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Abstract:

The purpose of this paper is to analyse the gender wage gap in Poland in different occupational groups. The authors aim to investigate how much of the raw differences in wages can be explained by differences in personal characteristics and in which occupational groups the unexplained part of wage gap is the highest.

The authors use the individual data from employers' statistics with detailed information about wages and personal characteristics of workers. The authors use base salaries per hour as the dependent variable. After controlling for differences in the gender composition of occupational groups the authors choose 24 occupational groups at 3-digit level and perform Oaxaca-Blinder two-component decomposition. The authors are the first to analyse the differences in gender wage gap in Poland by occupational groups. Another original contribution is that the wage gap is analysed not for the whole sample but after controlling for the segregation effect.

The results indicate that firstly, the raw differences by gender in base wages per hour are smaller than the ones in average wages per hour. Secondly, after controlling for differences in the gender composition of occupational groups the raw wage gap in Poland increases from 6.7% to 10.8%. Thirdly, in most of the analysed occupational groups the differences in characteristics explain only a minor part of the wage gap. The highest share of the unexplained part was among managers and in groups in which the specific vocational skills are required.

Keywords: Gender wage gap, Oaxaca-Blinder decomposition, occupational groups, Poland.

1. Introduction

The purpose of this paper is to analyse the gender wage gap in Poland in different occupational groups. The authors aim to investigate how much of the raw differences in wages can be explained by differences in personal characteristics of workers. Moreover, we analyse in which occupational groups the unexplained part of wage gap is the highest and to what extent it can be attributed to gender discrimination.

Statistical data show that in Poland women are paid on average less than men. According to the Eurostat, as of 2012, the unadjusted gender pay gap[1] amounted to 6.4%. In the public debate in Poland the differences in average wages between men and women are largely ascribed to gender discrimination.

In the present study we investigate the extent to which these differences can be explained by different characteristics relevant from the perspective of the labour market, hence justified by differential productivity potential of men and women. We particularly focus on the sectoral dimension of this phenomenon. For this purpose we estimate the adjusted gender wage gap in different occupational groups.

The analyses of gender wage gap and the problem of gender discrimination in the Polish labour market have been undertaken in previous studies (review of the literature is presented in the third section of the paper). The results obtained thus far depend heavily on the data and methodology used, but some general conclusions can be drawn. Firstly, the differences in average monthly wages between men and women are much higher than in the case of hourly wages, indicating lower labour supply of females compared to males. Secondly, the unexplained component of gender wage gap is much higher than the explained one, suggesting the existence of discrimination against women in the Polish labour market.

In the majority of the previous studies of the Polish labour market the gender wage gap has been estimated for the whole economy with occupation and/or industry as explanatory variables. In the presence of labour market segregation of women into less-paid occupations/industries this may result in the underestimation of the discrimination effect.

Moreover most of the analyses thus far have concentrated on gender differences in average wages, including premiums and bonuses. This approach may, in turn, lead to the overestimation of the discrimination effect since on average men work longer hours than women and specifically take more overtime. We aim to contribute to the existing empirical literature by correcting for these potential biases.

In this paper we use the base wage per hour, which does not include premiums and bonuses, as the dependent variable. Secondly, we restrict the analysis to occupational groups with nearly balanced gender ratio and, hence, control for potential gender segregation in the labour market. To the best of our knowledge we are the first to analyse the gender wage gap in Poland separately for different occupational groups.

As far as the methodology is concerned we follow the standard approach in the literature. To answer the question of to what extent the gender pay gap can be explained by different characteristics of males and females we use the Oaxaca (1973) – Blinder (1973) two-component decomposition.

The structure of the paper is as follows. In section two some methodological aspects of gender wage gap estimation are discussed. In section three the hitherto research on gender wage gap in Poland is presented. Section four contains description of the data used in the paper. Section five outlines our empirical strategy and the empirical results. Section six concludes.

[1] The terms “gender pay gap” and “gender wage gap” are used throughout the paper interchangeably.

2. The gender wage gap– definition and methodological issues

According to the Eurostat definition the unadjusted gender pay gap represents the difference between the average gross hourly earnings of male and female paid employees expressed as a percentage of the average gross hourly earnings of male paid employees[2].

However, not all the differences in earnings between men and women are due to discrimination. Article 2 of ILO Equal Remuneration Convention (No. 100)[3] states that: "*Each Member shall, by means appropriate to the methods in operation for determining rates of remuneration, promote and, in so far as is consistent with such methods, ensure the application to all workers of the principle of equal remuneration for men and women workers for work of equal value"*. However, Article 3 of the Convention[4] adds that: *"Differential rates between workers which correspond, without regard to sex, to differences, as determined by such objective appraisal, in the work to be performed shall not be considered as being contrary to the principle of equal remuneration for men and women workers for work of equal value"*.

The Polish Labour Code (Art. 183a §1) also specifies: "*Work of equal value means work that requires from workers both comparable qualifications, certified by documents specified in relevant regulations or by appropriate apprenticeship and professional experience, as well as comparable scope of responsibility and effort"*.

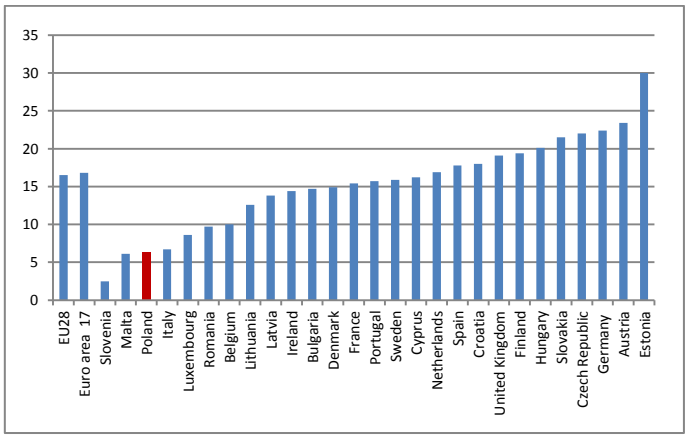
Hence, both the Equal Remuneration Convention and the Polish Labour Code state that not all the differences in pay between men and women are due to discrimination. The differences can result from both differences in personal (education, work experience, professional carrier, etc.) and job characteristics (different occupation, sector, branch, type and size of the firm, etc.). In the case of women lower average earnings may also be the result of career breaks or part-time work due to childbearing.

The differences in average wages between men and women among the EU Member States are very remarkable. In 2012 the highest gender wage gap was noted in Estonia (30%), the lowest in Slovenia (2.5%, see Figure 1). There are various reasons for this diversification – apart from different size of the discrepancy between males and females in human capital endowments, the differential female labour force participation rates may also play a role[5]. The rates are, in turn, affected by different institutional and cultural factors, e.g. the attitudes towards the division of labour in the family.

Compared to other EU member states, the gender pay gap in Poland is relatively low (Figure 1). In 2012 the average difference in hourly pay between men and women amounted to 6.4%. Lower differences among the EU countries were noted only in Slovenia (2.5%) and Malta (6.1%). Moreover, the gap has decreased significantly over time. Between 2007 and 2012 the unadjusted gender wage gap in Poland (according to the Eurostat data) fell from 14.9% to 6.4%.

[2] http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/en/earn_grgpg2_esms.htm
[3] http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C100 (30.11.2014).
[4] http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C100 (30.11.2014).
[5] http://ec.europa.eu/eurostat/statistics-explained/index.php/Gender_pay_gap_statistics

Figure 1. The unadjusted gender wage gap in the EU countries* in 2012 (%)



Notes: NACE Rev. 2 - Industry, construction and services (except for public administration, defence, compulsory social security)

* Data for Greece were not available

Source: Eurostat.

The raw wage gap is, however, a misleading indicator of gender inequality in the labour market, as it does not take into account the existing differences of male and female employees in productivity potential. It may either overestimate the extent of discrimination if women are systematically less qualified than men, or underestimate it.

Therefore, both for scientific and policy-making purposes in numerous studies since the early 1970s the raw gender differentials have been decomposed into a part that can be explained by differences in human capital endowments and an unexplained part (or a part explained by the difference in the value attached by the labour market to equal endowments of males and females). The latter part constitutes an estimate for gender discrimination in the labour market.

The decomposition was pioneered by Blinder (1973) and Oaxaca (1973) and it is usually based on the Mincer equation (Mincer, 1974; Mincer and Polachek, 1974), in which logarithmic wages are regressed against individual characteristics relevant from the perspective of the labour market (such as years of education, work experience or time-out-of-work). In line with the underlying human capital model (Becker, 1964) the coefficients in the wage regression are interpreted as returns to investment (or loss from disinvestment). It is also customary to include among explanatory variables job characteristics such as profession or industry.

Despite its simplicity, this approach poses several econometric problems. First of all, the estimates of discrimination effect are conditional upon the control variables included in the wage equation. If the gender differences in potential productivity are not fully accounted for by the control variables, the unexplained residual is likely to be biased upwards. On the other hand, if the explanatory variables in the wage equation are themselves the result of discrimination, the unexplained residual will be underestimated. This may be the case with job characteristics if occupational gender segregation leads to the overrepresentation of women in less-paid professions. Another potential source of estimation bias is the unobserved heterogeneity problem resulting in endogeneity of regressors in the wage equation. Some unobserved individual characteristics, e.g. mental abilities, affect both wages and some of the explanatory variables, e.g. educational attainment, which may lead to inconsistency of the ordinary least squares estimates. The estimates may also be inconsistent due to sample selection bias (the decision to supply labour - especially in the case of women - may be conditional on several factors such as expected wage, income of the partner, number of children) or measurement errors.

These identification problems are widely recognized in the literature but there is no consensus on how to handle them (Kunze, 2008). There is no agreement in the literature regarding the choice of controls and it is often restricted by the dataset available to the researcher. The endogeneity of regressors may be corrected for using instrumental variables estimator, but finding valid instruments – especially given data constraints – often poses major problems. If panel data are available, the unobserved individual effect may be captured by means of fixed effects estimator and some transformations of endogenous variables may be used as instruments by applying Hausman and Taylor (1981), Arellano and Bond (1991) or Arellano and Bover (1995) estimators. Despite potential inconsistency of the estimates most studies based on cross-sectional datasets apply, however, the OLS estimator (Kunze, 2008).

The results of cross-country studies suggest that gender wage discrimination is a well-established feature of labour markets in most developed economies (Blau and Kahn, 2003), i.e. only a fraction of raw wage gap between men and women can be explained by their differential productivity potential. It is also a persistent phenomenon. Although over time, raw wage gaps have fallen (from around 65% to 30% from the 1960s to the 1990s), most of this decrease was the result of improving labour market endowments of females as compared to males (Weichselbaumer and Winter-Ebmer, 2005).

The extent of wage discrimination and its evolution over time varies substantially across countries (e.g. Johnes and Tanaka, 2008), income quantiles (in many countries the gender wage gap is wider at the top and/or at the bottom of the wage distribution, suggesting the existence of 'glass ceilings' and/or 'sticky floors', e.g. Christofides et al., 2013) or experience levels (the gender wage gap seems to be present from the beginning of working careers and constant or even increasing over time, e.g. Kunze, 2005). There exist also substantial gender differences in professions and industries and wages are negatively related to the percentage of women in the occupation (Gronlund and Magnusson, 2013). To some extent this is the result of discrimination, but it also reflects women's tendency to choose occupations where flexibility of work hours is higher or penalties for time-out-of-work are smaller. Consequently, not only occupational segregation but also traditional division of labour in the family disadvantages women in the labour market (Blau and Kahn, 1996).

3. Overview of gender wage gap estimates in Poland

The amount of hitherto analyses of gender wage gap in Poland is rather scarce. The short description of the papers and their results is presented below.

Starting from the most recent one, Goraus and Tyrowicz (2014) used the Polish Labour Force Survey (PLFS) quarterly data from 1995q1 to 2012q4 to explain the differences in wages by gender. They used both Oaxaca-Blinder (1973) decomposition with two components and Nõpo (2008) decomposition with four components. Their explained variable was hourly wages. Firstly, they estimated the average wage gap in the analysed period using different specifications. The results however were similar and indicated that the adjusted gender wage gap (around 20%) was much higher than the unadjusted one (9%). The unexplained component in the case of Nõpo decomposition it was around 19-21%, in the case of Oaxaca-Blinder – around 21-23%. Secondly, they estimated the adjusted wage gap for all the quarters separately and investigated the cyclical properties of wage gap using the Hodrick and Prescott (1997) filter. The results showed that there was no trend in the evolution of gender gap and that the gender gap in Poland was rather stable over time.

Van der Velde, Tyrowicz and Goraus (2013) used data from the Polish Labour Force Survey in 2012 with hourly wage as an explained variable. Their results show that the raw gender pay gap amounted to about 25% in the case of monthly wages and about 9% in the case of hourly wages and was higher at the top of the distribution. The adjusted gender wage gap was higher than the raw gap across the whole distribution. The authors concluded that the problem of sample selection had significant

impact on the estimated gender wage gap. Moreover they found significant differences in wage gap between quartiles of the distribution.

Słoczyński (2012) estimated the gender wage gap in Poland for each of the 16 Polish regions separately. He used data from the Structure of Wages and Salaries by occupations in October 2008. The explained variable was logarithm of monthly wages. The Oaxaca-Blinder decomposition was used. Firstly, the pooled model (for all the regions) was analysed. Secondly, parameters of separate models for each region were estimated. The results indicate that the gender wage gap was much diversified between regions of Poland. The highest differences were observed in Slaskie (Silesian) region (25.4%). The lowest was in the Warminsko-Mazurskie region (5.9%) and other south-eastern, rural regions of Poland.

Mysikova (2012) estimated gender wage gap in Poland, the Czech Republic, Slovakia and Hungary using data from the Statistics of Income and Living Conditions (EU-SILC) in 2008. Hourly gross wage were used as the explained variable. First, Heckman (1979) regression method for women was used to deal with the selection problem. Second, the Oaxaca-Blinder decomposition to analyse the wage gap. Due to correction for the selection bias the third component (the "selection effect") was added to the decomposition. The results indicate that the difference between wages of men and women was the highest in the Czech Republic (0.26 log points) and Slovakia (0.20). It was much lower in Poland and Hungary (in both cases about 0.09). Negative selection effects were found in the Czech Republic and in Hungary. In Poland and Slovakia the selection effects were positive which means that in those countries the selection-corrected gender wage gap would be lower than the observed one. The differences in characteristics of men and women were responsible for 10% in the Czech Republic and 4.2% in Slovakia of observed gender wage gap. On the other hand, in Poland and Hungary, on average working women had better characteristics than working men. Discrimination effect was high for all four countries. In Poland and in Hungary it was exceeding 100% of the observed gender wage gap.

Rokicka and Ruzik (2010) aimed to estimate gender pay gap in informal employment in Poland. They used data from Polish Ministry of Labour and Social Affairs from 2007, hourly income. First, the authors measured the earnings inequality between formal and informal economies using deciles ratios, Gini coefficients and entropy indices. Second, the authors calculated the gender wage gap with OLS and quantile regression on a pooled sample (women and men together) with gender as an explanatory variable[6], separately for formal and informal workers. The results indicate that differences in wages by gender existed both in formal and informal economy in Poland. In informal market wage differences were higher for low wage earners, in formal market – it was the opposite. The raw gender wage gap in informal market varied from 24% (for 25th percentile of wages) to 15% (for 75th percentile) and was equal to 19% for the whole sample. In formal market the raw gender wage gap varied from 17% (for 25th percentile) to almost 23% (for 75th percentile) and was about 21% for the whole sample. The adjusted gender wage gap was significant at 1% level only in formal employment and varied between 15% and 18%. In the informal market the adjusted gender wage gap was significant (at 10% level) only for 25th percentile of wages and was equal to 25%.

Matysiak, Baranowska and Słoczyński (2010) used both the Polish Labour Force Survey and the Structure of Wages and Salaries by occupations data from the period 1996-2008. Monthly and hourly wages were taken as explained variable. Juhn, Murphy, Price (1991) and Oaxaca-Blinder decomposition were used. The authors showed that the gender wage gap was by almost 10 pp. lower for hourly than monthly data. It means that part of the differences might be explained by the differences in working time. The results indicate that the gender wage gap in Poland was pro-cyclical. The difference in wages were decreasing during the downturn and growing during the economic recovery. The gender wage gap in Poland was the highest for the individuals at the age of 35-44.

[6] Elder et al. (2010) showed that decomposition on pooled data systematically overstates the contribution of observable characteristics to mean outcome differences.

Oaxaca-Blinder decomposition revealed that the unexplained component was higher than the raw gender wage gap. The authors conclude that the differences in human capital and other observable characteristics were not able to explain the gender wage gap and differences in wages between men and women in Poland are due to discrimination.

Łatuszyński and Woźny (2008) used data collected by the private company (Hay Group) about wages of 183 666 individuals from 221 enterprises (only private sector) in 2004. As an explained variable they used hourly wages. They used Oaxaca-Blinder decomposition. The results indicate that the variables used in the model explained about 67% of the difference in base salary and 61% of difference in total remuneration. Moreover the difference in the feminization ratio explains about 42% of differences of the base salary and 35% in the case of the total remuneration. Differences in the feminization ratio of the occupational groups and employment structure enabled to explain about 86% of the difference in case of the base salary and 71% in case of the total remuneration. The gender wage gap was higher the higher the position of individuals in the company. It was the highest in case of specialists and managers. The gender wage differences varied also between regions. The lowest differences were observed in Dolnoslaskie (Lower Silesian), Slaskie (Silesian), Zachodniopomorskie and Warminsko-mazurskie regions. The highest in Kujawsko-pomorskie, Lubelskie and Lodzkie regions. The wage gap varied also between the occupations. The highest differences were among engineers, sales workers and workers in the customer service and the lowest for the R&D and IT workers. The gender wage differences were also much higher in large cities than in the rural areas.

Magda and Szydłowski (2008) used data from the Polish Labour Force Survey and Structure of Wages and Salaries by occupations in 1995-2006. Their explained variable was hourly wages. They used the Ordinary Least Squares (OLS), the Quantile Regression and Oaxaca-Blinder decomposition. The results indicate that raw gender gap was about 16% in case of the SWS data and about 13% for the PLFS data. Only small part of the gap was due to differences in observable characteristics (about 0.8% in case of SWS data and about 13% in case of PLFS data). Monthly wages at the bottom of the distribution were similar for men and women (probably because of the existence of minimum wage) but at the top of the distribution the difference was significant (above 20%). For the hourly wages the difference between males and females wages was twice smaller than for monthly data (about 7.5% in case of average wages and 6.6% for median wages). Also for hourly wages the gender wage gap have widened at the top of the distribution.

To the best of our knowledge the literature described above contains all of the latest analyses of the gender wage gap in Poland[7]. The magnitude of average gender wage gap differs due to differences in data and methodology used. However, the hitherto research confirms that firstly, the differences in average monthly wages between men and women are much higher than in case of hourly wages. It means that part of the wage differences might be explained by the differences in working time. Secondly, only minor part of the wage differences can be explained by differences in personal and employment characteristics. Majority of the research indicate that the unexplained component of gender wage gap is much higher than the explained one.

However some of the hitherto estimates of wage gap can be overestimated as most of them analyse the gender differences between average wages (including premiums and bonuses). As the share of premiums and bonuses in total labour costs differs between men and women, the better measure of workers' remuneration is the base salary. In the hitherto papers only Łatuszyński and Woźny (2008) use both average and base salaries as the explained variable.

On the other hand, in some of the hitherto research, where wage gap is estimated for the whole economy, the differences in wages by gender can be underestimated. This may be due to overrepresentation of women in less-paid professions. However in most of the above described

[7] Among the earlier papers we should also mention Grajek (2003) and Adamchik and Bedi (2003). However, as they used data from the early transition period, their results cannot be directly compared with the latter ones.

papers the problem of different occupational segregation of men and women has been mentioned[8], the analysed of gender wage gap decomposition were performed on the aggregate level.

In our paper we try to correct for the above mentioned imperfections. Firstly, as our main explanatory variable we use base wages per hour. Secondly, to eliminate this problem of different occupational segregation of men and women we adjusted our sample only to occupational groups with masculinization ratio between 0.4 and 0.6. Thirdly, our main contribution is to analyse the gender wage gap in Poland separately for different occupational groups.

As the methodology is concerned most of the hitherto research use the Oaxaca-Blinder decomposition. In some papers the analyses were extended by introducing other techniques, however the differences in results were rather small. Therefore Oaxaca-Blinder decomposition is also the method used in our further analyses.

4. Data

The data on wages and individual characteristics of employees come from the Structure of Wages and Salaries by occupations (SWS) database for 2012. The survey is carried out with biennial frequency. It covers entities of the national economy with the number of employees exceeding 9 persons. The database includes both full– and part–time employees who worked for the whole month in October[9].

The advantage of the SWS survey is high reliability of the data on wages. Contrary to the Labour Force Survey or the Household Budget Survey the wages in the SWS are not declared by the respondents (and, hence, often downward biased, especially in the case of high-income workers), but reported by the accounting departments along with the number of hours worked.

Another advantage of the SWS data is the quantitative nature of the sample. As of 2012, the SWS survey covers 12.8% of the population of enterprises with the number of employees exceeding 9 persons. The total number of observations in the sample is 725.2 thousands. The disadvantage of the database is its representativeness only for entities employing more than 9 employees[10].

The database contains information on wages and several personal characteristics such as gender, age, level of education, work tenure, occupation, as well as some employer's characteristics: ownership sector, size of the enterprise and its location as well as the NACE section. These variables were used as controls in our further analyses.

According to the data from the SWS survey for 2012, the average monthly wage of men (3790 PLN) was 17% higher than the average wage of women (3133 PLN, see Figure 2). After controlling for the differences in the number of hours worked the difference decreases significantly. The average hourly wage of men (21.4 PLN in October 2014) was only 7% higher than in the case of women (19.9 PLN). It confirms the results obtained in previous studies (see e.g. Słoczyński, 2010). The majority of differences in average monthly wages between men and women can be explained by differences in working time.

Apart from working time, on average male and female employees differ also with respect to the wage structure. In the case of men the share of statutory and optional prizes and bonuses is higher

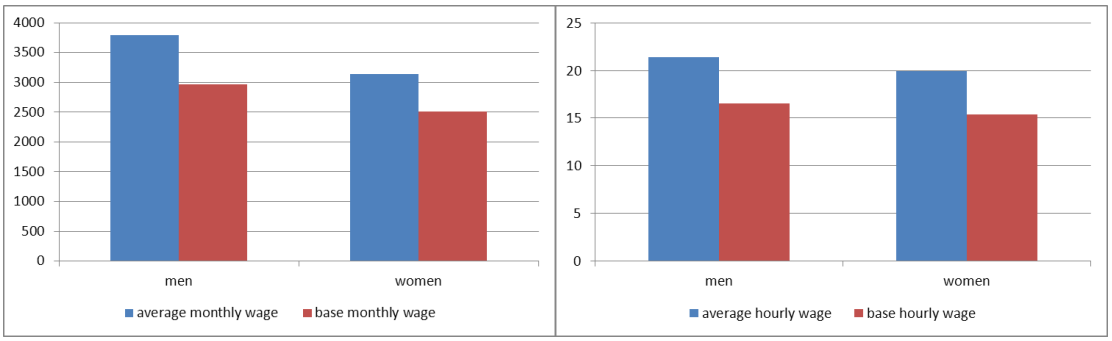
[8] Matysiak, Baranowska, Słoczyński (2008) calculated even the partial segregation indices for men and women in different occupational groups.

[9] Source: Structure of wages and salaries by occupations in October 2012, CSO.

[10] The survey does not include: apprentices, persons engaged in outwork (home–workers), students maintaining vacation or diploma practices, members of workers groups organised by other units and appointed to work in the reporting units, e.g. soldiers, labour corps members, convicts; moreover, excluded were: people on maternity or child–care leaves and people appointed to schools or PhD studies, etc., persons employed in intervention and public works, persons on sick leaves. For more information about sample selection scheme see: Structure of wages and salaries by occupations in October 2012, CSO, www.stat.gov.pl

than in the case of women. When excluding prizes and bonuses the magnitude of the raw gender pay gap decreases further to 6.7%. The base salary of the worker divided by the nominal number of hours will be used in the empirical part of the paper as the main explanatory variable.

Figure 2. Average monthly (left figure) and hourly (right figure) wages of men and women in October 2012 (PLN)

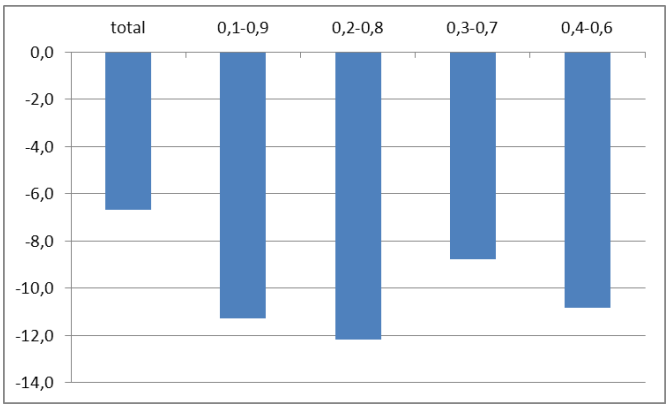


Source: Structure of wages and salaries by occupations in October 2012, CSO.

In order to capture the pure gender wage gap we want to separate two interacting effects: the potential segregation of women into less-paid occupations and possible wage discrimination against women. For this purpose we restrict our analysis to occupations with nearly balanced male-to-female (or masculinisation) ratio (0.4-0.6). To ensure sufficient number of observations 3-digit occupational groups[11] are used. We are left with 25 (out of 132) 3-digit occupational groups with masculinization ratio between 0.4 and 0.6[12].

Looking at the raw gender wage gap for the restricted sample we can notice, that after eliminating the occupational groups with overrepresentation of men or women, it is higher than in the whole sample and amounts to 10.8% (from 6.7%; see Figure 3).

Figure 3. The unadjusted gender wage gap (% difference between men and women base wage per hour) in Poland for the whole sample and after controlling for differences in masculinisation ratio



Source: Structure of wages and salaries by occupations in October 2012, CSO, own estimates.

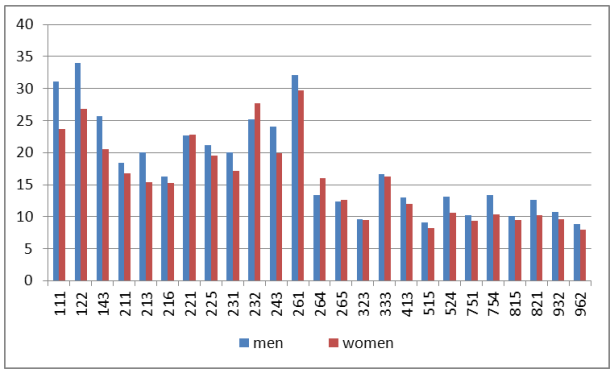
The unadjusted gender wage gap differs significantly across selected occupational groups (see Figure 4). In the majority of occupational groups the base wage per hour of men workers was on average higher than that of women. Only in four out of 25 selected groups women earned on average more than males. In two cases the differences were considerable – among Authors, journalists and linguists

[11] According to International Standard Classification of Occupations, ILO, http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_172572.pdf

[12] The list of the groups is presented in Table A1 in the Appendix.

(264[13]) and Vocational education teachers (232) the base salary of women were almost 17% and 9% higher than men. In the other two cases (Medical doctors, 221 and Creative and performing artists, 265) the raw differences in base wages per hour by gender were close to zero.

Figure 4. Average base wage per hour of men and women in occupational groups with masculinisation ratio between 0.4 and 0.6 in October 2012 (PLN)

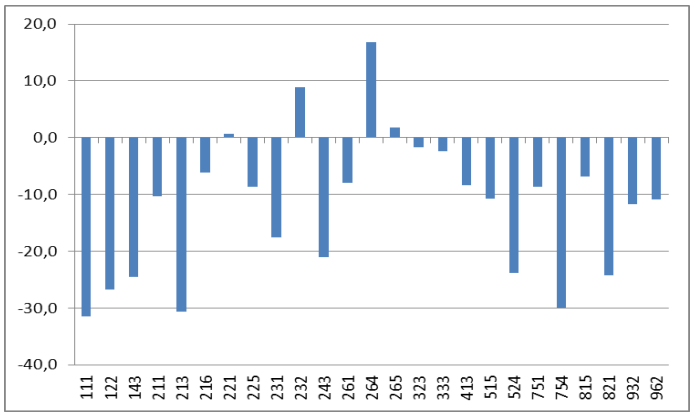


Source: Structure of wages and salaries by occupations in October 2012, CSO, own estimates.

The highest raw differences in base wage per hour between men and women were to be observed among Legislators and senior officials (111), Life science professionals (213) and Other craft and related workers (754). In all three groups men earned on average about 30% more than women.

The lowest (negative) differences between base wages per hour of men and women were noted in Traditional and complementary medicine associate professionals (323) and Business services agents (333) group. In both groups women earned around 2% less than men.

Figure 5. The unadjusted gender wage gap in 3-digit occupational groups with masculinisation ratio between 0.4 and 0.6 (% of men base wage per hour)



Source: Structure of wages and salaries by occupations in October 2012, CSO, own estimates.

5. Empirical strategy and the results

In this part of the paper we try to answer the question how much of the differences in wages between men and women in Poland is due to differences in workers' characteristics and how much can be attributed to wage discrimination. The usual approach is to study labour-market outcomes by groups (sex, race, etc.) and decompose mean differences in log wages based on linear regression models in a counterfactual manner.

[13] The number of 3-digit level occupational group is given according to International Standard Classification of Occupations, ILO.

To answer aforementioned question we use a two-step approach. In the first one the empirical wage equation is estimated. It contains all information available in the SWS data. The functional form allows the second-order polynomial interactions of personal characteristics (level of education and work experience) with characteristics of the entities (size of the firm, ownership sector, NACE section). Specifically, we included level of education, work experience, size of the firm, ownership sector and the interactions of size of the firm with the level of education, interactions of sector with educational level and working experience. As an additional control variable we also included NACE sections. As the main aim of the study is to estimate the wage equation separately for each occupational group, we do not include occupation indicators among explanatory variables.

In the second step we use the Oaxaca-Blinder decomposition (Blinder 1973; Oaxaca 1973). It is the most popular and well established in the literature approach to examine gender wage gap. The decomposition itself relies on the combination of separate wage regressions for men and women. The gap is decomposed into the part that is due to group differences in the magnitudes of the determinants of the outcome in question and group differences in the effects of these determinants. In decomposition, the interest is not just the difference in the mean of outcome variable between groups, but whether the difference is caused by the difference in coefficients or characteristics.

The decomposition divides the wage differential between two groups into a part that is "explained" by group differences in both personal (such as education or work experience) or employment (size of the firm, economic section) characteristics, and a residual part that cannot be accounted for by such differences in wage determinants. This "unexplained" part is often used as a measure of discrimination, but it also subsumes the effects of group differences in unobserved predictors.

The Oaxaca-Blinder two-components decomposition used to explain wage differences can be presented as:

$$D = (X_F - X_M)\beta_M + (\beta_F - \beta_M)X_F \qquad (1)$$

Where:

$(X_F - X_M)\beta_M$ - is the part of the gap between wages of women (F) and men (M) which can be explained by differences in their characteristics, the so-called explained part and

$(\beta_F - \beta_M)X_F$ - is the part of the gap which cannot be explained by the differences in characteristics and is treated as a discrimination effect, the unexplained part.

The decomposition is not unique as the group of men can be interchanged with the group of women. Nevertheless, as stated by Elder et al. (2010) many papers acknowledge this ambiguity by simply reporting both decompositions. However, the resulting differences are negligible.

Apart from Oaxaca-Blinder decomposition, some other methods are used in the analyses of gender wage gap: a decomposition method proposed by Juhn, Murphy and Pierce (1991), quantile regression approach proposed by Machado and Mata (2005) or matching approach similar to Nopo (2008). The first approach rely on a strong assumptions in order to derive their decomposition equation which introduces wage inequality as the price of unobserved skills measured as the standard deviation of the residuals. The second approach allows for decomposition but only for those men and women that are similar in employment related characteristics. As strong symptoms of occupational segregation are revealed from the data, using this methodology may lead to biased results. The last mentioned approach is attractive however computationally burdensome with such large dataset at our disposal.

To answer a question of how much of the wage differences between men and women in Poland can be explained by different workers' characteristics we included in the empirical equation all information available in the SWS data. The functional form allows the second-order polynomial

interactions of personal characteristics (level of education and work experience) with characteristics of the entities (size of the firm, ownership sector, NACE section).

In our model we included the interactions of size of the firm with the level of education, interactions of sector with educational level and experience. As a control variable we also included NACE sections. As the aim of the study is to estimate the wage equation separately for each occupational group, we do not include occupation indicators among explanatory variables. Inclusion of interactions of squared experience with other variable was not possible due to problems with the collinearity.

The estimated values of the Oaxaca-Blinder decomposition for the whole sample and the subsamples restricted to occupations with particular masculinisation ratio are presented in Table 1 and Figure 6. The total difference in log wages between group of men and group of women in the whole sample is 0.05. The explained part of the wage gap is negative and amounts to -0.054. It indicates that due to better characteristics of women the gap between wages of men and women should be much smaller, close to zero. The unexplained part is positive and twice higher (0.10) than the observed wage gap which, according to our interpretations, points to significant wage discrimination of women in Poland, however we have to bear in mind that at least part of the unexplained component could be explained by other, not included in the model, characteristics of the workers.

When we restrict the sample to occupations with masculinization ratio between 0.4 and 0.6, the total difference in log wages increases to 0.07. The explained component is still negative, however, its relative magnitude decreases (to -0.02). The unexplained part of the wage gap in the adjusted sample also decreases to 0.09, which is 130% of the total wage gap comparing to 200% in the whole sample. It indicates that in the whole sample including less-paid occupations with overrepresentation of women the discrimination effect is overestimated.

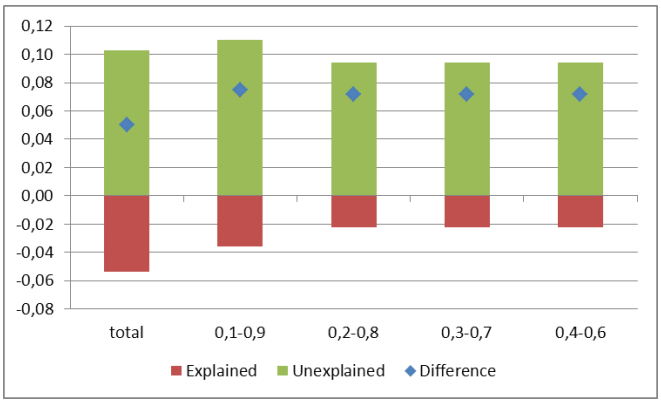
Table 1. Estimated parameters of Oaxaca-Blinder two-components decomposition in the whole sample and in subsamples with different masculinisation ratios

		Masculinisation ratio			
Total		0.1-0.9	0.2-0.8	0.3-0.7	0.4-0.6
Men	2.595	2.678	2.718	2.718	2.718
Women	2.546	2.603	2.647	2.647	2.647
Difference	0.050	0.075	0.072	0.072	0.072
Explained	-0.054	-0.036	-0.022	-0.022	-0.022
Unexplained	0.103	0.110	0.094	0.094	0.094
N Total	725239	543893	360700	201179	109166
N Men	359704	245802	169835	91882	53967
N Women	365535	298091	190865	109297	55199

N – size of the sample

Source: own estimates.

Figure 6. Oaxaca-Blinder two components decomposition in the whole sample and in subsamples with different masculinisation ratios



Source: own estimates.

In the next step we performed the Oaxaca-Blinder decomposition for each of the 24[14] occupational groups separately. The results (see Table 2 and Figure 7) indicate that in the case of most occupations the explained part is much smaller than the unexplained one.

Table 2. Estimated parameters of Oaxaca-Blinder two-components decomposition in each of the selected occupational groups

	Men	Women	Difference	Explained	Unexplained	N Total	N Men	N Women
111	3,362	3,092	0,270	0,038	0,232	1458	849	609
122	3,269	3,036	0,232	0,010	0,222	4871	2888	1983
143	3,101	2,859	0,242	0,063	0,180	2798	1488	1310
211	2,784	2,711	0,073	0,025	0,048	1109	549	560
213	2,892	2,645	0,246	0,139	0,107	3701	1743	1958
216	2,666	2,634	0,033	-0,020	0,053	1642	907	735
221	2,977	3,016	-0,039	0,011	-0,050	7646	3257	4389
225	2,998	2,907	0,092	0,052	0,040	217	90	127
231	2,857	2,706	0,150	0,071	0,079	10970	6105	4865
232	3,092	3,195	-0,103	-0,016	-0,087	3264	1470	1794
243	2,953	2,817	0,136	0,006	0,131	13686	5970	7716
261	3,278	3,212	0,066	0,001	0,065	4209	1678	2531
264	2,402	2,542	-0,140	-0,054	-0,086	1309	589	720
265	2,428	2,451	-0,022	-0,042	0,020	876	489	387
333	2,693	2,696	-0,003	0,044	-0,046	2196	964	1232
413	2,472	2,397	0,075	-0,017	0,092	889	381	508
515	2,136	2,039	0,097	0,036	0,061	6403	3309	3094
524	2,398	2,228	0,170	0,008	0,162	5137	2274	2863

[14] One group (Traditional and complementary medicine associate professionals; 323) was omitted because of insufficient number of observations in the sample (only 24 workers).

751	2,259	2,194	0,065	-0,028	0,093	7137	3723	3414
754	2,541	2,303	0,238	0,009	0,229	458	242	216
815	2,266	2,207	0,059	-0,042	0,101	1769	741	1028
821	2,478	2,287	0,190	-0,011	0,202	12198	6572	5626
932	2,315	2,214	0,101	0,005	0,096	9608	3980	5628
962	2,098	2,029	0,069	0,074	-0,004	9800	5376	4424

N – size of the sample

Source: own estimates.

Looking at the shares of the explained and unexplained components in the wages, we can divide the analysed occupational groups into the subgroups:

1) Occupation where the existing differences in wages are fully explained by different characteristics of the workers (Other elementary workers; 962). The explained part is even higher than the total wage gap and the unexplained part is negative which indicates that wages of women in that occupation are even too high, comparing to their counterparts.
2) Occupations where significant (47-56%) part of the total differences in wages is explained by different characteristics of workers. These are the groups with highly trained professionals:
    - Life science professionals (213),
    - Veterinarians (225),
    - University and higher education teachers (231).

3) Occupations where part (14-39%) of the differences in wages are explained by different workers' characteristics. These are mostly the relatively less-paid occupations with well educated workers employed:

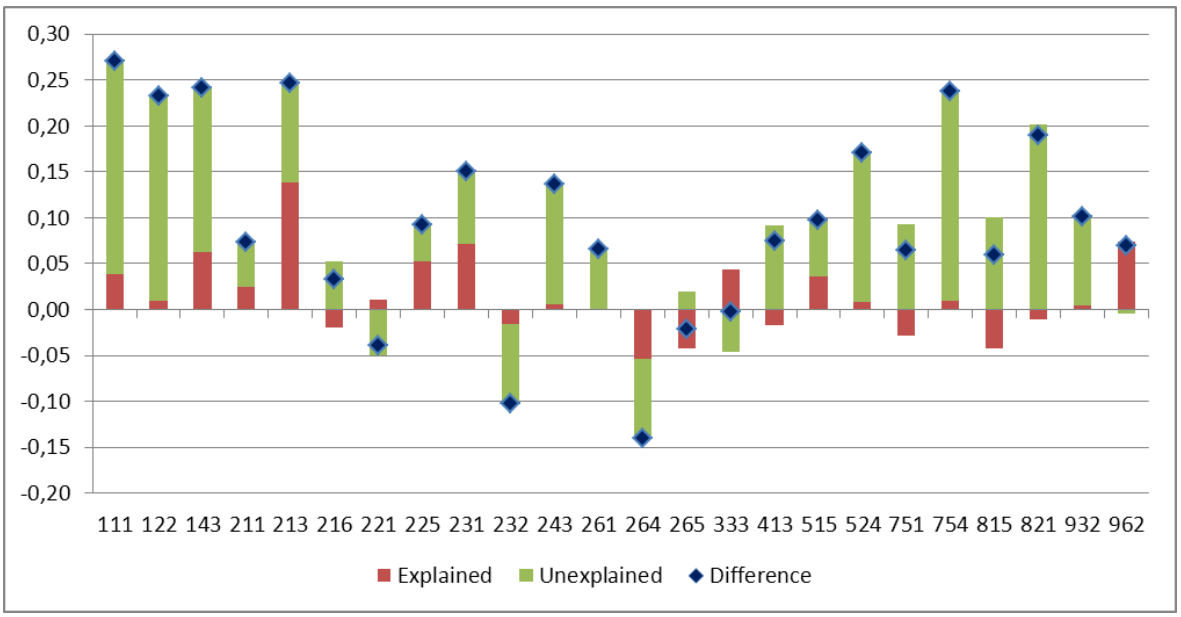
    - Legislators and senior officials (111),
    - Other services managers (143),
    - Physical and earth science professionals (211),
    - Authors, journalists and linguists (264),
    - Building and housekeeping supervisors (515),

4) Occupations where the explained component is positive, but very small (no more than 5% of total wage gap) and more than 95% of the total differences in wages between men and women are due to discrimination of women. These are on one hand the time-consuming occupations, on the other hand – the occupations where specific vocational skills are required:
    - Sales, marketing and development managers (122),
    - Sales, marketing and public relations professionals (243),
    - Legal professionals (261),
    - Other sales workers (524),
    - Other craft and related workers (754),
    - Manufacturing labourers (932).
5) Occupations where the explained component is negative and the unexplained component is higher than total wage gap. The negative explained component indicates that due to better characteristics, the base wages per hour of women in these occupations should be higher. Very high unexplained component indicates the presence of discrimination of women. Again these are on one hand the time-consuming occupations, on the other hand – the occupations where specific vocational skills are required:
    - Architects, planners, surveyors and designers (216),
    - Keyboard operators (413),

- Food processing and related trades workers (751),
- Textile, fur and leather products machine operators (815),
- Assemblers (821).

6) Occupations where wages of women are higher than the ones of men although it is not justified by their better characteristics, which indicates the discrimination of men. These are mostly the professions related to the public sector:
   - Medical doctors (221),
   - Vocational education teachers (232),
   - Authors, journalists and linguists (264).
7) Occupation where wages of women are higher than the wages of men due to women' better characteristics. Moreover the explained component is even higher than the total differences in wages which suggests that due to better characteristics the wages of women should be even higher.
   - Creative and performing artists (265).

Figure 7. Oaxaca-Blinder two components decomposition for each of the selected occupational groups (log percentage points)



Source: own estimates.

6. Conclusions

The aim of this paper was to analyse the gender wage gap in Poland in different occupational groups and answer a question in which of them the unexplained part of the gap, treated as the discrimination effect, was the highest.

We took data from the Structure of Wages and Salaries in October 2012 survey. To separate the potential segregation of women into less-paid occupations and possible wage discrimination against women we restrict our sample to occupations with nearly balanced male-to-female (or masculinisation) ratio (0.4-0.6). To eliminate the impact of premiums and bonuses on average wages we decide to analyse the differences in base salaries per hour.

Our analyses show that on average the base hourly wages of men in Poland in 2012 were only 6.7% higher that the wages of women. However when we restricted our sample to occupations with similar share of men and women employed the unadjusted gender wage gap increases to 10.8%. The differences in wages between men and women varied significantly across selected occupational

groups. In most of the groups the average base salary of men was higher than the one of women. In some of them the differences amounted to 30%. On the other hand in four groups (out of 25 selected) women earned on average more than men.

The results of the Oaxaca-Blinder two components decomposition for the whole sample indicate that due to better characteristics of women the gap between wages of men and women should be much smaller, close to zero. The unexplained part of the gap is positive and twice higher than the observed wage gap which points to significant wage discrimination of women in Poland. However, our results show that in the whole sample the discrimination effect is overestimated. After adjusting the sample to groups with masculinisation ratio between 0.4 and 0.6 the unexplained part of the wage gap decreases to 130% of the total differences in wages (comparing to 200% in the whole sample).

The Oaxaca-Blinder decomposition of the differences wage in selected occupational groups shows that only in one group the difference is fully explained by differences in workers' characteristics. In most of the groups the explained component of the wage gap is much lower than the unexplained one. In some of the groups the explained component was even negative indicating that due to better characteristics the wages of women should be higher. The results point to the existence of wage discrimination of women in Poland. The highest share of the unexplained part was among managers and in groups in which the specific vocational skills are required. Especially in the time-consuming managerial professions women earn less due to the need to reconcile work and motherhood.

On the other hand in three occupational groups the wages of women were higher than in case of men which was not justified by their better characteristics. These are the groups of medical doctors and vocational teachers, the groups where the base wages are often set by sectoral agreements. It points to the presence of some form of wage discrimination of men on Polish labour market.

While interpreting the results of the wage gap presented above we have to remember that they are strictly linked with the set of control variables in the empirical specification. The database used in the analyses lacks some relevant personal characteristics (e.g. marital status, number of children, first/second earner etc.) which would potentially have an impact on wages. Moreover, due to data limitation, our results are valid only for the employees working in the enterprises with more than 9 employees.

Our general results only in part confirm the findings of previous studies. We confirm that only a fraction of the gender wage gap in Poland can be explained by different characteristics of men and women. Moreover the wage gap is generally higher at the top of the wage distribution. However, our results show that some of the previous estimates of wage discrimination of women (the unexplained part) can be overestimated. We showed that when we separate the effect of segregation of women into less-paid occupations the discrimination effect is much smaller. Moreover, we showed that looking at the average effects may give the imprecise results as among occupational groups there are the ones where wage discrimination of women appears and the ones with wage discrimination of men.

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Appendix

Table A1. List of 3-digt level occupational groups with masculinisation ratio between 0.4 and 0.6

Code	Name of the occupational group	Masculinisation ratio	No of employees in the sample		No of employees - total economy	
			men	women	men	women
111	Legislators and senior officials	0,58	849	609	7920	5707
122	Sales, marketing and development managers	0,59	2888	35410	1983	26013
143	Other services managers	0,53	1488	1310	16395	12934
211	Physical and earth science professionals	0,50	549	560	5154	5002
213	Life science professionals	0,47	1743	1958	15845	17138
216	Architects, planners, surveyors and designers	0,55	907	735	12325	8873
221	Medical doctors	0,43	3257	4389	32849	46578
225	Veterinarians	0,41	90	127	930	1343
231	University and higher education teachers	0,56	6105	4865	47887	37360
232	Vocational education teachers	0,45	1470	1794	15122	18179
243	Sales, marketing and public relations professionals	0,44	5970	7716	72190	91694
261	Legal professionals	0,40	1678	2531	16647	25235
264	Authors, journalists and linguists	0,45	589	720	9043	9163
265	Creative and performing artists	0,56	489	387	4182	3351
323	Traditional and complementary medicine associate professionals	0,46	11	13	101	231
333	Business services agents	0,44	964	13148	1232	14782
413	Keyboard operators	0,43	381	508	4263	5220
515	Building and housekeeping supervisors	0,52	3309	3094	35870	33102
524	Other sales workers	0,44	2274	2863	31273	34905
751	Food processing and related trades workers	0,52	3723	3414	59404	47951
754	Other craft and related workers	0,53	242	216	2440	2117
815	Textile, fur and leather products machine operators	0,42	741	8005	1028	9851

821	Assemblers	0,54	6572	5626	65420	53012
932	Manufacturing labourers	0,41	3980	5628	51509	67378
962	Other elementary workers	0,55	5376	4424	65278	48387

Source: Structure of wages and salaries by occupations in October 2012, CSO and International Standard Classification of Occupations, ILO, http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_172572.pdf, own elaboration