I Z A Institute
of Labor Economics
Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 12026

Do Female Managers Help to Lower Within-Firm Gender Pay Gaps? Public Institutions vs. Private Enterprises

Iga Magda
Ewa Cukrowska-Torzewska

DECEMBER 2018

I Z A Institute
of Labor Economics

Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 12026

Do Female Managers Help to Lower Within-Firm Gender Pay Gaps? Public Institutions vs. Private Enterprises

Iga Magda
IBS, Warsaw School of Economics and IZA

Ewa Cukrowska-Torzewska
IBS and University of Warsaw

DECEMBER 2018

IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Do Female Managers Help to Lower Within-Firm Gender Pay Gaps? Public Institutions vs. Private Enterprises*

We analyze the link between the presence of female managers and the size of the firm-level gender pay gap, looking separately at the private and public sector. Using a large linked employer-employee dataset for Poland and a non-parametric and parametric decompositions, we find that higher presence of female managers is associated with more pay advantage towards women in selected types of public sector units: the ones in which remunerations of women and men are already equal, and a large share of the workforce is tertiary-educated. The effects are, however, relatively small in size. In private establishments, lower gender wage inequality is associated with higher shares of female workers, but not female managers.

JEL Classification: J16, J31, J45

Keywords: gender wage gap, wage inequalities, public sector, female managers, Ñopo decomposition, Oaxaca- Blinder decomposition

Corresponding author:
Iga Magda
Institute for Structural Research (IBS)
Wiśniowa 40B/8
02-520 Warsaw
Poland
E-mail: iga.magda@ibs.org.pl

* This Paper is forthcoming in Feminist Economics. This paper has benefited from the financial support provided by the Narodowe Centrum Nauki/ National Science Center, Poland DEC-2013/10/E/HS4/00445. Ewa Cukrowska-Torzewska gratefully acknowledges the support of the Foundation for Polish Science (FNP). We would like to thank Joanna Tyrowicz and participants of the 2016 EALE and 2016 WIEM conference for their comments and remarks. The usual disclaimers apply.

1. Introduction

The issue of the gender pay gap continues to attract the attention of both researchers and of policymakers. The policy options for reducing both the gender gap in employment and in wages include more and more of firm-level actions, such as adopting „equal pay for equal work" policies and the need to report firm-level pay gaps, adopting regulations aimed at increasing the share of managers, and especially of board members, who are female; and encouraging firms and institutions to increase female participation in the top levels of management. The existing evidence on the role that female managers play in shaping wage inequalities is, however, still scarce and this motivates our study. In this paper we want to contribute new insights to the ongoing debate on the role that female managers play in achieving wage equality and complying with the equal pay regulations at the firm level. We investigate the following questions: (i) how does the share of females in managerial positions affect within-firm gender inequality in pay, (ii) is the role of female managers different in the public and private sector, and in particular, could the larger share of managers who are female in the public sector explain its lower gender wage inequality. The latter is among the points the existing research has failed to address.

Most of the findings that exist on this topic refer to private sector firms in western Europe or the US, and thus may not be relevant for firms in less developed countries. There are also virtually no studies that have looked at public sector employees, which tend to have lower pay dispersion and different wage and management policies than private sector companies (Burgess and Ratto 2003; Lucifora and Meurs 2006; Weibel, Rost and Osterloh 2010).

In this study we focus on Poland, which is an interesting country to study in this context from four points of view. First, despite the significant structural changes that have occurred in the country over the past three decades, the share of public sector employment is still large (30 percent of total paid employment). Thus, to explain the gender wage gap in the Polish labor market, it is important to understand the wage policies and the smaller gender gap in the public sector. Second, Poland is one of the few economies in which there is a large discrepancy between the raw difference in the average wages of men and women (according to Eurostat statistics around 6-9 percent; lower than in most other European countries[1]) and the adjusted (unexplained) pay gap, which amounts to over 20 percent (e.g., Mysíková 2012; Van der Velde, Tyrowicz, and Goraus 2017). Third, Poland has both a relatively large share of well educated women and of women in management positions, in particular in the financial sector and entrepreneurial ranks (Leven 2008). Fourth, the public sector wage premium patterns, particularly with respect to gender, are similar to those in the other central and eastern European (CEE) countries, but differ from those in the countries of western Europe (Gregory and Borland 1999; Grotkowska and Wincenciak 2014). These differences in historical development of gender participation and pay levels in the private and public sector make us hypothesize on the potential differences in pay gaps' determinants between the CEE and other developed countries.

We also make methodological contributions to the existing literature. To estimate firm-level gender pay gaps, in addition to the standard Oaxaca-Blinder decomposition (Oaxaca 1973, Blinder 1973) we use a non-parametric approach proposed by Ñopo (2008) and base our analysis on a large set of linked employer-employee data. This allows us to estimate gender wage gaps within each firm, and thus to

[1] These Eurostat figures encompass data on fewer sectors than the country-level data we use, which -at least in Poland- reveal substantially lower raw gender pay gaps (in 2012 the Statistics Poland reported an average raw pay gap of 12 percent).

better control for segregation effects and firm heterogeneity. We also account in detail for coworker characteristics in order to better capture unobserved differences between firms with respect to skills, productivity, and human resources policies. We analyze the distributions of firm-level gender pay gaps, distinguishing between the public and the private sectors. Using these approaches, we add to the investigation of the relationship between gender segregation, female management, and the magnitude of the unexplained gender wage gap in the public and the private sectors.

Our results suggest that the role of female workers in affecting firm-level gender wage inequality is different in the private and public sector. We find that for private companies the meaningful factor is the share of female workers in the workplace, as their increased share is associated with reduced wage inequalities (which stands in contrast to studies for other countries). In public units, it is the presence of female managers that appears to be more important. Female managers are likely to affect within firm gender pay gaps in a subset of public institutions: namely, those that already advantage women in terms of pay and have relatively high-skilled workforce. These institutions are most likely to operate in the areas of education and public administration, and to have younger and more flexible employees than other public entities.

2. Gender pay inequality in the public and private sector and the role of female management

Below we focus on selected strands of literature we link in our analysis: i.e., the gender wage gap, the differences in pay gaps between the public and the private sectors and the role of female workers and female managers in shaping wage inequality by gender.

The gender wage gap is a well-established finding that has been researched in a number of countries. Extensive overviews of the existing evidence have, for example, been provided by Blau and Kahn (1999, 2017), Weichselbaumer and Winter-Ebmer (2005) and Booth (2009). Personal characteristics usually explain only a small part of the total wage gap (Christofides, Polycarpou, and Vrachimis 2013). Women's career decisions, shorter working hours, and occupational segregation contribute to between 30 percent and 60 percent of the wage differential (Blau and Kahn 1999; OECD 2012). The time women spend on childbearing and family and housework responsibilities also increases the gap (Hundley 2001; Manning and Swaffield 2008; Cutillo and Centra 2017) and leads to the motherhood wage penalty and the fatherhood premium (e.g. Correll, Benard and Paik 2007; Cukrowska-Torzewska and Lovasz 2016; Angelov, Johansson and Lindahl 2016). According to Goldin (2014) the gap is also largely due to firms' policies disproportionately rewarding particular working time arrangements. Other possible sources of the gender wage gap include psychological and behavioral differences between men and women, whereby men are assumed to earn higher wages because they are more career-oriented and competitive than women (Booth 2009). Nevertheless, a large share of the gap remains unexplained (OECD 2012); though it is unclear what part of the gap is attributable to discriminatory practices (Monk-Turner and Turner 2011).

The size of the gender wage inequality is often found to differ between the public and private sector. Most of the empirical literature finds that gender wage inequality is less pronounced among public sector than among private sector employees (Zweimuller and Winter-Ebmer 1994; Arulampalam, Booth and Bryan 2007; Barón and Cobb-Clark 2010; Cai and Liu 2011). This is likely because public institutions are more subject to government regulations and policies than private employers, thus the former may be more

likely than the latter to enforce strict anti-discriminatory and equal opportunities laws and policies (Arulampalam et al. 2007). Public sector employees are also more likely than private sector workers to be covered by collective agreements, which tend to reduce wage inequalities (Meng and Meurs 2004; Felgueroso, Perez-Villadoniga and Prieto-Rodriguez 2008; Antonczyk, Fitzenberger, and Sommerfeld 2010). The differences in the gender wage gap by sector may also be attributed to relatively higher wages, which women earn in the public sector (Gregory and Borland, 1999). However, this turns out to be true for well-developed countries, and does not hold for transition economies for which a negative public sector wage premium is reported (Lausev, 2014). The results of a recent study for Poland (Grotkowska and Wincenciak 2014) revealed that public sector workers experience a negative wage premium of around 5 percent; and that women in Poland are subject to a higher negative public sector wage premium than men.

Finally, the current studies are rather inconclusive on the role of women, and managers that are female, in shaping gender wage inequality. Higher shares of female workers tend to be associated with higher raw gender pay gaps (Reilly and Wirjanto 1999; Bayard, Hellerstein, Neumark and Troske 2003; Korkeamäki and Kyyrä 2006), but their relationship with the adjusted pay gap is either also positive (Macpherson and Hirsch 1995; Carrington and Troske 1998; Vieira, Cardoso and Portela 2005), or statistically insignificant (Meng 2004; Heinze and Wolf 2008). The positive association is likely driven by the occupational composition of men and women within the firm, and particularly by an overrepresentation of women in low-paid positions (Macpherson and Hirsch 1995).

The role of managers who are female in shaping gender wage gap is also far from clear. Existing studies differ in terms of the types of firms studied, management layers considered, firm outcomes measured, and the assessments of the interactions between all of these factors and firms' wage policies. Flabbi, Moro and Schivardi (2014) found that the presence of a female CEO reduces the gender pay gap at the top, lowers it at the bottom, and has no effect at the mean. Hultin and Szulkin (2003) and Cohen and Huffman (2007) found that female representation in management reduces gap, but the effect appears to be stronger for the second level of management (Hirsch 2013). Bertrand, Black, Jensen and Lleras-Muney (2014) show that the increased presence of female board members has essentially no effect on the gap. The analysis of Gagliarducci and Paserman (2015) in turn revealed that the effect of female leadership depends on the share of women in the second layer of the organization. What is important in the context of this study, the existing evidence relates virtually only to private sector companies, whereas the results are likely to be different for the public sector. The question whether these findings are universal and can be extended to economies with a different level of development and institutional setting, remains open.

Why would a gender pay gap among firm's workers be related to the gender of the organization's managers? First, the characteristics of the managers, including their leadership styles and shared values, which differ by gender, are important for firm performance (Bertrand and Schoar 2003; Bloom and van Reenen, 2010; Vieito 2012). For instance, compared to male managers, female managers are more likely to hoard labor (Matsa and Miller 2013) or to spend large amounts on CSR or environmental projects (Post, Noushi and Rubow 2011; Marquis and Lee 2013). Second, female managers spend less time on internal management and networking than their male counterparts (Jacobson, Palus, and Bowling, 2009). Women are also less willing to compete and less likely to take risk (e.g. Datta Gupta, Poulssen and Villeval 2013); they use soft skills to manage, rather than a hierarchical approach (Kaplan, Klebanov and Sorensen 2012). These gender-specific leadership styles might translate into different promotion and pay policies. Firms with more female board members and female managers are more likely to promote and attract women to top management (Matsa and Miller 2011; Bossler, Mosthaf and Schank 2016) and have lower pay gaps

between the CEO and vice-presidents, compared to male-led companies (Vieito 2012). If all or a portion of the gender pay gap is due to discrimination, we might expect that the presence of more women at the management layer would narrow the gap. One potential explanation for this is that women may be more likely than men to promote female-friendly workplace policies such as the provision of child care (Stumbitz, Lewis and Rouse 2018)). A second potential explanation is that female managers may be more efficient than men in mentoring other female workers, and women may be more likely than men to benefit from it (Athey, Avery and Zemski 2000). A third possible reason relates to theories of labor market discrimination, which predict that if women are less likely than men to discriminate against other women, organizations in which there are more women should have a smaller unjustified gender wage gap. This is especially relevant for discrimination against women due to motherhood and positive discrimination against men due to fatherhood.

3. Data

We use data from the 2012 Structure of Wages and Salaries by Occupations Survey (SWSS), a large matched employer-employee database collected by the Statistics Poland[2]. It covers individuals employed in establishments (local units) with at least 10 workers, and provides information on their earnings, working time, jobs held and employer characteristics. The SWSS serves as a basis for the European Structure of Earnings Survey (SES), though using the original SWSS dataset has the advantage of covering the entire public sector[3].

SWSS has a two-step sampling scheme: of local units and then of employees (this drawing is based on their occupation and gender). Thus, we do not observe all the employees in a firm, but use the employee-based frequency weights to account for those that are not included in the survey. For example, we can observe firm with 100 employees, but the data for employees covers only e.g. 50 observations. Each of the 50 employees is then assigned a weight, so that the weighted number of observations is equal to 100.

We derive the measure of an hourly wage using information on monthly salary (regular and over hours payments) and yearly bonuses. We also specify several additional indicators describing the firm-specific employment structure, including the firm's share of female employees, and share of women working in managerial positions[4] . An individual is considered a manager if he/she is working in an occupation with ISCO code 1 ("Managers"). We also account for the structure of employment with respect to age, education, and employment contract (open-ended/fixed-term).

[2] Detailed description of the dataset can be found at https://stat.gov.pl/en/topics/labour-market/working-employed-wages-and-salaries-cost-of-labour/structure-of-wages-and-salaries-by-occupations-in-october-2010,4,2.html. This paper uses Statistics Poland data, which has no responsibility for the results and conclusions which are those of the authors.

[3] We use the terms „firms", „enterprises" and „establishments" both for the private and public sector units, but the public ones include also units such as ministries or government agencies. Also, the ESES survey is a survey of local units and we do not have information on whether they belong to larger groups of companies (we observe only establishment/ plants, not firms/ companies).

[4] Though we only have information on a subset of workers in each firm for most establishments, we believe the calculated shares of workers to be representative as the drawing procedure reflects occupational and gender structures within establishments.

The analysis is carried out for a sample of enterprises that employ at least 100 employees (this choice is defined by the methodology we use, which is discussed in the next section). We also concentrate only on those firms in which at least 1 employee is working in a managerial position. Table 1 provides summary statistics for the key variables we use. The sample consists of 194,397 (43 percent) individuals working in 1,652 public establishments and 255,839 (57 percent) individuals employed in 2,256 private establishments. Compared to the average private sector employee, the average public sector employee earns 7 percent more[5], is slightly older and better educated, has more work experience, and is less likely to be a temporary worker. Public sector establishments tend to be primary engaged in non-market services, and particularly in public administration (21%), education (13%), health and social work activities (26%), though it is worth noting they are present in all the sectors. Private companies in turn operate mostly in manufacturing (43%), wholesale and retail trade (14%), and other market services (13%). Public and private firms do not differ significantly when it comes to firm size distribution.

Table 1. Means for key variables

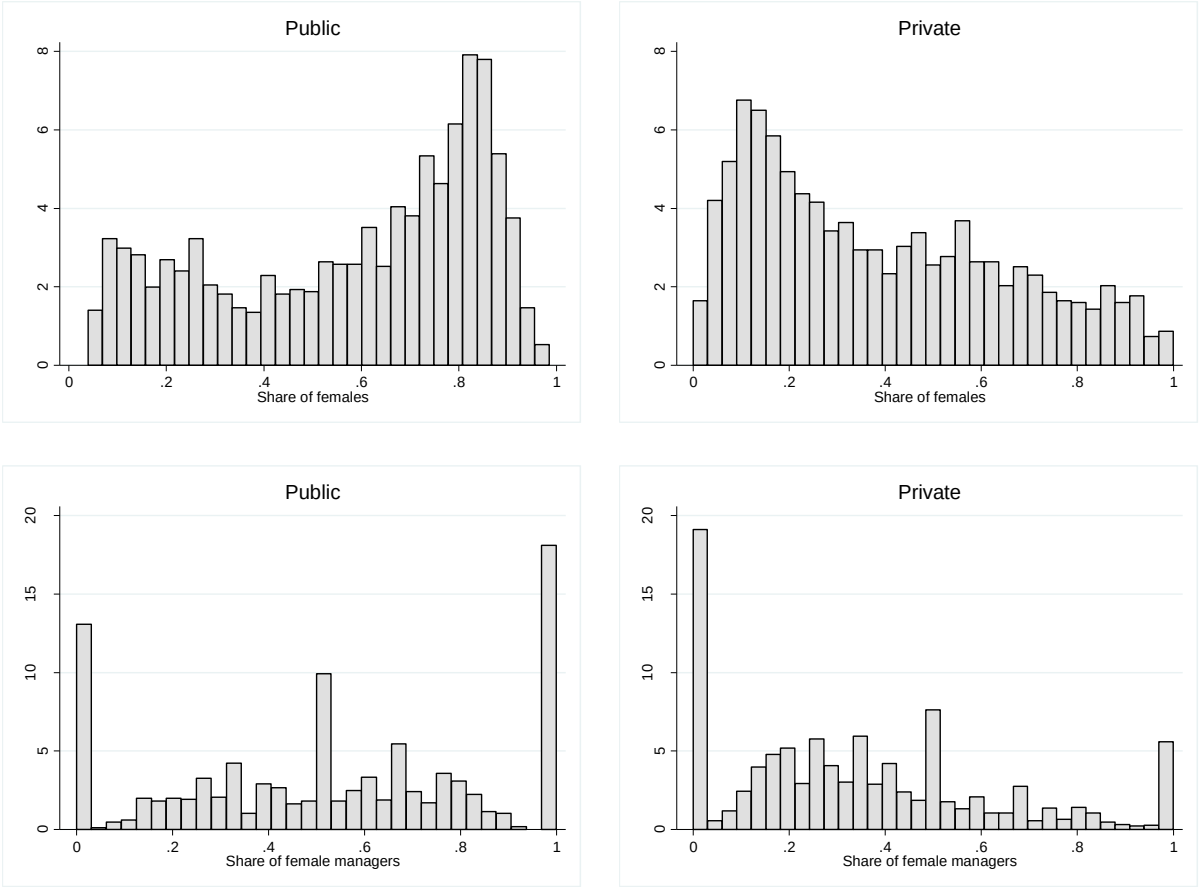
	All	Public	Private
Individual level			
Age (years)	40.6	43.8	38.7
Female	0.47	0.59	0.41
Education:			
Primary or less	0.06	0.04	0.07
Basic Vocational	0.21	0.13	0.25
Secondary General	0.09	0.06	0.11
Secondary Vocational	0.28	0.30	0.27
Tertiary	0.36	0.46	0.30
Experience	17.4	21.3	15.1
Tenure	10.5	14.1	8.5
Part time	0.04	0.04	0.05
Contract: temporary	0.26	0.13	0.34
Occupation			
highly skilled non-manual	0.45	0.61	0.36
lower skilled non-manual	0.20	0.17	0.21
skilled manual	0.28	0.16	0.34
elementary	0.07	0.06	0.08
Hourly wage (PLN)	28.9	30.2	28.1
Number of observations (unweighted)	450 236	194 397	255 839
Number of individuals (weighted)	4 392 731	1 613 922	2 778 809

[5] While reviewed literature finds that public sector employees earn less than private sector employees, summary statistics for our sample show a public sector wage premium. This inconsistency is driven by the fact that the results reported in reviewed literature are accounting for differences in characteristics of public and private sector employees, which is not true for the reported summary statistics. Individuals working in the public sector are more educated and have higher work experience than private sector employees, thus their average pay tends to be higher, but once these differences are netted out, they receive lower pay than comparable private sector employees.

Firm level			
Share of:			
females	0.47	0.58	0.38
female managers	0.42	0.53	0.34
workers aged 25-29	0.13	0.08	0.16
workers aged 55 +	0.14	0.18	0.12
workers with tertiary education	0.37	0.49	0.29
workers on a part-time schedule	0.04	0.04	0.03
workers on a temporary contract	0.14	0.09	0.17
Sector:			
Agriculture, forestry and fishing	0.01	0.01	0.01
Mining and quarrying	0.02	0.03	0.01
Manufacturing	0.31	0.08	0.48
Electricity, gas and water supply, sewerage, waste management	0.05	0.07	0.04
Construction	0.04	0.01	0.06
Wholesale and retail trade	0.08	0.00	0.14
Transport and storage	0.05	0.07	0.04
Market services	0.11	0.09	0.13
Administrative and support service activities	0.03	0.01	0.05
Public administration and defence; compulsory social activities	0.09	0.21	0.00
Education	0.06	0.13	0.01
Human health and social work activities	0.12	0.26	0.02
Arts, entertainment, recreation and other activities	0.02	0.03	0.01
Number of organizations/firms	3 908	1 652	2 256
Number of observations within the firm (unweighted)	115	117	113
Number of individuals within the firm (weighted)	1 124	1 652	2 256

The average share of women is higher in public sector establishments than in the private ones (58 percent vs. 38 percent, respectively), and the average share of female managers displays a similar pattern (53 percent vs. 34 percent, respectively). Thus, the degree of gender segregation appears to be greater in the public sector, as many public organizations have a high share of female employees (cf. Figure 1). In contrast, in the private sector, there are more firms with very low shares of females. Compared to the public sector, firms operating in the private sector are less likely to appoint women to managerial positions. The relatively high share female managers observed in the public sector is a consequence of the large number of public institutions in which women occupy nearly all of the managerial positions. The shares of female workers and female managers are obviously correlated, though the strength of this correlation is slightly higher in the public sector (0.62* vs 0.58*).

Fig. 1 Distribution of the firm-level share of females and the share of female managers by sector



4. Methodology

Taking advantage of the firm-level data we have, we apply a novel approach to analyze the gender wage differential from the point of view of an enterprise. We use both the standard Oaxaca- Blinder wage gap decomposition (Blinder 1973; Oaxaca 1973) and a methodology proposed by Ñopo (2008), which is a non-parametric alternative to parametric and semiparametric estimates of the gap (Moral-Arce, Sperlich, Fernández-Saínz and Roca 2012).

The Oaxaca - Blinder (OB) method is based on estimating wage equations separately for men and women and decomposing the gap in their averages wages using the derived estimates. To apply the OB decomposition we first estimate the wage equations for men and women and based on these estimates we portion out the wage gap between women and men to explained part, i.e. the part of the wage gap that is explained by differences in characteristics of men and women, and unexplained part or the so-called adjusted gender wage gap. For more details concerning the technicalities of the decomposition see supplementary materials available on-line.

We complement the OB decomposition with the Ñopo (2008) decomposition, a non-parametric method based on a matching algorithm. This method has been successfully applied to wage gap decompositions by, for example, Görzig, Gornig, and Werwatz (2005); Nicodemo and Ramos (2012); Ñopo, Daza, and Ramos (2012); and Anspal (2015). Compared to other decomposition methods, the advantage of the Ñopo method is that it accounts for the distribution of the observable characteristics of men and women. More

specifically, it accounts for the possibility that the distribution of the characteristics can be different for men and women, with the consequence that not all women are comparable to men. The wage gap is decomposed into components that reflect differences in characteristics and their returns among comparable men and women (who are in so-called "common support") and components that reflect the fact that not all women can be compared to men. More formal discussion of each of these components is presented in on-line supplementary materials.

In contrast to previous studies, we focus on firm-level wage inequality and its distribution, using the advantage of the linked employer-employee dataset. This means that we first derive mean gender wage gap for workers across all firms in our sample (with a further restriction to public or private sectors only). We refer to this gap as the gap at individual level. Next, we focus on the gender wage gap at the firm level, and derive gender wage gaps for each firm in our sample. To improve matching quality we limit our sample to individuals working in firms with at least 100 employees, and derive gender wage gaps for 3,908 firms. In the case of OB decomposition we estimate wage equations separately for men and women in each firm in our sample, and then derive 3,908 estimates of the wage gap.

Estimating firm-level gender wage gaps has an advantage of enabling us to partly overcome the problem of incomparable firm-level characteristics between male and female workers. We are able to account for the fact that men and women may sort to workplaces with different levels of wage premia associated with that workplace. Occupations of individuals are likely to be more proportionate (and comparable in terms of wage premia) within organizations than between them. Thus, by matching male and female individuals at the firm level we are able to better control for observable gender differences than in the case of matching individuals irrespective of the firm in which they work.

We match male and female individuals based on the following covariates: age (measured by five dummy variables for age groups: (1) 15-24, (2) 25-44, (3) 45-54, (4) 55-64, and (5) age 65+), education (five groups: (1) tertiary, (2) secondary vocational, (3) secondary general, (4) basic vocational, and (5) primary and less) and occupations (aggregated into five main groups based on ISCO classification, cf. Table 1 in the on-line Appendix). By choosing this specific set of covariates, we aimed to address the challenge of the „curse of dimensionality" (Anspal 2015); that is, the trade-off between the number of covariates used for matching and the percentage of matched cases. In general, the greater the number of variables over which the matching is performed, the better its quality, but the lower the share of women and men in the common support. To minimize this problem, we have tested various combinations of explanatory variables based on which individuals are matched and compared the percentage of matched cases. The results are presented in on-line Appendix Table A1. For the sake of comparability, the Oaxaca-Blinder decompositions include the same set of individual characteristics.

5. Results

5.1. Gender wage gap within firms

We start the discussion of the results by comparing the findings from the decomposition of the country-level gender wage gap (panel A of Table 2) and the average of within-firm gender pay gaps with the latter presented both for all employees and only those in non-managerial positions (panels B and C). We present results both for OB decompositions (panels A1, B1, C1) and Ñopo decompositions (panels A2, B2 and C2).

Table 2. Ñopo and Oaxaca – Blinder decomposition of the gender wage gap by sector

Level	Raw	Unexplained	Explained	Explained by	Explained by	% women	% men
Panel A1: GWG - individual level, Oaxaca – Blinder							
Overall	-0.255	-0.294	0.039	n/a	n/a	n/a	n/a
Private	-0.281	-0.284	0.003	n/a	n/a	n/a	n/a
Public	-0.261	-0.235	-0.026	n/a	n/a	n/a	n/a
Panel A2: GWG - individual level, Ñopo							
Overall	-0.255	-0.275	0.020	0.00	0.00	100%	100%
Private	-0.280	-0.269	-0.011	0.00	0.00	100%	100%
Public	-0.259	-0.215	-0.044	0.00	0.00	100%	100%
Panel B1: GWG among all employees - firm level, Oaxaca – Blinder							
Overall	-0.153	-0.166	0.013	n/a	n/a	n/a	n/a
Private	-0.159	-0.204	0.045	n/a	n/a	n/a	n/a
Public	-0.146	-0.097	-0.048	n/a	n/a	n/a	n/a
Panel B2: GWG among all employees - firm level, Ñopo							
Overall	-0.152	-0.145	-0.017	-0.03	0.038	67%	59%
Private	-0.158	-0.158	-0.014	-0.018	0.029	68%	54%
Public	-0.145	-0.128	-0.020	-0.044	0.050	66%	65%
Panel C1: GWG among employees working at non-managerial positions - firm level, Oaxaca - Blinder							
Overall	-0.155	-0.160	0.005	n/a	n/a	n/a	n/a
Private	-0.161	-0.207	0.046	n/a	n/a	n/a	n/a
Public	-0.146	-0.095	-0.051	n/a	n/a	n/a	n/a
Panel C2: GWG among employees working at non-managerial positions - firm level, Ñopo							
Overall	-0.140	-0.145	-0.006	-0.033	0.043	68%	59%
Private	-0.151	-0.163	-0.004	-0.018	0.030	68%	54%
Public	-0.125	-0.121	-0.008	-0.052	0.059	67%	66%

Source: Own estimates based on Badanie Struktury Wynagrodzeń wg Zawodów w Polsce.

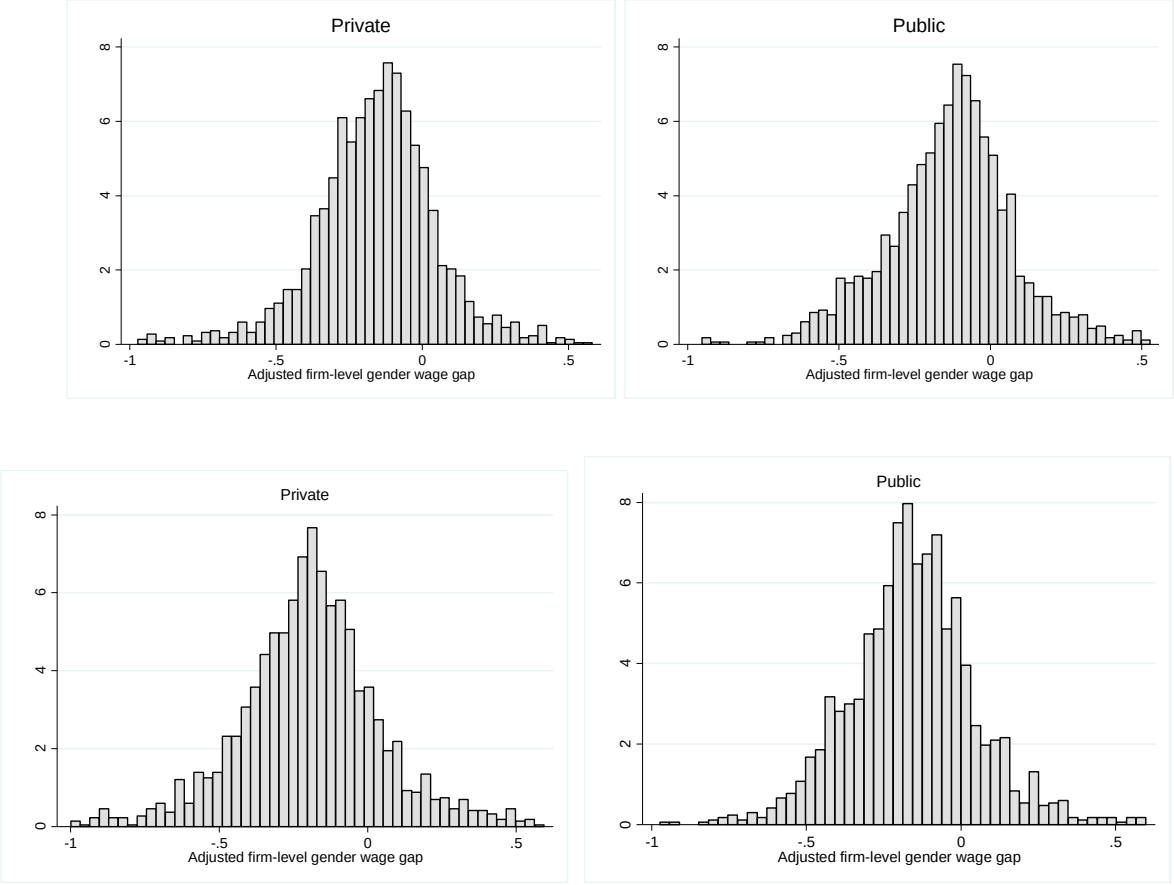
The raw pay gap, which is a difference in the average wages of male and female employees (expressed as a percentage of male wage), amounts to 25.5 percent in our sample (Panel A1 in Table 2)[6]. In line with the results of previous studies, our findings show that the gender wage gap is not explained by men's and women's characteristics, and that the unexplained (adjusted) component of the gap - which may be interpreted as the „discriminatory" component that does not result from men's and women's different

[6] This is figure higher than the recent results (17 percent) reported in Goraus and Tyrowicz (2014) or Van der Velde, Tyrowicz, and Goraus (2017); which are, however, based on a different data source (LFS) and include employees of small firms. Still, the results are consistent, as using a similar methodology (monthly earnings rather than hourly earnings, no firm size restriction) with the SWSS data we would get a raw difference of 17 percent as well.

endowments - is larger than the raw difference, amounting to 29 percent. The degree of inequality is larger in the private sector, in which female workers earn 28 percent less per hour than men on average. The corresponding pay gap in the public sector is around 26 percent. However, the explained components are much higher in the public sector, where differences in individual endowments explain around 10% of the observed difference in average wages. The results of the Ñopo decompositions, though very in line with the OB numbers, suggest a slightly lower unexplained gap and a higher explained component, both for private and public sector.

The remaining four panels of Table 2 present results from the decompositions within firms, meaning that (i) the OB decompositions are run separately for each firm and (ii) in the Ñopo procedure male and female employees are matched within each firm in the sample. They should therefore be interpreted as showing average within-firm gender wage inequality. Both OB and Ñopo results show that the mean gender wage gap within firms that is observed among all employees is around 15 percent, and it is still higher in the private sector than in the public sector. According to OB decomposition its unexplained part exceeds the raw gap (overall and in the private sector), but Ñopo results suggest that the unexplained component is lower than OB. This is because the explained component turns to be negative and some men and women are not comparable (they are out of the common support). An interesting observation concerns the estimates of the gender pay gap in the public sector: both Ñopo and OB confirm the raw gap is lower than in the private sector and that the unexplained component is lower that the raw gap. However, the size of the explained gap is much lower in the Ñopo decomposition, suggesting that sorting of men and women to establishments is stronger in the public sector than the private one.

Fig 2. Distribution of firm-specific adjusted gender wage gap by sector (Ñopo decomposition, upper panel and Oaxaca- Blinder decomposition, lower panel).



Overall, the results show that gender gap is smaller when men and women are compared within firms than across the firms. This discrepancy suggests that part of the gender wage inequality is due to the allocation of men and women and firm-specific factors. The gap that is observed among non-managerial workers (panels C1 and C2) is comparable to the gap estimated for all the employees. Both raw and adjusted pay gaps are higher in the private sector than in the public one, and the unexplained gap in the private sector is even higher than the raw difference. Interestingly, the distributions of the wage gap estimates by sector reveal that in around 19-22 percent of private firms and 20-24 percent of public units the adjusted wage gap is positive; meaning that in these firms women are earning more than "similar" men (cf. Figure 2).

5.2. The link between the firm-level gender wage gap and workers' sex composition

We now turn to the main point of our analysis: answering the question whether the gender pay gaps within firms are related to the presence of female managers, and to what extent this pattern differs between the public and the private sectors.

To test our hypothesis that higher shares of both managers and workers who are women, observed in the public sector, may be related to smaller adjusted gender pay gaps in public institutions, we run OLS estimations. In the analysis we focus on firm-level wage gaps among all employees but those on managerial positions (so that their wages do not bias our estimates). Estimates obtained for the gender pay gaps including managerial workers are provided as robustness checks in on-line supplementary materials.

We regress firm-level adjusted pay gaps derived for employees working in non-managerial position using Ñopo decomposition against a set of firm characteristics, including the share of female workers and female managers. Because we are using adjusted gap, we examine wage differences between men and women that work in the same firm and have comparable age, education and occupation. In all the regressions we use bootstrapped standard errors in order to correct for the two-step estimation procedure. We run the regressions separately for the public and the private establishments.

The results are summarized in Table 3 (the full set of estimated coefficients is available in an on-line Appendix Table A2). Model 1 controls for information on the firm's size, the region it operates in (NUTS-2 level), and the NACE sector. Model 2 additionally accounts for firm-level information on workers' characteristics, defined as their age and educational structure, and the proportions of a part-time schedule and a fixed-term contract. The results show that firms' characteristics are related to the gender wage gaps at an establishment level: higher shares of older and more educated workers are associated with higher gaps, increased collective bargaining coverage leads to lower gaps, and firms' specialization in market and non-market services, as compared to manufacturing, is associated with increased gaps. In the public sector, higher firm size is associated with lower gender pay gap, once all other characteristics are accounted for.Our main results reveal that in the private sector, gender pay gaps are smaller when the share of workers who are female is higher[7]. Such effect is, however, not observed for the public sector. The coefficients of 0.138 (model 1) and 0.155 (model 2) mean that with a 1 percentage point increase in

[7] The dependent variable takes negative values, as the gender wage gap is defined as the difference in women's versus men's average wage. Positive significant coefficients on the share of women in the private firms thus show that higher shares of women are associated with smaller (negative) gender wage gaps.

the share of women in the private firms, the negative wage gap in these firms decreases by 0.138*0.01 (model 1) and 0.155*0.01 (model 2). The positive effect of higher female shares on adjusted gender pay gaps seems to stand in contrast to economic theory and several empirical findings. However, we believe our data and model specification account for more workers' characteristics as compared to previous studies, because matching workers at the firm level allows us to capture more of men's and women's sorting into occupations and firms operating in specific industries[8] .

Table 3. Coefficients of women's and female managers' shares from the OLS regression of gender pay gaps at the firm level

Firm-level share of:	Model 1		Model 2	
	Private	**Public**	**Private**	**Public**
Women	0.138***	-0.038	0.155***	-0.028
	(0.035)	(0.041)	(0.031)	(0.036)
Female managers	-0.012	0.042*	-0.018	0.043*
	(0.029)	(0.022)	(0.032)	(0.024)
Controls:				
Collective bargaining	*Yes*		*Yes*	
NACE	*Yes*		*Yes*	
Regions	*Yes*		*Yes*	
Firm size	*Yes*		*Yes*	
Coworkers' characteristics	*No*		*Yes*	

*Notes: Bootstrapped standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; detailed estimation output is presented in Appendix Table A2.*

We find no statistically significant relationship in the private sector between the share of women holding managerial positions and the gender pay gap among workers in non-managerial positions. By contrast, we find that in the public sector a higher share of managers who are female is associated with a lower degree of firm-level gender wage inequality among non-managers. It thus appears that women's greater involvement in top-level management in public organizations may be positively related to the smaller adjusted gender wage gaps observed in these units for other employees (though this this relation is only significant at 10% significance level). More precisely, the coefficients of 0.042 (model 1) and 0.043 (model 2) indicate that 10 percentage point increase in the share of female managers in the public institutions is associated with app. 0.004 decrease in the size of the negative wage gap. This positive effect is thus rather weak.

We also test whether the relationship between the shares of workers and managers who are female and the firm-level gender pay gap is different in firms with high and low unexplained pay gaps. [9] To this end,

[8] Carrington and Troske (1998) emphasize that the link between shares of workers who are female and male and female wages may be due to segregation along finer dimensions of occupation and industry, e.g. plants with many women may employ workers with relatively low skills. This is a pattern we find in our analysis.

[9] We see two potential reasons for the nonlinear link between the pay gaps and female workforce involvement. First, the size (and sign) of the gender pay gap may reflect unobserved firm characteristics; thus, firms that display similar gaps may be more comparable in this respect. Second, if the size of the pay gap reflects the level of discrimination, female managers' power to decrease it may be greater in firms with larger wage gaps.

we estimate the regression of the (recentered) influence function (RIF) of the unconditional quantiles of gender pay gaps at the firm level (Firpo, Fortin and Lemieux, 2009), looking at firms in the 10th, 25th, 50th, 75th, and 90th percentiles of the adjusted pay gap distribution in each sector.

The results are summarized in Table 4 (the full estimation output is available in on-line Appendix Tables A3 and A4). The positive link between the size of the gender pay gap for non-managerial workers and the share of workers who are women in the private sector holds for all but the very top of the gap distribution. This means that in firms, in which there is a relatively large pay disadvantage of women, increased share of female workers is linked to reduced gender wage inequality. The coefficients suggest that the link is the strongest among the firms with highest wage gaps and it gradually decreases with the size of the gap. When the gap is already small (i.e., at the upper end of the pay gap distribution) or even positive—meaning that men are disadvantaged in terms of wages—the sex composition of the workforce does not play a role. Firms with the greatest unexplained wage gaps also have the smallest share of women (with the shares of 29 percent and 37 percent for 10th and 25th quantiles, around 42 percent for 50th and 75th quantile, and 44 percent for 90th quantile). Our results thus show that when women in private companies are underrepresented, they experience higher wage disadvantage over men, but this disadvantage is reduced when the share of women increases. Regardless of the size of the gender wage gap, the public sector does not reveal any significant association between the share of female workers and gender wage inequality.

Table 4. Coefficients of women's and female managers' shares from the regression of the (recentered) influence function (RIF) of the unconditional quantiles of gender pay gaps at the firm level

	private sector				
Firm-level share of:	**10th p**	**25th p**	**50th p**	**75th p**	**90th p**
women	0.236***	0.168***	0.098***	0.048	0.007
	(0.050)	(0.029)	(0.027)	(0.031)	(0.039)
female managers	-0.015	-0.001	-0.011	0.004	0.058
	(0.040)	(0.025)	(0.024)	(0.022)	(0.039)
Controls:	*Collective bargaining, NACE, firm size, region, coworkers' characteristics.*				
Firm-level share of:	**public sector**				
	10th p	**25th p**	**50th p**	**75th p**	**90th p**
women	-0.054	-0.061	-0.003	-0.006	0.041
	(0.078)	(0.058)	(0.037)	(0.041)	(0.079)
female managers	-0.004	0.023	0.024	0.022	0.103**
	(0.048)	(0.032)	(0.022)	(0.020)	(0.042)
Controls:	*Collective bargaining, NACE, firm size, region, coworkers' characteristics.*				

*Notes: Bootstrapped standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; detailed estimation output available in an online Appendix tables A3 and A4.*

When we look at the relation between the share of managers who are female and the gender pay gap for non-managers, we see that there is no statistically significant relationship among the organizations with large or medium-sized pay gap. However, among public organizations that have a large share of managers who are female, and that already have a relatively small or even positive pay gap (upper decile of the pay

gap distribution), women's pay advantage is even higher. Once again, the quantitative impact of the share of female managers is rather small as indicated by the coefficient of 0.058 that reflects a 0.0058 decrease in the size of the gender pay gap in return to a 10 percentage point increase in the share of female managers.

Finally, we test the relationship between the size of the adjusted gender pay gap and the shares of employees and managers who are women in firms with various levels of human capital, which we treat as a proxy for the skill content of jobs. We suspect the role of female managers might be different in establishments employing better educated (and better paid) workers as gender pay gaps tend to increase along the wage/skill distribution (Blau and Kahn 2017). We rerun the analysis for firms with low, medium, and high shares of tertiary-educated individuals. We prefer to focus on educational structure rather than average wages paid as these are driven by the pay gaps and gender sorting among firms/occupations. The main results are presented in Table 5 (the full estimation output is available in on-line Appendix Table A5). The findings indicate that in the private firms, a higher share of employees who are female is associated with a smaller pay gap in firms with low and medium skilled workforce, while in the public sector this applies to medium skilled workforce only. In private sector the link is strongest among firms with low levels of human capital. These institutions are also characterized by low share of women: 36 percent as compared to 40 percent for medium level and 51 percent for high level of human capital. We also find a statistically significant relationship between the share of managers who are female and the gender pay gap in high-skilled public sector institutions. This relation, once again, reveals that higher presence of female managers is associated with lower gender wage inequality. The size of the estimated coefficient of 0.096 reflects somewhat stronger effect of female managers for these institutions than for all public institutions (Table 3) or public institutions with lowest pay gaps (Table 4).

Table 5. Coefficients of women's and female managers' shares from the OLS regression of gender pay gaps at the firm level, low, medium, and high human capital firms

	private sector			public sector		
Firm-level share of:	**low skilled**	**medium skilled**	**high skilled**	**low skilled**	**medium skilled**	**high skilled**
Women	0.219***	0.122*	0.083	0.063	0.136*	-0.030
	(0.080)	(0.064)	(0.051)	(0.073)	(0.075)	(0.059)
Female managers	-0.052	0.003	0.045	0.013	0.009	0.096***
	(0.063)	(0.052)	(0.046)	(0.047)	(0.053)	(0.029)
Controls:	*Collective bargaining, NACE, firm size, region, coworkers' characteristics.*					

*Notes: Bootstrapped standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; detailed estimation output available in an online Appendix Table A5.*

What kinds of organizations are the high-skilled/low pay gap public institutions in which an increased presence of female managers is associated with even higher pay advantage towards women? They are disproportionately in the education and public administration sectors, whereas few are in the manufacturing sector. They are, on average, small in size and have high shares of both workers and managers who are female. The workers in these organizations tend to have shorter tenures, which suggests that these organizations were either founded more recently and/or that they have been experiencing a high degree of employee turnover.

To ensure the reliability of our findings, we additionally run series of robustness checks, which are available in on-line supplementary materials. The robustness analysis confirms our findings that increased presence of female managers is associated with smaller gender wage gap in selected high-skilled/low pay gap public institutions.

6. Conclusions

We add to the literature analyzing the link between the presence of female managers and the firm-level gender pay gap and its private/public sector perspective and provide evidence on this link for Poland, where large shares of workers are employed in the public sector, and the gender wage gap is smaller in the public than in the private sector. We hypothesize that women's overrepresentation in the public sector relative to the private sector, especially at the managerial level, translates to its lower overall gender wage inequality.

Using a comprehensive set of linked employer-employee data, we derive the estimates of the gender wage gap at the individual level and at the firm level. We use two methods to estimate the gaps – standard Oaxaca-Blinder decomposition and Ñopo decomposition that is based on a matching algorithm, which allows us to account for sorting of men and women with certain characteristic to specific firms. The two approaches yield consistent results.

We show that the private and public sectors differ in the role workers feminization plays for within firm gender pay gaps. While the presence of female managers does not appear to relate to the size of the adjusted gender pay gap in the private sector, it appears to hold for some of the public sector firms and institutions. These public institutions tend to have a highly skilled workforce, offer above-average wages, have a relatively small or even positive pay gap, and operate in the public administration or education. This finding appears to be in line with the inconclusive literature and Gagliarducci and Paserman (2015) argument about the heterogeneity of the role female managers play in workers' employment and wage outcomes. What matters are not only management strata, but also the institutional context as indicated by the public / private sector difference. Moreover, data and methodological issues are important: both with respect to how managerial positions are defined and identified and how occupational differences of men and women are captured and are controlled for. Future research on the role of female managers in determining firm-level gender pay gaps should further account for the firm and occupational sorting of workers. Looking at how women advance their earnings within and between firms and how these careers' progressions are shaped by the presence of women at managerial levels could be an interesting area for future studies.

For private companies we find that a higher share of workers who are women correlates with a smaller firm-level pay gap. This finding, which stands in contrast to theoretical predictions and some of the empirical evidence, relates particularly to private firms that already have large wage gaps and which employ large shares of low skilled workers. We believe this result may partly be driven by the matching methodology we applied, which allows us to account for between and within firm sorting of men and women. Moreover, it may pertain to the fact that in these companies the share of female workers tends to be low, so its increase may lead to more equal pay.

We also show that Poland distinguishes itself with a relatively low overall raw gender wage gap and large adjusted wage gaps that mostly arise due to female better education, compared to men. What could thus shape the high 'unexplained' part of the gender pay gap, especially at the firm level? Gender inequality in

the labor market is the product of several factors, and discrimination most notably relates to the institutional setting and cultural norms. In this respect, the case of Poland reflects other neighboring central and eastern European countries (Hungary, Czech Republic and Slovakia) with 'embedded neoliberalism' (Bohle and Greskovits 2007). From the perspective of gender equality in pay, family-work reconciliation policies may be particularly important, and in this field Poland ranks average on labor market friendliness, but low on family policy setting and on gender norms (Matysiak and Węziak – Białowolska 2016). The refamilialist direction of family policies in recent years (Saxonberg and Szelewa, 2007; Javornik 2014) could potentially reinforce the difficulty to combine work and family life and further contribute to the female wage disadvantage, despite their higher educational attainment.

What is also striking in our results is the public / private sector difference in the workforce composition (in terms of gender, age, education or type of contract held). More than twenty years after the economic transition public sector still plays an important role in the economy, and its employees seem to face more gender wage equality. One can argue this is influenced by a legacy of the past: under the socialist system, wages were compressed in the state owned enterprises. The observed trend of increasing private employment will thus likely reinforce the overall gender wage inequality, if the private sector preserves its current wage policies.

Finally, a few reservations should be mentioned. First, despite our attempt to control for a wide range of coworker characteristics, it is difficult to separate the influence of female managers from the unobservable factors that may affect gender pay gaps (e.g., productivity differentials). In particular, our study is based on the use of occupational codes for managers and their sex, but this does not necessarily reveal the real hierarchy of power in the organization. Second, the obtained results do not represent a state of general equilibrium, and are likely to change as the number of female managers grows. The gender difference in management styles may diminish over time, and companies may change their sex-differentiated promotion structures or wage-setting policies in response to equal pay campaigns, irrespective of the share of women in management. Also, gender equity minded firms are likely to tackle gender inequality both in managerial positions and in wages, translating to a correlation between the two, but not a causal relationship. Third, the private/ public difference in the share of managers who are female may not affect wages, but other fringe benefits and non-wage forms of compensation prevalent in the public sector (Budd 2004). Fourth, in our study we are not able to distinguish between individuals in the top (board members) and the lower management layers. It is, however, clear, that manager's ability to affect wage policies and gender pay gaps will differ depending on her position.

All in all, our result suggest that while the attempts to bring more women to top and influential managerial positions are necessary, they seem unlikely to easily assure equal pay for equal work for women.

References

Angelov, Nikolay, Per Johansson, and Erica Lindahl. 2013. "Is the Persistent Gender Gap in Income and Wages Due to Unequal Family Responsibilities?" IZA Discussion Papers 7181.

Anspal, Sten. 2015. "Gender Wage Gap in Estonia: a Non-parametric Decomposition." *Baltic Journal of Economics* 15(1): 1–16.

Antonczyk, Dirk, Bernd Fitzenberger, and Katrin Sommerfeld. 2010. "Rising Wage Inequality, the Decline of Collective Bargaining, and the Gender Wage Gap." *Labour Economics* 17(15): 835–847.

Arulampalam, Wiji, Alison L. Booth, and Mark L. Bryan. 2007. "Is There a Glass Ceiling over Europe ? Exploring the Gender Pay Gap across the Wage Distribution." *Industrial and Labor Relations Review* 60(2): 163–186.

Athey, Susan, Christopher Avery, and Peter Zemsky. 2000. "Mentoring and Diversity." *American Economic Review* 90(4): 765–86.

Barón, Juan D. and Deborah A. Cobb-Clark. 2010. "Occupational Segregation and the Gender Wage Gap in Private- and Public-Sector Employment: A Distributional Analysis." *Economic Record* 86(273): 227–246.

Bayard, Kimberly, Judith Hellerstein, David Neumark, and Kenneth Troske. 2003. "New Evidence on Sex Segregation and Sex Differences in Wages from Matched Employee-Employer Data*." Journal of Labor Economics* 21(4): 887–922.

Bertrand, Marrianne and Antoinette Schoar. 2003. "Managing with Style: The Effect of Managers on Firm Policies." *The Quarterly Journal of Economics* 118(4): 1169-1208.

Bertrand, Marianne, Sandra E. Black, Sissel Jensen, and Adriana Lleras-Muney. 2014. "Breaking the Glass Ceiling? The Effect of Board Quotas on Female Labor Market Outcomes in Norway." IZA Discussion Paper No. 8266.

Blau, Francine D. and Lawrence M. Kahn. 1999. "Analyzing the Gender Pay Gap." *The Quarterly Review of Economics and Finance* 39(5): 625–646.

Blau, Francine D. and Lawrence M. Kahn. 2000. "Gender Differences in Pay." *Journal of Economic Perspectives* 14(4): 75–100.

Blau, Francine D. and Lawrence M. Kahn. 2017. "The Gender Wage Gap: Extent, Trends, and Explanations." *Journal of Economic Literature* 55(3): 789-865.

Blinder, Alan S. 1973. "Wage Discrimination: Reduced Form and Structural Estimates." *Journal of Human Resources* 8(4): 436-455.

Bloom, Nicholas and John Van Reenen. 2010. "Why Do Management Practices Differ across Firms and Countries?" *Journal of Economic Perspectives* 24(1): 203-24.

Bohle, Dorothee and Bela Greskovits. 2007. "Neoliberalism, Embedded Neoliberalism and Neocorporatism: Towards Transnational Capitalism in Central-Eastern Europe." *West European Politics* 30(3): 443-466.

Booth, Alison L. 2009. "Gender and Competition." *Labour Economics* 16(6): 599–606.

Bossler, Mario, Alexander Mosthaf, and Thorsten Schank. 2016. "More Female Manager Hires Through More Female Managers? Evidence from Germany." IZA Discussion Paper No. 10240.

Budd, John W. 2004. "Non-wage Forms of Compensation." *Journal of Labor Research*, 25(4): 597-622.

Burgess, Simon and Marisa Ratto. 2003. "The role of Incentives in the Public Sector: Issues and Evidence." *Oxford Review of Economic Policy* 19(2): 285-300.

Cai, Lixin and Amy Y. C. Liu. 2011. "Public-Private Sector Wage Gap in Australia: Variation along the Distribution." *British Journal of Industrial Relations* 49(2): 362–390.

Carrington, William J. and Kenneth R. Troske. 1998. "Sex Segregation in US Manufacturing." *ILR Review* 51(3): 445-464.

Christofides, Louis N., Alexandros Polycarpou, and Konstantinos Vrachimis. 2013. "Gender Wage Gaps, 'Sticky Floors' and 'Glass Ceilings' in Europe." *Labour Economics* 21: 86–102.

Cohen, Philip and Matt L. Huffman. 2007. "Working for the Woman? Female Managers and the Gender Wage Gap." *American Sociological Review* 72: 681-704.

Correll, Shelley, Benard, Stephen and In Paik. 2007. "Getting a Job: Is There a Motherhood Penalty?" *American Journal of Sociology* 112(5): 1297-1338.

Cukrowska-Torzewska, Ewa and Anna Lovasz. 2016. "Are Children Driving the Gender Wage Gap? Comparative Evidence from Poland and Hungary." *The Economics of Transition* 24(2): 259-297.

Cutillo, Andrea and Marco Centra. 2017. "Gender-Based Occupational Choices and Family Responsibilities: The Gender Wage Gap in Italy." *Feminist Economics* 23(4): 1-31.

Datta Gupta, Nabanita, Poulsen, Anders, and Marie Villeval. 2013. "Gender Matching and Competitiveness: Experimental Evidence." *Economic Inquiry* 51(1): 816–835.

Felgueroso, Florentino, Maria J. Perez-Villadoniga, and Juan Prieto-Rodriguez. 2008. "The Effect of the Collective Bargaining Level on the Gender Wage Gap: Evidence from Spain." *The Manchester School* 76(3): 301–319.

Firpo, Sergio, Nicole M. Fortin, and Thomas Lemieux. 2009. “Unconditional Quantile Regressions.” *Econometrica* 77(3): 53-973.

Flabbi, Luca, Mario Macis, Andrea Moro, and Fabiano Schivardi. 2014. “Do Female Executives Make a Difference? The Impact of Female Leadership on Gender Gaps and Firm Performance.” IZA Discussion Paper No. 8602.

Gagliarducci, Stefano and M. Daniele Paserman. 2015. “The Effect of Female Leadership on Establishment and Employee Outcomes: Evidence from Linked Employer-Employee Data,” in Solomon W. Polachek , Konstantinos Tatsiramos , Klaus F. Zimmermann,eds. Gender Convergence in the Labor Market (Research in Labor Economics, Volume 41), pp.343 – 375. Emerald Group Publishing Limited. .

Goldin, Claudia. 2014. “A Grand Gender Convergence: Its Last Chapter” *The American Economic Review* 104(4): 1091-1119.

Goraus, Karolina and Joanna Tyrowicz. 2014. “Gender Wage Gap in Poland – Can It Be Explained by Differences in Observable Characteristics?” *Ekonomia* 36: 125-148.

Goraus, Karolina, Joanna Tyrowicz, and Lucas van der Velde. 2017. "Which Gender Wage Gap Estimates to Trust? A Comparative Analysis." Review of Income and Wealth 63.1: 118-146.

Gorzig, Bernd, Martin Gornig, and Axel Werwat. 2005. “Explaining Eastern Germany's Wage Gap: The Impact of Structural Change.” *Post-Communist Economies* 17(4): 449-464.

Gregory, Robert G. and Jeff Borland. 1999. “Recent Developments in Public Sector Labor Markets,” in David Card and Orley Ashenfelter, eds. *Handbook of Labor Economics 3C, pp.* 3573-3630. Amsterdam: Elsevier B.V.

Grotkowska, Gabriela and Leszek Wincenciak. 2014. “Public Sector Wage Premium in Poland : Can It Be Explained by Structural Differences in Employment?” *Ekonomia* 38: 47–73.

Heinze, Anja and Elke Wolf. 2010. “The Intra-firm Gender Wage Gap: a New View on Wage Differentials Based on Linked Employer–Employee Data.” *Journal of Population Economics 23*(3): 851-879.

Hirsch, Boris. 2013. “The Impact of Female Managers on the Gender Pay Gap: Evidence From Linked Employer-Employee Data for Germany.” *Economics Letters* 119(3): 348-350.

Hultin, Mia and Ryszard Szulkin. 2003. “Mechanisms of inequality, unequal access to organisational power and the gender wage gap.” *European Sociological Review* 19: 143-159.

Hundley, Greg. 2001. “Why Women Earn Less Than Men in Self-employment.” *Journal of Labor Research* 22(817): 817–829.

Jacobson, Willow S., Christine K. Palus, and Cynthia J. Bowling. 2009. “A Woman's Touch? Gendered Management and Performance in State Administration.” *Journal of Public Administration Research and Theory* 20(2): 477-504.

Javornik, Jana. 2014. “Measuring State De-familialism: Contesting Post-socialist Exceptionalism.” *Journal of European Social Policy* 24(3): 240-257.

Kaplan, Steven, Mark Klebanov, and Morten Sorensen. 2012. “Which CEO Characteristics and Abilities Matter?” *The Journal of Finance* 67: 973–1007.

Korkeamäki, Ossi and Tomi Kyyrä. 2006. “A Gender Wage Gap Decomposition For Matched Employer–Employee Data.” *Labour Economics* 13(5): 611-638.

Lausev, Jelena. 2014. “What Has 20 Years of Public-Private Pay Gap Literature Told Us? Eastern European Transitioning vs. Developed economies.” *Journal of Economic Surveys* 28(3): 516-550.

Leven, Bozena. 2008. “Poland's Transition and New Opportunities for Women.” *Feminist Economics* 14(1): 123-136.

Lucifora, Claudio and Dominique Meurs. 2006. “The Public Sector Pay Gap in France, Great Britain and Italy.” *Review of Income and wealth* 52(1): 43-59.

Macpherson, David A. Barry T.Hirsch. 1995. “Wages and Gender Composition: Why Do Women's Jobs Pay Less?” *Journal of labor Economics* 13(3): 426-471.

Manning, Alan and Joanna Swaffield. 2008. “The Gender Gap in Early-Career Wage Growth.” *The Economic Journal* 118: 983–1024.

Matsa, David A. and Amalia R. Miller. 2011. “Chipping Away at the Glass Ceiling: Gender Spillovers in Corporate Leadership.” *American Economic Review* 101(3): 635-39.

Matsa, David A. and Amalia R. Miller. 2013. “A Female Style in Corporate Leadership? Evidence from Quotas.” *American Economic Journal: Applied Economics* 5(3): 136-69.

Matysiak, Anna and Dorota Węziak-Białowolska, D. 2016. „Country-Specific Conditions for Work and Family Reconciliation: An Attempt at Quantification.” *European Journal of Population* 32(4): 475-510.

Marquis, Christopher and Matthew Lee. 2013. “Who Is Governing Whom? Executives, Governance and the Structure of Generosity in Large U.S. Firms.” *Strategic management Journal* 34(4): 483–97.

Meng, Xin and Dominique Meurs. 2004. “The Gender Earnings Gap: Effects of Institutions and Firms - a Comparative Study of French and Australian Private Firms.” *Oxford Economic Papers* 56(2): 189-208.

Meng, Xin. 2004. “Gender Earnings Gap: the Role of Firm specific effects.” *Labour Economics* 11(5): 555-573.

Monk-Turner, Elizabeth and Charlie G. Turner. 2001. “Sex Differentials in Earnings in the South Korean Labor Market.” *Feminist Economics* 7(1): 63-78.

Moral-Arce, Ignacio, Stefan Sperlich, Ana I. Fernández-Saínz, and Maria J. Roca. 2012. “Trends in the Gender Pay Gap in Spain: a Semiparametric Analysis.” *Journal of Labor Research* 33(2): 173-195.

Mysíková, Martina. 2012. “Gender Wage Gap In The Czech Republic And Central European Countries.” *Prague Economic Papers* 3: 328-346.

Nicodemo, Catia and Raul Ramos. 2012. “Wage Differentials Between Native and Immigrant Women in Spain: Accounting for Differences in Support.” *International Journal of Manpower* 33(1): 118-136.

Ñopo, Hugo. 2008. “Matching as a Tool to Decompose Wage Gaps.” *The Review of Economics and Statistics* 90(2): 290-299.

Ñopo, Hugo, Nancy Daza, and Johanna Ramos. 2012. „Gender Earning Gaps Around the World: a Study of 64 Countries.” *International Journal of Manpower* 33(5): 464-513.

Oaxaca, Ronald. 1973. “Male-Female Wage Differentials in Urban Labor Markets.” *International Economic Review* 14(3): 693-709.

OECD. 2012. *Closing the gender gap: Act Now*. Paris.

Post, Corinne, Rahman Noushi, and Emily Rubow. 2011. “Green Governance: Boards of Directors’ Composition and Environmental Corporate Social Responsibility.” *Business and Society* 50(1): 189–223.

Reilly, Kevin T. and Tony S. Wirjanto. 1999. “Does More Mean Less? The Male/Female Wage Gap and the Proportion of Females at the Establishment Level.” *The Canadian Journal of Economics* 32(4): 906–929.

Saxonberg, Steven and Dorota Szelewa. 2007. “The Continuing Legacy of the Communist Legacy? The Development of Family Policies in Poland and the Czech Republic.” *Social Politics* 14(3): 351-379.

Stumbitz, Bianca, Lewis, Susan, and Julia Rouse. 2018. “Maternity Management in SMEs: a Transdisciplinary Review and Research Agenda.” *International Journal of Management Reviews* 20(2): 500-522.

Vieira, Jose A. C., Cardoso, Ana R., and Miguel Portela. 2005. “Gender Segregation and the Wage Gap in Portugal: An Analysis at the Establishment Level.” *The Journal of Economic Inequality* 3(2): 145-168.

Vieito, Joao P. T. 2012. “Gender, Top Management Compensation Gap, and Company Performance: Tournament versus Behavioral Theory.” *Corporate Governance: An International Review* 20(1): 46–63.

Weibel, Antoinette, Katja Rost, and Margit Osterloh. 2010. “Pay for Performance in the Public Sector—Benefits and (Hidden) Costs.” *Journal of Public Administration Research and Theory* 20(2): 387-412.

Weichselbaumer, Doris and Rudolf Winter-Ebmer. 2005. “A Meta Analysis of the International Gender Wage Gap.” *Journal of Economic Surveys* 19(3): 479–511.

Zweimuller, Josef and Rudolf Winter-Ebmer. 1994. “Gender Wage Differentials in Private and Public Sector Jobs.” *Journal of Population Economics* 7: 271–285.

Appendix

Table A1. Ñopo decomposition results by various combinations of covariates included in the matching procedure (all employees, regardless of firm size)

Combination (dummies for)	Matched men	Matched females	Average wage difference	Average adjusted wage gap
age + education	86%	78%	-15.2%	-17.9%
age+ education+ experience	77%	69%	-15.2%	-18.4%
age + education + experience + tenure	65%	58%	-15.2%	-18.8%
age + education + experience + tenure + occupations	47%	42%	-15.2%	-15.1%
age + education + experience + tenure + occupations + contract type	44%	40%	-15.2%	-15.0%
age + education + experience + tenure + occupations + contract type + part time	43%	38%	-15.2%	-15.1%
age + education + occupations	67%	59%	-15.2%	-14.5%

Notes: The age is measured by five dummy variables for age groups: (1) 15-24, (2) 25-44, (3) 45-54, (4) 55-64, and (5) age 65+), education is measured by five education groups: (1) tertiary, (2) secondary vocational, (3) secondary general, (4) basic vocational, and (5) primary and less); experience and tenure are measured by four dummy variables: (1) 0-1 year, (2) 1-5 years, (3) 5-20 years, (4) more than 20 years, occupations are measured by five dummy variables reflecting the major occupation groups based on ISCO classification: (1) major group 1; (2) major groups 2 and 3 (), (3) major groups 4 and 5, (4) major groups 6 and 9; (5) major groups 7 and 8; contract type is measured by two dummy variables: (1) contract for indefinite period, (2) temporary contract; part time is measure by a dummy variable.

Table A2. Coefficients of women's and female managers' shares obtained from OLS estimation of gender pay gaps at firm level

Firm level:	Model 1		Model 2	
	private	public	private	public
Share of female workers	0.138***	-0.038	0.155***	-0.028
	(0.035)	(0.041)	(0.031)	(0.036)
Share of female managers	-0.012	0.042*	-0.018	0.043*
	(0.029)	(0.022)	(0.032)	(0.024)
Share of workers aged 25-29			0.072	-0.024
			(0.063)	(0.087)
Share of workers aged 55+			0.194***	0.199***
			(0.074)	(0.076)
Share of tertiary educated workers			-0.021	0.123***
			(0.025)	(0.027)
Share of part-time workers			0.004	0.330***
			(0.048)	(0.090)
Share of temporary workers			0.036	-0.030
			(0.025)	(0.028)
Collective bargaining – central level	-0.012	0.033	-0.012	0.032

	(0.024)	(0.031)	(0.022)	(0.034)
Collective bargaining – firm level	-0.019*	-0.026**	-0.024**	-0.008
	(0.010)	(0.012)	(0.012)	(0.015)
NACE: Agriculture	0.009	0.002	-0.005	-0.026
	(0.066)	(0.032)	(0.064)	(0.047)
NACE: Construction	-0.003	-0.025	-0.011	-0.020
	(0.038)	(0.053)	(0.038)	(0.055)
NACE: Market services	0.037***	0.110***	0.035**	0.090***
	(0.012)	(0.021)	(0.015)	(0.020)
NACE: Non-market services	0.082***	0.083***	0.058***	0.044**
	(0.020)	(0.024)	(0.019)	(0.020)
Firm size: 500-1000	0.001	-0.092***	0.003	-0.077***
	(0.013)	(0.017)	(0.013)	(0.014)
Firm size: 1000-3000	0.001	-0.100***	0.002	-0.087***
	(0.012)	(0.016)	(0.013)	(0.014)
Firm size: 3000-5000	-0.077**	-0.166***	-0.073**	-0.148***
	(0.033)	(0.034)	(0.029)	(0.031)
Firm size: 5000-10000	-0.028	-0.225***	-0.026	-0.211***
	(0.033)	(0.032)	(0.040)	(0.035)
Constant	-0.224***	-0.121***	-0.259***	-0.214***
	(0.022)	(0.030)	(0.033)	(0.046)
Number of observations	2,189	1,645	2,189	1,645
R2	0.057	0.105	0.063	0.132

Notes: Bootstrapped standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Regressions control for regional dummies.

Table A3. Coefficients of women's and female managers' shares from the regression of the (recentered) influence function (RIF) of the unconditional quantiles of gender pay gaps at the firm level: private sector

	private sector				
Firm-level:	**10th p**	**25th p**	**50th p**	**75th p**	**90th p**
Share of female workers	0.236***	0.168***	0.098***	0.048	0.007
	(0.050)	(0.029)	(0.027)	(0.031)	(0.039)
Share of female managers	-0.015	0.001	-0.011	0.004	0.058
	(0.040)	(0.025)	(0.024)	(0.022)	(0.039)
Share of workers aged 25-29	0.093	0.083	0.078	0.047	-0.148
	(0.104)	(0.080)	(0.065)	(0.068)	(0.100)
Share of workers aged 55+	0.217	0.161**	0.101	0.068	-0.009
	(0.141)	(0.076)	(0.066)	(0.072)	(0.114)
Share of tertiary educated workers	0.084**	0.001	-0.102***	-0.129***	-0.022
	(0.038)	(0.026)	(0.025)	(0.029)	(0.046)
Share of part-time workers	-0.087	-0.040	0.050	-0.001	0.042
	(0.087)	(0.060)	(0.060)	(0.062)	(0.096)

Share of temporary workers	0.048	0.043*	0.037**	0.049**	0.021
	(0.034)	(0.023)	(0.019)	(0.023)	(0.038)
Collective bargaining – central level	-0.041	-0.012	0.007	0.000	0.000
	(0.049)	(0.034)	(0.031)	(0.031)	(0.041)
Collective bargaining – firm level	-0.016	-0.022	-0.005	-0.017*	-0.024
	(0.016)	(0.014)	(0.012)	(0.010)	(0.018)
NACE: Agriculture	-0.120	0.063	0.051	0.024	0.003
	(0.174)	(0.082)	(0.068)	(0.066)	(0.082)
NACE: Construction	-0.111**	-0.025	0.004	0.040	0.129***
	(0.053)	(0.032)	(0.022)	(0.025)	(0.046)
NACE: Market services	0.005	0.032**	0.044***	0.053***	0.052**
	(0.022)	(0.015)	(0.015)	(0.016)	(0.025)
NACE: Non-market services	-0.019	0.043**	0.087***	0.080***	0.039
	(0.033)	(0.021)	(0.024)	(0.024)	(0.031)
Firm size: 500-1000	0.052**	0.024	-0.003	-0.037***	-0.043**
	(0.022)	(0.017)	(0.013)	(0.013)	(0.021)
Firm size: 1000-3000	0.068***	0.027	-0.013	-0.022	-0.064***
	(0.026)	(0.017)	(0.015)	(0.016)	(0.025)
Firm size: 3000-5000	0.001	-0.002	-0.075**	-0.071***	-0.138***
	(0.068)	(0.048)	(0.036)	(0.026)	(0.026)
Firm size: 5000-10000	0.063	0.039	-0.073	-0.103**	-0.128*
	(0.069)	(0.050)	(0.053)	(0.050)	(0.068)
Constant	-0.573***	-0.382***	-0.203***	-0.044	0.091**
	(0.051)	(0.033)	(0.024)	(0.029)	(0.035)
Number of observations	2,189	2,189	2,189	2,189	2,189
R2	0.050	0.060	0.060	0.062	0.035

Notes: The same as in Table A2.

Table A4. Coefficients of women's and female managers' shares from the regression of the (recentered) influence function (RIF) of the unconditional quantiles of gender pay gaps at the firm level: public sector

	public sector				
Firm-level:	**10th p**	**25th p**	**50th p**	**75th p**	**90th p**
Share of female workers	-0.054	-0.061	-0.003	-0.006	0.041
	(0.078)	(0.058)	(0.037)	(0.041)	(0.079)
Share of female managers	-0.004	0.023	0.024	0.022	0.103**
	(0.048)	(0.032)	(0.022)	(0.020)	(0.042)
Share of workers aged 25-29	0.462**	-0.015	0.074	-0.110	-0.356
	(0.205)	(0.145)	(0.125)	(0.125)	(0.238)

Share of workers aged 55+	0.643***	0.313***	0.215***	0.050	-0.031
	(0.174)	(0.099)	(0.069)	(0.082)	(0.131)
Share of tertiary educated workers	0.359***	0.290***	0.103***	-0.032	-0.100*
	(0.063)	(0.040)	(0.031)	(0.035)	(0.054)
Share of part-time workers	0.285***	0.045	0.049	0.275***	0.814***
	(0.087)	(0.105)	(0.090)	(0.105)	(0.268)
Share of temporary workers	0.059	0.052	-0.070	-0.069	-0.032
	(0.071)	(0.055)	(0.048)	(0.049)	(0.081)
Collective bargaining – central level	-0.052	0.026	0.025	0.013	0.081
	(0.052)	(0.028)	(0.025)	(0.031)	(0.062)
Collective bargaining – firm level	-0.014	-0.022	-0.017	-0.017	-0.002
	(0.036)	(0.017)	(0.013)	(0.015)	(0.026)
NACE: Agriculture	0.139***	0.027	-0.073	-0.054	-0.127***
	(0.052)	(0.122)	(0.078)	(0.055)	(0.048)
NACE: Construction	-0.126	-0.037	-0.003	0.030	0.091
	(0.146)	(0.080)	(0.050)	(0.039)	(0.089)
NACE: Market services	0.062	0.106***	0.102***	0.104***	0.111***
	(0.048)	(0.030)	(0.024)	(0.025)	(0.040)
NACE: Non-market services	0.009	0.047	0.045*	0.073***	0.051
	(0.048)	(0.036)	(0.024)	(0.028)	(0.044)
Firm size: 500-1000	-0.082**	-0.074***	-0.058***	-0.077***	-0.120***
	(0.039)	(0.025)	(0.015)	(0.016)	(0.024)
Firm size: 1000-3000	-0.064*	-0.068**	-0.084***	-0.083***	-0.115***
	(0.035)	(0.027)	(0.016)	(0.017)	(0.029)
Firm size: 3000-5000	-0.245**	-0.199***	-0.121***	-0.095***	-0.098
	(0.121)	(0.059)	(0.042)	(0.028)	(0.060)
Firm size: 5000-10000	-0.480**	-0.328***	-0.166***	-0.116***	-0.104**
	(0.199)	(0.095)	(0.040)	(0.024)	(0.040)
Constant	-0.698***	-0.387***	-0.190***	0.002	0.154**

	(0.100)	(0.050)	(0.036)	(0.038)	(0.079)
Number of observations	1,645	1,645	1,645	1,645	1,645
R2	0.094	0.137	0.106	0.075	0.076

Notes: The same as in Table A2.

Table A5. Coefficients of women's and female managers' shares from the OLS regression of gender pay gaps at the firm level, low, medium, and high human capital firms

	private sector			**public sector**		
Firm-level:	**low skilled**	**medium skilled**	**high skilled**	**low skilled**	**medium skilled**	**high skilled**
Share of female workers	0.219***	0.122*	0.083	0.063	0.136*	-0.03
	(0.080)	(0.064)	(0.051)	(0.073)	(0.075)	(0.059)
Share of female managers	-0.052	0.003	0.045	0.013	0.009	0.096***
	(0.063)	(0.052)	(0.046)	(0.047)	(0.053)	(0.029)
Share of workers aged 25-29	0.030	0.374**	0.012	0.080	0.658**	-0.110
	(0.200)	(0.180)	(0.073)	(0.267)	(0.278)	(0.108)
Share of workers aged 55+	0.187	0.350***	0.032	0.235	0.392***	0.124
	(0.154)	(0.127)	(0.122)	(0.193)	(0.149)	(0.120)
Share of part-time workers	0.022	0.038	0.006	0.230	-0.011	0.420***
	(0.150)	(0.240)	(0.055)	(0.367)	(0.205)	(0.091)
Share of temporary workers	0.028	-0.006	0.036	-0.027	0.011	-0.041
	(0.052)	(0.048)	(0.031)	(0.075)	(0.118)	(0.050)
Collective bargaining – central level	0.014	-0.037	-0.002	-0.049	0.004	0.075**
	(0.054)	(0.056)	(0.033)	(0.071)	(0.061)	(0.036)
Collective bargaining – firm level	-0.016	-0.046*	-0.005	-0.022	-0.019	0.017
	(0.024)	(0.027)	(0.015)	(0.025)	(0.030)	(0.024)
NACE: Agriculture	0.083	-0.158	dropped	-0.033	0.034	0.039
	(0.087)	(0.156)		(0.067)	(0.051)	(0.064)
NACE: Construction	-0.032	-0.043	0.042	-0.026	-0.114**	dropped

	(0.069)	(0.066)	(0.031)	(0.056)	(0.047)	
NACE: Market services	0.011	0.078***	0.026	0.117***	0.026	0.074
	(0.030)	(0.028)	(0.017)	(0.026)	(0.034)	(0.073)
NACE: Non-market services	0.088**	0.026	0.037	0.004	-0.035	0.121*
	(0.038)	(0.056)	(0.031)	(0.044)	(0.043)	(0.070)
Firm size: 500-1000	0.026	-0.003	-0.017	-0.066**	-0.108***	-0.053**
	(0.029)	(0.030)	(0.016)	(0.028)	(0.024)	(0.023)
Firm size: 1000-3000	0.013	0.017	-0.030*	-0.029	-0.130***	-0.087***
	(0.022)	(0.031)	(0.018)	(0.031)	(0.031)	(0.023)
Firm size: 3000-5000	0.006	-0.160**	-0.025	-0.157***	-0.149***	-0.138***
	(0.036)	(0.075)	(0.032)	(0.058)	(0.051)	(0.040)
Firm size: 5000-10000	-0.037	-0.014	-0.046	-0.225***		-0.204***
	(0.079)	(0.096)	(0.032)	(0.062)		(0.032)
Constant	-0.235***	-0.371***	-0.236***	-0.183**	-0.293**	-0.231**
	(0.061)	(0.086)	(0.041)	(0.093)	(0.126)	(0.094)
Number of observations	739	565	884	538	446	661
R2	0.100	0.113	0.071	0.123	0.130	0.156

Notes: The same as in Table A2.