DISCUSSION PAPER SERIES

Gender Pay Gap Patterns in Domestic and Foreign-Owned Firms

Iga Magda
Katarzyna Sałach

DISCUSSION PAPER SERIES

IZA DP No. 12453

Gender Pay Gap Patterns in Domestic and Foreign-Owned Firms

Iga Magda
IBS, SGH Warsaw School of Economics and IZA

Katarzyna Sałach
University of Warsaw and IBS

JUNE 2019

ABSTRACT

Gender Pay Gap Patterns in Domestic and Foreign-Owned Firms*

We investigate differences in gender wage gaps between foreign-owned and domestically-owned firms in Poland, a country that has experienced large FDI inflows over the past three decades. In line with the findings of several other studies, we show that according to standard estimates of adjusted gender wage gaps, these differences are much larger in the foreign-owned companies than in the domestic firms. However, we also find that these estimates cannot be trusted because the domestically-owned firms have considerably higher levels of gender segregation, and because the OLS estimates of the adjusted gender wage gaps in this sector are more likely to be biased. Using a matching and decomposition technique (Ñopo 2008) that allows us to capture gender wage differentials over a common support, we find that gender wage gaps in domestically-owned firms are only slightly smaller than those in foreign-owned companies. Our results also indicate that women tend to segregate into low-paid jobs in the domestic sector, whereas there is no evidence of such a pattern in the foreign sector. The analysis furthers shows, however, that foreign-owned companies have much larger within-firm differences in earnings (net out of composition effects), and that these earnings they pay vary less across firms. In sum, we find that the nature of gender wage gaps and the factors that underlie them differ between domestic and foreign-owned companies.

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

1. Introduction

A large number of studies have shown that the gender wage gap (GWG) tends to be larger in foreign-owned companies than in domestically-owned firms. This larger gender wage gap is found both when the raw differences in the average wages of men and women are measured, and when the pay gap is adjusted by taking into account differences in observable individual, job, and firm characteristics. So far, however, neither theoretical nor empirical research has provided a convincing explanation for why women are more disadvantaged in terms of pay if the company they work for is owned by foreign investors.

Our study has two main goals. First, we aim to determine whether gender pay gaps are indeed larger in foreign-owned firms than in domestic firms, and whether our findings are robust to different methodological approaches for calculating gender pay gaps. Second, we want to shed light on the factors that could explain the differences in the size of the gender pay gap depending on firm ownership.

We use large cross-sectional sample of linked employer-employee data for Poland to establish patterns of gender pay differences in the domestic and foreign-owned firms. Like other Central and East European countries, Poland benefited from large FDI inflows after the economic transition in the early 1990s. As a consequence, 16% of entities employing 10 or more employees in Poland in 2014 were at least partially owned by foreign investors (CSO 2015)[1]. These entities employed 14% of all paid employees in Poland, and offered their Polish workers wages that were, on average, 60-70% higher than those offered by domestically-owned firms. Yet because this foreign ownership wage premium applied mainly to men, the raw wage gap was much larger in firms with foreign ownership than in domestic companies.

Two main findings emerge from our study. First, the standard OLS estimates of the differences in gender pay gaps depending on ownership sector may be strongly biased by the much greater degree of gender segregation in employment in domestically-owned firms than in foreign-owned firms. Because the male and female employees of domestically-owned firms are less likely to be *comparable* in terms of their individual and workplace characteristics, assessing the wage gaps in these companies can be challenging. After men and women are matched and compared across a joint set of individual and job characteristics, we find that the gender pay gaps in domestically-owned firms are only slightly smaller than those in foreign-owned companies. This result appears to contradict the raw gender pay gap estimates and the standard OLS estimates of adjusted pay gaps.

Thus, we show that while domestic and foreign-owned firms have gender pay gaps that are comparable in size, the determinants of these gaps appear to

---

[1] The highest shares of foreign capital were invested in the manufacturing sector, wholesale and retail trade, motor vehicle and motorcycle repair, and information and communication.

differ. Our second contribution relates to the differences in the factors that contribute to the female pay disadvantage depending on ownership sector: while employment segregation by gender appears to translate into lower pay for women in domestically-owned firms, the level of employment segregation by gender is much lower in foreign-owned companies. Meanwhile, compared to domestically-owned firms, foreign-owned companies tend to have much higher levels of within-firm wage inequality among both men and women. This pattern likely explains part of the average within-firm gender wage gaps.

This paper is organised as follows. In section 2, we review the relevant literature. In section 3, we present the data we use. We then describe our methodology in section 4, and discuss the results in section 5. Section 6 concludes.

2. Firm ownership and gender wage differentials

Economic theory suggests that gender pay gaps should be smaller among foreign-owned companies than among domestically-owned firms. This prediction is based on the assumption that, compared to their domestic counterparts, foreign-owned firms are more likely to operate under highly competitive market conditions, and are thus less likely to discriminate. This assumption is, in turn, based on the personal taste hypothesis, which states that discrimination is costly for employers that are subject to competition (Becker, 1957; Arrow, 1973). These theoretical arguments are further reinforced by the assumption that the weaker product market competition that are enjoyed by domestic companies, and by publicly-owned firms in particular, could create opportunities for higher rents, which may be shared with employees. To the extent that these domestic firms prefer to employ men and to reward them more than women (gender differences in rent sharing have been confirmed by Nekby, 2003), gender wage gaps should be larger in domestic firms than in foreign-owned establishments. Apart from these competition theory considerations, the expectation that gender pay gaps would be smaller in foreign-owned firms is supported by trade theory, which posits that the ability of foreign-owned firms to engage in gender-based pay discrimination is reduced (Black and Brainerd, 2004). Again, this expectation is based on the observation that foreign-owned firms tend to import and export products, whereas domestic companies tend to be oriented towards the domestic market.

The empirical evidence regarding these assumptions is inconclusive: the theoretical link between the (higher) degree of market competition and the (smaller) size of the gender labour market gap has been confirmed by Black and Strahan (2001); Meng (2004); and Zweimüller, Winter-Ebner, and Weichselbaumer (2008). Heyman, Svaleryd, and Vlachos (2013) also partly confirmed this link by finding employment effects, but no wage effects. By contrast, Li & Dong (2011) found that firms that have larger gender wage premia are more likely to operate in industries subject to fierce competition.

There could be other reasons why the gender pay gap tends to be smaller in foreign-owned firms. First, these companies may have firm-level policies regarding childbearing and childcare that result in smaller gender wage differentials. Family-friendly practices in the workplace can help to close the gender pay gap (Felfe, 2012). Foreign-owned firms may be more likely than domestically-owned companies to support both equal pay legislation and family-friendly workplace solutions (Kodama, Javorcik, & Abe, 2018). If highly-educated women are selected into foreign-owned companies because these firms have a flexible approach to work-life balance, the pay gaps in these companies should be smaller. We would presume that these transmission mechanisms are particularly important for Poland, as approximately 90% of all foreign capital that has been invested in Poland came from the EU countries (with the biggest shares coming from the Netherlands (18%), Germany (16%), and France (15%)). We would expect these firms would "import" their pay policies from their home countries, which tend to have much smaller adjusted gender pay gaps than Poland (Christofides 2013). Moreover, the practices of domestic and foreign-owned firms vary significantly in a number of other ways that affect their wage-setting mechanisms, and, thus, their gender pay differentials. For example, the internal labour markets, organisational structures, job ladders and vacancy-based promotions, and standardised wage schedules of these companies tend to differ (Gerber, 2012; Ono 2007).

However, some authors have argued that gender pay gaps are likely to be especially large in foreign-owned companies because these firms often require employees to work long hours. Such demands tend to benefit men, who are more likely than women to be willing to work long hours and to maintain a flexible schedule (Goldin 2014; Vahter and Masso, 2019). Similarly, Bøler, Javorcik, and Ulltveit-Moe (2018) have suggested that exporting firms may require their workforce to have a greater degree of employer-centred working time flexibility, as employees may need to work with customers in different time zones. Since exporting firms are more likely to be foreign-owned than domestically-owned, such demands on workers might also contribute to the observed differences in the gender pay gaps of domestically-owned and foreign-owned workplaces.

The empirical literature that refers explicitly to differences in the gender pay gaps in domestically-owned and foreign-owned firms is limited. It is widely acknowledged that foreign firms usually offer wage premia that have a direct impact on the foreign-domestic pay gap (Conyon et al., 2002; Eriksson and Pytlikova, 2011; Hijzen et al., 2013). These wage premia have been attributed to the technology, capital, and competition externalities of multinational companies (Bandick 2011, Conyon et al. 2002, Chen, Ge, & Lai, 2011). However, it is less obvious whether (and, if so, why) these foreign-ownership wage premia are higher or lower for men than for women; and, thus, whether the gender pay gap is increased or decreased by FDI inflows and ownership structure. Most of the previous research that addressed these questions investigated conditions in China from a microeconomic perspective. Many of

these studies found that wage premia are indeed higher for men than for women in the foreign-owned sector, and that the gender pay gaps are therefore larger in foreign-owned firms than in domestically-owned companies (Maurer-Fazio et al., 1999; Liu et al., 2000; Maurer-Fazio & Hughes, 2002; Rickne, 2012). Chen et al. (2013) argued that the more pronounced differences in the earnings of men and women in foreign-owned firms reflect larger productivity gaps between men and women, and not discrimination. It should, however, be noted that their study measured gender pay differences as the association between a firm's female employment share and average wages at the firm level. The patterns of gender pay gaps may also change over time. Again for China, Braunstein and Brenner (2007) found that while the FDI benefited the wages of women more than those of men in the mid-1990s, this pattern reversed in the early 2000s. It is also worth emphasising that the mechanisms that operate in a developing country might not be present in a more advanced context, where the FDI inflow may not translate into more women entering the labour market or attaining higher levels of education (Seguino & Grown, 2006). Seguino (2000) found a positive correlation between total FDI and the gender wage gap in Taiwan, but no similar relationship in Korea. Oostendorp (2009) showed that gender wage gaps decrease with trade and FDI inflows, although these findings applied to richer countries only. Friedman et al. (2011) reported for Chile that a higher degree of FDI openness is associated with smaller gender pay gaps. To the best of our knowledge, there is little evidence regarding this relationship for European countries. The main exceptions are Zulfiu-Alili (2014), who found that gender wage gaps are larger in foreign-owned firms than in domestically-owned companies in Macedonia; and Vahter and Maaso (2019), who observed a similar pattern in Estonia.

We add to the studies on the association between gender pay gaps and firm ownership by linking our research to two other distinct strands of literature: namely, to studies on gender occupational segregation and on within-firm wage inequality.

There is a large body of literature on the segregation of women into specific low-paid occupations, industries, and companies (Bayard et al. 2003, Reilly & Wirjanto, 1999). This pattern of segregation explains a sizeable fraction of the gender wage gap (as much as one-half, Blau & Kahn 2017), and is more likely to reflect wage discrimination than differences in job and personal characteristics. It is important to note that occupational segregation by gender may already reflect labour market discrimination against women (in employment rather than wages). Recent studies on sex segregation in employment have emphasised the potential roles played by monopsony in the labour market and the lower labour supply elasticities of women than of men (Hirsch et al. 2014).

We also link our study to the emerging literature on firm-level determinants of wage inequality. Several authors have recently documented the growing contributions of establishment effects to the widening of wage distributions (Antonczyk et al. 2010; Barth et al. 2016, Card et al. 2013, Card et al. 2018;

Handwerker et al. 2016). In one of the few studies that included the gender dimension of the establishment's role in shaping wage inequality, Card et al. (2016) found that both sorting across firms (i.e., women's higher probability of working at firms that pay low wages) and differences in within-firm bargaining (i.e., women receiving less of the wage premium than men) contribute to the gender wage gap. We aim to add to this literature by showing that the ownership status is another firm characteristic that is likely to have an impact on the shape and the gender dimension of the wage distribution.

To the best of our knowledge, there are no existing studies that have directly investigated differences in gender segregation patterns between domestic and foreign-owned firms, or differences in the within-firm wage bargaining strategies of men and women depending on firm ownership. We believe, however, that these two issues are relevant for the purposes of our study, and hope that our analysis will uncover new factors (or a combination of existing explanations) that can help explain why gender wage gaps exist, and how they vary across workers and firms.

3. Data and descriptive statistics

We use data from the Structure of Wages and Salaries by Occupations (SWSO) survey conducted by Statistics Poland in 2008, 2010, 2012, and 2014. The SWSO is a large, linked employer-employee dataset that covers organisations employing 10 or more employees, and that provides information on both the yearly and the monthly (during the reference month of October) earnings of individuals. The dataset also contains information on the number of normal and overtime hours employees have worked, and on a range of individual characteristics (e.g., gender, age, education, occupation, experience, tenure) and firm characteristics (e.g., NACE, type of ownership (public/private and domestic/foreign ownership), firm size, coverage by collective pay agreement and firm size). Because we are interested in comparing the gender wage gaps in domestically-owned and foreign-owned firms in the private sector, we restrict our sample to companies with one ownership type only (i.e., we exclude firms with mixed ownership). The sample size varies from 278,032 individual observations in 2010 to 343,143 individual observations in 2014. The total number of observations in a pooled sample of the years 2008, 2010, 2012, and 2014 is 1,230,945. We use sample weights that reflect the survey's two-stage sampling procedure (at the firm and the worker level). We calculate gender pay gaps using data on hourly wages, which we compute as the sum of the yearly salary and the yearly honorarium, divided by the number of hours worked yearly. We include in the salary any compensation from overtime, awards, or statutory bonuses.

6

Table 1. Descriptive statistics of selected variables, 2014

	domestic	foreign
female (share)	40%	43%
age (average)	40	37
primary education (share)	7%	7%
Basic vocational education (share)	30%	18%
secondary education (share)	38%	36%
tertiary education (share)	24%	39%
job experience (average)	16	13
tenure (average)	8	7
firm size (average)	334	1136
Fixed-term contracts (share)	39%	28%
collective agreements (both firm-level and industry-level)	38%	34%
Men, average hourly wage (PLN)	17.04	30.00
Women, average hourly wage (PLN)	14.99	22.06
Number of observations	222,203	120,940

Notes: For descriptive statistics for the years 2008, 2010, and 2012, see Appendix A1. Wages expressed in PLN, 2008 value, deflated with the CPI.

Source: Own calculations based on the Structure of Wages and Salaries by Occupations 2014 data.

Foreign-owned firms account for 14.3% of all of the firms in our data, and employ 30% of all of the workers in the sample. Clearly, there are differences in the structure of the workforce depending on ownership type (Table 1 and Appendix A1). Women constitute a minority of the workforce in both the foreign-owned and the domestically-owned companies, though their share is slightly higher in the foreign-owned companies. Employees of the foreign firms are, on average, three years younger and better educated than those of the domestic firms. While the shares of workers with primary and secondary education are similar, there are striking differences by ownership type in the shares of workers with basic vocational education (12 p.p. more in domestic companies in 2014) and tertiary education share (15 p.p. more in foreign firms). Although the share of workers with tertiary education employed in domestically-owned firms has increased over time (Appendix A1), the gap between the two ownership types is still large.

Compared to their counterparts who work for domestic firms, employees who work for foreign establishments are less likely to be employed on fixed-term contracts, and they are more likely to work for a large organisation. Thus, in 2014, men who were working for foreign-owned companies earned on average 76% more than men who were working for domestically-owned firms. Among

women, the corresponding difference was 47%. Furthermore, in both sectors, the distribution of female wages is shifted to the left of the male distribution, but this shift is greater in the foreign sector. Thus, the Polish data seem to confirm findings for other countries indicating that gender wage inequalities are larger in foreign-owned than in domestically-owned companies.

Figure 1. Men's and women's distribution of log wages in foreign- and domestically-owned firms
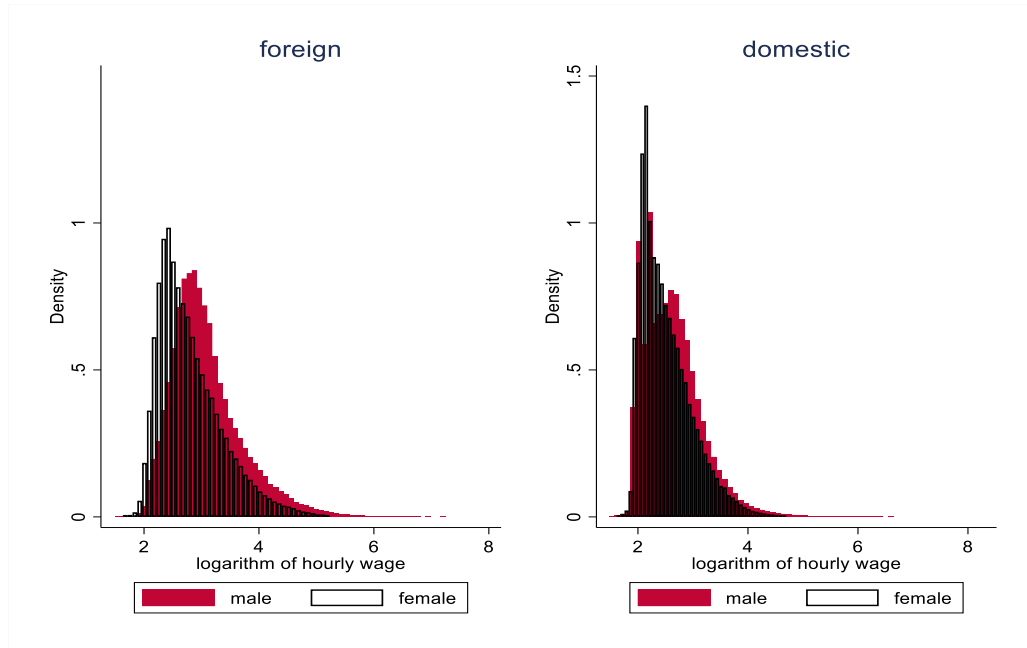
Notes: Wages expressed in PLN, 2008 value, deflated with the CPI.

Source: Own calculations based on the Structure of Wages and Salaries by Occupations 2008, 2010, 2012, and 2014 data.

4. Research methodology

In the first step, we calculate the raw gender wage gaps; that is, the simple difference in the average hourly wages of men and women, expressed as the percentage of men's wages. We do so separately for the two types of firm ownership: domestic and foreign. Then, to obtain adjusted gender wage gaps, we use a traditional Mincer wage regression with the logarithm of the hourly wage as a dependent variable. We estimate it using OLS. Our basic model contains a set of standard control variables, including gender and the type of ownership (domestic or foreign); as well as individual-level characteristics (age, education, experience, and tenure), job-level characteristics (occupation, type of job contract, and part-time/full-time position), and firm-level characteristics (firm size, NACE sector, collective bargaining coverage, and a set of co-worker characteristics that allow us to better capture firm heterogeneity). We also

include an interaction term between gender (female) and type of ownership (foreign). To enable us to compare the OLS model and the Ñopo decomposition (see below), we have built a second OLS model with a restricted set of covariates. In this model, we exclude tenure, collective bargaining, and some of the co-worker characteristics (for a detailed list of variables, see Table A2 in the Appendix). In all of our models, we cluster standard errors at the firm level.

The second part of our analysis is based on a new and different approach to estimating gender wage gaps that was introduced by Ñopo (2008). This approach is a non-parametric method that is based on a matching algorithm. Its main advantage is that it allows us to capture gender differences in the common support; that is, between the men and women for whom at least one "statistical twin" (based on the observable characteristics) could be found in the sample. The Ñopo decomposition also provides information about the distribution of the differences in the wages of men and women that remain unexplained by the characteristics of comparable male and female individuals. It has been successfully applied to studies of the wage gap by, for example, Görzig, Gornig, and Werwatz (2005); Nicodemo and Ramos (2012); Ñopo, Daza, and Ramos (2012); and Anspal (2015).

Following the Ñopo procedure, we calculate the average differences in the hourly wages of men and women in domestically-owned and foreign-owned firms (separately), and then decompose this average wage gap into four main components. Denoting the gender wage gap in sector j − the average difference in wages between men and women − by Δ_j we decompose the gap as:

$$\Delta_j = \Delta_{X_j} + \Delta_{0_j} + \Delta_{M_j} + \Delta_{F_j}$$

where the specific components take the form of:[23]

$$\Delta_X = E_{F,matched}[Y \mid F] - E_{M,matched}[Y \mid F]$$

$$\Delta_0 = E_{M,matched}[Y \mid F] - E_{M,matched}[Y \mid M]$$

$$\Delta_M = \mu^M (E_{M,matched}[Y \mid M] - E_{M,unmatched}[Y \mid M])$$

$$\Delta_F = \mu^F (E_{F,matched}[Y \mid F] - E_{F,unmatched}[Y \mid F])$$

---

[2] For simplicity, in the formulas that follow we omit the subscript j.

[3] The formulas presented here differ from those in the original Ñopo (2008) article because, in order to be consistent with our GWG estimations derived using OLS, we calculate $\Delta = E[Y \mid F] - E[Y \mid M]$ instead of $\Delta = E[Y \mid M] - E[Y \mid F]$. Put differently, throughout the paper we express the GWG as a percentage of male wages. When applying the Ñopo procedure, we thus compare every male's wages to the average wages of all matching females; i.e., we resample without replacement for males, and with replacement for females.

and $E[Y|.]$ denotes the expected value of earnings Y conditional on being male *(M)* or female *(F)*, calculated for a subsample given in the subscript; i.e., matched (being in the common support) or unmatched, males or females. μ^M and μ^F denote the probability of men and women, respectively, not being matched. The first component Δ_X thus reflects the part of the wage gap that can be explained by the differences in the distribution of the observable characteristics of comparable men and women; i.e., those individuals who are in the common support. In contrast, Δ_0 stands for the "unexplained" part of the wage gap; that is, the part that cannot be attributed to the differences in the characteristics of men and women over the common support. This part of the gap is usually attributed to unobservable characteristics (that determine earnings), which may also include discrimination. The last two components, Δ_M and Δ_F capture the gender-specific gap between individuals who are in and out of the common support. The two components are computed as the difference between the expected wages of men/women out of the common support and the expected wages of men/women in the common support, weighted by the probability measure (under the distribution of the characteristics of males/females) of the set of characteristics that females/males do not have. For example, Δ_F captures the part of the gap that would disappear if there were no women with the combination of characteristics X that remain unmatched by men; or, in other words, if every woman had at least one combination of the set of characteristics that men have. The gap would also disappear if all unmatched females were paid, on average, the same as all matched females.

The characteristics over which matching is performed correspond to the covariates we used in the Mincer wage regression, with previously continuous variables now being categorised. Thus, we include age (divided into five groups), education (four levels), experience (three groups), occupation (at the ISCO 1 level), firm size (three groups), a full-time/part-time indicator, type of job contract (permanent/fixed), NACE sector and type of firm ownership (domestic or foreign), share of female workers in a given firm (three levels: less than 20%, 20-60%, more than 60%), as well as a year dummy.

In the third part of our analysis, we investigate the issue of gender segregation in employment, which could explain the inter-sectoral differences in the GWG levels. Thus, we first calculate the Duncan dissimilarity index (Duncan & Duncan, 1955) with a formula that takes the following form:

$$D = \frac{1}{2}\sum_{i=1}^{N}|\frac{m_i}{M} - \frac{f_i}{F}|$$

where M and F denote total male and female population, respectively; and m_i and f_i denote the population of males or females in the ith category (i.e., occupation, occupation x education, occupation x education x age group, etc.). N is the total number of analysed categories. We calculate the index separately

for domestic and foreign firms. Second, we define a "job" variable as an intersection of NACE (18 categories), occupation (nine categories), and firm size (three categories); and investigate the correlation between the share of women and the average male wage in a given job. To do so, we use both Pearson's correlation coefficient and OLS regression. Third, we determine which jobs are low-paid based on whether a job's mean male wage is equal to or below 80% of the median of all mean male wages (per job). We then apply a logistic regression in order to model the probability of women sorting into low-paid jobs.

Finally, to address the issue of within-firm and between-firm wage inequality in domestically- and foreign-owned firms (cf. Barth et al. 2016), we decompose the variance of residual wages (net out the influence of the differences in individual-level and firm-level characteristics, as in Model 2 in Table A2 in the Appendix), separately for men and women in domestically- and foreign-owned companies:

$$Var(X_{ij}) = Var(within) + Var(between) = Var(X_{ij} - \underline{X}_j) + Var(\underline{X}_j)$$

where, in our case, X_{ij} is the logarithm of the residual wage of individual i in the establishment j, and $\underline{X}_j$ denotes the weighted mean residual wage of all individuals in establishment j. We calculate the total variance of residual wages and between-firm variance, and derive the within-firm variance as the difference between the two.

5. Results

The raw gender wage gaps in Poland differ in size depending on whether individuals work in companies that are domestically- or foreign-owned. We define "raw gender wage gap" as the difference in the average wages of men and women, expressed as the percentage of men's wages. We calculate the raw GWG separately for workers in domestically- and foreign-owned firms, and conclude that although women have lower wages than men in both sectors, the raw gender wage gap is twice as large in the foreign-owned firms as it is in the domestically-owned firms (27.3% and 13.6%, respectively, Table 2).

As we explained in the introduction, the raw GWG is not the most suitable measure of gender wage inequality. While the size of the gender pay gap varies substantially across sectors, this pattern may be explained in part by differences in the composition of male and female workers in domestically- and foreign-owned firms. To eliminate this effect, we calculate the GWG adjusted for the characteristics of workers, jobs, and firms. In the first step, we use a standard OLS regression, as discussed in the methodology section. We consider two sets of explanatory variables: a full set and a restricted set. The restricted set will allow us to compare the results with those from the Ñopo decomposition, which we will perform in the next step. Regardless of which set is chosen, we find that the adjusted GWGs are smaller than the raw GWGs, and that the differences in the sizes of the GWG by firm ownership type

persist: the adjusted GWGs are around 12% in the domestically-owned firms, and are between 19% and 23% in the foreign-owned companies (Table 2). These findings tell us two things. First, differences in the individual, job, and firm characteristics of men and women explain a portion of the raw gap. Second, even after differences in workers' characteristics are accounted for, the GWG is much larger in the foreign-owned sector than in the domestic sector. This result is in line with the large discrepancy in raw mean wages observed between the two ownership sectors. Interestingly, we find that adjusting the GWG for worker, job, and firm characteristics matters significantly for the foreign sector, as it reduces the gap; but it is not very important for the domestic sector. While we suspect that the nature of the GWG and the mechanisms that underlie it differ between the two sectors, we are unable to explore these potential factors using the OLS methodology. In particular, we consider it likely that the differences between the two sectors in the size of the GWG stem from unobservable differences among workers, and from the failure of the OLS to capture gender segregation into different types of jobs.

Table 2. Raw and OLS adjusted gender wage gaps in domestically- and foreign-owned firms

Ownership	Raw GWG	Adjusted GWG (restricted set of explanatory variables)	Adjusted GWG (full set of explanatory variables)
domestic	13.6%	12.1%	12.3%
foreign	27.3%	23.3%	19.3%

Notes: The full set of estimates is available in Appendix, Table A2: Model 1 for a restricted set of explanatory variables, Model 3 for the full set.
Source: Own calculations based on the Structure of Wages and Salaries by Occupations 2008, 2010, 2012, and 2014 data.

As we are unable to deal with the unobserved heterogeneity with our data (although we try to minimise it using a set of co-worker characteristics), we re-run our analysis of the gender pay gaps using the Ñopo methodology presented in the previous section. Compared to the OLS, this approach allows us to better control for the possibility that women and men do not have the same *sets* of observable characteristics, and that the shares of men and women in the common support are different in the foreign-owned firms than in the domestically-owned companies.

Table 3. Gender wage gaps in domestically- and foreign-owned firms, adjusted for firm and worker characteristics: summary of the Ñopo decomposition results

	Gender wage gap	Percentage of matched women	Percentage of matched men
domestic	16.8%	79.8%	62.5%
foreign	18.5%	84.7%	75.5%

Source: Own calculations based on the Structure of Wages and Salaries by Occupations 2008, 2010, 2012, and 2014 data.

The results of the Ñopo estimates are presented in Table 3. Once workers are matched over the common support, the differences in the size of the GWG between the domestic and the foreign-owned sectors are considerably smaller, amounting to less than two percentage points. Interestingly, this smaller sectoral difference is driven mainly by a large increase in the estimated size of the gender pay gap in the domestic sector. All in all, it turns out that the size of the gender pay gap is only slightly larger in the foreign-owned sector than in the domestic sector. This finding seems to contradict the raw pay gap results and the OLS estimates. Moreover, it appears that men and women are less likely to be "similar" in domestically-owned companies than in foreign-owned firms. This assumption is confirmed by the summary of the matching results, which is presented in columns 3 and 4 of Table 3. While 85% of women and 76% of men in the foreign-owned sector had a "twin" observation in the dataset, these shares were significantly lower in the domestically-owned firms.

Which estimates should we trust? The differences in the average size of the gender pay gap between the domestic and the foreign sectors depending on the estimation methodology used (OLS versus matching-based Ñopo decomposition) and the varying degrees of "twin" matching in the two sectors suggest that levels of gender segregation differ between the domestically- and foreign-owned firms. If that is the case, it is likely that the matching-based methodology better reflects the differences in the size of the gender pay gap between the two sectors than the OLS methodology. For this reason, we will focus on the issue of gender segregation in domestically- and foreign-owned firms in the next part of our analysis.

To determine whether there are different degrees of gender segregation in the domestic and the foreign-owned firms, we calculate the Duncan dissimilarity index (Duncan & Duncan, 1955; see Methodology section). The value of the Duncan index (when multiplied by 100) may be interpreted as the percentage of the labour force who would have to change occupation in order to bring about a perfect correspondence between the share of females within each occupation and the overall share of female workers. The results, presented in Table 4, provide evidence of a higher degree of worker dissimilarity by gender in the domestic sector than in the foreign sector. This observation holds regardless of the combination of individual, job, and firm characteristics we take into account.[4] Therefore, we conclude that the strategy of comparing

---

[4] It is also robust to the unequal number of non-empty intersections of categories in the two sectors of ownership. Since the foreign sector is, in general, less numerous in our sample than the domestic sector, the more variables we add to the dissimilarity index, the more empty intersections appear in the foreign sector. Therefore, the number of intersections taken into account while calculating the index separately for the two types of ownership differs. This could bias the results downwards for the foreign sector or upwards for the domestic sector, thus making them no longer comparable. However, when we restrict our sample to only the intersections that are present in both types of ownership, the results hold: they

gender pay gaps in domestically-owned and foreign-owned firms using Ñopo matching methods is preferable to OLS estimates.

Table 4. Duncan dissimilarity index (gender segregation index)

Duncan dissimilarity index		Included variables							
domestic	foreign	occupation (9 categories)	education (4 categories)	age group (5 categories)	fixed term contract (binary)	part-time (binary)	years of experience (3 categories)	firm's size (3 categories)	NACE (18 categories)
0.36	0.20	X							
0.38	0.23	X	X						
0.40	0.25	X	X	X					
0.40	0.26	X	X	X	X				
0.41	0.27	X	X	X	X	X			
0.41	0.27	X	X	X	X	X	X		
0.42	0.29	X	X	X	X	X	X	X	
0.51	0.37	X	X	X	X	X	X	X	X

Notes: Numbers range on a scale from 0 to 1, where 0 = perfect similarity and 1= perfect dissimilarity.

Source: Own calculations based on the Structure of Wages and Salaries by Occupations 2008, 2010, 2012, and 2014 data.

It appears that the much higher values of gender dissimilarity in the domestic sector than in the foreign sector explain the large gap in the estimates of the GWGs in the two sectors based on the OLS and the matching techniques. Since the Ñopo decomposition shows that the GWGs in the domestic and the foreign-owned firms are much closer in size (and the OLS and Ñopo estimates are similar for the foreign-owned sector, but not for the domestic sector), it is likely that there are different determinants of the gender pay gaps in the two sectors. To shed more light on this issue, further on we focus on two points: (1) looking in more detail at the sorting of workers into low-paid jobs in domestic and foreign-owned firms, and (2) analysing wage inequality within domestic and foreign-owned firms.

To address the first of these issues, we attempt to determine whether the higher degree of gender segregation observed in the domestic sector is attributable to women selecting into low-paid jobs, and whether such a selection is present in the foreign sector as well. In order to answer these questions, we first investigate the correlation between the share of women and the average male wage in a given job. We define "a job" as the intersection of NACE (18 categories), occupation (nine categories) and firm size (three

only differ for the last row of the table, which shows that the index for domestic ownership is equal to 0.49.

categories). We exclude cells with less than 10 observations, and thus end up with 443 "jobs" in our sample. We then make an assumption that "a job" can be classified as domestic if the share of foreign ownership in it is less than 10%, and as foreign if the share of foreign ownership in it exceeds 30%[5]. Using these definitions, we find that the relationship between the share of women and the average male wage[6] in a given job is negative (the higher the share of women in a particular job, the lower the average male wage in this job) and significant in the domestic sector, and is insignificant in the foreign sector (Table 5). We run both an OLS regression without any controls and calculate Pearson's correlation coefficient.

Table 5. Correlation between the share of women and the mean male wage in a given "job", domestic and foreign ownership separately

Ownership	OLS regression Coef. (Std. Err.)	Pearson's Correlation Coef.	p-value	Number of observations ("jobs")
domestic	-0.054 (0.024)	-0.15	0.024	224
foreign	0.089 (0.094)	0.09	0.349	109

Notes: A job is classified as domestic if the share of foreign ownership in it is less than 10%. A job is classified as foreign if the share of foreign ownership in it exceeds 30%. OLS regression with dependent variable "share of women in a given job", independent variable "mean male wage" and a constant.

Source: Own calculations based on the Structure of Wages and Salaries by Occupations 2008, 2010, 2012, and 2014 data.

The results suggest that the sorting of women into low-paid occupations is an important determinant of gender pay gaps in domestically-owned firms in Poland. This is not the case in foreign-owned firms. In order to reinforce this finding, we take a different approach and run a logistic regression with a binary indicator "works in a low-paid job" as a dependent variable. We use the previously defined jobs, and consider a job as being low-paid if its mean male wage is equal to or below 80% of the median of all mean male wages (per job). This gives us a total of 29.6% of workers assigned to low-paid jobs[7]. We then regress this variable on a female dummy, a dummy for foreign ownership, and the interaction between these two variables. We also control for the worker's age, education, tenure, type of contract, part-time employment, and workplace characteristics; and for the year of the study (for full regression results, see Appendix, Table A2).

---

[5] The results remain robust if we assume a share of 50%.

[6] As a robustness check, we also use the mean of the female wage and the mean of the general wage in a given job. The findings remain consistent. We decided to use the male wage because if women are paid less and their share in a given job is bigger, the mean wage in this job would naturally be lower.

[7] Defining the threshold at the level of 60% of the median would result in only 3.6% of workers being in low-paid jobs.

The results show that in domestically-owned firms, the probability of a woman sorting into a low-paid job is almost 4% higher than that of a man. In foreign-owned firms, this difference is not statistically significant (Table 6).

Table 6. Average marginal effects in logistic regression of gender and firm ownership on the probability of working in a low-paid job

	dy/dx	Std. Err.	p-value
male (base)			
female, domestic	0.038	0.004	0.000
female, foreign	-0.003	0.007	0.610
Number of observations	1,230,945		

Notes: Full list of control variables and their coefficients can be found in the Appendix, Table A2. Standard errors clustered at the firm level and computed using the Delta method.
Source: Own calculations based on the Structure of Wages and Salaries by Occupations 2008, 2010, 2012, and 2014 data.

Wage inequality within domestic and foreign-owned firms is another possible dimension of sectoral differences in gender pay gaps determinants. Recent studies have emphasised the role firms play in shaping wage inequality, and have investigated between- and within-firm wage inequality (Card et al. 2013, Barth et al. 2016). We follow this approach by decomposing wage inequality in domestic and foreign-owned establishments into within- and between-firm components. We base our analysis on residual wages; that is, on wages after netting out the compositional effects that we are able to account for (i.e., the individual- and firm-level characteristics of individuals in our sample). We find that for the residual wages, the share of within-firm variance is greater than the share of between-firm variance in both domestic and foreign-owned companies; though it is much higher in the latter (Table 7). Thus, foreign-owned companies have much larger within-firm differences in earnings, and the levels of compensation they provide differ less across firms[8]. In the domestic sector, these two components are more balanced. It is also interesting to note that there is again a gender difference in the role of within-firm wage inequality. In particular, we observe that the shares of within-firm wage inequality are higher for women than for men in the domestic sector, but not in the foreign sector.

---

[8] Investigating the reasons why there is a sectoral gap in the role of within-firm wage differentials is beyond the scope of our paper, as we are unable to assess how much of this difference stems from more heterogeneity in the productivity of workers. We note, however, that firm characteristics do play a larger role in determining wages in the domestic than in the foreign sector. The results of a simple OLS regression with standardised coefficients, run separately for domestic and foreign-owned firms, show, for example, that the coefficient associated with firm size is much higher for the domestic firms. Moreover, when we compare R^2 for the regressions with and without the firm size variable (separately for domestic and foreign ownership), we can see that adding this variable to the regression results in a 0.035 increase in R^2 for domestic firms, and no increase for foreign firms.

Table 7. Variance of residual wages (error terms in linear regression of logarithm of wages) within and between firms [% of within-firm variance in total variance].

Year	Domestic			Foreign		
	all	men	women	all	men	women
2014	53%	48%	53%	71%	67%	67%
2012	53%	47%	53%	70%	67%	66%
2010	53%	48%	52%	72%	69%	68%
2008	51%	45%	51%	70%	69%	64%

Notes: The list of control variables in the regression used to obtain the residuals is the same as in Model 2 (Appendix, Table A2), excluding female and year variables.
Source: Own calculations based on the Polish SES 2008, 2010, 2012, and 2014 data.

To sum up, our analysis shows that there are no substantial differences in the sizes of the adjusted gender pay gaps in domestic and foreign-owned firms. The differences observed with raw data or with OLS estimates stem from the much higher degree of job segregation in the domestic sector, which translates into a seemingly smaller pay gap in this sector. We also observe that the main factors that contribute to the gender wage gaps in the two sectors are different. Women appear to be more likely to sort into low-paid jobs in the domestic sector, but not in the foreign sector. At the same time, the foreign-owned companies have much higher shares of within-firm wage inequality, which translates into higher levels of gender wage inequality.

6. Conclusions

We studied gender pay gaps in domestic and foreign-owned firms in Poland, analysing the differences in the sizes of these gaps. We first provided evidence for why the OLS estimates may be a misleading indicator of the differences in the sizes of the gender wage gaps in the foreign-owned and the domestically-owned sectors, and showed that there is a much higher degree of gender segregation in the latter sector. Female employees were found to be much less "comparable" to male employees in the domestically-owned firms than in the foreign-owned companies, as in the foreign sector men and women were shown to be more likely to have the same sets of individual-, job-, and firm-level characteristics. This made the comparison of the sizes of the gender pay gaps in the two sectors more challenging.

We responded to this challenge by using a novel approach by Ñopo (2008). We decomposed the observed differences in the average wages of men and women in the foreign-owned sector and the domestically-owned sector separately into a component that reflected the differences in the observable characteristics of men and women over the common support, and components that reflected the unexplained differences in and out of the common support. We thus showed that while the size of the gender pay gap is slightly larger in the foreign-owned firms than in the domestically-owned firms, the difference is much smaller than the OLS estimates would suggest. We also found, however,

that contrary to competition theory, the gender wage gap is not smaller in the foreign-owned firms.

More research is needed to identify the factors that could be driving the foreign/domestic differences in this context. We have shed light on two of them: gender segregation and within/between-firm wage inequality. Occupational sex segregation has been thoroughly analysed in the literature, but not from the angle of firm ownership. It would be interesting to investigate why domestic firms appear to have much higher levels of gender segregation and female selection into low-paid jobs. In a similar vein, we have shown that, unlike in domestic firms, wages in foreign-owned firms are much more likely to vary within firms than between them. Again, identifying the sources of these differences and investigating whether these higher levels of within-firm wage inequality translate into higher levels of female disadvantage are directions for future research.

References

Anspal, S. (2015). Gender wage gap in Estonia: a non-parametric decomposition. *Baltic Journal of Economics*, *15*(1), 1–16.

Antonczyk, D., Fitzenberger, B., & Sommerfeld, K. (2010). Rising wage inequality, the decline of collective bargaining, and the gender wage gap. *Labour Economics*, *17*(5), 835–847.

Arrow, K. (1973). *The Theory of Discrimination.* In: *Discrimination in Labor Markets*, edited by Orley Ashenfelter and Albert Rees, 3–33. Princeton and Oxford: Princeton University Press.

Bandick, R. (2011). Foreign acquisition, wages and productivity. *The World Economy*, *34*(6), 931-951.

Barth, E., Bryson, A., Davis, J. C., & Freeman, R. (2016). It's where you work: Increases in the dispersion of earnings across establishments and individuals in the US. *Journal of Labor Economics*, 34(S2), S67-S97.

Bayard, K., Hellerstein, J., Neumark, D., & Troske, K. (2003). New Evidence on Sex Segregation and Sex Differences in Wages from Matched Employee-Employer Data. *Journal of Labor Economics*, *21*(4), 887–922.

Becker, G. S. (1971). *The Economics of Discrimination*, Second edition. Chicago and London: University of Chicago Press, 1957.

Black, S. E., & Brainerd, E. (2004). Importing Equality? The Impact of Globalization on Gender Discrimination. *Industrial & Labor Relations Review*, *57*(4), 540–559.

Black, S. E., & Strahan, P. E.. (2001). The division of spoils: Rent-sharing and discrimination in a regulated industry. *American Economic Review* 91(4): 814–31.

Blau, F. D., & Kahn, L. M. (2017). The gender wage gap: Extent, trends, and explanations. *Journal of Economic Literature*, *55*(3), 789-865.

Bøler, E. A., Javorcik, B., & Ulltveit-Moe, K. H. (2018). Working across time zones: Exporters and the gender wage gap. *Journal of International Economics*, *111*, 122–133.

Braunstein, E., & Brenner, M. (2007). Foreign direct investment and gendered wages in urban China. *Feminist Economics*, *13*(3–4), 213–237.

Card, D., Jörg Heining, and Patrick Kline (2013). Workplace Heterogeneity and the Rise of West German Wage Inequality. *The Quarterly Journal of Economics* 128.3, pp. 967–1015.

Card, D., Cardoso A.R. & Kline P. (2016). Bargaining, sorting, and the gender wage gap: Quantifying the impact of firms on the relative pay of women. *Quarterly Journal of Economics* 131, no. 2: 633–86.

Card, D., Cardoso A.R. Heining J., & Kline P. (2018). Firms and Labor Market Inequality: Evidence and Some Theory. *Journal of Labor Economics* 36.S1, pp. 13–70

Chen, Z., Ge, Y., & Lai, H. (2011). Foreign Direct Investment and Wage Inequality: Evidence from China. *World Development*, *39*(8), 1322–1332.

Chen, Z., Ge, Y., Lai, H., & Wan, C. (2013). Globalization and Gender Wage Inequality in China. *World Development*, 44, 256–266.

Christofides LN, Polycarpou A., Vrachimis K. (2013), Gender Wage Gaps, 'Sticky Floors' and 'Glass Ceilings' in Europe, *Labour Economics*, Vol. 21

Conyon, M. J., Girma, S., Thompson, S., & Wright, P. W. (2002). The productivity and wage effects of foreign acquisition in the United Kingdom. *The Journal of Industrial Economics*, 50(1), 85-102.

CSO (Central Statistical Office) (2015). Economic activity of entities with foreign capital in 2014. Warsaw, Poland.

Duncan, O. D., & Duncan, B. (1955). A Methodological Analysis of Segregation Indexes. *American Sociological Review*, 20(2), 210.

Eriksson, T., & Pytlikova, M. (2011). Foreign ownership wage premia in emerging economies. *Economics of Transition*, *19*(2), 371–395.

Felfe, C. (2012), The MotherhoodWage Gap: What About Job Amenities?, *Labour Economics*, Vol. 19, No. 1, pp. 59-67

Gerber, T. P. (2012). The structural perspective on postsocialist inequality: Job loss in Russia. *Research in Social Stratification and Mobility*, *30*(1).

Goldin, C. (2014). A Grand Gender Convergence: Its Last Chapter. *American Economic Review*, *104*(4), 1091–1119.

Gorzig, B., Gornig M. & Werwat A. (2005). Explaining Eastern Germany's Wage Gap: The Impact of Structural Change. *Post-Communist Economies* 17(4): 449-464.

Handwerker, E. W., & Spletzer, J. R. (2016). The Role of Establishments and the Concentration of Occupations in Wage Inequality. In *Inequality: Causes and consequences* (pp. 167-193). Emerald Group Publishing Limited.

Heyman, F., Svaleryd, H., & Vlachos, J. (2013). Competition, takeovers, and gender discrimination. *Industrial and Labor Relations Review*, *66*(2), 409–432.

Hijzen, A., Martins, P. S., Schank, T., & Upward, R. (2013). Foreign-owned firms around the world: A comparative analysis of wages and employment at the micro-level. *European Economic Review*, *60*, 170–188.

Hirsch, B., T. Schank, and C. Schnabel (2010). Differences in labor supply to monopsonistic frms and the gender pay gap: An empirical analysis using linked employer–employee data from Germany. *Journal of Labor Economics* 28:2: 291–330.

Kodama, N., Javorcik, B. S., & Abe, Y. (2018). Transplanting corporate culture across international borders: Foreign direct investment and female employment in Japan. *The World Economy*, *41*(5), 1148-1165.

Li, L., & Dong, X.-Y. (2011). Economic Transition and the Gender Earnings Gap in Chinese Industry: the Role of Firm Characteristics. *Contemporary Economic Policy*, *29*(1), 67–87.

Liu, P.-W., Meng, X., & Zhang, J. (2000). Sectoral gender wage differentials and discrimination in the transitional Chinese economy. *Journal of Population Economics*, *13*(2), 331–352.

Maurer-Fazio, M., & Hughes, J. (2002). The Effects of Market Liberalization on the Relative Earnings of Chinese Women. *Journal of Comparative Economics*, *30*(4), 709–731.

Maurer-Fazio, M., Rawski, T. G., & Zhang, W. (1999). Gender Wage Gaps in China' s Urban Labour Market, 1988-1994. *The China Journal*, *41*, 55–88.

Meng, X. (2004). Gender earnings gap: The role of firm specific effects. *Labour Economics*, *11*(5), 555–573.

Nekby, L. (2003). Gender differences in rent sharing and its implications for the gender wage gap, evidence from Sweden. *Economics Letters* 81(3): 403–10.

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

Ñopo, H. (2008). Matching as a tool to decompose wage gaps. *Review of Economics and Statistics*, *90*(2), 290–299.

Ñopo, Hugo, N. Daza, & Ramos J. (2012). Gender Earning Gaps Around the World: a Study of 64 Countries. *International Journal of Manpower* 33(5): 464-513

Ono, H. (2007). Careers in foreign-owned firms in Japan. *American Sociological Review*, *72*(2), 267-290.

Oostendorp, R. H. (2009). Globalization and the gender wage gap. *The World Bank Economic Review*, *23*(1), 141-161.

Reilly, K. T., & Wirjanto, T. S. (1999). Does more mean less? The male/female wage gap and the proportion of females at the establishment level. *Canadian Journal of Economics*, 906-929.

Rickne, J. (2012). Gender and Work Compensation in China's Industrial Sector. *Review of Income and Wealth*, 58(2), 307–329.

Seguino, S. (2000). The effects of structural change and economic liberalisation on gender wage differentials in South Korea and Taiwan. *Cambridge Journal of Economics*, *24*(4), 437-459.

Seguino, S., & Grown, C. (2006). Gender equity and globalization: Macroeconomic policy for developing countries. *Journal of International Development*, *18*(8), 1081–1104.

Vahter, P., & Masso, J. (2019). The contribution of multinationals to wage inequality: foreign ownership and the gender pay gap. *Review of World Economics*, *155*(1), 105–148.

Zulfiu-Alili, M. (2014). Inward Foreign Direct Investment and Wage Inequality in Macedonia. *Eastern European Economics*, *52*(5), 56-86.

Zweimuller, J., & Winter-Ebmer, R. (1994). Gender wage differentials in private and public sector jobs. *Journal of Population Economics*, *7*, 271–285.

Appendix

Table A1. Descriptive statistics of selected variables for years the 2008, 2010, 2012

	2008		2010		2012	
	domestic	foreign	domestic	foreign	domestic	foreign
female (share)	40%	43%	39%	42%	40%	41%
age (average)	39	35	39	36	40	36
primary education (share)	8%	6%	7%	5%	7%	5%
Basic vocational education (share)	36%	25%	34%	24%	31%	21%
secondary education (share)	38%	39%	39%	41%	38%	39%
tertiary education (share)	18%	30%	19%	30%	23%	35%
job experience (average)	15	12	16	12	16	13
tenure (average)	6	5	7	6	8	7
firm size (average)	286	1216	308	1274	330	1071
Fixed-term contracts (share)	42%	35%	41%	33%	39%	28%
collective agreements (both firm-level and industry-level)	36%	34%	42%	42%	42%	42%
Men, average hourly wage (PLN)	16.32	27.67	15.94	27.32	16.36	26.79
Women, average hourly wage (PLN)	13.54	19.16	13.83	19.64	14.37	20.09
Number of observations	219,170	69,908	200,599	77,433	219,04	101,6

Notes: The sample is weighted to represent the total population of the Polish workforce in private domestic and foreign-owned firms. Wages expressed in PLN, 2008 value, deflated with the CPI.

Source: Own calculations based on the Structure of Wages and Salaries by Occupations 2008, 2010, 2012 data.

Table A2. Regression results: gender wage gap in domestic and foreign-owned firms

	logarithm of wage (OLS, Model 1)	logarithm of wage (OLS, Model 2)	logarithm of wage (OLS, Model 3)	working in a low-paid job (logistic regression)
Female	-0.121***	-0.114***	-0.123***	0.210***
	(0.003)	(0.003)	(0.002)	(0.023)
Foreign	0.266***	0.203***	0.202***	-1.969***
	(0.007)	(0.007)	(0.006)	(0.064)
female x foreign	-0.112***	-0.103***	-0.070***	-0.261**
	(0.010)	(0.008)	(0.006)	(0.104)
Age	0.027***	0.025***	0.025***	-0.016***
	(0.001)	(0.000)	(0.000)	(0.003)
age2	-0.000***	-0.000***	-0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
education: basic vocational (base: primary)	0.009*	0.009***	0.007	-0.052
	(0.005)	(0.004)	(0.004)	(0.037)
education: secondary (base: primary)	0.083***	0.067***	0.063***	-0.640***
	(0.005)	(0.004)	(0.005)	(0.039)
education: tertiary (base: primary)	0.336***	0.226***	0.209***	-1.974***
	(0.008)	(0.005)	(0.005)	(0.039)
Tenure	-	0.006***	0.005***	-0.055***
		(0.000)	(0.000)	(0.002)
Experience	0.006***	0.004***	0.003***	-0.017***
	(0.000)	(0.000)	(0.000)	(0.001)
Part-time dummy	-0.017***	-0.008*	-0.004	0.171***
	(0.004)	(0.004)	(0.004)	(0.024)
fixed-term contract dummy	-0.127***	-0.086***	-0.092***	-0.220***
	(0.004)	(0.004)	(0.003)	(0.024)
logarithm of firm size	0.044***	0.045***	-	-
	(0.003)	(0.002)		
collective bargaining	-	0.026***	0.018***	-0.705***
		(0.005)	(0.004)	(0.034)
share of women	-0.002***	-0.002***	-0.002***	-0.024***
	(0.000)	(0.000)	(0.000)	(0.001)
share of workers with tertiary education	-	0.007***	0.007***	0.004***
		(0.000)	(0.000)	(0.001)
share of workers under age 35	-	-0.001***	-0.001***	0.018***
		(0.000)	(0.000)	(0.001)
share of workers aged 55	-	-0.001***	-0.001***	-0.705***

or older		(0.000)	(0.000)	(0.034)
year: 2010 (base: 2008)	-0.008	-0.023***	-0.022***	0.086*
	(0.008)	(0.007)	(0.006)	(0.045)
year: 2012 (base: 2008)	-0.018**	-0.050***	-0.047***	0.250***
	(0.008)	(0.007)	(0.006)	(0.046)
year: 2014 (base: 2008)	0.045***	0.002	0.005	0.236***
	(0.008)	(0.007)	(0.006)	(0.046)
Other controls:				
occupation dummies	yes	yes	no	no
NACE dummies	yes	yes	no	no
"job" dummies (occupation x NACE x firm size)	no	no	yes	no
Observations	1,230,945	1,230,945	1,230,945	1,230,945
R-squared / Pseudo R-squared	0.522	0.561	0.580	0.235

Notes: Models with an intercept. Standard errors (in parentheses) clustered at the firm level. In the logistic regression, the dependent variable is defined as the probability of working in a low-paid job; i.e., a job in which the mean of men's wages equals 80% of the median or less of the mean of men's wages in all jobs. *** p¡0.01, ** p¡0.05, * p¡0.1.

Source: Own calculations based on the Structure of Wages and Salaries by Occupations 2008, 2010, 2012, and 2014 data.