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Gender wage gap in the workplace: Does the age of the firm matter?•

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Abstract

We contribute to the literature on firm-level determinants of gender wage inequalities by studying the link between a firm's age and the size of its gender pay gap. Using European Structure of Earnings data for eight European countries, we find that in all of these countries, the gender wage gaps are smallest in the youngest firms. Our results also show that in Central European countries, the size of the gender pay gap clearly increases with the age of the company; whereas there is no such link in the older EU member states. Levels of gender wage inequality appear to be highest in companies that were previously state-owned, but were privatized during the transition. We interpret our findings with the support of competition and monopsony theories.

Keywords: gender pay gaps, transition, age of firms, wage differentials, discrimination

JEL: J16, J31, J45

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1. Introduction

The issue of the gender wage gap continues to attract attention from policymakers, as well as from researchers who are trying to fully explain its causes and development (see Bertrand, 2011; Blau and Kahn, 2016 for literature reviews). In an effort to close this gap, policymakers enforce regulations and equal treatment laws that require firms to pay equal wages, regardless of gender. Yet there is a mounting evidence that gender pay gaps continue to exist at the firm level ("within jobs"); (Bayard et al., 2003; Korkeamäki and Kyyrä, 2006; Goldin, 2014; Petersen and Morgan, 1995; Petersen et al., 1997). Moreover, with the growing availability of linked employer-employee data, the firm dimension is becoming a key area of interest for researchers, as it is seen as an important factor in shaping gender wage inequality (Blau and Kahn, 2016).

The firm characteristics that have been previously found to affect the extent of such firm-level gender pay gaps include the type of ownership (Arulampalam et al., 2007; Barón and Cobb-Clark, 2010; Boler et al., 2015; Borjas, 2002; Braunstein and Brenner, 2007; Cai and Liu, 2011; Javorcik et al., 2016; Oostenddorp, 2009; Zweimuller and Winter-Ebmer, 1994) the firm's size (Bertrand and Hallock, 2001; Carrington and Troske, 1995), and the shares of women in management at different levels (Bossler et al., 2016; Cardoso and Winter-Ebmer, 2010; Cohen and Huffman, 2007; Flabbi et al., 2014; Hensvik, 2014; Hultin and Szulkin, 2003; Matsa and Miller, 2011). Other studies have looked at the role of collective bargaining coverage (Antonczyk et al., 2010; Card et al., 2015; Elvira and Saporta, 2001; Heinze and Wolf, 2010) and of industry structure (Gannon et al., 2007).

How can firm-level wage policies shape the gender wage gap? First, research that has linked firm-level wage policies and the evidence on workers' segregation has shown that better (worse) paying firms are more likely to hire men (women) (Blau, 1977). Several studies have suggested that the differential sorting of men and women into firms (and occupations) may explain a portion of the gender wage gap (Bayard et al., 2003; Bertrand and Hallock, 2001; Card et al., 2014; Meng and Meurs, 2004). Second, the tendency among firms that pay relatively low wages to employ more women than men may be partly explained by evidence indicating that the female labor market is more monopsonistic than the male labor market (Manning, 2003) due to factors such as search frictions, heterogeneous preferences among workers, and mobility costs. Thus, a portion of the wage gap might be explained by the tendency of firms to maximize profit in noncompetitive labor markets. This suggests that there is price rather than taste discrimination against women (Becker, 1957; Robinson, 1969); i.e., that employers believe that women are more attached than men to non-pecuniary job attributes, and thus use their wage-setting power to maximize profits by paying women less, all other things being equal. Consistent with the monopsony explanation, it has been shown that from the perspective of the employer, women have lower labor supply elasticities than men[1] (Hirsch et al., 2010; Ranson and Oaxaca, 2010; Webber, 2016), and that a woman's premium from working at a high-paying firms and from job mobility is smaller than a man's (Del Bono and Vuri, 2011; Card et al., 2016; Hospido, 2009).

Our study aims to add to the literature on how firms shape gender wage differences, but from a different perspective that has, to the best of our knowledge, so far been unexplored: namely, we examine the role of the

[1]At the market level, women's labor supply is more elastic than men's, but this might be reversed at the firm level due to factors such as different preferences regarding non-wage job characteristics (e.g., the job's location or working hours) and the degree of immobility (Hirsch et al. 2010).

firm's age. Specifically, we look at the link between how long a company has operated in the market and the firm's wage policies. Start-ups tend to pay lower wages, ceteris paribus, than more mature companies. It has, for example, been shown that on average, wages in newly founded establishments are 8% lower than in similar incumbent firms (Brixy et al., 2007); and that firms that have been operating for longer periods of time tend to pay higher wages (Haltiwanger et al., 1999). However, the existing evidence does not provide a clear picture of the link between a firm's age and the level of gender wage inequality. On the one hand, new businesses exhibit greater heterogeneity in earnings and productivity than more mature firms (Haltiwanger et al., 2007), which leads us to hypothesize that the gender pay gaps might be larger in newer than in older companies. On the other hand, in line with Becker's theory of discrimination (1957), we can expect that new businesses face greater competitive pressures, and thus behave in more egalitarian ways than their more established counterparts. This would mean that new businesses should have smaller wage gaps because they cannot afford to discriminate due to market pressures (Black and Brainerd, 2004; Heinze and Wolf, 2010). However, the evidence of such a link is not unequivocal (Li and Dong ,2011). Thus, the predicted association between a firm's age and its gender pay gap is far from clear.

In our study, these two competing theoretical predictions are further blurred by our focus on transition economies of Central Europe. In these countries, the older firms started operating before the transition to a market economy occurred, and are therefore are likely to be affected by legacy practices from the socialist past, including the tendency to have lower overall levels of wage dispersion (Brainerd, 2000; Atkinson and Micklewright, 1992; Rutkowski, 1996) and more similar wage levels for women and men (Razzu, 2016). Some of these previously state-owned companies have remained under public control, while others have been privatized. We expect to observe that in these privatized firms, the pay policies are less discriminatory, and that the differences in the wage levels of male and female employees are therefore smaller. Moreover, we expect to find that the privatization process led to further declines in gender pay differentials in the former state-owned enterprises, as these firms could not afford to pay women less than men after they entered a more competitive world (Becker, 1957). Thus, the questions of which of these three factors is the stronger determinant of within-firm wage levels, and of whether younger firms have larger or smaller gender pay gaps, are key to our research.

To answer these questions, we examine four post-transition Central European countries: Poland, Hungary, the Czech Republic, and Slovakia. These countries have a common institutional setting with similar determinants: they all experienced a transition to a market-oriented economy in the early 1990s, and underwent reforms aimed at adjusting their institutions to the *acquis communautaire* and EU policies (Meny et al., 2002; Schimmelfennig, and Sedelmeier, 2004). Additionally, to investigate whether the links found between the ages of firms and their gender wage gaps are specific to transition countries, we provide a comparative analysis in which we also examine selected Western and Southern European countries.

2. Data and research methods

For our study, we have chosen to use data from the 2010 European Structure of Earnings Survey, which is a large matched employer-employee database provided by the Eurostat. The data cover firms with at least 10 employees, and are made available for most European countries in a comparative and consistent framework. While our main focus is on four Central European post-transition countries (Poland, Hungary, the Czech Republic, and the Slovak

Republic), in order to support and prove the reliability of the findings, we also provide a comparative framework and report data for selected Western European countries[2].

We use data on hourly wages, which are defined as the average gross hourly earnings in a given month. The primary variable of interest to us – namely, the age of the firm – is not given in the dataset. We thus derive this measure indirectly using a proxy of the maximum tenure of employees in a given firm (Magda et al., 2012). We categorize firms' ages into four groups: 0-3 years, 3-10 years, 10-20 years, and older than 20 years. Importantly, the last category will represent the firms that existed before the transition, regardless of whether they remained public or were privatized. Our data for each country range from covering 6,000 firms in Slovakia (employing more than 770,000 workers) to covering 26,000 firms in Hungary (with an average firm size of just 31 and a total of 835,000 surveyed employees, Table 1). The distribution of firms' ages is comparable for Poland and the Czech Republic, where relatively small shares of firms are new (young) (around 7%-8%), and relatively large shares of firms are more than 20 years old (around 44%-52%). In Slovakia, the share of firms that are older is smaller, but is still more than one-quarter of all firms. In Hungary, the share of businesses that are new is a relatively large (16%). In all four countries, the share of all workers employed in the private sector is large, ranging from 63% to 75%.

Table 1. Descriptive statistics

	Czech Republic	Hungary	Poland	Slovakia
No. of firms	18,046	26,529	17,041	5,799
No. of individuals	1,993,625	835,207	681,702	773,860
Average size	110	31	40	133
Distribution of workers across firm cohorts				
Age: 0-3	8%	16%	7%	7%
Age: 3-10	15%	23%	19%	27%
Age: 10-20	25%	24%	30%	37%
Age:>20	52%	37%	44%	28%
% private sector workers	75%	65%	63%	70%

Source: Own calculations based on 2010 EU SES.

Our empirical analysis of the link between the age of the firm and the gender pay gap is based on an OLS regressions. In particular, to investigate how the size of the gender pay gap differs by the firm's age, we estimate the following equation:

$$\ln(w)_i = \alpha_0 + \alpha_1 female_i + \sum_k \alpha_k (female_i * firm_age_d_{i,k}) + \boldsymbol{\alpha X} + \boldsymbol{\alpha Z} + \varepsilon_i$$

(1)

The dependent variable is defined as a logarithm of an hourly wage rate, and the key independent variable, which captures the gender wage gap, is a female dummy. In the regressions, we allow the gender wage gap to differ for

[2] Despite the general comparability of the ESES data survey framework, there are differences in sampling schemes across the EU countries, particularly at the firm level. Since we have incorporated firm-level characteristics in our analysis, we have chosen to focus on the Central and Western EU countries that provided a reliable number of observations at the firm level.

firms of different ages, which is done by interacting the female dummy variable with dummy variables for firms' ages (0-3 years, 3-10 years, 10-20 years, and older than 20 years). In the regression, we also control for individual-level characteristics, denoted by a vector X, to adjust the wage gap for observable differences between men and women. The variables include each individual's age, education, tenure, part-time status job, and occupation. We also account for firm-level heterogeneity and control for the firm's size, age, sector, NACE, and region (control variables denoted by a vector Z). Additionally, we include each firm's share of women employees, as employing more women than men is likely to be associated with lower wages, owing to the devaluation of the work done by women and taste-based discrimination (Blau, 1977; Levanon et al., 2009). As wage levels may be affected by collective agreement coverage (Magda et al., 2012), we also include two variables that reflect whether the employees in the firm are covered by collective agreements at the national or the industry level, and whether there is any other form of collective coverage, including within-enterprise or employer agreements.

3. Results

3.1. Firms' characteristics by age

We started the analysis of the link between firms' ages and firm-level gender pay gaps with a description of older and younger firms - in terms of size, employment structures, average wages, and, importantly, wage dispersion. We assumed that the characteristics of younger and older firms differed, which would in turn have affected firms' wage gaps. For example, higher levels of wage inequality have been observed in larger firms (Mueller et al., 2017) and in firms with larger shares of female employees (Bayard et al., 2003; Blau and Kahn, 2000; Reilly and Wirjanto, 1999).

Table 2 depicts firms' characteristics by age groups and by country; Figure 1 in the appendix also plots wage distribution by firms' ages and by country. The data indicate that compared to firms that had been operating in the market for more than 20 years, younger firms tended to be smaller. Because these firms were small, they might have had lower levels of wage inequality (Mueller et al., 2017). Younger firms were also slightly less likely than older firms to have employed women, and may therefore have exhibited lower levels of sex segregation; and, in turn, smaller wage gaps.

Based on our theoretical predictions, we expected to observe a decreasing gradient in the association between firms' ages and overall levels of wage inequality. Our findings are thus somewhat surprising. For example, we found that in Poland and in Hungary, the older the firms were, the higher the overall variance in wages was. While this pattern was not as clear in the Czech Republic or Slovakia, we found that the variance in wages was higher in the oldest than in the newest firms in these countries as well (cf. also the wage distribution graphs presented in the appendix). The differences in the average wages of men and women ("raw pay gaps") displayed the same patterns: i.e., they increased with firms' ages in all of the countries except Poland. Given the patterns observed in the other three countries, the finding that in Poland the gaps in the average wages of men and women were substantially smaller in the oldest firms may seem puzzling. This apparent discrepancy could be attributable to be a public sector peculiarity, since after we calculated the differences for the private sector, we found that the pattern in Poland was reversed: as in the other three countries, the gender pay differences in Poland were shown to increase with the firm's age. To disentangle the various compositional effects on male and female wages, we proceeded with an estimation of the gender pay gaps (adjusted for individual- and firm-level characteristics).

Table 2. Firms' characteristics by age groups and by country

Age groups		CZ	HU	PL	SK
Size and employment structure					
0-3	Size: Small firms 10-49 employees	**0.141**	**0.497**	**0.476**	**0.088**
	Size: Medium firms 50-249 employees	**0.160**	**0.217**	**0.268**	**0.233**
	Size: Large firms > 250 employees	**0.699**	**0.286**	**0.256**	**0.679**
	% of women	0.427	0.489	0.510	0.484
3-10	Size: Small firms 10-49 employees	**0.092**	**0.668**	**0.357**	**0.071**
	Size: Medium firms 50-249 employees	**0.183**	**0.180**	**0.280**	**0.236**
	Size: Large firms > 250 employees	**0.725**	**0.152**	**0.363**	**0.694**
	% of women	0.457	0.484	0.433	0.472
10-20	Size: Small firms 10-49 employees	**0.084**	**0.588**	**0.260**	**0.092**
	Size: Medium firms 50-249 employees	**0.217**	**0.202**	**0.348**	**0.342**
	Size: Large firms > 250 employees	**0.699**	**0.210**	**0.392**	**0.566**
	% of women	0.509	0.489	0.448	0.495
20+	Size: Small firms 10-49 employees	**0.092**	**0.381**	**0.197**	**0.033**
	Size: Medium firms 50-249 employees	**0.147**	**0.325**	**0.308**	**0.183**
	Size: Large firms > 250 employees	**0.762**	**0.295**	**0.494**	**0.783**
	% of women	0.494	0.654	0.562	0.513
Wages					
0-3	Ln(wage)	4.610	6.558	2.703	1.349
	Var(ln(wage))	0.098	0.094	0.128	0.115
	Ln(wage) for men – ln(wage) for women	**0.041**	**-0.045**	**0.127**	**0.093**
3-10	Ln(wage)	4.738	6.778	2.690	1.402
	Var(ln(wage))	0.120	0.148	0.125	0.106
	Ln(wage) for men – ln(wage) for women	**0.133**	**0.047**	**0.085**	**0.118**
10-20	Ln(wage)	4.812	6.847	2.822	1.473
	Var(ln(wage))	0.143	0.148	0.152	0.131
	Ln(wage) for men – ln(wage) for women	**0.193**	**0.103**	**0.091**	**0.190**
20+	Ln(wage)	4.915	6.904	3.034	1.511
	Var(ln(wage))	0.118	0.157	0.178	0.122
	Ln(wage) for men – ln(wage) for women	**0.212**	**0.155**	**0.037**	**0.211**

Source: Own calculations based on 2010 EU SES.

3.2. Firms' ages and gender pay gaps

Table 3 summarizes the results obtained from regressing a female dummy interacted with variables reflecting firms' ages on the log of hourly wage rate. The results show that the gender pay gaps clearly changed with the firm's age. In specification [1], we ran the OLS on log wages, while controlling for a set of individual-, job-, and firm-level characteristics; which yielded an adjusted gender wage gap of 10% in Hungary, of 14% in Poland and

the Czech Republic, and of 15% in Slovakia. After we added controls for firms' ages (specification [2]), the results changed slightly.

In specification [3], we added interactions between gender and the firm's age, which produced interesting results. We found a clear positive association between the firms' age and the gender pay gap among workers. Women were shown to be less disadvantaged in terms of pay in the youngest firms: among the firms that had been operating in the market for less than three years, the gender pay gap virtually disappeared in the Czech Republic and Hungary, and was significantly smaller in Poland and Slovakia. Firms 3-10 years old also had smaller gender pay gaps than firms that had been operating for 10-20 years. Finally, the oldest firms, which existed before the start of the economic transition in 1990, had even larger gender pay gaps than the firms that were 10-20 years old in Hungary and Slovakia, but not in Poland and the Czech Republic (where the finding was negative or close to zero, but was insignificant in statistical terms).

Next, to investigate whether these patterns differed for firms that remained public and those that were privatized, we examined the link between the age of the firm and the firm-level gender wage gap separately for the private and public sector. The results, which are presented in Table 4, show that among private sector companies, there was a clear link between the age of a firm and the size of the gender pay gap, and that this pattern was consistent across all four countries. While newly established private firms displayed the lowest levels of gender wage inequality, the size of the (adjusted) wage gap between men and women increased with the ages of the firms. Our findings are therefore in line with the competition hypothesis; i.e., they suggest that the younger firms were not in a position to pay workers who had similar characteristics differently, and thus could not afford to discriminate. Our results also show that among private firms that had been operating in the market for more than 20 years – i.e., firms that existed before the 1990s as public companies, and that were privatized following the transition – levels of gender wage inequality were the highest[3]. This finding suggests that there is no "legacy of the past" with respect to equal gender pay policies in companies that had been state-owned in a centrally planned economy. This result also contradicts our theory-based expectations that after entering a competitive market, privatized firms faced with higher levels of competition would be prevented from engaging in gender wage discrimination.

[3] We also verified these findings by running separate OLS regressions for the oldest firms in which we interacted the female dummy with the private sector affiliation. The results confirmed that the gender pay gap was larger in the privatized firms than in the firms that remained under public control (Appendix Table A.1.)

Table 3. OLS results: firms' ages and gender wage gaps in the Czech Republic, Hungary, Poland, and Slovakia

	Czech Republic			Hungary			Poland			Slovakia		
Specification	[1]	[2]	[3]	[1]	[2]	[3]	[1]	[2]	[3]	[1]	[2]	[3]
Female	-0.144***	-0.145***	-0.173***	-0.104***	-0.104***	-0.107***	-0.138***	-0.137***	-0.162***	-0.152***	-0.152***	-0.167***
	(0.004)	(0.004)	(0.009)	(0.004)	(0.004)	(0.008)	(0.003)	(0.003)	(0.007)	(0.004)	(0.004)	(0.013)
Female * age0-3			0.177***			0.133***			0.046**			0.108***
			(0.029)			(0.015)			(0.021)			(0.033)
Female * age 3-10			0.079***			0.059***			0.059***			0.059***
			(0.017)			(0.012)			(0.013)			(0.020)
Female * age >20			0.004			-0.050***			0.029***			-0.018
			(0.016)			(0.013)			(0.010)			(0.023)
Controls:												
Personal	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Job characteristics	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Firm characteristics	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Firm's age	no	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes
Interactions female*firm's age	no	no	yes	no	no	yes	no	no	yes	no	no	yes
Number of observations	1,981,785	1,981,785	1,981,785	835,207	835,207	835,207	681,702	681,702	681,702	773,860	773,860	773,860

*Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Personal characteristics include age, education, tenure. Job characteristics include occupation, part-time status. Firm characteristics include size, sector, share of women, NACE, region.*

Source: Own calculations based on 2010 EU SES.

Table 4. OLS results: firms' ages and gender wage gaps in the Czech Republic, Hungary, Poland, and Slovakia, by sector

	Private sector				Public sector			
Specification	Czech Republic	Hungary	Poland	Slovakia	Czech Republic	Hungary	Poland	Slovakia
Female	-0.174***	-0.139***	-0.169***	-0.176***	-0.023	-0.026	-0.098***	-0.142***
	(0.010)	(0.009)	(0.007)	(0.014)	(0.029)	(0.017)	(0.012)	(0.014)
Female * age0-3	0.191***	0.134***	0.054**	0.100***	0.008	0.060**	0.123***	0.205**
	(0.030)	(0.016)	(0.023)	(0.034)	(0.051)	(0.025)	(0.035)	(0.089)
Female * age 3-10	0.085***	0.062***	0.071***	0.067***	0.005	0.049*	0.020	-0.007
	(0.017)	(0.013)	(0.014)	(0.022)	(0.058)	(0.026)	(0.017)	(0.027)
Female * age >20	-0.062***	-0.071***	-0.041***	-0.059*	-0.092***	-0.080***	0.021	0.026
	(0.014)	(0.020)	(0.013)	(0.031)	(0.034)	(0.020)	(0.014)	(0.020)
Number of observations	1,160,321	156,981	348,197	510,093	821,464	678,226	333,505	263,767
R2	0.432	0.422	0.440	0.393	0.560	0.619	0.512	0.477

*Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; regressions control for personal characteristics (age, education, tenure), job characteristics (occupation, part-time status), and firm characteristics (age, size, share of women, NACE, region).*

Source: Own calculations based on 2010 EU SES.

To further investigate to what extent these findings are specific to transition countries, we examined the link between firms' ages and the sizes of the gender pay gaps for selected private firms in older EU member states. For this comparative analysis, we selected four countries: Italy, Portugal, Spain, and Sweden. Again, our choices were driven primarily by data availability (as we needed larger samples of firm-level observations). Second, we decided to focus on Southern European economies in particular, as these countries, like the CEE countries, tend to favour a more traditional gender division of labour, and to enact policies that support these views (Crompton and Harris, 1997; Fahlén, 2016; Fortin, 2005).[4] As Pfau-Effinger (2012) has argued, the culture dimension is an important determinant of women's labour market participation. Indeed, all of the selected EU and CEE countries have very low maternal employment rates (OECD Family Database, 2017)5, and thus have low overall female employment rates (Eurostat, 2017); which, as Ollivetti and Petrongolo (2010) have shown, are associated with higher levels of gender inequality in earnings. Our choice was further supported by the relatively similar levels of economic development (as measured by GDP per capita) in these countries. For comparative reasons, we also present results for Sweden, which differs from the rest of countries we examined, as it has more gender-equal

[4] It should be noted that the CEE countries are not homogenous in terms of their attitudes toward traditional gender roles. For the CEE countries, Weziak-Bialowolska (2015) has shown that while the Czech Republic and Hungary tend to be more egalitarian, Poland and Slovakia are much more traditional

labour market policies, more labour market flexibility, and relatively egalitarian attitudes toward women's and men's social roles (Korpi, 2000).

Two interesting observations can be made when looking at the results shown in Table 5. First, like in the CEE countries, in the Southern European countries women who were working in the youngest firms were less disadvantaged in terms of pay (whereas there was no such link in Sweden). Second, the association between a firm's age and the size of its pay gap that was observed in the CEE countries was not found in the older EU member states, with the exception of Spain.

Thus, while it seems that the smaller gender pay gaps found among younger firms (in both the new and the old EU member states) could be explained by the competition theory, it is likely that other factors contributed to the wage gap between men and women increasing with the ages of the more mature firms in the CEE countries, and to the lack of such a link in more mature economies. We see two potential reasons why the pay gaps between men and women working in older firms – and particularly in firms that existed before the transition – were found to be larger in the post-transition countries than in the other EU member states.

First, the larger gender pay gaps found among the oldest firms in the CEE might be attributable to the monopsony theory we discussed above, and may thus reflect price ("Robinsonian") discrimination. Among these firms, the labour supply might have been less elastic for women than for men, as the privatized firms were more likely to have remained covered by collective agreements (offering nonpecuniary benefits) than by greenfield investments (Gardawski, 1999; Crowley, 2004), and women may have been more likely than men to have responded to these benefits. While it is difficult to provide credible evidence of a gender gap in the elasticity of labour supply to firms (Hirsch, 2016), we found some support for the claim that such a gap could have affected the oldest (privatized) firms in the CEE countries. When we looked at the data on employee churn by gender, which we proxy by the shares of workers with different tenures at the firm level (Appendix Table A.2.), we found that these shares were quite similar among young firms in Central, Eastern, and Southern Europe. However, we also uncovered differences between older firms. For example, in Southern Europe far larger shares of men than of women had very long tenures, which suggests that men had relatively low turnover. The opposite was shown to be the case among the oldest firms in the CEE, where larger shares of women than of men had very long tenures. We suspect that these lower levels of female turnover reflect women's preferences to remain with employers that were previously public enterprises.

Second, it is possible that the larger gender pay gaps found in older firms in the CEE were associated with more discriminatory attitudes (Janssen et al., 2015). It has been shown that in the CEE countries, gender norms and attitudes have slightly changed in the first decade after the transition (e.g., Sequino, 2007) and in recent years (World Bank, 2012). Shifts in gender attitudes can also be seen in the recent changes in family policies, and particularly in the introduction of shared leave and paternity leave for fathers (OECD Family Database, 2017). To the extent that the observed gender wage gaps reflect the discriminatory practices of employers, older (both public and privatized) companies may be expected to have a larger wage gap stemming from a deeply rooted conviction that women are less productive than men because of their family and childcare responsibilities. This assumption should be less relevant for younger companies, as such firms are more likely to employ younger workers, and are thus less likely to hold traditional views regarding women's work.

Table 5. OLS results: firms' ages and gender wage gaps in selected Western European countries

	Private sector			
Specification	Spain	Italy	Portugal	Sweden
Female	-0.124***	-0.113***	-0.156***	-0.091***
	(0.007)	(0.009)	(0.012)	(0.005)
Female * age0-3	0.050***	0.053**	0.089***	-0.003
	(0.014)	(0.021)	(0.022)	(0.013)
Female * age 3-10	0.020*	0.025*	0.024	-0.000
	(0.011)	(0.013)	(0.016)	(0.009)
Female * age >20	-0.031***	-0.016	-0.029	-0.014
	(0.010)	(0.011)	(0.018)	(0.010)
Number of observations	180,140	198,527	96,930	153,483
R2	0.477	0.388	0.555	0.438

*Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; regressions control for personal characteristics (age, education, tenure), job characteristics (occupation, part-time status), and firm characteristics (size, share of women, NACE, region).*

Source: Own calculations based on 2010 EU SES.

4. Conclusions

Economic theories offer competing predictions regarding the link between the degree of gender wage inequality and a company's characteristics, and especially its age. Our findings show that in seven out of eight European countries studied, gender wage gaps are smallest in the youngest firms. However, when we looked at firms that had been operating in the market for longer periods of time, this pattern became more blurred, and more region- and sector-specific. In particular, we found a clear pattern of the size of the gender pay gap increasing with the firm's age in Central Europe, but not in older EU member states. Moreover, levels of gender wage inequality appear to be highest in companies that were previously state-owned, and that were privatized during the transition.

Our observation that in the post-transition countries, the largest gender wage gaps are among the oldest companies – that is, the firms that were in existence before the transition – suggests that in a competitive market structure, companies that have a well-established position in the market are less likely than younger firms to adopt equal wage policies, and thus practice a greater degree of gender wage differentiation. The larger gender pay gaps found in older firms in Central Europe likely also reflect these firms' relatively monopsonistic position on the labour market, and the lower levels of labour supply elasticity among their female employees women. Alternatively, the discriminatory gender pay policies in these older establishments may be attributable to a failure among management to fully adapt to changes in gender norms and discriminatory attitudes. These factors appear to be less relevant in European economies without a transition history.

Our study has two important limitations. First, as our dataset included only firms with at least 10 employees, it is not representative of all young firms, many of which are likely to be smaller. Second, our research focused on correlations between firms' ages and gender pay gaps, not on their causal relationships. Moreover, we were unable to control for selection processes to older establishments, or to observe the development of gender wage gaps within firms over time. This is an area that should be given more attention in future research.

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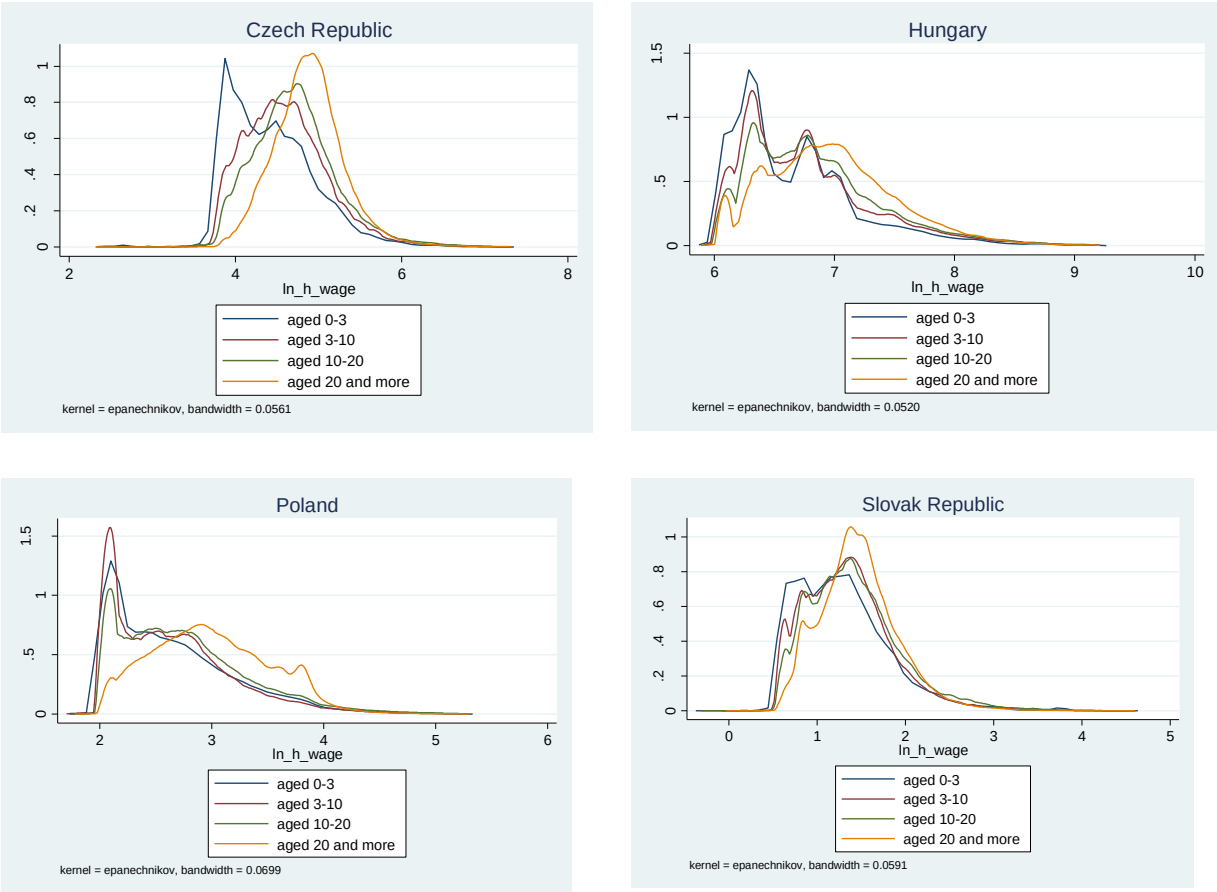
Appendix

Figure A. 1. Wage distribution by firms' age and by country



Source: Own calculations based on 2010 EU SES.

Table A. 1. OLS estimation results for the subsample of firms aged 20 years and more

Specification	Czech Republic	Hungary	Poland	Slovakia
Female	-0.104***	-0.104***	-0.074***	-0.116***
	(0.015)	(0.008)	(0.006)	(0.014)
Female* private	-0.126***	-0.041*	-0.123***	-0.079***
	(0.024)	(0.021)	(0.013)	(0.026)
Private	0.029	0.027	-0.086***	0.070**
	(0.033)	(0.035)	(0.017)	(0.035)
Number of observations	1,262,746	593,612	376,063	367,767
R2	0.511	0.572	0.510	0.488

*Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; regressions control for personal characteristics (age, education, tenure), job characteristics (occupation, part-time status), firm characteristics (size, share of women, NACE, region).*

Source: Own calculations based on 2010 EU SES.

Table A. 2. Tenure distribution in private firms aged 20 and more by gender of the workers and country

Years	CZ	ES	HU	IT	PL	PT	SE	SK
	women							
tenure =0	0.115	0.073	0.072	0.031	0.044	0.025	0.117	0.068
tenure (0;2>	0.152	0.123	0.126	0.083	0.122	0.142	0.138	0.129
tenure (2;4>	0.125	0.136	0.094	0.097	0.105	0.075	0.130	0.122
tenure (4;6>	0.084	0.097	0.060	0.069	0.073	0.062	0.077	0.071
tenure (6;8>	0.060	0.076	0.047	0.077	0.046	0.064	0.079	0.056
tenure (810>	0.055	0.082	0.054	0.081	0.045	0.085	0.079	0.047
tenure (10;12>	0.043	0.055	0.043	0.056	0.046	0.064	0.060	0.047
tenure (12;16>	0.092	0.066	0.081	0.086	0.101	0.084	0.075	0.092
tenure (16;20>	0.062	0.063	0.070	0.083	0.070	0.108	0.062	0.068
tenure (20;30>	0.123	0.135	0.218	0.242	0.225	0.214	0.183	0.188
tenure >30	0.088	0.095	0.135	0.096	0.124	0.076	0.000	0.113
	men							
tenure =0	0.123	0.063	0.088	0.026	0.060	0.024	0.102	0.085
tenure (0;2>	0.142	0.098	0.127	0.068	0.136	0.142	0.132	0.131
tenure (2;4>	0.117	0.104	0.099	0.086	0.115	0.076	0.127	0.121
tenure (4;6>	0.085	0.076	0.069	0.065	0.079	0.062	0.081	0.080
tenure (6;8>	0.060	0.062	0.056	0.064	0.050	0.061	0.077	0.063
tenure (810>	0.061	0.069	0.056	0.068	0.048	0.069	0.078	0.049
tenure (10;12>	0.050	0.060	0.044	0.053	0.048	0.059	0.058	0.046
tenure (12;16>	0.103	0.078	0.093	0.087	0.110	0.080	0.079	0.097
tenure (16;20>	0.065	0.071	0.067	0.083	0.084	0.098	0.062	0.072
tenure (20;30>	0.095	0.195	0.177	0.292	0.175	0.229	0.204	0.143

tenure >30	0.099	0.124	0.125	0.109	0.094	0.099	0.000	0.113

Source: Own calculations based on 2010 EU SES.

Table A. 3. OLS results: gender wage gaps estimates (supplements Table 3).

	CZ	HU	PL	SK	CZ	HU	PL	SK	CZ	HU	PL	SK
Female	-0.150	-0.120	-0.163	-0.186	-0.161	-0.145	-0.181	-0.212	-0.144	-0.104	-0.138	-0.152
	(0.007)	(0.006)	(0.006)	(0.009)	(0.008)	(0.005)	(0.005)	(0.008)	(0.004)	(0.004)	(0.003)	(0.004)
Age 30-49 dummy	0.087	0.062	0.147	0.080	0.088	0.061	0.139	0.086	0.105	0.078	0.144	0.101
	(0.007)	(0.006)	(0.004)	(0.007)	(0.006)	(0.005)	(0.004)	(0.006)	(0.006)	(0.005)	(0.004)	(0.007)
Age 50+ dummy	0.020	0.064	0.091	0.018	0.047	0.066	0.091	0.038	0.078	0.094	0.107	0.079
	(0.009)	(0.009)	(0.006)	(0.009)	(0.010)	(0.008)	(0.006)	(0.009)	(0.009)	(0.007)	(0.005)	(0.009)
Education: secondary	0.224	0.234	0.208	0.279	0.098	0.080	0.066	0.156	0.110	0.122	0.074	0.146
	(0.011)	(0.009)	(0.006)	(0.009)	(0.010)	(0.009)	(0.005)	(0.010)	(0.008)	(0.008)	(0.004)	(0.010)
Education: tertiary	0.704	0.816	0.883	0.768	0.363	0.499	0.484	0.451	0.383	0.560	0.489	0.459
	(0.015)	(0.013)	(0.010)	(0.012)	(0.015)	(0.013)	(0.009)	(0.013)	(0.013)	(0.014)	(0.008)	(0.013)
Tenure	0.014	0.011	0.015	0.010	0.011	0.010	0.012	0.007	0.008	0.008	0.010	0.006
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)
Part-time job					-0.109	0.244	0.001	-0.111	-0.086	0.296	0.022	-0.061
					(0.014)	(0.007)	(0.012)	(0.013)	(0.014)	(0.008)	(0.008)	(0.012)
Occupation: highly skilled non-manual					0.571	0.507	0.546	0.456	0.554	0.414	0.525	0.479
					(0.014)	(0.010)	(0.008)	(0.014)	(0.013)	(0.011)	(0.007)	(0.013)
Occupation: lower skilled non-manual					0.180	0.243	0.122	0.139	0.174	0.160	0.095	0.145
					(0.016)	(0.008)	(0.015)	(0.016)	(0.015)	(0.010)	(0.008)	(0.017)
Occupation: skilled manual					0.215	0.245	0.160	0.157	0.169	0.131	0.134	0.108
					(0.014)	(0.010)	(0.008)	(0.014)	(0.013)	(0.009)	(0.007)	(0.013)
Private sector dummy									-0.028	-0.016	-0.141	0.011
									(0.017)	(0.013)	(0.011)	(0.022)
Firm size: 10-49									-0.275	-0.251	-0.169	-0.188
									(0.014)	(0.011)	(0.009)	(0.016)
Firm size: 50-249									-0.080	-0.090	-0.068	-0.101
									(0.013)	(0.011)	(0.009)	(0.014)
NACE: market services									0.018	-0.005	0.011	0.012
									(0.013)	(0.010)	(0.010)	(0.016)
NACE: non-market services									-0.099	-0.108	-0.106	-0.099
									(0.019)	(0.013)	(0.014)	(0.019)

Share of female workers in each firm									-0.035	-0.082	-0.092	-0.167
									(0.021)	(0.013)	(0.015)	(0.027)
Collective agrrement coverage: national or industry level									0.005	0.183	0.068	-0.012
									(0.018)	(0.027)	(0.017)	(0.018)
Collective agreement coverage: other									0.034	0.115	0.012	0.015
									(0.014)	(0.013)	(0.007)	(0.021)
Constant	4.364	6.450	2.310	1.005	4.211	6.282	2.247	0.932	4.383	6.597	2.566	1.089
	(0.014)	(0.014)	(0.009)	(0.012)	(0.016)	(0.011)	(0.010)	(0.015)	(0.031)	(0.019)	(0.017)	(0.039)
Number of observations	1,993,625	835,207	681,702	773,860	1,981,785	835,207	681,702	773,860	1,981,785	835,207	681,702	773,860
R2	0.259	0.305	0.366	0.286	0.381	0.378	0.458	0.364	0.452	0.481	0.501	0.408

Source: Own calculations based on 2010 EU SES.

Table A. 4. OLS results: gender wage gaps estimates controlling for firms' age (supplements Table 4)

	CZ	HU	PL	SK	CZ	HU	PL	SK
Female	-0.144	-0.104	-0.137	-0.152	-0.175	-0.109	-0.162	-0.167
	(0.004)	(0.004)	(0.003)	(0.004)	(0.009)	(0.008)	(0.007)	(0.013)
Female age0-3					0.179	0.126	0.047	0.107
					(0.029)	(0.014)	(0.021)	(0.032)
Female age 3-10					0.081	0.052	0.059	0.059
					(0.017)	(0.012)	(0.013)	(0.019)
Female age >20					0.008	-0.040	0.030	-0.018
					(0.016)	(0.012)	(0.010)	(0.023)
Age 30-49 dummy	0.102	0.078	0.145	0.100	0.102	0.079	0.145	0.100
	(0.006)	(0.005)	(0.004)	(0.007)	(0.006)	(0.005)	(0.004)	(0.007)
Age 50+ dummy	0.075	0.095	0.109	0.077	0.076	0.096	0.109	0.077
	(0.009)	(0.007)	(0.005)	(0.009)	(0.009)	(0.007)	(0.005)	(0.009)
Education: secondary	0.112	0.122	0.074	0.146	0.110	0.122	0.074	0.145
	(0.008)	(0.008)	(0.004)	(0.010)	(0.008)	(0.008)	(0.004)	(0.010)
Education: tertiary	0.385	0.560	0.487	0.458	0.380	0.561	0.487	0.455
	(0.013)	(0.014)	(0.008)	(0.013)	(0.013)	(0.014)	(0.007)	(0.013)
Tenure	0.007	0.007	0.009	0.006	0.007	0.007	0.009	0.006
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)
Part-time job	-0.086	0.299	0.021	-0.060	-0.086	0.296	0.022	-0.060
	(0.014)	(0.007)	(0.008)	(0.012)	(0.014)	(0.007)	(0.008)	(0.012)
Occupation: highly skilled non-manual	0.554	0.413	0.527	0.478	0.555	0.413	0.526	0.479
	(0.013)	(0.011)	(0.007)	(0.013)	(0.013)	(0.011)	(0.007)	(0.013)
Occupation: lower skilled non-manual	0.177	0.161	0.098	0.144	0.175	0.158	0.098	0.145
	(0.015)	(0.009)	(0.008)	(0.017)	(0.015)	(0.009)	(0.008)	(0.016)
Occupation: skilled manual	0.169	0.130	0.137	0.108	0.170	0.129	0.137	0.107
	(0.013)	(0.009)	(0.007)	(0.013)	(0.012)	(0.008)	(0.007)	(0.013)
Private sector dummy	-0.040	-0.004	-0.133	0.002	-0.044	-0.007	-0.134	0.001
	(0.018)	(0.014)	(0.011)	(0.022)	(0.018)	(0.014)	(0.011)	(0.023)
Firm size: 10-49	-0.265	-0.245	-0.163	-0.193	-0.264	-0.241	-0.164	-0.193
	(0.014)	(0.010)	(0.009)	(0.016)	(0.013)	(0.010)	(0.009)	(0.016)
Firm size: 50-249	-0.083	-0.088	-0.066	-0.103	-0.082	-0.084	-0.066	-0.103
	(0.013)	(0.011)	(0.009)	(0.014)	(0.012)	(0.011)	(0.009)	(0.014)
NACE: market services	0.019	-0.002	0.014	0.013	0.020	-0.003	0.015	0.016
	(0.013)	(0.010)	(0.010)	(0.016)	(0.013)	(0.010)	(0.010)	(0.016)
NACE: non-market services	-0.093	-0.106	-0.104	-0.098	-0.088	-0.104	-0.105	-0.092
	(0.019)	(0.013)	(0.014)	(0.019)	(0.018)	(0.013)	(0.014)	(0.018)

Share of female workers in each firm	-0.039	-0.085	-0.096	-0.168	-0.052	-0.103	-0.098	-0.175
	(0.021)	(0.013)	(0.015)	(0.028)	(0.022)	(0.014)	(0.015)	(0.028)
Collective agreement coverage: national or industry level	-0.005	0.182	0.067	-0.007	-0.007	0.174	0.068	-0.008
	(0.018)	(0.028)	(0.017)	(0.019)	(0.018)	(0.027)	(0.017)	(0.019)
Collective agreement coverage: other	0.047	0.113	0.010	0.025	0.047	0.107	0.010	0.023
	(0.015)	(0.013)	(0.007)	(0.022)	(0.015)	(0.013)	(0.007)	(0.023)
Firm age: age 0-3	-0.135	-0.061	0.013	-0.020	-0.213	-0.119	-0.009	-0.074
	(0.024)	(0.011)	(0.018)	(0.023)	(0.029)	(0.013)	(0.023)	(0.029)
Firm age: age 3-10	-0.028	-0.026	-0.041	-0.028	-0.063	-0.049	-0.066	-0.056
	(0.014)	(0.011)	(0.011)	(0.015)	(0.016)	(0.012)	(0.013)	(0.017)
Firm age: age >20	-0.050	0.001	0.011	-0.042	-0.053	0.024	-0.002	-0.032
	(0.013)	(0.012)	(0.009)	(0.018)	(0.018)	(0.015)	(0.011)	(0.024)
Constant	4.424	6.602	2.563	1.117	4.446	6.615	2.576	1.128
	(0.031)	(0.020)	(0.018)	(0.037)	(0.031)	(0.020)	(0.019)	(0.038)
Number of observations	1,981,785	835,207	681,702	773,860	1,981,785	835,207	681,702	773,860
R2	0.457	0.482	0.502	0.409	0.460	0.484	0.502	0.411
note: p<0.01, p<0.05, p<0.1								

Source: Own calculations based on 2010 EU SES.

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