low turnover of high skilled	-0.057	-0.239**	0.048	0.019	-0.175**	-0.189**
	(0.043)	(0.062)	(0.050)	(0.093)	(0.030)	(0.062)
interm. turnover of low skilled	-0.067	-0.232*	0.057	0.032	-0.058	-0.137*
	(0.063)	(0.101)	(0.064)	(0.097)	(0.042)	(0.062)
interm. turnover of medium skilled	-0.033	-0.087	0.096**	0.020	-0.043	0.084
	(0.053)	(0.081)	(0.035)	(0.069)	(0.031)	(0.073)
interm. turnover of high skilled	-0.016	-0.082	0.041	-0.012	-0.071†	0.041
	(0.053)	(0.074)	(0.044)	(0.079)	(0.037)	(0.076)
high turnover of low skilled	-0.064	-0.150†	0.120*	-0.012	-0.112**	-0.053
	(0.064)	(0.086)	(0.035)	(0.076)	(0.037)	(0.084)
high turnover of medium skilled	-0.005	-0.095	0.124**	-0.061	-0.022	0.029
	(0.059)	(0.086)	(0.044)	(0.075)	(0.029)	(0.064)
high turnover of high skilled	0.089	-0.031	0.264**	0.311**	0.032	0.220**
	(0.069)	(0.086)	(0.047)	(0.076)	(0.045)	(0.083)

Standard errors (in parentheses) clustered by firm: † : 10% * : 5% ** : 1%

coefficients in this Table refer to controls in the set of estimates presented in Table 6.

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