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# GENDER PAY GAP IN THE MICRO LEVEL – CASE OF POLAND

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**Abstract:** The paper analyzes the size of the GPG in enterprises located in Poland and with at least 10 employees. For this purpose a linear model is constructed for individual data that allows to distinguish the influence of sex, occupation and education on the earnings. That allows to explain the size of income discrepancies caused by external, objective factors and assess the magnitude of sex discrimination.

**Keywords:** gender pay gap, wage inequality

## MEASUREMENT OF GENDER PAY GAP

### Introductory remarks

Official statistics publish Gender Pay Gap (GPG) on the basis of Structure of Earnings Survey which is carried out in Poland every two years. Calculated values are presented by Eurostat in separate tables for six age classes, private and public ownership, for full and part timers and for economic activities used in statistical classification according to NACE Rev. 2. Gender Pay Gap calculated for such aggregations may be misleading and gives poor insight into possible salary discrimination. For instance in particular sections women and men may be polarized in different occupations. Aggregated GPG cannot also explain the influence of additional factors such as job experience and education level. As a result virtual GPG in the micro level remains unknown.

**Gender pay gap in mainstream economics**

Differences in wages between men and women have not been an extended field of research in mainstream economics. In the classic economics maximum incomes appear when marginal productivity of labour equals real wage. The lower the real wage the more the enterprise may employ at a benefit. Real wages automatically adjust to the supply and demand for work. In the classical model it is assured by assumptions of perfectly competitive markets, flexible prices and full information. In such world wage discrimination is not possible. Companies will simply pay wages to men and to women to the amount that maximizes the companies' income. Exceptions in the model are allowed but they are never permanent. Keynes models and articles also do not refer to possible wage discrimination. It is so because Keynes revolution was especially designed against the idea of voluntary unemployment advocated by the classics. Keynes himself did not bother about wage discrimination. Much more serious was for him the idea that the overall demand may be not sufficient to guarantee full employment. Elastic nominal nor real wages were for him not a proper solution for curing economy diseased with involuntary unemployment. Monetarist revolution neither addressed the possible wage discrimination. For monetarists the key issue was to control the inflation, to control the money supply and to limit state activity to a necessary minimum. New Classical Economics followed the steps of old classics and by imposing assumptions of rational expectations, by imposing that individuals maximize utility – companies maximize profits and by assuming that full and relevant information is available it also excludes the possibility of wage discrimination. Production and employment fluctuations are explained mainly by unexpected money supply changes which probably affect both women and men with the same strength. Rational expectations, flexible prices and only voluntary unemployment in the Real Convergence Cycle Theory also do not emphasize wage discrimination. Exogenous productivity shocks presumably influence male and female's level of wages equivalently. With some help of shedding the light on possible wage discrepancies comes New Keynesian Economics. It raised from the Keynesian economics in response to its weaknesses, especially to the one which is particularly important for the purposes of this article: lack of proper micro foundations. New keynesian economists believe that classical microeconomics is not relevant in real, complex environment. New Keynesians inhabit the theoretical world with imperfect competition, incomplete markets, heterogeneous labour force and asymmetric information. In this micro area one may search for explanations of differences in individual wages. However as most of the models describe variety of reasons, seldom can they successfully deal with distinction between male and female's earnings. Implicit Contracts explain what might be the cause of Walras' Auction's Mechanism disfunction in the labour market as wages often diverge from marginal efficiency of labour. Besides other flaws of this model (for instance: in times of economic downturn the model does not predict redundancies) it is not

clear at all why women ought to have less profitable implicit contracts than men. The Efficiency-Wage Theory would justify those differences but only on the basis that men on average do work more efficiently than women and that is why men are allowed by the market forces to earn more. Selections models ground the existence of wages above market clearing rate by claiming that higher wages are an excellent incentive to lure better and more efficient employees and so to reduce high costs of doing business (interviews, redundancies of inefficient employees etc.). According to those models wage discrepancies between man and woman may appear if men are on average better employees than women. Possible cause for this may be the assumption that men are on average better educated or that on average they have broader or longer job experience. Dubious is the explanation of shirking models that men need to be paid on average more than women to ensure the quality of their efforts. Minimizing turnover again seems to apply to males and females with the same attitude. Even sociological theories that emphasize the importance of fairness and higher wages for increasing morale and raising productivity are helpless to explain GPG. Besides recent criticism of Efficiency-Wage Theory that it denials some basic facts that those who are most efficient, valuable for society do not earn most at all and quite opposite, those who contributed to the subprime crisis by irresponsible banking policy got high wages and received in reward enormous bonuses, the Efficiency-Wage Theory turned out to help implicitly to isolate some factors that might be responsible for the gap between male and female's wages. Those could be level of finished education, job experience and individual, sociological characteristics affecting efficiency of labour and thus wages. Some additional ideas about the GPG indicator may come from Insider-Outsider model as it has implications for the structure of unemployment. Higher wages in this model result from exploiting by employees the economic rent which is generated by turnover costs. Higher wages may get employees with longer job experience and those who negotiate more aggressively and efficiently. As for mentioned models objective causes of the pay gap could be education, job experience, productivity and traits of character. The last sociologic variable could be of certain importance[1] as men may have different patterns in society and it can influence their more "aggressive" behavior at the labour market. However it is not easy to measure features of character. In the article it is assumed that this factor is insignificant. It could be argued that in modern societies patterns of both men and women become similar and that women have the same goals as men in the labour market. However this issue is not measured in this article and needs more research especially in the sociologic grounds. As a replacement for this variable it is desirable to take into account a responsibility that an individual has on his/her post.

[1] Zon np. Leibbrandt A., List J.A. (2012) Do Women Avoid Salary Negotiations? Evidence From A Large Scale Natural Field Experiment, NBER Working Paper, No. 18511, 2012.

The higher the responsibility and the complexity of tasks the higher the wage ought to be.

Summing up, if men are on average better educated, have longer job experience, are more productive, have more desirable traits of character and carry out more responsible and complex tasks they should earn more. In such case there is no wage discrimination. Only objective reasons explain the pay gap.[2] However if these objective explanatory variables do not help to explain the differences of women's and men's wages then we might have a situation of gender pay discrimination, which could be defined as a situation where one sex earns higher wages than opposite sex without any objective causes.

## DATA AND EMPIRICAL MODEL

### Official statistics and empirical analyses of GPG

According to Eurostat on the basis of Structure of Earnings Survey, GPG in industry, construction and services (except public administration, defence, compulsory social security) in Poland represented by the difference between average gross hourly earnings of male paid employees and of female paid employees as a percentage of average gross hourly earnings of male paid employees accounted for merely 4.5% in 2010. It turned out to be a significant drop as in 2008 GPG indicator equaled 11.4%. The indicator was slightly different in industry, construction and services except activities of households as employers and extra-territorial organizations and bodies. GPG in 2010 amounted to 4.9% and in 2008 to 11.1%. Such values in 2010 seem low in comparison to other European countries. Developed countries, among which one could list for instance Germany 22.2%, United Kingdom 20.1%, Austria 23.7% had significantly higher numbers. Neighbors of Poland from socialistic block also are in much worse situation – Czech Republic 21.0%, Estonia 27.3%, Latvia 13.6%, Lithuania 11.9%, Slovakia 20.5%. Much higher than Poland's outcome is the average GPG for UE (16.2%) and for the Euro area (16.3%) too. Among countries for which data are available, only Slovenia (2.3%) and Italy have small GPG, in the first case lower than GPG for Poland and in the second case similar to polish GPG. Such small GPG for Poland and high for most of other countries raises crucial questions and doubts. Explanation for these discrepancies between countries could be that in Poland woman are simply less discriminated than in other European countries. Other possible interpretation is that there might be in fact no discrimination as wage differences in particular countries result from objective factors. This interpretation may be grounded by family patterns. In Poland in most cases both parents work

[2] For possible objective reasons of GPG see for example: Amaram D.I. (2010) The gender pay gap: Review and update, China-USA Business Review, Volume 9, No.6 (Serial No.84).

full time. One of the reason might be their pursuit to maintain certain level of living standard. Contrary to Poland, in Germany, where purchasing power of average income is higher, women were often interested only in part-time job. This could have influenced the level of GPG as usually (except for high specialists) part-timers earn less than full-timers. Among other objective factors on the basis of economic theory mentioned earlier influencing GPG level in European countries could be that men are on average better educated, have longer job experience, are more productive, have more desirable traits of character and carry out more responsible tasks. This would mean however that woman in Poland are on average better educated, have longer job experience, are more productive, have more desirable traits of character and carry out more responsible tasks than their female colleagues from other countries. That however seems not plausible to become the responsible cause for such huge differences between countries. This leaves us with two possibilities: either woman in Poland are less discriminated or they are more valuable for employers due to certain reason. Third possibility is that GPG calculated for aggregated values might not measure the discrimination effect correctly. Official statistics publish Gender Pay Gap (GPG) on the basis of Structure of Earnings Survey which is carried out in Poland every two years. Calculated values are presented by Eurostat in separate tables for six age classes, private and public ownership, for full and part timers and for economic activities used in statistical classification according to NACE Rev. 2. Gender Pay Gap calculated for such aggregations may be misleading and gives poor insight into possible salary discrimination. For instance in particular sections sexes may be polarized in different occupations. A good example is construction. In this section men usually do simple works and can be accounted for so called middle staff while woman employed in this section generally concentrate in specialists posts. Average wages differ from each other in those groups so the wage discrepancies not necessarily imply that any sex is discriminated even within this one section. It can be taken almost for granted that aggregated GPG for all sections, that is for whole country, will be heavily biased. Moreover the issue raised above is not the only reason for the bias. Aggregated GPG can neither explain the influence of additional factors, such as job experience and education level. As a result it is doubtful that officially published GPG is significant in the micro level. It should be treated only as an introductory value which limits ought to be known before drawing conclusions about possible wage discrimination in particular countries. To estimate the level of discrimination and the "less unbiased" value of GPG it is unavoidable to construct an econometric model. For this purpose a linear model for Poland is constructed that allows to distinguish the influence of sex, occupation and education (and other variables, see next chapter) in individual companies on the earnings. That allows to explain the size of income discrepancies caused by external, objective factors and assess the magnitude of sex discrimination.

There are other papers that measure and quantify GPG. Paper of Adamchik and Bedi measure using different methodologies and specifications estimated GPG

for Poland. They support the view that most of the explained wage gap can be attributed to industrial and occupational segregation. However they still find that substantial fraction (between 40-50%) of the wage gap (estimated to amount to 21-22%) remains unexplained.[3] The existence of GPG both in formal and informal Poland's economy proved M. Rokicka and A. Ruzik (2010). They found that the inequality of earnings between unregistered women and men is bigger at the bottom of the earnings distribution. In the case of formal employees, the inequality at the top of the distributions tends to increase.[4] Even within homogenous group of national MBA's, detailed demographic, family, and human capital measures explained only 58 percent of the raw gender wage gap equaled 15.5%, claim Grove, Hussey and Jetter (2011). Authors proved that experiences, noncognitive skills, and priorities distinctly influenced men's and women's outcomes. After including extended set of covariates, the unexplained gap shrinked to merely 6.1 percent at the 25th percentile, 4.3 percent at the 50th percentile, and only 1.3 percent at the 75th percentile.[5] Similar outcomes (while not taking into account soft skills) concerning magnitude of discrimination, but for completely other sample – for south Italy citizens, obtained Giaimo, Bono and Magno (2007). According to their research 35,9% of wage differential can be attributed to discrimination.[6] O'Darchai (2011) compared GPG among chosen occupations and their subcategories (group of legislators, senior officials and managers) for 23 European Countries. He found that in Poland within this high-qualified group of professions GPG is relatively stronger and wage inequality greater than in chosen sample (30.95%). The total, average wage gap for Poland on the basis of data from year 2006 the author estimated to the amount of 17.03% [O'Darchai 2011]. N. Catia using quantile regression and counterfactual decomposition methods showed that wage gap is positive in each Mediterranean country. He found that the most part of it is composed of discrimination effect, while the characteristics effect is small [Catia, 2009]. All the papers regardless of the time, region, population sample indicate that GPG exists and that there always remains a fraction that cannot be explained by objective causes. This magnitude of discrimination amounts from few percents (while taking into consideration also soft skills) to circa 40%. It is crucial to answer whether the unexplained gap calculated by Adamchik and Bedi (2001) has shrinked in Poland since year 1996. It is also important to compare result

[3] Adamchik V.A., Bedi A.S. (2001) Persistence Of The Gender Pay Differential in a Transition Economy, ISS Working Paper, No.349., Hague: Institute of Social Studies.

[4] Rokicka M., Ruzik A. (2010) The Gender Pay Gap In Informal Employment in Poland, Case Network Studies and Analyses, No.406, Warszawa.

[5] Grove W.A., Hussey A., Jetter M. (2011) The Gender Pay Gap Beyond Human Capital, Heterogeneity in Noncognitive Skills and in Labor Market Tastes, The Journal of Human Resources.

[6] Giaimo R., Bono F., Magno (2007), Interpreting the Decomposition of the Gender Earnings Gap, new.sis-statistica.org.

obtained by the model and simple GPG calculated by Eurostat to draw proper conclusions about usefulness of this measure.

In the paper, GPG is estimated as a differential between logarithms of men's and women's arithmetic hourly average wages: $\ln(\overline{W_m}) - \ln(\overline{W_k})$. The calculated indicator may be decomposed into two effects: a *discrimination effect* and an *equipment effect*. Equipment effect represents the fraction of the wage gap explained by particular characteristics of men and women. The unexplained part is called the discrimination effect and might be treated as potential discrimination. The discrimination effect consists of sum of discrimination on men's behalf and the discrimination on women's behalf. To measure each effect one must use the extended Oaxaca-Blinder decomposition.

$$\ln(\overline{W_m}) - \ln(\overline{W_k}) = (\overline{X_m} - \overline{X_k})\hat{\beta}^* + (\hat{\beta}^m - \hat{\beta}^*)\overline{X_m} + +(\hat{\beta}^* - \hat{\beta}^k)\overline{X_k}$$

where:

$\overline{W_m}$ – average men's hourly wage,

$\overline{W_k}$ – average women's hourly wage,

$\overline{X_m}$ – vector of average men's characteristics,

$\overline{X_k}$ – vector of average women's characteristics,

$\hat{\beta}^m$ – coefficient vector of men´s wage function,

$\hat{\beta}^k$ – coefficient vector of women´s wage function,

$\hat{\beta}^*$ – coefficient vector of the equilibrium wage (non-discriminatory wage).

Functions' men's and women's wage coefficients are estimated on the basis of the estimator of classical least square method:

$$\ln(\overline{W_m}) - \ln(\overline{W_k}) = (\overline{X_m} - \overline{X_k})\hat{\beta}^* + (\hat{\beta}^m - \hat{\beta}^*)\overline{X_m} + +(\hat{\beta}^* - \hat{\beta}^k)\overline{X_k} \quad (1)$$

$$\hat{\beta} = (X^T X)^{-1} X^T \ln(W) \quad (2)$$

where: $X$ is a matrix of observations of independent variables representing employees' characteristics, $\ln(W)$ is a vector of hourly wages' natural logarithms.

The expression $(\overline{X_m} - \overline{X_k})\hat{\beta}^*$ from equation (1) represents the part of GPG which is explained by characteristics of men and women. This part is called the *equipment effect*. It comes from the word „equipped" as both men and women can be appropriately equipped in experience, human capital etc. which allows to receive particular wages.

The expression $(\hat{\beta}^m - \hat{\beta}^*)\overline{X_m} + +(\hat{\beta}^* - \hat{\beta}^k)\overline{X_k}$ represents the unexplained fraction of the wage gap. This is the *discrimination effect*.

Key problem rests on determining the function of equilibrium wage. Reimers (1983) uses as parameters of the equilibrium wage function arithmetical average of the regression coefficients of men's and women's wage functions:

$$\hat{\beta}_R^* = \frac{\hat{\beta}^m + \hat{\beta}^k}{2} \tag{3}$$

Cotton (1988) weighs the average with shares of men and women in the total sample population:

$$\hat{\beta}_C^* = \frac{n_m \hat{\beta}^m + n_k \hat{\beta}^k}{n_m + n_k} \tag{4}$$

where: $n_m$ and $n_k$ are respectively number of men and women in the sample of employees.

Neumark (1988) estimates regression coefficients of the equilibrium wage function together for men and for women:

$$\ln(W) = X\hat{\beta}^* + u \tag{5}$$

where: $u$ is a vector of random variables.

In the paper equilibrium wage was determined on the basis of all three approaches.

**Data used for analysis**

Coefficients of the econometric models were estimated using the data from *Structure of Earnings* survey, a research carried out in Poland every two years on the statistical form Z-12 *Sprawozdanie o strukturze wynagrodzeń według zawodów*. Last available data come from edition of the survey for October 2010.

Explanatory variables that are incorporated into wage functions vary across different studies. In most studies it is assumed that variables affecting wages are: education, experience, working position, industry, responsibility, duty, the company size, number of years worked in the company, labour union membership, region, marital status and number of children.[7] In the article as explanatory variables were taken: region (represented for Poland by 16 voivodships), size of the company (*small* for less than 10 employees, *medium* for between 10 and 49 employees and *big* for more than 49 employees), way of determining wages, working position represented by 9 separate classes with different duties and responsibilities, completed education, type of employment contract, working time system, age, length of job experience, contract type (full or part-time), sector of

[7] Hedija V., Musil P. (2010), Genderová Mzdová Mezera, Working paper CVKS, Brno: Ekonomicko-Správní Fakulta MU, (issn 1801-4496), Hedija V., Musil P. (2011) Gender Pay Gap – Application In The Specific Enterprise, Review Of Economic Perspectives – národohospodářský obzor, Vol. 11, issue 4.

activity (public or private), place of job (if in headquarters or not) and type of economic activity. Data for marital status and number of children were unavailable.

It is impossible to incorporate into the model all the dummy variables describing particular characteristics due to their dichotomy, which causes colinearity with intercept in the models. To eliminate this effect, one of the variables within certain characteristics was omitted. Variables excluded from the models are called reference variables and they are bolded in Table 1.

Table 1. Set of independent variables

| Voivodship | | | |
|---|---|---|---|
| WOJ.02 | dolnośląskie | WOJ.18 | podkarpackie |
| WOJ.04 | kujawsko-pomorskie | WOJ.20 | podlaskie |
| WOJ.06 | lubelskie | WOJ.22 | pomorskie |
| WOJ.08 | lubuskie | WOJ.24 | śląskie |
| WOJ.10 | łódzkie | WOJ.26 | świętokrzyskie |
| WOJ.12 | małopolskie | WOJ.28 | warmińsko-mazurskie |
| **WOJ.14** | **mazowieckie** | WOJ.30 | wielkopolskie |
| WOJ.16 | opolskie | WOJ.32 | zachodniopomorskie |
| *Size of the entity* | | | |
| **MALE** | **small** | DUZE | big |
| SREDNIE | middle-size | | |
| *Way of determining earnings* | | | |
| **SUW1** | **settlements regulated by group of entities** | SUW3 | on the basis of other regulations |
| SUW2 | labour settlements within the company | | |
| *Profession groups* | | | |
| **ZAW1** | **Politicians, higher Officials and managers** | ZAW6 | Farmers, Gardeners, Fishermen and Foresters |
| ZAW2 | Specialists | ZAW7 | Manufactury Workers and Craftsmen |
| ZAW3 | Technicians and middle staff | ZAW8 | Fitters and Machine Operators |
| ZAW4 | Office employees | ZAW9 | Simple work employees |
| ZAW5 | Shop assistants and personal services employees | | |
| *Education* | | | |
| **WYKSZ_WY** | **higher** | WYKSZ_ZZ | basic vocational |

Cont. on the next page

Table 1. (cont.) Set of independent variables

| | | | |
|---|---|---|---|
| WYKSZ_PO | post-secondary | WYKSZ_GM | gimnasium |
| WYKSZ_SZ | secondary vocational | WYKSZ_PP | elementary and not full elementary |
| WYKSZ_SO | general secondary | | |
| *Type of employment contract* | | | |
| **RUOP1** | **for indefinite duration** | ROUP3 | till the time of finishing ordered job |
| RUOP2 | for definite duration | RUOP4 | probation |
| *Working Time System* | | | |
| **SCP10** | **basic** | SCP50 | weekend job |
| SCP20 | balanced | SCP60 | shortened week |
| SCP30 | intermittent time system | SCP70 | constant job |
| SCP40 | task system | | |
| *Age* | | | |
| WIEK | | | |
| *Number of years in specific company* | | | |
| STAZ | | | |
| *Contract type* | | | |
| PEŁNY full-time | | **NIEPEŁNY part-time** | |
| *Sector* | | | |
| PUBLICZNY public | | **PRYWATNY private** | |
| *Job in headquarters* | | | |
| SIEDZIBA | | | |
| *Statistical Classification of Economic Activities in the European Community, Rev. 2* | | | |
| SEK_A | Agriculture, Forestry And Fishing | SEK_K | Financial And Insurance Activities |
| SEK_B | Mining And Quarrying | SEK_L | Real Estate Activities |
| SEK_C | Manufacturing | SEK_M | Professional, Scientific And Technical Activities |
| SEK_D | Electricity, Gas, Steam And Air Conditioning Supply | SEK_N | Administrative And Support Service Activities |
| SEK_E | Water Supply; Sewerage, Waste Management and Remediation Activities | **SEK_O** | **Public Administration and Defence; Compulsory Social Security** |
| SEK_F | Construction | SEK_P | Education |
| SEK_G | Wholesale And Retail Trade; Repair Of Motor Vehicles And Motorcycles | SEK_Q | Human Health And Social Work Activities |

Cont. on the next page

Table 1. (cont.) Set of independent variables

| | | | |
|---|---|---|---|
| SEK_H | Transportation And Storage | SEK_R | Arts, Entertainment And Recreation |
| SEK_I | Accommodation And Food Service Activities | SEK_S | Other Service Activities |
| SEK_J | Information And Communication | | |

Source: own work

Functions' men's and women's wage coefficients estimated on the basis of the estimator of classical least square method are presented in Table 2. All the variables turned out to be statistically significant at the level of at least 10%.

Table 2. Wage functions parameters and average values of independent variables

| | *Men* | *Women* | *Total* | Average M | Average W |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |
| const | 3.4546 | 3.1297 | 3.3069 | 1 | 1 |
| WON02 | -0.0942 | -0.1090 | -0.1077 | 0.08051 | 0.08226 |
| WON04 | -0.1749 | -0.1402 | -0.1623 | 0.05010 | 0.05043 |
| WON06 | -0.2285 | -0.1840 | -0.2049 | 0.04157 | 0.04770 |
| WON08 | -0.1843 | -0.1447 | -0.1731 | 0.02300 | 0.02434 |
| WON10 | -0.1717 | -0.1325 | -0.1550 | 0.05486 | 0.05994 |
| WON12 | -0.1460 | -0.1254 | -0.1388 | 0.07811 | 0.08829 |
| WON16 | -0.1687 | -0.1391 | -0.1580 | 0.02053 | 0.02106 |
| WON18 | -0.2329 | -0.1793 | -0.2049 | 0.05250 | 0.05003 |
| WON20 | -0.1464 | -0.1421 | -0.1485 | 0.02497 | 0.02875 |
| WON22 | -0.0850 | -0.0888 | -0.0905 | 0.05296 | 0.05235 |
| WON24 | -0.1020 | -0.1245 | -0.1152 | 0.15072 | 0.12023 |
| WON26 | -0.2187 | -0.1686 | -0.1915 | 0.02636 | 0.02490 |
| WON28 | -0.1792 | -0.1623 | -0.1755 | 0.02955 | 0.03403 |
| WON30 | -0.1370 | -0.1195 | -0.1319 | 0.09977 | 0.09662 |
| WON32 | -0.1483 | -0.1285 | -0.1445 | 0.02868 | 0.03644 |
| DUZE | 0.3407 | 0.1576 | 0.2459 | 0.79304 | 0.71505 |
| SREDNIE | 0.1474 | 0.0919 | 0.1243 | 0.19841 | 0.26894 |
| SUW2 | -0.0218 | -0.0274 | -0.0224 | 0.46933 | 0.35376 |
| SUW3 | -0.0334 | -0.0204 | -0.0255 | 0.48403 | 0.58691 |
| ZAW2 | -0.2918 | -0.0923 | -0.1979 | 0.19041 | 0.38199 |
| ZAW3 | -0.4822 | -0.3697 | -0.4426 | 0.10142 | 0.12693 |
| ZAW4 | -0.6531 | -0.4714 | -0.5857 | 0.06215 | 0.11707 |
| ZAW5 | -0.7754 | -0.6037 | -0.7238 | 0.07362 | 0.11035 |
| ZAW6 | -0.7468 | -0.6976 | -0.7134 | 0.00323 | 0.00138 |
| ZAW7 | -0.6281 | -0.5860 | -0.5449 | 0.22849 | 0.04351 |
| ZAW8 | -0.6051 | -0.4649 | -0.5100 | 0.19128 | 0.03982 |

Cont. on the next page

Table 2. (cont.) Wage functions parameters and average values of independent variables

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| ZAW9 | -0.7674 | -0.7432 | -0.7843 | 0.06774 | 0.11085 |
| WYKSZ_PO | -0.2383 | -0.2767 | -0.2687 | 0.03483 | 0.06978 |
| WYKSZ_SZ | -0.2559 | -0.3264 | -0.2881 | 0.23311 | 0.19206 |
| WYKSZ_SO | -0.2620 | -0.2927 | -0.2893 | 0.06857 | 0.09020 |
| WYKSZ_ZZ | -0.3292 | -0.4077 | -0.3649 | 0.31112 | 0.13736 |
| WYKSZ_GM | -0.3557 | -0.2053 | -0.2956 | 0.00183 | 0.00042 |
| WYKSZ_PP | -0.3598 | -0.4083 | -0.3934 | 0.05863 | 0.04449 |
| RUOP2 | -0.1511 | -0.1212 | -0.1453 | 0.25647 | 0.22969 |
| RUOP3 | -0.0625 | -0.1259 | -0.0750 | 0.00401 | 0.00267 |
| RUOP4 | -0.2635 | -0.1937 | -0.2339 | 0.00732 | 0.00625 |
| SCP20 | 0.0000 | 0.0104 | 0.0000 | 0.14137 | 0.14583 |
| SCP30 | -0.2245 | -0.1029 | -0.2055 | 0.00183 | 0.00029 |
| SCP40 | 0.1877 | 0.1650 | 0.2011 | 0.02520 | 0.01410 |
| SCP60 | 0.0000 | 0.1485 | 0.0796 | 0.00048 | 0.00025 |
| SCP70 | 0.1123 | 0.1105 | 0.1495 | 0.01887 | 0.00252 |
| PELNY | 0.0128 | -0.0417 | -0.0188 | 0.94547 | 0.90559 |
| SEKTOR | 0.0184 | 0.0521 | 0.0363 | 0.37618 | 0.60002 |
| SIEDZIBA | -0.0569 | 0.0066 | -0.0246 | 0.85212 | 0.88657 |
| WIEK | 0.0025 | 0.0064 | 0.0038 | 40.8340 | 40.8570 |
| STAZ_WJS | 0.0058 | 0.0052 | 0.0055 | 9.77520 | 10.6180 |
| SEK_A | 0.0565 | 0.0732 | 0.1247 | 0.01428 | 0.00510 |
| SEK_B | 0.4471 | 0.3590 | 0.5668 | 0.04392 | 0.00522 |
| SEK_C | 0.0000 | 0.0360 | 0.0601 | 0.31342 | 0.14793 |
| SEK_D | 0.1772 | 0.2257 | 0.2799 | 0.03545 | 0.00989 |
| SEK_E | 0.0174 | 0.0434 | 0.1054 | 0.02457 | 0.00692 |
| SEK_F | -0.0063 | -0.0374 | 0.0944 | 0.07608 | 0.01031 |
| SEK_G | 0.0000 | 0.0158 | 0.0429 | 0.10059 | 0.11258 |
| SEK_H | -0.0539 | 0.0524 | 0.0476 | 0.08213 | 0.03354 |
| SEK_I | -0.0490 | 0.0000 | 0.0000 | 0.00690 | 0.01215 |
| SEK_J | 0.1395 | 0.1332 | 0.1838 | 0.02628 | 0.01543 |
| SEK_K | 0.1713 | 0.1355 | 0.1411 | 0.02027 | 0.04580 |
| SEK_L | 0.0000 | 0.0752 | 0.0733 | 0.01211 | 0.01326 |
| SEK_M | -0.0114 | 0.0454 | 0.0438 | 0.02300 | 0.02462 |
| SEK_N | -0.3229 | -0.0631 | -0.1541 | 0.03754 | 0.02602 |
| SEK_P | 0.1230 | 0.2164 | 0.2045 | 0.09189 | 0.27403 |
| SEK_Q | -0.0985 | -0.0932 | -0.1045 | 0.03125 | 0.13719 |
| SEK_R | -0.1131 | -0.1176 | -0.0903 | 0.01152 | 0.01512 |
| SEK_S | -0.1286 | -0.0800 | -0.0885 | 0.00165 | 0.00235 |

Source: own calculations

Next, according to presented methodology there were calculated equipment and discrimination effects for three possible equilibrium wages. Estimated GPG for Poland turned out to be equal merely 1.85%. It means that however men on

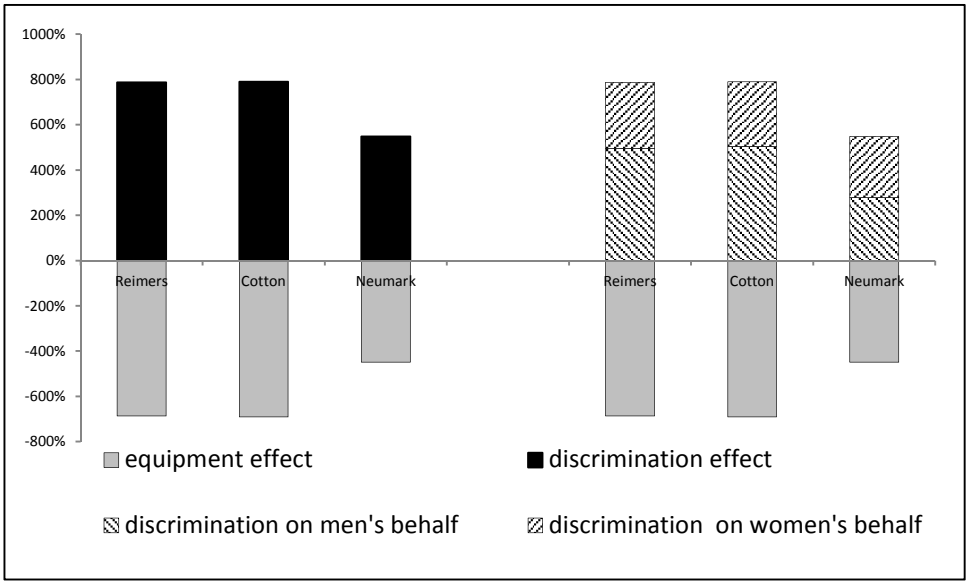
average receive higher wages than women. The difference between average wages is relatively small. To answer the question of discrimination existence and its magnitude one must compare equipment effect and discrimination effect.

Table 3. Particular effects and Gender Pay Gap

| Equilibrium wage of | equipment effect | discrimination effect | discrimination on men's behalf | discrimination on women's behalf | GPG |
|---|---|---|---|---|---|
| Reimers | -0.1269 | 0.1454 | 0.0916 | 0.0537 | 0.0185 |
| Cotton | -0.1275 | 0.1460 | 0.0931 | 0.0529 | 0.0185 |
| Neumark | -0.0829 | 0.1013 | 0.0515 | 0.0499 | 0.0185 |

Source: own calculations

Figure1. Equipment effect and discrimination effect as a percentage of GPG




Source: own calculations

Equipment effect represents in Poland -690% to -480% of existing GPG. This is the part explained by different, objective, taken into the model characteristics of men and women. Negative values of the equipment effect can be explained by claiming that women have on average better characteristics than men, so women should earn higher wages in comparison to men. However one must notice that discrimination effect is positive and a little smaller than equipment effect. The unexplained by objective factors difference of men's and woman's wages is of similar magnitude. It means that objective factors explain less than 50% of the wage differences of the adjusted for objective variables GPG. Rest, the unexplained part may be treated as potential discrimination. Discrimination effect

is a sum of favoritism of men (accounted for 5% to 9%) and a pure discrimination component accounted to be equal 5%. Women have on average 5 to 9% lower wages than men, because men are treated more favorably in the labour market. It is however not clear whether to treat it as discrimination. However the model indicated that women receive ca. 5% lower wages due to pure discrimination component. It means that lower by 5% wages are caused only by the fact that they are women. It is obvious that such outcome indicates and measures the magnitude of discrimination. However if to treat favoritism of men and pure discrimination component together as a general sex discrimination, we can summarize in simplification that women get wages lower than men's wages by 10.13% to 14.6% due to discrimination. However the level of discrimination might be little lower as a result of sociological, psychological and social factors that were not taken into account for the decomposition.

## CONCLUDING REMARKS

It was proved in the research that aggregated, unadjusted GPG calculated by Eurostat may differ significantly from the GPG adjusted for objective determinants of wages. Research carried out in the paper indicate that simple GPG indicator is not capable of detecting discrimination of wages between women and men. According to unadjusted GPG for Poland discrimination of wages was relatively small in 2010. GPG calculated using Oaxaca-Blinder decomposition is also not an appropriate measure of discrimination of wages between women and men. According to this GPG potential discrimination would have been very low in 2010. However results of carried out Oaxaca-Blinder decomposition show that woman in Poland are better „equipped" for market needs and should earn more. That is why GPG itself might be low, but even though the discrimination exists. The analysis proves that in simplification women in Poland receive on average from 10.1% to 14.6% lower wages in comparison to men as a result of potential discrimination. However the level of virtual discrimination might be little lower due to sociological, psychological and social factors that were not taken into account for the decomposition. The pure discrimination component equals ca. 5%.

## LITERATURE

Adamchik V.A., Bedi A.S. (2001) Persistence Of The Gender Pay Differential in a Transition Economy, ISS Working Paper, No. 349, Hague: Institute of Social Studies.

Amaram D.I. (2010) The gender pay gap: Review and update, China-USA Business Review, Vol. 9, No. 6 (Serial No.84).

Blinder A. (1973) Wage discrimination: Reduced Form and Structural Estimates, The Journal of Human Resources, 8 (4), 436-455.

Catia N. (2009) Gender Gap and Quantile Regression in European Families, IZA Discussion Paper No. 3978.

Cotton J. (1988) On the decomposition of Wage Differentials, The Review of Economic and Statistics, 70 (4), 236-243.

Giaimo R., Bono F., Magno G.L. (2007) Interpreting the Decomposition of the Gender Earnings Gap, available on line: http://new.sis-statistica.org/wp-content/uploads/2013/09/RS10-Interpreting-the-Decomposition-of-the-Gender-Earnings-Gap.pdf .

Grove W.A., Hussey A., Jetter M. (2011) The Gender Pay Gap Beyond Human Capital, Heterogeneity in Noncognitive Skills and in Labor Market Tastes, The Journal of Human Resources, 46(04), 827-874.

Hedija V., Musil P. (2010) Genderová Mzdová Mezera, Working paper cvks, brno: ekonomicko-správní fakulta mu, (issn 1801-4496).

Hedija V., Musil P. (2011) Gender Pay Gap – Application In The Specific Enterprise, Review Of Economic Perspectives – národohospodářský obzor, Vol. 11, issue 4.

Leibbrandt A., List J.A. (2012) Do Women Avoid Salary Negotiations? Evidence From A Large Scale Natural Field Experiment, NBER Working Paper, No. 18511.

Neumark D. (1988) Employer's Discriminatory Behavior and the Estimation of Wage Discrimination, The Journal of Human Resources, 14 (3), 693-709.

O'Darchai S. (2011) The Gender Pay Gap In Research: A Comparison Of 23 European Countries, Brussels Economic Review - Cahiers Economiques De Bruxelles, Vol. 54 (2/3).

Reimers C. (1983) Labour Market Discrimination Against Hispanics and Black Men, The Review of Economic and Statistics, 65 (4), 570-579.

Rokicka M., Ruzik A. (2010) The Gender Pay Gap In Informal Employment in Poland, Case Network Studies and Analyses, No. 406, Warszawa.