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Abstract

In this paper, we look at the evolution of firms' wage structures using a linked employer-employee dataset, which has longitudinal information for firms and covers a large fraction of the Czech labor market during the period 1998-2006. We first look at the evolution of individual wage determination and find evidence of slightly increasing returns to human capital and diminishing gender inequality. We then document sharp increases in both within-firm and between-firm inequality. We investigate various hypotheses to explain these patterns: increased domestic and international competition, an increasingly decentralized wage bargaining, skill biased technological change and a changing educational composition of the workforce. We find some support for that all these factors have contributed to the changes in the Czech wage structure, and that increased sorting is strongly associated with the observed changes in wage inequality.

Keywords: sorting, wage inequality, linked employer-employee dataset, firm panel data, Czech Republic

JEL Codes: J31, P31

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1. Introduction

In recent years, many countries have experienced a considerable increase in wage inequality. The topic has especially been debated and studied in the US, where the increase was among the largest, and this has led to various new theories to explain the phenomenon.¹ The aim of this paper is to document the changes in the wage structure of the Czech Republic (CR) in the post-transition years and to look more closely at a number of key explanations of these changes. In particular, our interest is in improving our understanding of the factors that have given rise to the rather large increase in wage inequality in CR during the first decade of the current century.

There are a number of reasons why a study of the CR may be of more general interest. One important reason is that the country is one of the ten new member states that joined the European Union in April 2004, eight of which from the former so called "Soviet bloc". Always among the frontrunners, the CR recently caught up Portugal (member state since 1986) in terms of GDP per capita (Eurostat, 2006). This evolution indicates interesting developments and a rapid transformation of the Czech economy. Still, relatively little attention has been paid to how the EU accession and EU membership have affected the new member states' labor markets.² In order to gain EU membership, successive governments launched significant deregulation of several product markets, leading to an increase in the competition faced by Czech firms both from abroad and within its borders. Another important change is the move from a relatively centralized, tripartite wage bargaining system towards an increasingly decentralized wage setting. Finally, it should

¹ See e.g. Bound and Johnson (1992), Katz and Murphy (1992) and Katz and Autor (1999) for early evidence; Acemoglu (2002), Card and DiNardo (2002) and Lemieux (2008) for recent surveys; and Lemieux (2006) and Autor et al. (2008), for new developments.

² Only a few papers have documented the dynamics of the labor market in the new EU member states, see e.g., Flanagan (1995); Filer, Jurajda and Planovsky (1999), Svejnar (1999); Jurajda and Terell (2003); Münich, Svejnar and Terrell (2005). The great majority of previous studies have been concerned with the early transition years and consequently the evidence from late-transition and pre- and post- EU accession years is rather thin on the ground. A recent study by Jurajda (2003) looks at returns to schooling in the CR using linked employer-employee data for year 2002. The paper shows that the return to education is relatively high, close to 10%. Another paper exploiting recent micro data is Csillag (2008) in which alternative models of wage determination are tested.

also be noticed that there has been a continued "marketization" of the Czech economy also during the period that followed the first post-revolution years.

A key feature of our analysis is that we focus on the role of firm characteristics in explaining wages, and how changes in the structure of firms' workforces could affect wage inequality. The role of the firm is often overlooked in the literature on wage inequality despite the fact that a large literature documents the role of firm size, foreign ownership, or more generally firm productivity. We argue that changes in firms' characteristics are likely to have contributed to the increase in wage inequality. One particular mechanism that we study is the role of increased sorting: the best firms acquiring a larger proportion of the most productive workers in the economy. A theoretical explanation of this evolution was suggested by Kremer and Maskin (1996): When workers with different skills are imperfect substitutes, tasks are complementary and output is more sensitive to skills in some tasks, an increase in skill dispersion causes firms to specialize in one skill level or another.

We make use of a comprehensive linked employer-employee dataset covering all workers in more than 2,000 private sector firms, i.e. an average of one million individuals each year, over the period 1998-2006.³ We document a sizeable increase in overall wage inequality in the CR (see Figures 1 and 2). The 90/10 percentile ratio of hourly wage increased by 7 per cent over the 1998-2006 period. The increase has chiefly occurred above the median of the distribution. The 90/50 percentile ratio of hourly wage increased by 4.9 per cent, while the 50/10 wage percentile ratio only increased by 2.2 per cent, and has actually been decreasing since 2003.

<Insert figures 1 and 2 around here>

In order to understand what is driving this increase in wage inequality, we first run standard Mincerian regressions and look at the evolution of the estimated parameters over time. We find rising returns to university education up to 2002, then slightly declining; rising returns to age and tenure; and a gradually decreasing gender wage gap. We next

³ See section 3 for a detailed description of the dataset we use for this analysis.

decompose the evolution of wage inequality into within- and between-firm wage inequality. Within-firm wage inequality is found to be strongly associated with foreign ownership and the share of individuals with a university education. Between-firm inequality (within sectors) is principally explained by differences in the variation across industries in the share of university- educated workers within firms. Our main findings suggest that the changing educational composition both within and between firms is an important engine driving increased inequality in the CR. We show that our results can also be interpreted as evidence of increased sorting: the more productive firms in specific sectors are more able to attract those who recently graduated from university as they offer higher wages and better career prospects.

Other important factors are the growth in foreign ownership contributing to more within-firm inequality. However, we find little evidence that increased competition (higher import penetration and lower average profit margins) at the industry-level is associated with within-firm wage inequality, especially when controlling for firm fixed effects. We also control for the change in wage bargaining system that took place gradually since the mid-nineties by adding dummies describing the level of bargaining (at the level of the sector or at the level of the firm). A more decentralized wage bargaining could lead to more pay differentiation between firms and hence contribute to increased wage inequality. However, we do not find evidence of firm-level bargaining being associated with increased within-firm or between-firm inequality.

The current paper also contributes to the recent literature on the role of the changing educational composition as a determinant of wage inequality (see e.g., Lemieux, 2006), but differs from previous studies as we focus on the firm level. In the beginning of the nineties, the Czech government took a number of steps to increase the number of university graduates and as a result university enrolment went up by approximately 50 percent.⁴ Thus, another important development is the upskilling of the Czech labor force. We show that this change in the educational composition of the workforce is important in explaining recent changes in the Czech wage structure.

⁴ See Jurajda (2003) for a discussion and analysis.

The remainder of the paper is organized as follows. Section 2 describes the data sets used. In section 3, we discuss the various theories that could explain observed changes in the Czech wage structure. Section 4 presents our empirical methodology and results. Section 5 concludes and discusses the policy implications of our findings, as well as some ideas for future research.

2. Data

For our analysis we use a linked employer-employee dataset covering all workers from over 2,000 companies during the period 1998-2006. This was provided by a private consulting company on behalf of the Czech Ministry of Labor and Social Affairs.⁵

The sampling strategy used by the consultancy firm is to survey all firms with more than 250 employees every year, while a rotating random sample is adopted for smaller firms (15% of all firms between 50 and 249 employees, and 4.5% of firms between 10 and 49 employees). However, as we are concerned that our results could be influenced by the sampling frame, we have also constructed a balanced panel data set consisting of the firms that are present for the entire period and test the robustness of our cross-sectional findings on it. Table 1 provides basic summary statistics for both the unbalanced and the balanced panel of firms.

<Insert Table 1 around here>

Our analysis will be based on a subsample consisting of private sector firms employing at least 10 employees. These restrictions provide us an unbalanced panel with 2,416 firm observations and on average little over 1 million employee observations per year.

The data set contains information about the age, gender, education, occupation, firm tenure⁶, hourly wage, total annual compensation as well as its wage and bonus components. The hourly wage information is of unusually high quality as it is reported by

⁵ See Eriksson and Pytlikova (2004) or Jurajda and Paligorova (2006) for more details.

⁶ Tenure information is available since 2002.

the employer and it is not associated with measurement errors arising from division of aggregate income by number of working hours. The quality of hourly wage variable is moreover increased by the fact that the same information is used within the firms to calculate the employee's vacation and absence pay.

One limitation of the data is that for confidentiality reasons, it is not straightforward to follow individuals over time, as the individual identifier is not necessarily the same every year. However, the firm identifiers remain unchanged and hence, the data set is a firm panel.

The data set provides some information about important firm characteristics, such as sales, profits, type of ownership, industry (3-digit NACE) and the region where the firm operates. We received separate information about the firm's bargaining regime for years 2002 to 2005. Thus, we know whether there is a firm-specific bargaining agreement, either at the sector or firm level. However, we can distinguish between these two types of bargaining regimes for year 2006, only. Nevertheless, we will try to analyze the effect of the presence of a bargaining agreement and the difference between the two bargaining regimes (see Appendix A for a description of the distribution of this variable).

In addition, the data set has been augmented with industry (3-digit NACE) level variables describing international and domestic competition, which will be describe in more detail in a later section.

3. Hypotheses

The Czech Republic is a relatively small EU country with little over 10 million inhabitants situated right in the middle of the EU. It resulted from the break up of Czechoslovakia on January 1st, 1993, which itself had broken free from the communist regime in November 1989, following the Velvet Revolution. It rapidly adopted a series of reforms to transform the economy and was labeled as a fast reformer. Early in transition, the unemployment rate remained very low relatively to other fast reformers like Poland and Hungary, what was considered by some economists as a puzzle. However, the differences vis-à-vis other transition economies shrunk after the deep recession in 1997-98

(see Appendix B for a few economy-wide indicators). In 2007, it had a GDP per capita equal to 80% of EU average, one of the best score among the new member states after Slovenia. The country also became more integrated in the world economy, as the share of imports and exports in GDP grew substantially from around 50% to around 70% in less than a decade. The country also takes up the rotating EU presidency for six months from January 1st, 2009.

Over the last ten years, the Czech Republic has experienced several changes that are likely to have contributed to changes in the Czech wage structure. One important change is the gradual shift from a centralized, tripartite wage bargaining system towards a considerably more decentralized wage setting. In particular, the wage setting process has moved to the firm level⁷, which is likely to have changed the relative weights of employer and employee effects on the wage structure. This development has removed the constraints on firm-specific bargaining, increased local bargaining power and as a consequence we would expect to observe an increase in the variability of the firm-specific component of wages. In other words, decentralized wage setting is hypothesized to have given rise to an increase in wage dispersion between as well as within firms.

Another potential source of pressures towards changes in the wage structure is the increased competition in product markets, above all because of privatization of former state-owned companies, but also due to growing international competition as a consequence of the Czech Republic becoming a new EU member state and the deregulation of several markets as a result of the process towards the EU membership. Increasing competition is predicted to erode firms' product market rents, what could then lead to reduced wage dispersion among employers.⁸ As for the impact of increased

⁷ In 2006 almost 40% of firms in our sample of private firms have firm-level wage bargaining, while only 15% of firms have higher (that is mainly industry) level wage bargaining.

⁸ Syverson (2004) shows that in a market with heterogeneous firms, stronger competition will in general lead to less dispersion in productivity. He also provides some empirical evidence in support of this hypothesis.. Changes in the productivity dispersion are also likely to be associated with changes in the wage dispersion both within and between firms.

competition on firms' internal wage structure, the prediction is ambiguous (see e.g., Cuñat and Guadalupe, 2006).⁹

A factor that has been emphasized in the international discussion about changes in wage dispersion is the phenomenon of skill-biased technological change which, it is argued, has led to an increase in returns to observable as well unobservable skills and in inter-firm wage differentials (Aghion, Howitt and Violante, 2004; Acemoglu, 2002; Lemieux, 2008). Skill-biased technological change can in the case of the Czech Republic have been further reinforced by the fact that the transition from a planned to a market economy is associated with a considerable skill mismatch. One can also conceive of the introduction of market-oriented business practices or a shift to a business environment with considerably stronger competition as forms of "technological revolutions" (Caselli, 1999). If these new (marketing, management and other business) practices are implemented at different rates, we would expect increased differences in wages between firms and that increased wage dispersion may develop even for observationally similar employees.

Another explanation has been suggested by Lemieux (2006) in a recent paper. He shows by means of a simple variance decomposition exercise that part of the increase in wage inequality in the U.S. can be explained by a mechanical relationship with the share of college-educated workers.¹⁰ A similar argument was also put forward by Kremer and Maskin (1996), who argue that a change in the skill distribution is followed by increased sorting. This could be the case also for Czech Republic, where there was an increase in supply of university graduates over the studied period, see the discussion above and Jurajda (2003). In our sample, the share of employees with university education went up from 9.5% to 10.8% over the period we analyze, see Table 2. In our analysis we control for the changing educational composition *at the firm level*.

<Insert Table 2 around here>

⁹ This is because on one hand more competition raises the reward to market stealing activities and hence implies steeper incentive contracts; on the other hand, the residual demand shrinks and so market stealing becomes less attractive and accordingly, incentive pay schemes become flatter.

¹⁰ Autor, Katz and Kearney (2008) disagree with this claim and find evidence in favor of skill-biased technical change.

4. Results

Increased Wage Inequality

We begin by considering changes in how the labor market rewards employees' skills. For this purpose we estimate conventional Mincerian wage equations, i.e., for each year we regress log real gross hourly earnings on individual's age, tenure, gender and education:

$$\log W_{it} = c + \beta_1 \text{TENURE}_{it} + \beta_2 (\text{TENURE}_{it})^2 + \beta_3 \text{AGE}_{it} + \beta_4 (\text{AGE}_{it})^2 + \beta_5 \text{Gender}_{it} + \sum \beta_j \text{Edu}_{jit} + \text{Controls} + \varepsilon_{it}$$

Education enters the equation as a set of education dummy variables with secondary education being the omitted category. We add industry, region and ownership dummies, and occupational dummies as controls. We have estimated these equations with and without firm effects. The tenure variable is only available as from 2002 onwards and we report estimates with this included for the shorter time period.

The estimates are displayed in Tables 3 and 4. They indicate that returns to experience and university education have increased slightly, while the gender gap has narrowed by about four percentage points. The results are quite robust to the introduction of firm fixed effects (Table 4). Further, we can observe some dynamics at the lower end of the educational distribution. The gap between employees with a secondary education and workers with no or primary education is shrinking over time, which may in part be due to the substantial increases in minimum wages during the period (see Appendix C). We do not observe important differences in the explanatory power over time. The fact that the returns to education did not increase much could, as we discussed in section 3, be explained by the evolution of supply. We focus on this relationship in the next steps of our analysis.

<Insert Tables 3 and 4 around here>

Increased Within- and Between-Firms Inequality

Next we exploit the fact that our linked employer-employee data allow us to look for sources of the changes in inequality by decomposing wage inequality into its between-firm and within-firm components. In Table 5, we report these two measures computed as standard deviations. As can be seen from the table, within-firm wage inequality remained stagnant during the first half of the period after which we notice a sharp increase: in 2006 the standard deviation has reached its highest level during the period and is 50% higher than its initial level. The between-firm dispersion decreased from 1998 to 2000, and then started to increase again.¹¹

<Insert Table 5 around here>

Another way of studying differences in pay levels across firms, while accounting for differences in the composition of their workforces is to look at the variance of the estimated firm effects. In Table 6, we report the standard deviation of firm effects obtained after controlling for differences in human capital. The dispersion of firm effects exhibits first a slight decline, then an increase, bringing it back to the same level as in the beginning of the period. The last column in table 6 shows the adjusted R²s from wage regression with firm fixed effects as the only regressors. The adjusted coefficients of determination have increased by 2-3 percentage points over the period¹², and most of this occurred around 2002. The rise in the role of the firm fixed effects in predicting wages occurred roughly in parallel with the increase of the variance of the employer wage effects. This is consistent with increased sorting of skills between firms, on which we will provide additional evidence below.

¹¹ It should be pointed out that the patterns in between- and within-firm inequality are sensitive to how the sample of firms is defined. We find a similar evolution when we consider the balanced panel only.

¹² As can be seen from Table 2, the adjusted R²s from estimations which included human capital, region and industry dummies do not exhibit a corresponding increase.

<Insert Table 6 >

Simply looking at the overall evolution of wage inequality does not enable us to validate or invalidate the various theories described in section 3. The increase in inequality could be the result of distinct forces pulling the wage structure in different directions: increased competition could reduce differences between firms, but these changes could be counteracted by decentralization of wage setting processes and technological change (interpreted broadly). In the next subsections we try to disentangle the impact of these different forces.

Explaining Within-Firm Wage Inequality

We construct three explanatory variables to capture changes in domestic and international competition through imports and exports. Our measure of domestic competition is computed as the average profit margin at the 3-digit industry level (from our linked data set). We adopt two conventional measures of competition from international trade: the export intensity and the import penetration ratio, both measured at the 3-digit industry level. These variables were computed using information on imports and exports by 3-digit industry levels provided to us by the Czech Statistical Office.

Equipped with these additional explanatory variables, we run regressions with the estimated firm effects as dependent variable and log labor productivity, the share of workers with university level education, foreign ownership, firm size, region, industry, and year dummies as explanatory variables. A collection of estimates are displayed in Table 7.

<Insert Table 7 around here>

One of the hypotheses we want to test is whether stronger competition reduces firms' "ability to pay", resulting in a reduction in the firm-specific level component of pay. A problem in estimating the impact of our trade variables is that they turned out be strongly

correlated, and hence, entering them both in the same regression is clearly associated with multicollinearity. For this reason they are included separately in columns 1 and 2. As can be seen, both of them carry a positive coefficient, but neither proved to differ significantly from zero. On the other hand, our average profit margin variable has, as expected, a positive effect (column 3), as it increases the ability of the firm to pay wages above average. However, this effect disappears when we include both the trade and the competition variables together with labor productivity (column 5). In effect, the firm effects appear to be explained primarily by differences in labor productivity, foreign ownership and firm size. It is also worth noting that the year dummies are tracing a relatively strong trend increase in the firm effects. Another interesting finding is that the presence of collective bargaining is associated with a higher average firm wage, as we would have expected as well (columns 6 and 7).

Turning now to consider what are the main factors explaining within-firm wage inequality, we employ a similar specification as in Table 7 but with within-firm wage dispersion as the dependent variable and a number of variables describing the composition of the firm's workforce as additional explanatory variables. Three different specifications are presented: without firm effects, and with industry and firm effects, respectively. As before, due to multicollinearity, the export and import variables have to be entered separately.

<Insert Table 8 around here>

As can be seen from Table 8, the firm effects account for a substantial portion of the equation's explanatory power. Not surprisingly, entering firm effects gives rise to quite large changes in the coefficient estimates of the other explanatory variables as both these and the dependent variable are not likely to change significantly in the short run. For a given human capital composition of the workforce, larger and foreign owned firms have a larger pay spread. One observation also worth making is that the year dummies are consistently insignificant, indicating that the time series pattern in within-firm dispersion observed in Table 5 are explained by the variables included in the regression model.

Turning to our competition variables, we find that higher import penetration and lower average profit margin in the industry are associated with a lower within-firm spread in wages in the OLS specification, but these findings are not robust once we introduce industry or firm effects. Our results regarding the effect of collective bargaining imply that there is no significant relationship with within-firm wage dispersion, suggesting that bargaining mainly affects the level and not the variance of wages. However, these results are not robust with respect to omission of the firm size variable. Collective bargaining and firm level agreements in particular, are more common in larger firms. Hence, exclusion of firm size from the regressions in Table 8 yields positive and statistically significant coefficients (estimation results are available from the authors upon request).

Last but not least, we find a strong positive relationship between the share of university-educated workers and within-firm wage dispersion. This finding is robust to the introduction of firm effects, which indicates that the changing composition of the workforce plays an important role in explaining changes in wage dispersion across firms. This could in turn be explained by increased sorting, as more productive firms can more easily attract new cohorts of university-educated employees. In the next subsections we explore this relationship further. The estimated coefficient is large, but it should be remembered that the share of college-educated workers is quite small on average. In order to gauge the size of the effect, note that the difference in standard deviation between a firm with a 6% share and another one with a 12% share is estimated at 6 points (*ceteris paribus*), compared to an average of within-firm inequality between 48 and 76.

Explaining Between-Firm Wage Inequality

To examine the heterogeneity of between-firm wage dispersion, we look at differences across industries. For this purpose, we first compute within-industry between-firm wage dispersion equal to the standard deviation of the firm average wage within each 3-digit industry. Next, we estimate a regression where the dependent variable is between-firm wage dispersion within each 3-digit industry. Accordingly, all the explanatory variables are measured at the industry level, too. Results are presented in Table 9.

<Insert Table 9 around here>

We find that stronger competition is associated with lower between-firm wage dispersion in the OLS specification, but once industry fixed effects are introduced, this relationship disappears. Similar findings apply to foreign ownership and the collective bargaining variable.

Once again the educational composition plays an important role: the standard deviation of the share of university educated workers within an industry is positively and strongly related to between-firm wage dispersion.

Increased Sorting: The Evolution of the Share of College-Educated Workers

Our final empirical test relates the composition of the workforce to firm level characteristics like labor productivity and firm size. We enter firm effects to control for the fact that some firms had a higher proportion of educated workers to begin with.

<Insert Table 10 around here>

Results are shown in Table 10, from which we may observe that the share of university-educated workers is strongly and positively correlated with labor productivity and firm size, even after catering for firm effects. This would tend to confirm our hypothesis of increased sorting: more productive firms employ an increasing share of university-educated workers. Further support is found in Table 11 which shows that the share of college-educated workers increased from 11% to around 16% in firms in the top decile of the productivity distribution, while it remained constant in the bottom decile around 5%.

<Insert Table 11 around here>

5. Conclusion

In this paper, we have used a rich linked employer-employee dataset covering a significant proportion of Czech private sector firms and their employees to analyze the determinants of post-transition wage inequality in the Czech Republic. We find that increased foreign ownership and increased returns to education could be associated with increased wage inequality. Another important factor is the change in the educational composition and increased sorting of university-educated individuals into the more productive firms. These two factors explain a large fraction of the observed increase in within-firm as well as between-firm wage dispersion.

In future work, we want to examine more closely the link between wage dispersion and productivity dispersion, as well as to investigate in more detail the increased sorting mechanism that we documented (see e.g., Faggio et al. (2007)). We would also like to analyze the role of pay for performance. Lemieux, Macleod and Parent (2006) have shown that the rise in pay for performance has accounted for about 25% of the growth in male wage inequality in the United States between the late 70s and early 90s. As we know very little about the effects of increased performance pay in other countries, such a study would be a valuable contribution to the literature.

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Table 1: Summary statistics**A. The unbalanced panel of firms**

| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|-----------------------------|----------|----------|---------|----------|-----------|-----------|-----------|-----------|-----------|
| Number of individuals | 790,386 | 822,280 | 863,399 | 928,893 | 1,013,771 | 1,082,701 | 1,168,270 | 1,273,828 | 1,475,725 |
| Number of firms | 1,489 | 1,838 | 2,151 | 2,402 | 2,372 | 2,445 | 2,853 | 3,156 | 3,040 |
| Average employment | 531 | 448 | 401 | 387 | 427 | 443 | 410 | 404 | 485 |
| Average hourly wages in CZK | 78.64 | 83.33 | 91.24 | 100.18 | 106.30 | 114.75 | 120.30 | 126.01 | 136.58 |
| Average yearly wages in CZK | 142974.8 | 157736.2 | 169095 | 178599.7 | 187337.8 | 203812.2 | 213309.1 | 219120.2 | 215995.3 |

B. The balanced panel of firms

| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|-----------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Number of individuals | 406,810 | 385,351 | 388,387 | 381,227 | 417,393 | 393,551 | 395,504 | 399,683 | 422,811 |
| Number of firms | 481 | 481 | 481 | 481 | 481 | 481 | 481 | 481 | 481 |
| Average employment | 846 | 801 | 808 | 793 | 868 | 818 | 822 | 831 | 879 |
| Average hourly wages in CZK | 80.65 | 86.90 | 95.35 | 105.78 | 109.57 | 117.43 | 122.11 | 128.96 | 139.21 |

Table 2: Evolution of the share of workers with university education

| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|-------------------------------------|-------|-------|-------|-------|-------|--------|--------|--------|--------|
| % of ind. with university education | 9.52% | 9.46% | 9.66% | 9.46% | 9.77% | 10.56% | 10.70% | 10.70% | 10.81% |

Figure 1: Changes in real hourly wage inequality as measured by P90/P10 percentile ratio, years 1998-2006

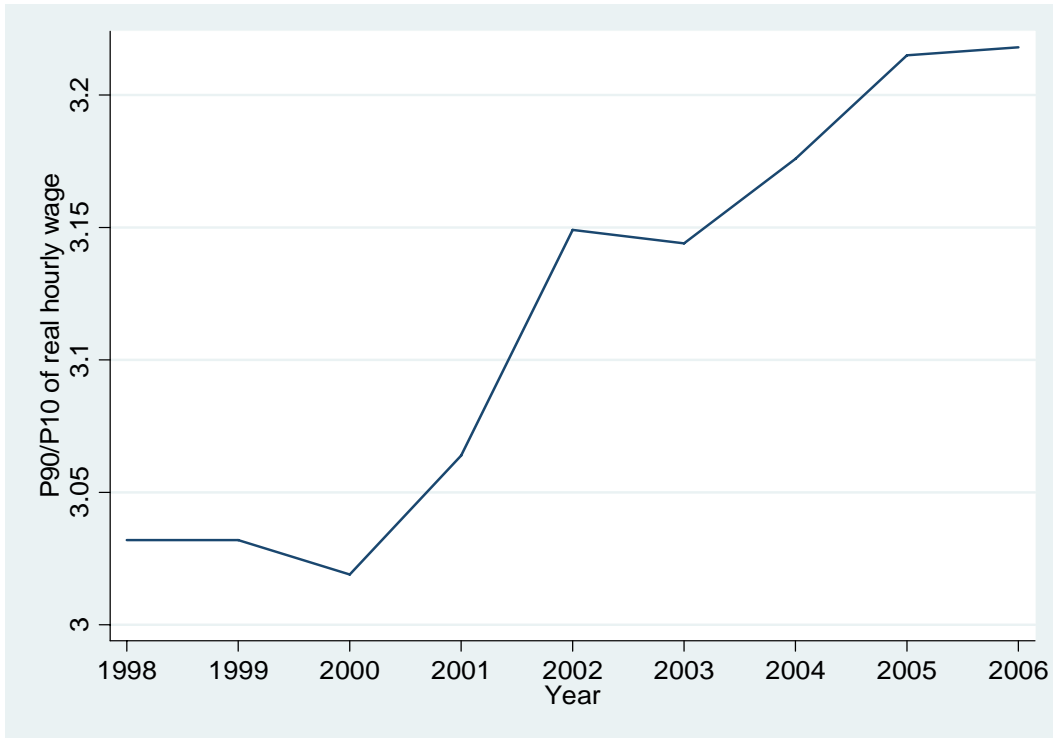


Figure 2: Changes in real hourly wage inequality as measured by P90/P50 and P50/P10 percentile ratios, years 1998-2006

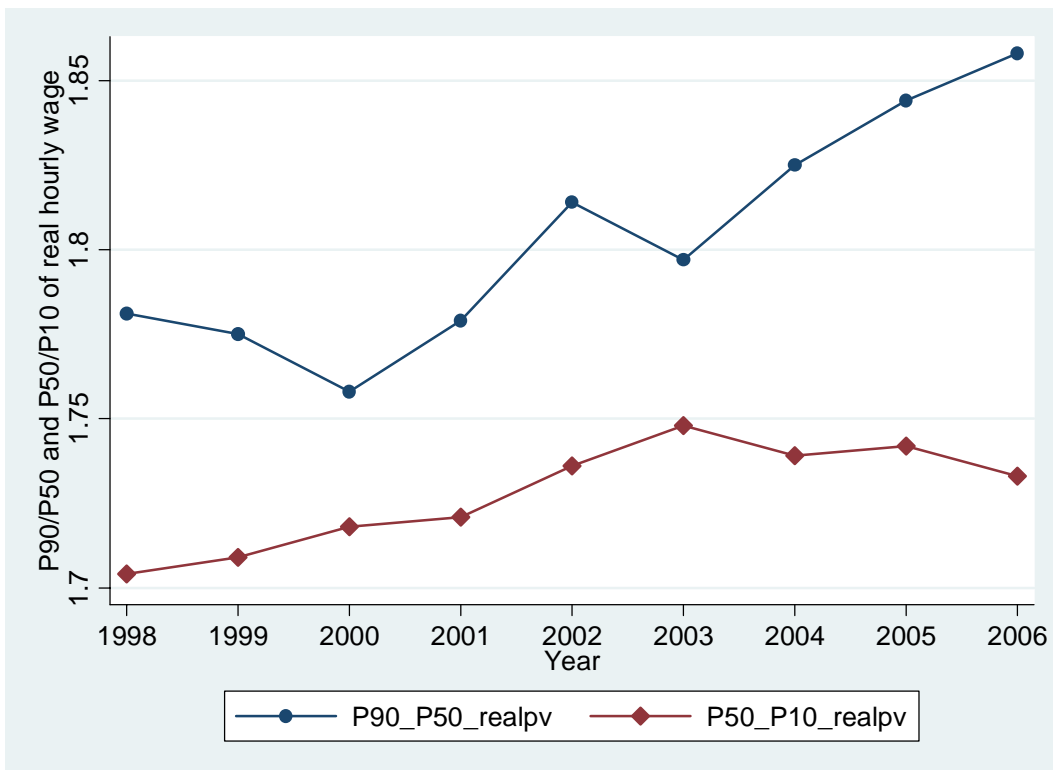


Table 3: Individual wage regressions

A. Unbalanced sample, no tenure (1998-2006)

| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|------------------|-----------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | <i>Dep. Var.: Log Hourly Wage</i> | | | | | | | | |
| Age | 0.035 [0.000]*** | 0.042 [0.000]*** | 0.039 [0.000]*** | 0.036 [0.000]*** | 0.036 [0.000]*** | 0.036 [0.000]*** | 0.038 [0.000]*** | 0.039 [0.000]*** | 0.039 [0.000]*** |
| Age-sq/100 | -0.038 [0.000]*** | -0.048 [0.000]*** | -0.044 [0.000]*** | -0.04 [0.000]*** | -0.041 [0.000]*** | -0.04 [0.000]*** | -0.042 [0.000]*** | -0.043 [0.000]*** | -0.043 [0.000]*** |
| Female | -0.245 [0.001]*** | -0.24 [0.001]*** | -0.228 [0.001]*** | -0.23 [0.001]*** | -0.232 [0.001]*** | -0.227 [0.001]*** | -0.223 [0.001]*** | -0.217 [0.001]*** | -0.222 [0.001]*** |
| No or primary | -0.271 [0.006]*** | -0.391 [0.006]*** | -0.255 [0.006]*** | -0.249 [0.006]*** | -0.299 [0.007]*** | -0.372 [0.007]*** | -0.267 [0.006]*** | -0.305 [0.006]*** | -0.236 [0.006]*** |
| Lower secondary | -0.206 [0.001]*** | -0.185 [0.001]*** | -0.162 [0.001]*** | -0.179 [0.001]*** | -0.177 [0.001]*** | -0.176 [0.001]*** | -0.182 [0.001]*** | -0.192 [0.001]*** | -0.188 [0.001]*** |
| University | 0.578 [0.002]*** | 0.564 [0.002]*** | 0.591 [0.001]*** | 0.606 [0.001]*** | 0.634 [0.001]*** | 0.625 [0.001]*** | 0.607 [0.001]*** | 0.618 [0.001]*** | 0.615 [0.001]*** |
| Foreign | 0.053 [0.001]*** | 0.133 [0.001]*** | 0.095 [0.001]*** | 0.091 [0.001]*** | 0.08 [0.001]*** | 0.075 [0.001]*** | 0.119 [0.001]*** | 0.121 [0.001]*** | 0.119 [0.001]*** |
| Firm Size | 0.044 [0.000]*** | 0.038 [0.000]*** | 0.041 [0.000]*** | 0.034 [0.000]*** | 0.023 [0.000]*** | 0.026 [0.000]*** | 0.018 [0.000]*** | 0.02 [0.000]*** | 0.019 [0.000]*** |
| Region dummies | YES | | | | | | | | |
| Industry dummies | YES | | | | | | | | |
| Observations | 601922 | 687321 | 783587 | 857366 | 905251 | 977137 | 1111814 | 1214734 | 1253130 |
| R-squared | 0.44 | 0.43 | 0.43 | 0.44 | 0.44 | 0.44 | 0.43 | 0.45 | 0.44 |

Notes: 10, 5 and 1 % levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

B. Unbalanced sample, with tenure (2002-2006)

| | 2002 | 2003 | 2004 | 2005 | 2006 |
|------------------|----------------------------------|----------------------|----------------------|----------------------|----------------------|
| | <i>Dep.Var.: Log Hourly Wage</i> | | | | |
| Age | 0.022 [0.000]*** | 0.022 [0.000]*** | 0.022 [0.000]*** | 0.022 [0.000]*** | 0.022 [0.000]*** |
| Age-sq/100 | -0.028 [0.000]*** | -0.027 [0.000]*** | -0.027 [0.000]*** | -0.027 [0.000]*** | -0.027 [0.000]*** |
| Tenure | 0.019 [0.000]*** | 0.02 [0.000]*** | 0.023 [0.000]*** | 0.024 [0.000]*** | 0.025 [0.000]*** |
| Tenure-sq/100 | -0.035 [0.000]*** | -0.037 [0.000]*** | -0.043 [0.000]*** | -0.046 [0.000]*** | -0.047 [0.000]*** |
| Female | -0.224 [0.001]*** | -0.217 [0.001]*** | -0.214 [0.001]*** | -0.208 [0.001]*** | -0.212 [0.001]*** |
| No or primary | -0.284 [0.007]*** | -0.353 [0.007]*** | -0.237 [0.005]*** | -0.272 [0.005]*** | -0.199 [0.006]*** |
| Lower secondary | -0.166 [0.001]*** | -0.167 [0.001]*** | -0.172 [0.001]*** | -0.182 [0.001]*** | -0.177 [0.001]*** |
| University | 0.64 [0.001]*** | 0.634 [0.001]*** | 0.619 [0.001]*** | 0.628 [0.001]*** | 0.626 [0.001]*** |
| Foreign | 0.093 [0.001]*** | 0.091 [0.001]*** | 0.134 [0.001]*** | 0.139 [0.001]*** | 0.139 [0.001]*** |
| Firm Size | 0.016 [0.000]*** | 0.017 [0.000]*** | 0.008 [0.000]*** | 0.011 [0.000]*** | 0.006 [0.000]*** |
| Region dummies | YES | | | | |
| Industry dummies | YES | | | | |
| Observations | 880131 | 977005 | 1111717 | 1214667 | 1222194 |
| R-squared | 0.47 | 0.47 | 0.46 | 0.48 | 0.47 |

Notes: 10, 5 and 1 % levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

Table 4: Individual wage regressions - with firm fixed effect

A. Unbalanced sample, no tenure (1998-2006)

| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|-----------------|-----------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | <i>Dep. Var.: Log Hourly Wage</i> | | | | | | | | |
| Age | 0.032 [0.000]*** | 0.039 [0.000]*** | 0.035 [0.000]*** | 0.032 [0.000]*** | 0.032 [0.000]*** | 0.032 [0.000]*** | 0.034 [0.000]*** | 0.034 [0.000]*** | 0.033 [0.000]*** |
| Age-sq/100 | -0.034 [0.000]*** | -0.042 [0.000]*** | -0.039 [0.000]*** | -0.035 [0.000]*** | -0.035 [0.000]*** | -0.035 [0.000]*** | -0.036 [0.000]*** | -0.037 [0.000]*** | -0.036 [0.000]*** |
| Female | -0.209 [0.001]*** | -0.205 [0.001]*** | -0.192 [0.001]*** | -0.194 [0.001]*** | -0.185 [0.001]*** | -0.185 [0.001]*** | -0.184 [0.001]*** | -0.18 [0.001]*** | -0.182 [0.001]*** |
| No or primary | -0.288 [0.005]*** | -0.414 [0.006]*** | -0.263 [0.006]*** | -0.251 [0.006]*** | -0.282 [0.006]*** | -0.288 [0.007]*** | -0.227 [0.005]*** | -0.23 [0.005]*** | -0.186 [0.006]*** |
| Lower secondary | -0.182 [0.001]*** | -0.176 [0.001]*** | -0.16 [0.001]*** | -0.158 [0.001]*** | -0.156 [0.001]*** | -0.155 [0.001]*** | -0.159 [0.001]*** | -0.162 [0.001]*** | -0.152 [0.001]*** |
| University | 0.527 [0.001]*** | 0.506 [0.001]*** | 0.534 [0.001]*** | 0.544 [0.001]*** | 0.56 [0.001]*** | 0.545 [0.001]*** | 0.526 [0.001]*** | 0.542 [0.001]*** | 0.54 [0.001]*** |
| Constant | 3.602 [0.005]*** | 3.532 [0.004]*** | 3.677 [0.004]*** | 3.835 [0.004]*** | 3.883 [0.004]*** | 3.94 [0.004]*** | 3.961 [0.004]*** | 3.996 [0.003]*** | 4.092 [0.003]*** |
| Observations | 601922 | 687321 | 783587 | 857366 | 905251 | 977137 | 1111814 | 1214734 | 1253130 |
| R-squared | 0.6 | 0.58 | 0.58 | 0.6 | 0.6 | 0.6 | 0.59 | 0.59 | 0.58 |

Notes: 10, 5 and 1 % levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

B. Unbalanced sample, with tenure (2002-2006)

| | 2002 | 2003 | 2004 | 2005 | 2006 |
|-----------------|----------------------------------|----------------------|----------------------|----------------------|----------------------|
| | <i>Dep.Var.: Log Hourly Wage</i> | | | | |
| Age | 0.021 [0.000]*** | 0.021 [0.000]*** | 0.021 [0.000]*** | 0.021 [0.000]*** | 0.02 [0.000]*** |
| Age-sq/100 | -0.025 [0.000]*** | -0.024 [0.000]*** | -0.024 [0.000]*** | -0.024 [0.000]*** | -0.023 [0.000]*** |
| Tenure | 0.018 [0.000]*** | 0.019 [0.000]*** | 0.02 [0.000]*** | 0.021 [0.000]*** | 0.022 [0.000]*** |
| Tenure-sq/100 | -0.032 [0.000]*** | -0.033 [0.000]*** | -0.036 [0.000]*** | -0.04 [0.000]*** | -0.042 [0.000]*** |
| Female | -0.183 [0.001]*** | -0.182 [0.001]*** | -0.181 [0.001]*** | -0.177 [0.001]*** | -0.18 [0.001]*** |
| No or primary | -0.264 [0.006]*** | -0.276 [0.007]*** | -0.202 [0.005]*** | -0.2 [0.005]*** | -0.162 [0.006]*** |
| Lower secondary | -0.15 [0.001]*** | -0.15 [0.001]*** | -0.154 [0.001]*** | -0.157 [0.001]*** | -0.147 [0.001]*** |
| University | 0.573 [0.001]*** | 0.56 [0.001]*** | 0.542 [0.001]*** | 0.558 [0.001]*** | 0.555 [0.001]*** |
| Constant | 4.026 [0.004]*** | 4.081 [0.004]*** | 4.121 [0.004]*** | 4.17 [0.004]*** | 4.272 [0.004]*** |
| Observations | 880131 | 977005 | 1111717 | 1214667 | 1222194 |
| R-squared | 0.62 | 0.62 | 0.61 | 0.61 | 0.6 |

Notes: 10, 5 and 1 % levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

Table 5: the evolution of within-firm and between-firms real hourly wage inequality

| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Within-Firm Wage Inequality | 48.38 | 49.24 | 48.91 | 52.33 | 55.84 | 62.29 | 63.14 | 65.26 | 74.35 |
| Between- firm Wage Inequality | 48.75 | 43.33 | 41.01 | 43.78 | 47.91 | 55.86 | 54.13 | 55.35 | 63.45 |

Note: Within-firm wage inequality is equal to the average standard deviation of real hourly wage within firms. Between- firm wage Inequality is defined as the standard deviation of the average real hourly wage between firms in our sample.

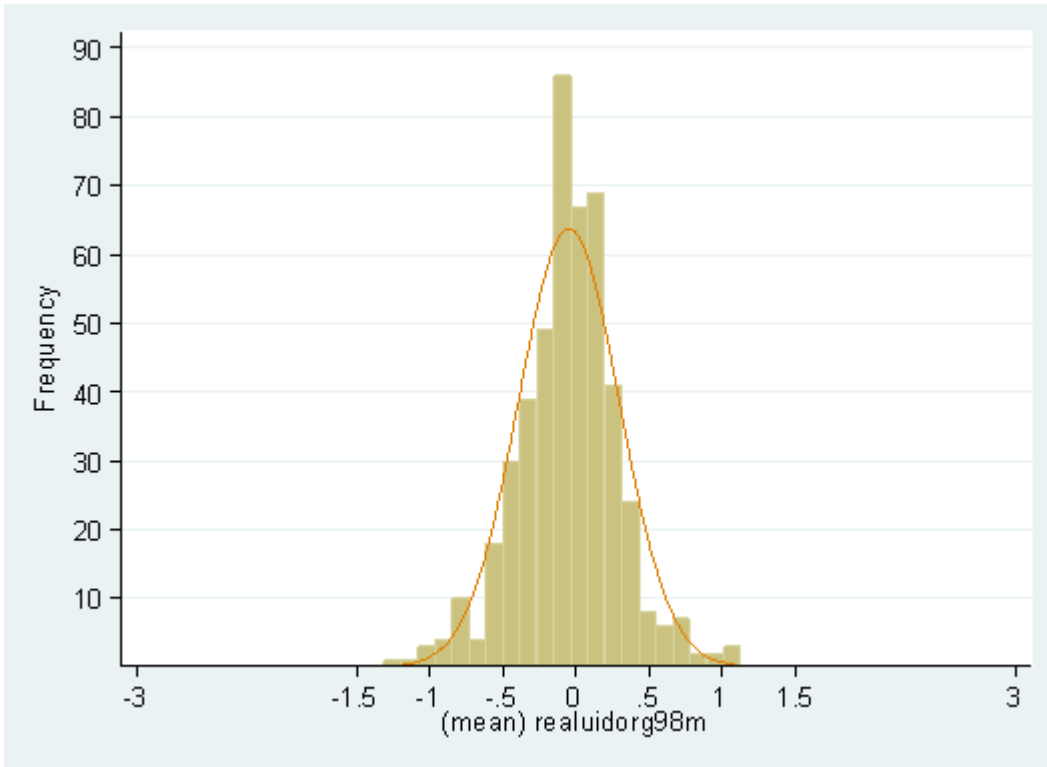
Table 6: Evolution of the standard deviation of the fixed effect

| Year | Standard deviation of the fixed effect from the log real yearly earnings | Standard deviation of the fixed effect from the log real hourly wage | Adjusted R ² s from wage regressions with firm fixed effects only |
|------|--|--|--|
| 1998 | 0.402 | 0.31 | 0.400 |
| 1999 | 0.409 | 0.289 | 0.392 |
| 2000 | 0.374 | 0.279 | 0.399 |
| 2001 | 0.364 | 0.276 | 0.416 |
| 2002 | 0.409 | 0.28 | 0.423 |
| 2003 | 0.404 | 0.291 | 0.432 |
| 2004 | 0.406 | 0.29 | 0.422 |
| 2005 | 0.4 | 0.285 | 0.420 |
| 2006 | 0.429 | 0.298 | 0.414 |

Note: The Adj R² from wage regressions with firm effects are run on the same number of observations as wage regressions with human capital variables shown in Table 3 in order to be comparable.

Figure 3: Evolution of the distribution of the firm fixed effect (log yearly earnings)

1998



2006

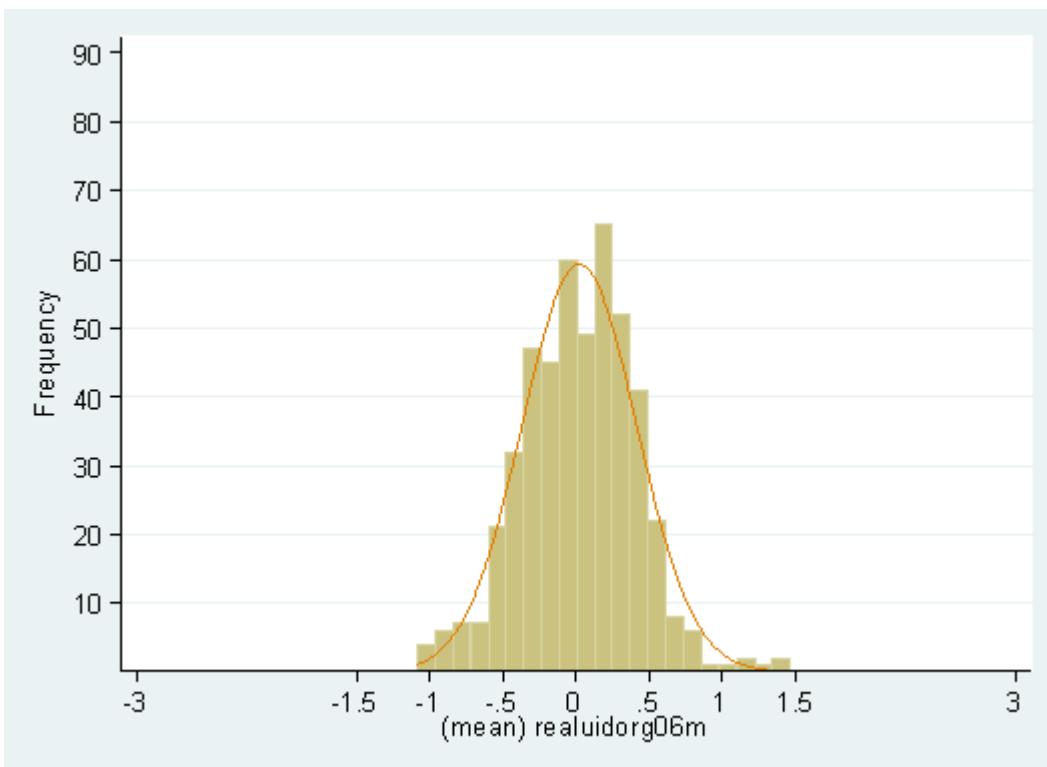


Table 7: Explaining the Firm-Fixed Effect in the Wage Regression

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|--------------------------------|-------------------------------------|----------------------|----------------------|----------------------|----------------------|---------------------|---------------------|
| | <i>Dep.Var.: Firm-Fixed Effects</i> | | | | | | |
| Export Intensity | -0.006 [0.021] | - | - | - | 0.028 [0.021] | - | - |
| Import Penetratio Ratio | - | 0.001 [0.003] | - | - | -0.002 [0.003] | - | - |
| Average Industry Profit Margin | - | - | 0.121 [0.036]*** | - | 0.014 [0.061] | - | - |
| Log Labor Productivity | - | - | - | 0.102 [0.002]*** | 0.111 [0.003]*** | - | - |
| Foreign | 0.144 [0.006]*** | 0.144 [0.006]*** | 0.133 [0.005]*** | 0.080 [0.005]*** | 0.091 [0.006]*** | 0.136 [0.006]*** | 0.146 [0.011]*** |
| Log Size | 0.035 [0.002]*** | 0.035 [0.002]*** | 0.021 [0.001]*** | 0.014 [0.002]*** | 0.021 [0.002]*** | 0.018 [0.002]*** | 0.018 [0.004]*** |
| Coll. Agreement (Y/N) | - | - | - | - | - | 0.015 [0.005]*** | - |
| Firm Level Coll. Agr. | - | - | - | - | - | - | 0.026 [0.011]** |
| Industry Level Coll. Agr. | - | - | - | - | - | - | 0.037 [0.016]** |
| Year dummies | YES | | | | | | |
| Region dummies | YES | | | | | | |
| Industry dummies | YES | | | | | | |
| Constant | -0.795 [0.193]*** | -0.798 [0.193]*** | -0.428 [0.020]*** | -1.036 [0.026]*** | -1.359 [0.155]*** | -0.429 [0.278] | -0.212 [0.210] |
| Observations | 7626 | 7626 | 20692 | 12312 | 4923 | 10922 | 2737 |
| R-squared | 0.39 | 0.39 | 0.45 | 0.57 | 0.57 | 0.51 | 0.54 |

Notes: 10, 5 and 1 % levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses. Firm fixed effects are calculated from hourly real wage regressions with HC controls.

Table 8: Explaining Within-Firm Wage Inequality

| | OLS | FE(NACE) | FE(firm) | OLS | FE(NACE) | FE(firm) | OLS | FE(NACE) | FE(firm) | OLS | FE(NACE) | FE(firm) |
|--------------------------------|--|-----------------------|------------------------|-----------------------|-----------------------|------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|
| | <i>Dep. Var.: Within Firm Standard deviation of Hourly Real Wage</i> | | | | | | | | | | | |
| Export Intensity | -10.787 [1.290]*** | -0.513 [4.286] | -1.230 [2.768] | - - | - - | - - | - - | - - | - - | -9.207 [1.519]*** | 1.024 [4.465] | -0.933 [2.876] |
| Import Penetration Ratio | - - | - - | - - | -2.330 [0.611]*** | -0.534 [0.690] | -0.163 [0.508] | - - | - - | - - | 0.244 [0.701] | -0.518 [0.710] | -0.113 [0.523] |
| Average Industry Profit Margin | - - | - - | - - | - - | - - | - - | 47.713 [6.286]*** | 7.025 [7.266] | 8.568 [5.236] | 73.479 [11.039]*** | 19.999 [13.606] | 11.349 [10.574] |
| Log Size | 5.182 [0.379]*** | 4.790 [0.413]*** | -2.514 [1.381]* | 4.957 [0.379]*** | 4.788 [0.413]*** | -2.507 [1.381]* | 4.331 [0.232]*** | 4.894 [0.254]*** | -2.918 [0.692]*** | 5.082 [0.381]*** | 4.774 [0.414]*** | -2.487 [1.386]* |
| Foreign | 18.198 [1.209]*** | 17.023 [1.219]*** | 1.583 [1.823] | 17.837 [1.212]*** | 17.033 [1.219]*** | 1.603 [1.822] | 23.335 [0.920]*** | 19.260 [0.914]*** | 4.235 [1.268]*** | 17.760 [1.211]*** | 17.029 [1.222]*** | 1.568 [1.831] |
| Share of NoEdu/PrimEdu | -16.502 [18.433] | -18.086 [17.998] | -37.224 [21.920]* | -11.538 [18.487] | -18.054 [17.996] | -37.130 [21.920]* | -15.881 [11.360] | -5.655 [10.786] | -16.052 [10.876] | -18.865 [18.457] | -18.329 [18.054] | -36.519 [22.026]* |
| Share of Lower Secondary Edu | -5.022 [3.278] | -6.828 [3.333]** | -0.004 [5.703] | -5.602 [3.289]* | -6.857 [3.333]** | 0.016 [5.703] | -12.000 [2.004]*** | -4.993 [1.996]** | -3.351 [2.551] | -5.390 [3.290] | -6.973 [3.344]** | -0.038 [5.739] |
| Share of University Edu | 108.405 [4.382]*** | 150.845 [6.061]*** | 127.093 [12.316]*** | 115.008 [4.306]*** | 150.833 [6.061]*** | 127.140 [12.316]*** | 167.740 [2.801]*** | 174.076 [3.585]*** | 110.998 [5.774]*** | 108.201 [4.378]*** | 150.601 [6.073]*** | 127.000 [12.350]*** |
| Share of Females | -23.737 [2.267]*** | -22.319 [3.241]*** | -46.289 [8.659]*** | -25.040 [2.269]*** | -22.369 [3.240]*** | -46.333 [8.660]*** | -10.251 [1.330]*** | -17.262 [2.089]*** | -18.121 [4.482]*** | -21.732 [2.290]*** | -22.382 [3.249]*** | -46.424 [8.695]*** |
| StDev of Age | -0.757 [0.362]** | -0.041 [0.377] | -0.431 [0.564] | -0.619 [0.363]* | -0.043 [0.377] | -0.427 [0.564] | -2.173 [0.205]*** | -1.141 [0.205]*** | 0.373 [0.279] | -0.798 [0.363]** | -0.080 [0.379] | -0.441 [0.567] |
| Year dummies | YES | | | | | | | | | | | |
| Region dummies | YES | | | | | | | | | | | |
| Constant | 34.550 [5.025]*** | 22.258 [5.639]*** | 98.419 [10.151]*** | 29.508 [4.997]*** | 22.289 [5.082]*** | 97.666 [9.954]*** | 34.341 [2.901]*** | 21.327 [2.917]*** | 55.649 [4.877]*** | 37.509 [4.998]*** | 22.053 [5.670]*** | 97.960 [10.198]*** |
| Observations | 7651 | 7651 | 7651 | 7651 | 7651 | 7651 | 20819 | 20819 | 20819 | 7622 | 7622 | 7622 |
| R-squared | 0.23 | 0.30 | 0.74 | 0.23 | 0.30 | 0.74 | 0.31 | 0.41 | 0.78 | 0.24 | 0.30 | 0.74 |

Notes: 10, 5 and 1 % levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

Table 8: Explaining Within-Firm Wage Inequality *Cont.*

| | OLS | FE(NACE) | FE(firm) | OLS | FE(NACE) | FE(firm) | OLS | FE(NACE) | OLS |
|--------------------------------|--|-----------------------|------------------------|-----------------------|-----------------------|------------------------|-----------------------|------------------------|------------------------|
| | <i>Dep. Var.: Within Firm Standard deviation of Hourly Real Wage</i> | | | | | | | | |
| Coll. Agreement (Y/N) | 0.181 [1.139] | 2.534 [1.156]** | -2.083 [1.702] | 5.974 [1.676]*** | 2.464 [1.730] | -4.918 [3.184] | - | - | - |
| Firm Level Coll. Agr. | - | - | - | - | - | - | 2.867 [2.873] | 3.205 [3.034] | 10.217 [4.082]** |
| Industry Level Coll. Agr. | - | - | - | - | - | - | 3.292 [3.376] | 2.502 [4.316] | 5.515 [5.369] |
| Export Intensity | - | - | - | -22.754 [4.854]*** | 8.068 [10.554] | -0.291 [7.576] | - | - | -41.037 [14.783]*** |
| Import Penetration Ratio | - | - | - | 11.850 [4.467]*** | -5.240 [10.283] | -0.951 [6.680] | - | - | 22.761 [14.402] |
| Average Industry Profit Margin | - | - | - | 79.252 [15.417]*** | 20.653 [19.906] | 7.591 [15.884] | - | - | 75.652 [38.273]** |
| Log Size | 4.220 [0.392]*** | 5.031 [0.422]*** | -6.517 [1.345]*** | 4.085 [0.592]*** | 4.498 [0.641]*** | -5.648 [2.396]** | 5.023 [0.969]*** | 6.913 [1.027]*** | 4.140 [1.527]*** |
| Foreign | 28.022 [1.334]*** | 20.898 [1.310]*** | 0.788 [1.677] | 18.454 [1.570]*** | 17.271 [1.588]*** | -0.683 [2.399] | 29.961 [2.794]*** | 24.352 [2.945]*** | 22.939 [3.664]*** |
| Share of NoEdu/PrimEdu | -20.545 [17.863] | 0.353 [16.687] | -3.337 [22.905] | -22.681 [25.707] | -16.666 [25.329] | -5.542 [44.548] | -22.288 [32.972] | -7.346 [32.452] | -27.302 [43.217] |
| Share of Lower Secondary Edu | -14.536 [3.103]*** | -3.804 [3.044] | 8.568 [5.769] | -9.019 [4.528]** | -10.624 [4.600]** | 5.953 [10.331] | -22.968 [7.577]*** | -9.200 [7.778] | -18.866 [11.229]* |
| Share of University Edu | 177.891 [4.004]*** | 211.102 [5.777]*** | 129.087 [11.897]*** | 115.898 [6.250]*** | 171.850 [8.780]*** | 160.112 [21.182]*** | 194.905 [8.827]*** | 220.180 [13.579]*** | 117.197 [15.007]*** |
| Share of Females | -12.401 [2.075]*** | -18.935 [3.356]*** | -31.948 [8.353]*** | -20.684 [3.187]*** | -19.561 [4.534]*** | -50.485 [13.859]*** | -11.854 [4.771]** | -17.592 [7.696]** | -13.381 [8.076]* |
| StDev of Age | -3.351 [0.316]*** | -1.155 [0.319]*** | -0.217 [0.493] | -0.726 [0.495] | -0.144 [0.523] | -0.512 [0.917] | -2.804 [0.726]*** | -0.076 [0.773] | 0.969 [1.248] |
| Year dummies | <i>YES</i> | | | | | <i>Cross-section</i> | | | |
| Region dummies | <i>YES</i> | | | | | | | | |
| Constant | 60.402 [49.561] | 48.514 [45.235] | 100.768 [32.623]*** | 43.355 [44.748] | 32.293 [43.439] | 110.165 [37.878]*** | 50.135 [10.253]*** | 10.840 [11.032] | 31.227 [17.235]* |
| Observations | 10942 | 10942 | 10942 | 4854 | 4854 | 4854 | 2743 | 2743 | 1251 |
| R-squared | 0.35 | 0.47 | 0.86 | 0.22 | 0.29 | 0.77 | 0.34 | 0.46 | 0.20 |

Notes: 10, 5 and 1 % levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

Table 8: Explaining Within-Firm Wage Inequality Cont.

| | OLS | FE(NACE) | FE(firm) | OLS | FE(NACE) | FE(firm) |
|--------------------------------|--|------------|------------|-------------|-------------|-------------|
| | <i>Dep. Var.: Within Firm Standard deviation of Hourly Real Wage</i> | | | | | |
| Coll. Agreement (Y/N) | - | - | - | 2.757 | 2.249 | -3.273 |
| | - | - | - | [1.905] | [1.967] | [3.796] |
| Export Intensity | - | - | - | -4.243 | 20.459 | 7.627 |
| | - | - | - | [5.171] | [11.713]* | [8.505] |
| Import Penetration Ratio | - | - | - | 3.904 | -14.558 | -6.403 |
| | - | - | - | [4.656] | [10.327] | [7.329] |
| Average Industry Profit Margin | - | - | - | 93.092 | 40.656 | 13.805 |
| | - | - | - | [16.315]*** | [20.717]** | [16.742] |
| Log Labor Productivity | 13.121 | 12.218 | 5.845 | 13.176 | 12.603 | 6.191 |
| | [0.385]*** | [0.465]*** | [0.727]*** | [0.901]*** | [1.052]*** | [2.238]*** |
| Log Size | 2.324 | 3.184 | -1.309 | 2.191 | 2.736 | 7.707 |
| | [0.302]*** | [0.339]*** | [0.991] | [0.686]*** | [0.764]*** | [3.028]** |
| Foreign | 14.277 | 11.699 | 2.786 | 12.443 | 10.888 | 0.942 |
| | [1.069]*** | [1.074]*** | [1.577]* | [1.748]*** | [1.804]*** | [2.732] |
| Share of NoEdu/PrimEdu | 5.339 | 1.323 | -21.029 | -1.701 | 11.730 | 6.438 |
| | [16.613] | [15.864] | [16.745] | [40.357] | [39.827] | [56.116] |
| Share of Lower Secondary Edu | -1.848 | -2.552 | -9.546 | 0.414 | -3.566 | 1.428 |
| | [2.467] | [2.488] | [3.381]*** | [5.080] | [5.261] | [12.004] |
| Share of University Edu | 160.187 | 175.120 | 120.779 | 116.469 | 163.837 | 219.469 |
| | [3.825]*** | [4.965]*** | [7.882]*** | [8.246]*** | [11.972]*** | [30.274]*** |
| Share of Females | -2.633 | -2.328 | -8.634 | -3.951 | -0.235 | -22.465 |
| | [1.618] | [2.729] | [6.566] | [3.689] | [5.472] | [17.995] |
| StDev of Age | -1.994 | -1.727 | -0.229 | -0.704 | -1.060 | -0.525 |
| | [0.272]*** | [0.281]*** | [0.428] | [0.584] | [0.638]* | [1.127] |
| Year dummies | YES | | | | | |
| Region dummies | YES | | | | | |
| Constant | -51.790 | -54.688 | 9.803 | -47.072 | -45.592 | -13.247 |
| | [4.864]*** | [5.259]*** | [10.033] | [39.019] | [38.442] | [47.318] |
| Observations | 12373 | 12373 | 12373 | 3108 | 3108 | 3108 |
| R-squared | 0.36 | 0.45 | 0.80 | 0.28 | 0.36 | 0.80 |

Notes: 10, 5 and 1 % levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

Table 9: Explaining Between-Firm Wage Inequality

| | OLS | OLS | OLS | OLS | FE (NACE) | FE (NACE) | FE (NACE) | FE (NACE) |
|----------------------------------|---|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | <i>Dep. Var.: Between-Firm Standard deviation of Hourly Real Wage</i> | | | | | | | |
| Export Intensity | -7.272 [1.372]*** | - | - | -4.905 [2.001]** | 0.170 [2.917] | - | - | 0.893 [3.087] |
| Import Penetration Ratio | - | -4.796 [1.087]*** | - | -1.139 [1.557] | - | -0.817 [1.195] | - | -0.938 [1.268] |
| Average Industry Profit Margin | - | - | 36.610 [8.782]*** | 35.028 [9.050]*** | - | - | 1.488 [8.120] | 0.579 [8.422] |
| Log of Average Size | 1.428 [0.675]** | 1.236 [0.677]* | -1.715 [0.639]*** | 1.453 [0.674]** | 2.167 [1.616] | 2.143 [1.613] | -0.958 [1.335] | 2.302 [1.624] |
| Share of Foreign | 5.004 [3.063] | 4.385 [3.078] | 19.518 [3.515]*** | 3.962 [3.094] | 5.388 [3.938] | 5.205 [3.945] | 11.179 [4.190]*** | 5.179 [4.056] |
| StDev of Share of University Edu | 237.167 [10.405]*** | 242.953 [10.304]*** | 215.262 [10.004]*** | 236.632 [10.328]*** | 215.096 [12.010]*** | 214.588 [11.951]*** | 135.030 [13.134]*** | 215.027 [12.104]*** |
| StDev of Share of Females | 18.401 [7.990]** | 16.687 [8.059]** | 7.153 [8.603] | 16.890 [8.028]** | 12.754 [10.582] | 14.020 [10.561] | 3.434 [10.584] | 14.895 [10.836] |
| Year dummies | YES | | | | | | | |
| Constant | 0.825 [4.427] | 0.253 [4.454] | 20.875 [4.562]*** | -0.152 [4.427] | -0.369 [10.091] | -5.135 [9.981] | 22.552 [8.267]*** | -1.705 [10.206] |
| Observations | 607 | 607 | 1431 | 604 | 607 | 607 | 1431 | 604 |
| R-squared | 0.56 | 0.55 | 0.32 | 0.57 | 0.80 | 0.80 | 0.67 | 0.80 |

Notes: 10, 5 and 1 % levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

Table 9 Cont.: Explaining Between-Firm Wage Inequality – Cont.

| | OLS | OLS | FE(NACE) | FE(NACE) | OLS | OLS |
|---|------------------------|------------------------|------------------------|------------------------|------------------------|-----------------------|
| <i>Dep. Var.: Between-Firm Standard deviation of Hourly Real Wage</i> | | | | | | |
| Share of Firms with Coll. Agreement | -14.543 [3.130]*** | -1.175 [2.771] | -6.385 [4.187] | -6.155 [4.007] | - | - |
| Share of Firms with Firm-level Coll. Agreement | - | - | - | - | -26.312 [14.320]* | 21.644 [19.947] |
| Share of Firms with Industry-level Coll. Agreement | - | - | - | - | -19.965 [10.840]* | -0.982 [12.278] |
| Export Intensity | - | -4.863 [3.721] | - | 1.492 [5.761] | - | 14.117 [20.734] |
| Import Penetration Ratio | - | -1.784 [3.163] | - | -0.448 [4.500] | - | -22.940 [18.617] |
| Average Industry Profit Margin | - | 19.187 [11.355]* | - | 1.080 [11.049] | - | 11.674 [42.817] |
| Log of Average Size | 1.853 [0.838]** | 2.135 [0.847]** | -0.799 [2.225] | 2.270 [2.400] | -0.744 [3.643] | -8.311 [4.677]* |
| Share of Foreign | 14.440 [3.815]*** | 2.208 [3.384] | 9.269 [4.588]** | 3.652 [4.886] | 6.258 [9.536] | 0.469 [12.022] |
| StDev of Share of University Edu | 284.791 [13.170]*** | 245.577 [11.797]*** | 258.445 [17.106]*** | 239.737 [15.333]*** | 326.625 [68.287]*** | 221.165 [112.263]* |
| StDev of Share of Females | -24.116 [11.699]** | 21.547 [10.163]** | 18.995 [15.662] | 38.516 [16.191]** | -26.130 [37.006] | 42.739 [42.575] |
| Year dummies | <i>YES</i> | | | | <i>Cross-section</i> | |
| Constant | 7.522 [5.449] | 0.737 [5.347] | 22.329 [13.391]* | -4.090 [14.954] | 35.507 [20.867]* | 58.271 [23.199]** |
| Observations | 745 | 426 | 745 | 426 | 66 | 39 |
| R-squared | 0.46 | 0.60 | 0.85 | 0.84 | 0.44 | 0.38 |

Notes: 10, 5 and 1 % levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

Table 9 Cont.: Explaining Between-Firm Wage Inequality – Cont.

| | OLS | OLS | OLS | FE(NACE) | FE(NACE) |
|--|-------------|-------------|----------------------|-------------|-------------|
| <i>Dep.Var.: Between-Firm Standard deviation of Hourly Real Wage</i> | | | | | |
| Share of Firms with Coll. Agreement | - | -2.116 | - | - | -6.003 |
| | | [2.728] | | | [3.824] |
| Share of Firms with Firm-level Coll. Agreement | - | - | 2.495 | - | - |
| | | | [18.367] | | |
| Share of Firms with Industry-level Coll. Agreement | - | - | -0.704 | - | - |
| | | | [11.013] | | |
| Export Intensity | - | -2.951 | 7.564 | - | -1.210 |
| | | [3.670] | [21.546] | | [5.653] |
| Import Penetration Ratio | - | -2.560 | -11.368 | - | -0.555 |
| | | [3.093] | [18.769] | | [4.207] |
| Average Industry Profit Margin | - | 16.538 | -6.317 | - | 5.902 |
| | | [11.526] | [37.913] | | [10.369] |
| StDev of Log Labor Productivity/100 | 0.013 | 0.049 | 0.702 | 0.008 | 0.056 |
| | [0.003]*** | [0.010]*** | [0.203]*** | [0.002]*** | [0.009]*** |
| Log of Average Size | -1.403 | 1.350 | -4.591 | -1.060 | 3.403 |
| | [0.670]** | [0.863] | [4.737] | [1.532] | [2.269] |
| Share of Foreign | 17.610 | 1.913 | 0.227 | 9.587 | 3.227 |
| | [3.554]*** | [3.302] | [10.724] | [4.357]** | [4.578] |
| StDev of Share of University Edu | 250.938 | 240.593 | 238.986 | 166.428 | 236.157 |
| | [10.994]*** | [11.697]*** | [98.004]** | [14.870]*** | [14.425]*** |
| StDev of Share of Females | -5.648 | 20.102 | 34.842 | -10.950 | 48.892 |
| | [8.961] | [10.040]** | [37.580] | [12.012] | [15.272]*** |
| Year dummies | <i>YES</i> | | <i>Cross-section</i> | <i>YES</i> | |
| Constant | 18.936 | 10.692 | 30.489 | 23.636 | -5.824 |
| | [4.822]*** | [5.395]** | [25.190] | [9.574]** | [14.415] |
| Observations | 1322 | 414 | 37 | 1322 | 414 |
| R-squared | 0.37 | 0.63 | 0.57 | 0.68 | 0.87 |

Notes: 10, 5 and 1 % levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

Table 10: Explaining the Share of College Educated Workers

| <i>Dep. Var.: Share of College-Educated Workers</i> | (1) | (2) | (2) |
|---|-------------------|-------------------|-------------------|
| Log(Labor productivity) | 0.027*** (0.001) | 0.023*** (0.001) | 0.002*** (0.001) |
| Log(Size) | -0.012*** (0.001) | -0.005*** (0.001) | -0.024*** (0.001) |
| Year dummies | YES | YES | YES |
| Region dummies | NO | YES | YES |
| Industry fixed effect | NO | YES | NO |
| Firm fixed effect | NO | NO | YES |
| Constant | -0.045*** (0.008) | -0.061*** (0.007) | 0.186*** (0.012) |
| Adj. R ² | 0.09 | 0.57 | 0.89 |
| # obs. | 12,432 | 12,432 | 12,432 |

Table 11: Share of college-educated workers by labor productivity decile

| <i>Share of College-Educated Workers</i> | Top productivity decile | Bottom productivity decile |
|---|--------------------------------|-----------------------------------|
| 1998 | 11.05% | 4.69% |
| 1999 | 12.25% | 5.14% |
| 2000 | 11.69% | 5.49% |
| 2001 | 12.22% | 4.72% |
| 2002 | 12.40% | 4.59% |
| 2003 | 13.53% | 4.02% |
| 2004 | 14.81% | 4.48% |
| 2005 | 15.06% | 4.23% |
| 2006 | 15.63% | 5.04% |

Appendix A: Distribution of collective agreement

| | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|-------|-------|-------|-------|-------|
| No. of firms without a collective agreement | 557 | 794 | 587 | 469 | 1,182 |
| No. of firms with a collective agreement | 1,293 | 1,448 | 1,346 | 1,704 | 1,568 |
| - with firm-level agreement | - | - | - | - | 1,102 |
| - with industry level agreement | - | - | - | - | 464 |

Appendix B: The development of main economic indicators: 1994 – 2006

| CZECH REPUBLIC | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|------|------|------|------|------|------|------|------|------|------|------|-------|-------|
| GDP annual growth at 2000 const. prices | 2,2 | 5,9 | 4,0 | -0,7 | -0,8 | 1,3 | 3,6 | 2,5 | 1,9 | 3,6 | 4,2 | 6,1 | 6,1 |
| Inflation rate | 10,0 | 9,1 | 8,8 | 8,5 | 10,7 | 2,1 | 3,9 | 4,7 | 1,8 | 0,1 | 2,8 | 1,9 | 2,5 |
| CPI (year2005=100) | 59,1 | 64,5 | 70,2 | 76,2 | 84,4 | 86,2 | 89,4 | 93,6 | 95,4 | 95,5 | 98,1 | 100,0 | 102,5 |
| Unemployment rate | 4,3 | 4,0 | 3,9 | 4,8 | 6,5 | 8,7 | 8,8 | 8,1 | 7,3 | 7,8 | 8,3 | 7,9 | 7,1 |
| Labor productivity growth | 1,0 | 4,2 | 3,3 | -0,9 | 0,9 | 3,9 | 4,0 | 2,2 | 1,6 | 4,6 | 4,1 | 4,6 | 4,4 |
| The growth of gross average earnings % | 18,6 | 18,6 | 18,3 | 9,9 | 9,2 | 8,4 | 6,4 | 8,7 | 7,3 | 6,6 | 6,6 | 5,2 | 6,5 |
| The growth of real average earnings % | 7,8 | 8,7 | 8,7 | 1,3 | -1,4 | 6,2 | 2,4 | 3,8 | 5,4 | 6,5 | 3,7 | 3,2 | 3,9 |

Source: Czech Statistical Office

Appendix C: Development of minimum wage (MW) and other labor market measures: 1993 – 2006.

| CZECH REPUBLIC changes from 1.1. | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|-------------------------------------|-------|-------|-------|-------|-------|-------|------------------|------------------|-------|-------|-------|-------|-------|------------------|
| Monthly MW | 2.200 | 2.200 | 2.200 | 2.500 | 2.500 | 2.650 | 3.250 3.600 * | 4.000 4.500 * | 5.000 | 5.700 | 6.200 | 6.700 | 7185 | 7.580 7.955 * |
| Hourly MW | 12,00 | 12,00 | 12,00 | 13,60 | 13,60 | 14,80 | 18,00 20,00 * | 22,30 25,00 * | 30,00 | 33,90 | 36,90 | 39,60 | 42,50 | 44,70 48,10 * |
| Increase in MW in % | 0,0 | 0,0 | 0,0 | 13,6 | 0,0 | 6,0 | 22,6 10,8 * | 11,1 12,5 * | 11,1 | 14,0 | 8,8 | 8,1 | 7,2 | 5,5 5,0 * |
| MW as %-age of average wage | 37,3 | 31,4 | 26,5 | 25,4 | 23,1 | 22,5 | 28,1 | 33,1 | 33,8 | 35,9 | 36,6 | 37,1 | 37,8 | 39,4 |
| Real MW, 2000 = 100 | 3.661 | 3.328 | 3.047 | 3.185 | 2.934 | 2.813 | 3.378 3.742 * | 4.000 4.500 * | 4.776 | 5.347 | 5.811 | 6.108 | 6.432 | 6.646 6.984 * |
| Net monthly MW | 1.903 | 1.903 | 1.903 | 2.188 | 2.188 | 2.319 | 3.114 | 3.783 | 4.184 | 4.702 | 5.080 | 5.457 | 6.130 | 6.428 |
| Subsistence wage in CZK | 1.960 | 2.160 | 2.440 | 2.890 | 3.040 | 3.430 | 3.430 | 3.770 | 4.100 | 4.100 | 4.100 | 4.100 | 4.300 | 4.420 |

Notes: * changes as from July 1.

Source: Czech Statistical Office and the Ministry of Labour and Social Affairs.

Appendix D: Evolution of export and import share as % of GDP

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 ¹⁾ |
|--------------------------|---------|---------|---------|---------|---------|---------|---------|--------------------|
| Export share as % of GDP | 51.21 % | 53.91 % | 50.92 % | 53.20 % | 61.20 % | 62.62 % | 66.70 % | 70.15 % |
| Import share as % of GDP | 56.73 % | 58.91 % | 53.80 % | 55.91 % | 61.60 % | 60.48 % | 64.56 % | 66.66 % |

Source: Czech Statistical Office

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