B E R O C

What Forms Gender Wage Gap in Belarus?

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Abstract

In this paper we focus on estimating the gender difference in wages using data from the Generations and Gender Survey (GGS) conducted in Belarus in 2017. The results show that the average gender wage differential amounts to 22.6%. We use quantile regressions to look at difference in returns at various earnings deciles and then the Oaxaca-Blinder and Juhn-Murphy-Pierce decomposition techniques to define the components that form the wage gap. We find that the adjusted gender pay gap is mostly formed by the difference in rewards rather than personal characteristics. The gap increases throughout the wage distribution and accelerates at the top deciles indicating presence of a strong glass ceiling effect. However, the distinction between private and state sectors demonstrate existence of the glass ceiling only in the public segment. The reduction of the pay gap in the lowest part of distribution is partly attributed to the endowments' component compensating women for their discrimination in the market as well as because of the minimum wage policy implemented by the state.

1. Introduction

Despite high female labor force participation rates and anti-discriminatory legislation, the causes and consequences of gender wage inequality in the labor market continue to attract increasing attention in empirical studies worldwide. This problem has been studied in application to many countries, and findings show a reasonably large difference in male and female wages (see Blau, 1998; Gunderson, 1989; Jarrell & Stanley, 2004; Weichselbaumer & Winter-Ebmer, 2005). Wage decomposition analysis implemented in these studies shows, first, that the smallest part of the earnings gap can be explained by differences in cognitive abilities and observed productivity characteristics, such as work experience and education; and, second, that the largest part of the wage gap remains unexplained and is usually recognized as female discrimination together with unmeasured differences in productivity and remuneration (Blau & Kahn, 2017).

Belarus is not an exception and faces the problem of wage inequality like other neighboring and transition countries. The difference in earnings between men and women preserves. According to official statistics, in 2015 the average unadjusted gender wage gap amounted to 23.8% and in 2017 it slightly increased to the level of 25.4%. Moreover, the level of female earnings is lower compared with men throughout all the sectors of economy despite whether there is a predominance of any gender in the sector or if there is equal gender distribution within the sector.

Nevertheless, there are features specific to the Belarusian labor market bringing certain singularity. Belarus might be the case of mix between egalitarianism and western market model of control (Akulava, 2016). On the one hand, there is a preserved idea of social equality and solidarity existed in the USSR with the attempts to keep the excessive demand for labor and preferably equalized wages. However, the lack of state funds reduces the ability to finance the declared equality (Lisenkova & Bornukova, 2015).

On the other, the collapse of the USSR introduced market reforms with a growth of competition from abroad and within the country. However, the progress is slow and the country is still transforming from the planned to the market economic model. As for now, the role of state sector is dominant. According to the official statistics, in 2017 the share of the gross value added (GVA) produced by the companies with state presence equaled to 60.6%. At the same time, state keeps implementing the full employment policy that results in relatively low level of unemployment that equaled to 5.6% in 2017. The main consequence of that is the lack of companies' incentives for the growth of competitiveness and improvement of performance (Akulava, 2016). This also explains low motivation of individuals in search for a new and better job and professional advancement (Blanchflower, 2001). Meanwhile, Belarusian women keep being actively involved in the labor force. The current rate of female involvement equals to 75%, while the same indicator for men equal 81% (ILOSTAT)[1]. Again, such situation is more typical for the Soviet labor market than for the market economy. At the same time, certain traditional pattern of the gender roles preserves in Belarus, women are considered as the main childcare and household duty holders in the families and

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[1] International Labour Organization, ILOSTAT database.

"double-burden" bearers (Bergmann, 1981) of work and family responsibilities. Such burden often affects the choice of occupation meaning that women might prefer flexibility and less workload over the level of remuneration.

In this regard, this paper aims at answering the question concerning the factors that influence the large differential in earnings between men and women in Belarus. Additionally, this study tries to expand the current literature on gender wage gap in Belarus multiway. First, it is the first study that looks at the wage gap across different types of occupations. Second, it analyses whether there any differences in the size of the wage gap by comparing birth cohorts born between 1955 to 1994. Third, it evaluates the role of the state and private sectors in distribution of gender wage gap taking into account that the level of discrimination is linked to the level competitiveness of the markets (Becker, 1957). Fourth, this study provides analysis of the gender wage gap based on the Gender-Generation Survey 2017, making it possible to use the hourly wages and to compare the results with the estimations of monthly wages based on official statistics (Akulava, 2016; Pastore & Verashchagina, 2011) as well as confront Belarus to other transition countries for similar surveys.

The methodology consists of several parts. First, we present the gender wage gap as the average logarithmic (log) differences in wages between men and women. Second, we apply an Oaxaca-Blinder (OB) method (1973) that allows estimating the selectivity corrected wage equations and decomposes the wage gap at means into the explained and unexplained parts. Consequently, this approach helps to determine the components of gender differences in wages. Third, we apply a Juhn, Murphy and Pierce (JMP, 1993) decomposition technique that allows us to compute the gender wage gap at different quantiles of the earnings distribution.

The results show that female wages are lower than male all over the wage distribution and the unadjusted gender wage gap amounts to 22.6%. Employing Oaxaca-Blinder decomposition, we find that the differential in earnings between men and women is almost entirely (104.8%) due to the unexplained component and not personal characteristics of the respondents (-4.8%), which is likely to be attributable to discrimination. The size of the gap is growing while moving from the bottom to the top of the earnings distribution. The attempt to look at the gender wage differential from different perspectives reveals presence of the discriminatory component that negatively influences wages of women born 1975 to 1984 and from 1985 to 1994. Distinction by occupational type shows presence of the wage gap both in male- and female-dominant industries, meaning that it is not the segregation into less-paid and more flexible occupations that negatively affects the level of women's earnings. We also find that females with secondary education or higher are undervalued in the market unconditional to whether their productivity characteristics are statistically better or worse off than endowments of their male competitors.

Finally, this study contributes to the literature on gender wage gap in Belarusian labor market in several ways. First, this paper updates previous findings on the value and the structure of the gender wage gap in Belarus conducted by Pastore & Verashchagina (2005; 2011) and Akulava (2016). Second, this paper provides a more comprehensive distributional analysis of the wage differentials and quantifies the contribution of a rich set of labor market characteristics to the distributional wage

disparities between men and women in Belarus. Third, in addition to the existing studies (Pastore & Verashchagina, 2005) our results help to understand if there is a "sticky-floor" or a "glass-ceiling" phenomenon in Belarus. We find that the largest gender wage gap appears at the top of the distribution (at the 75th and 90th percentiles), which is consistent with the evidence found in the high-income and transition countries. However, the distinction by the ownership type showed existence of the glass ceiling only in the state sector without any evidence of its presence in the private sector. This finding goes in line with Becker's argument (1957) that competition reduces the level of discrimination as the cost-minimization forces to choose the optimum for the firm despite any racial or gender prejudice.

The rest of the paper is structured as follows. Section 2 presents the literature review. Section 3 describes the methodology used in the research and guides the empirical analysis. Section 4 discusses the data used. Section 5 presents and interprets the results of the analysis. Finally, Section 6 concludes and develops some implications for public policy intervention.

2. Literature

Literature on gender wage gap aims to explain the presence of the differential in remuneration by various reasons: personal characteristics, occupation and market segregation, breaks in career due to the childbearing or other causes and also discrimination in case there are no differences in characteristics and the occupation.

The first block of studies focuses on the differences in remuneration because of unequal productivity and quality of human capital. Less-experience, lack of required skills and knowledge as well as fewer incentives to invest into education and work extra-hours partially explain wage disparity (Blau& Kahn, 1997; Warren et al., 2001; Booth & Francesconi, 2003; Amuedo-Dorantes & de la Rica, 2006; Manning & Swaffield, 2008, Lemieux et al., 2009). Moreover, various differences in behavior matter: networking, voluntarism, career aspirations affect the level of remuneration (Niederle & Vesterlund, 2007; Azmat & Ferrer, 2017). The study performed by Card *et al.* (2016) showed that it is also about sorting and bargaining, i.e. the firm-specific pay premiums contribute to the gender wage gap if women are less likely to work at high-paying firms or if women negotiate worse wage bargains with their employers than men.

The second block of the literature explains the wage disparity by the female segregation into the low-paid occupations. This means that women often tend to choose non-pecuniary benefits over the level of remuneration in order to be more flexible. Having possibility to work part-time or spend time with children work as incentives for choice towards the less-paying industries (Sorensen, 1990; Reilly & Wirjanto, 1999; Bayard *et al.*, 2003; Jurajda & Harmgart, 2007; Triventi, 2013, Matuszewska-Janica, 2015).

The literature on the inter-industry wage gap shows that the significant impact of occupational and industry choice and experience on the level of remuneration (Blau& Kahn, 2017). According to Fields & Wolff (1995) around 33% of the earnings differential is explained by the cumulative effect of industry, where men and women operate.

As for the discrimination, it may be present in various forms like different level of remuneration or unwillingness to hire certain group of employees, or discrimination in terms of professional and educational development (Becker, 1957). The block on discrimination provides certain ambiguity in results depending on the country and the cultural norms in the society (Albrecht *et al.*, 2004; Cudeville & Gurbuzer, 2007; Livanos & Pouliakas, 2012; Christofides *et al.*, 2010; Magnani & Zhu, 2010; Śliwicki & Ryczkowski, 2014).

The studies on post-Soviet countries shows presence of the wage-disparity of around 20-45% subject to the country of interest The gap is mostly due to differences in the remuneration, while higher personal characteristics of women decreases the gap (Oshchepkov, 2006; Gangulli & Terrell, 2006; Khitarishvilli, 2009). Empirical studies on Belarus reveal the similar pattern (Verashchagina & Pastore, 2011; Akulava, 2016).

3. Methodology

The study is based on the typical Mincerian model that estimates individual return on various influencing factors using the OLS approach (Mincer, 1974):

$$\ln w_{it} = \alpha + \delta_i X_i + u_i,$$
$$u_i = N(0, \sigma^2),$$

(1)

where $\ln w_i$ – the natural logarithms of hourly (monthly) earnings of person i, X_i – vector of explanatory factors that affect personal level of earnings.

The foregoing mean regression framework exclusively focuses on the average, which provides an incomplete account of the gender wage gap. In this light, the quantile regression approach allows the gender wage gap to be estimated at particular quantiles of conditional wage distribution in contrast to simply the mean of the OLS regression.[2] The appraisal of a several conditional quantile functions gives a more comprehensive picture of the relationship between the conditional distribution of the wage and selected covariates that provided by the mean regression. Using this methodology, the log wage equation may be estimated conditional on a given specifications at different percentiles of the residuals including 10th, 25th, 50th, 75th, or 90th (Chamberlain, 1994).

Next, the decomposing procedure in our study consists of two techniques taking into account their strong and weak sides. First, using the Oaxaca-Blinder decomposition (1973) the difference in wages between men and women can be presented as follows:

$$\left(\overline{\ln W^m} - \overline{\ln W^f} \right) = \hat{\beta}^m \overline{X}^m - \hat{\beta}^f \overline{X}^f,$$

(2)

where $\overline{\ln W^m}$ and $\overline{\ln W^f}$ are the average natural logarithms of hourly wages, $\hat{\beta}^m$ and $\hat{\beta}^f$ are vectors of the estimated regression coefficients, $\overline{X}^m$ and $\overline{X}^f$ are the matrices of the average values of male and female characteristics, correspondingly. By adding and subtracting $\hat{\beta}^m \overline{X}^f$ from the right-hand side of Eq. (2), it follows that:

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[2] In comparison with the OLS approach, the quantile regression procedure, first, is less sensitive to outliers, second, provides a more robust estimator (Koenker, 2005; Koenker & Bassett, 1978), and, third, may also have better properties than OLS in the presence of heteroscedasticity (Deaton, 1997).

$$\left(\overline{\ln W^m} - \overline{\ln W^f}\right) = \hat{\beta}^m \left(\overline{X}^m - \overline{X}^f\right) - \overline{X}^f \left(\hat{\beta}^m - \hat{\beta}^f\right), \tag{3}$$

The Equation (3) matches the standard Oaxaca-Blinder (1973) wage decomposition that is based on the male wage structure. The first term on the right hand side of the equation relates to the explained component and defines the portion of the wage differential due to observable differences in male and female characteristics. The second term represents the unexplained (residual) component and relates to the portion of the wage differential that is not explained by observable gender differences in characteristics. This component arises from the differences in the rates of return to male and female characteristics potentially caused by the wage discrimination. It measures the wage gain that, given their average characteristics, female employees would obtain if they were to be paid the same as male employees.

The wage differential decomposition specified in Eq. (3) assumes that in the absence of wage discrimination females will have the same rates of return to characteristics as males. However, in this analysis, we use the female wage structure, namely, we examine how the wage structure between the two groups would change if the wage determination of males been the same as that of females, i.e. assuming that the non-discriminatory wage structure is the female wage structure. The decomposition is thus carried out as:

$$\left(\overline{\ln W^m} - \overline{\ln W^f}\right) = \hat{\beta}^f \left(\overline{X}^m - \overline{X}^f\right) - \overline{X}^m \left(\hat{\beta}^m - \hat{\beta}^f\right), \tag{4}$$

The main problem with the Oaxaca-Blinder decomposition is that it also performs decomposition at their means and does not take into account the diversity of the gap amount depending on the income percentile. Correspondingly, the Juhn, Murphy and Pierce (JMP) technique (1993) allows separation of the difference not only at means but also at certain quartiles of the earnings distribution. This technique also allows isolation of gap due to characteristics (quantity) effect, coefficients (price effect) and unobserved factors. As the decomposition of earnings gap occurs within various quartiles, the differential decomposition takes the following form:

$$\left(\overline{\ln W_q^m} - \overline{\ln W_q^f}\right) = \hat{\beta}^m \left(\overline{X_q}^m - \overline{X_q}^f\right) - \overline{X_q}^f \left(\hat{\beta}^m - \hat{\beta}^f\right), \tag{5}$$

where q stands for the quantile q.

However, the weakness of the JMP decomposing method is that it does not take into account the problem of potential heteroscedasticity and considers the error terms to be independent. At that, we should take into account the possibility of incorrect results of decomposition in case of improper model allocation and dependency of the error term.

4. Data

4.1. Data and sample selection

We use data from the Generations and Gender Survey (GGS) conducted in Belarus in 2017 by the United Nations Population Fund (UNFPA) and the United Nations Children's Fund (UNICEF) within the framework of the Generations and Gender Program of the United Nations Economic Commission

for Europe. This survey is nationally representative dataset covering the whole of the country disaggregated by regions. In the course of the survey, about 10,000 permanent residents of Belarus aged 18-79 were interviewed. The GGS-2017 contains information on a range of individual (age, gender, marital status, educational attainment, employment status, hours worked, wages earned etc.) and household-level characteristics (household size and composition, religion, land holding, location, asset ownership etc.). However, the data lacks information on the distribution of respondents by sector of employment. This limitation is taken into account during the analysis of the results.

Correspondingly, the wage equation developed in this research (based on Eq. (1)) is augmented with variables for different occupations (Chzhen & Mumford, 2011; Gupta *et al.*, 2006), educational attainments (Chzhen & Mumford, 2011; Jolliffe & Campos, 2005), marital status (Chzhen & Mumford, 2011), number of young children in the household, presence of other adults in the household (parents)[3], beliefs and moral attitude, potential work experience, type of the organization where respondent works, and region of residence.

Using the International Classification of Occupations (ISCO-08), we defined a set of binary indicators in order to capture occupational effect (Dumount, 2006). Taking the one-digit ISCO categories, we include ten occupational category dummies: skilled agricultural, forestry and fishery workers, elementary occupations, services and sales workers, plant and machine operators and assemblers, craft and related trade workers, clerical support workers, technicians and associate professionals, armed forces occupations, managers, and professionals. In these settings, the manual labor low skilled jobs correspond to first, second and third categories, and manual labor high skilled jobs correspond to fourth, fifth and sixth categories. The office or other administrative low skilled jobs correspond to seventh and eighth categories, and the office or other administrative high skilled jobs correspond to ninth and tenth categories. The reference category is first category – "skilled agricultural, forestry and fishery workers".

We use respondent's educational attainment as proxy for respondent's skills in order to take into account their potential productivity.[4] In this regard, we define five dummy variables to capture the highest level of educational attainment of the respondent: primary education completed, lower secondary education completed, upper secondary education completed, post-secondary non-tertiary education completed, graduate (at least completed a Bachelor's degree).[5] The reference category is those respondents with only primary education. In addition to the educational variable, the measure of respondent's potential experience is also included as a complementary proxy for productivity.

The potential work experience is calculated as individual's age minus years of schooling and minus six. Following Munich *et al.* (2005) in case of women we also adjust it for the maternity leave period by subtracting a number of own children multiplied by 3 years.

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[3] Living with parents in the household is supposed to influence the possibility of working of women (in case of childcare) – parents might be considered as labor market substitutes for women.

[4] According to the theory of human capital, the individual earnings can be defined as a positive function of educational attainment. Therefore, this explanatory variable is supposed to directly influence productivity and correspondingly the wage rate.

[5] This approach was used by Newell & Reilly (1999), who studied several selected transitional economies.

The type of the organization, where respondent works is classified into private or public defined with the corresponding dummy variables. The region dummy variables control for region specific differences in labor markets in Belarus. The reference category is "Minsk city". A full list of variables and their definition is presented in Table 1.

Table 1. Definition of variables

Variable	Variable description
Wage	Hourly wage of the respondent.
Gender	Gender of the respondent.
Coresident children	Dummy variable indicating the presence of coresident children in the household with the respondent.
Married	Dummy variable indicating that the respondent is officially married.
Single	Dummy variable indicating that the respondent is single.
Living with parents	Dummy variable indicating that the respondent lives with parents in the household.
Religiosity	Categorical variable defining level of the respondent's religiosity: 0 – not at all religious, 1 – low level of religiosity, 2 – average level of religiosity, and 3 – high level of religiosity.
Fairness	Dummy variable indicating the general fairness of the respondent: 0 – respondent would take advantage, and 1 – respondent would try to be fair.
Trust	Dummy variable indicating the general trust of the respondent: 0 – respondent thinks that it is needed to be very careful with most of the people, and 1 – respondent thinks that most people can be trusted.
Planning	Categorical variable defining planning scale of the respondent: 0 – low level of planning, 1 – average level of planning, and 2 – high level of planning.
Tradition	Categorical variable defining gender values (whose task is it to earn money for the family) of the respondent: 0 – man's task, 1 – equal task of both sexes, and 2 – woman's task.
Experience	Potential work experience of the respondent calculated as the respondent's age minus his years of education and minus six years. It is also corrected for the maternity leave: number of own children multiplied by 3 years (only for women).
Education	Categorical variable defining highest level of the respondent's education: 1 – respondent completed primary education, 2 – respondent completed lower secondary education, 3 – respondent completed upper secondary education, 4 – respondent completed post-secondary non-tertiary education, and 5 – respondent completed at least a Bachelor's degree.
Occupation	Categorical variable defining respondent's occupation category (ISCO-08)[a] ordered according to ISEI[b] (from low to high): 1 – skilled agricultural, forestry and fishery workers, 2 – elementary occupations, 3 – services and sales workers, 4 – plant and machine operators and assemblers, 5 – craft and related trade workers, 6 – clerical support workers, 7 – technicians and associate professionals, 8 – armed forces occupations, 9 – managers, and 10 – professionals.
Private	Dummy variable indicating that the respondent works at the private organization.
Public	Dummy variable indicating that the respondent works at the public organization.
Minsk city	Dummy variable indicating respondent residing in Minsk city.
Brest region	Dummy variable indicating respondent residing in the Brest region.
Gomel region	Dummy variable indicating respondent residing in the Gomel region.
Grodno region	Dummy variable indicating respondent residing in the Grodno region.
Minsk region	Dummy variable indicating respondent residing in the Gomel region.
Mogilev region	Dummy variable indicating respondent residing in the Mogilev region.
Vitebsk region	Dummy variable indicating respondent residing in the Vitebsk region.

Source: GGS-2017.

Note: [a] ISCO-08 – International Standard Classification of Occupations. [b] ISEI – International Socio-Economic Index of Occupational Status.

The sample used in this study includes individuals between the age of 23 and 62 years inclusively to ensure that we do not include people who are likely to be child labor, just graduated students or retired. The official retirement age in Belarus in 2017 was 60.5 for males and 55.5 for females, however a large proportion of men and women continue to work beyond the retirement age at least for next several years.

4.2. Descriptive statistics

Descriptive statistics for the sample of wage employees are reported in Table 2, for women and men, respectively. Table 2 shows some important differences concerning male and female respondents. Belarusian men have higher work experience – by approximately 2.6 years. There are by 13 percentage points more single women than single men. However, higher share of male population lives with their parents. Furthermore, Belarusian women are more religious, fair, and trustful, while Belarusian men have higher tendency to planning and preservation of traditions.

Table 2. Descriptive statistics for wage employees by gender

Variable	Males		Females	
	Mean	Std. Dev.	Mean	Std. Dev.
Wage	3.609	3.724	3.132	4.295
Experience	22.410	11.924	19.811	10.080
Family:				
Coresident children	0.525	0.500	0.562	0.496
Married	0.710	0.454	0.569	0.495
Single	0.193	0.395	0.323	0.468
Living with parents	0.161	0.368	0.137	0.344
Beliefs and moral attitude:				
Religiosity	1.595	0.843	1.970	0.733
Fairness	0.608	0.488	0.641	0.479
Trust	0.368	0.483	0.408	0.492
Planning	1.034	0.739	0.963	0.753
Tradition	1.638	0.529	1.509	0.548
Education:				
Primary education	0.017	0.131	0.013	0.114
Lower secondary education	0.183	0.387	0.118	0.322
Upper secondary education	0.370	0.483	0.402	0.490
Post-secondary non-tertiary education	0.106	0.308	0.064	0.245
Bachelor's degree or higher	0.324	0.468	0.403	0.491
Occupation:				
Skilled agricultural, forestry and fishery workers	0.051	0.221	0.021	0.144
Elementary occupations	0.119	0.323	0.115	0.320
Services and sales workers	0.070	0.256	0.201	0.401
Plant and machine operators and assemblers	0.064	0.244	0.017	0.130
Craft and related trade workers	0.182	0.386	0.051	0.219
Clerical support workers	0.017	0.130	0.080	0.271
Technicians and associate professionals	0.155	0.362	0.090	0.286
Armed forces occupations	0.023	0.151	0.003	0.051
Managers	0.071	0.257	0.064	0.244
Professionals	0.248	0.432	0.359	0.480
Organization type:				
Private	0.248	0.432	0.189	0.392
Public	0.752	0.432	0.811	0.392
Region:				
Minsk city	0.197	0.398	0.207	0.405
Brest region	0.132	0.339	0.122	0.327
Gomel region	0.084	0.278	0.117	0.322
Grodno region	0.132	0.338	0.143	0.350
Minsk region	0.212	0.409	0.184	0.388
Mogilev region	0.104	0.305	0.097	0.296
Vitebsk region	0.140	0.347	0.130	0.337
Observations	1260		1316	

Source: authors estimates based on GGS-2017.
Note: estimates reflect weighted data.

Additionally, there are also significant differences in educational qualifications between Belarusian men and women. First, there is a higher share of women in the upper secondary education and

Bachelor's degree education – 40.2% and 40.3% in comparison with 37.0% and 32.4% for men. Second, there is a higher share of men in the lower secondary education and post-secondary non-tertiary education – 18.3% and 10.6% in comparison with 11.8% and 6.4% for women.

Women and men are almost equally divided into low-paid and high-paid workers. For example, 48.5% of the woman at work and 50.3% of male employees are low-paid workers. However, the share of women working in private organization is lower by approximately 6 percentage points in comparison with men.

Next, concerning mean hourly wages, Figure 1 illustrates the varying experience of ten-year birth cohorts spanning the birth years from 1955-1994. The left axis reports the mean hourly wages expressed in Belarusian rubles (BYN). The bottom axis defines birth cohorts (generations). The figure highlights, first, the tendency for increasing divergence of mean male and female wages for all four studied birth cohorts; second, the highest wages for males and females are observed in 1975-1984 birth cohort; and, third, a large drop in mean wages for both sexes in the 1985-1994 birth cohort jointly with largest mean wage differential. Overly, Belarusian mean hourly wages are substantially higher for men versus women in all studied ten-year birth cohorts.
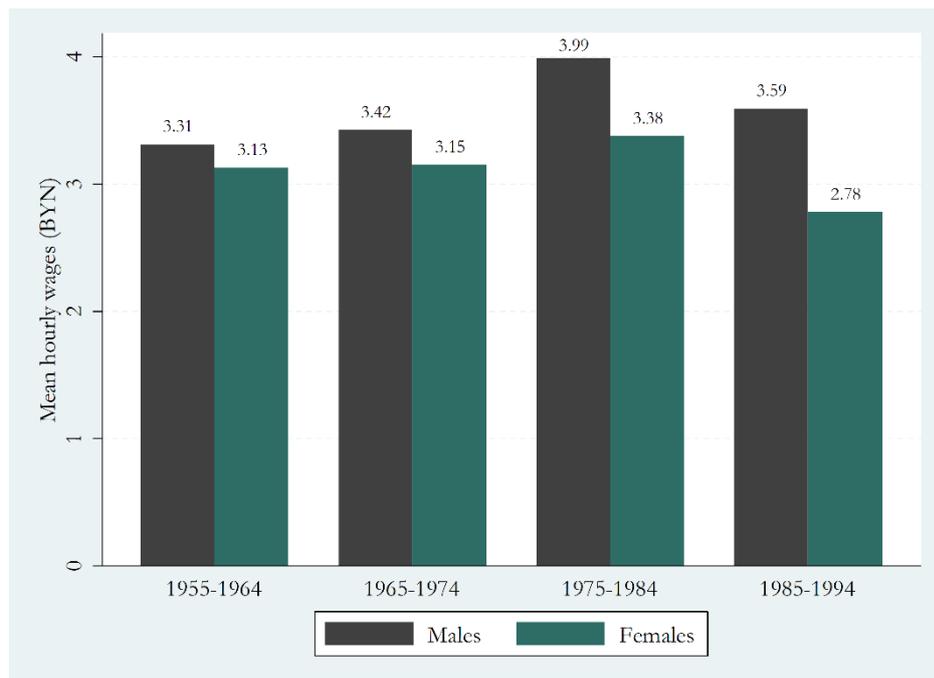

Figure 1. Mean hourly wages by birth cohorts

Source: authors estimates based on GGS-2017.

Note: estimates reflect weighted data.

Figure 2 shows the difference in the marital status of men and women indicating, first, that the single status of women in Belarus adds to hourly wages on average approximately 2.9%; and, second, marriage increases average wages of men by approximately 4%.
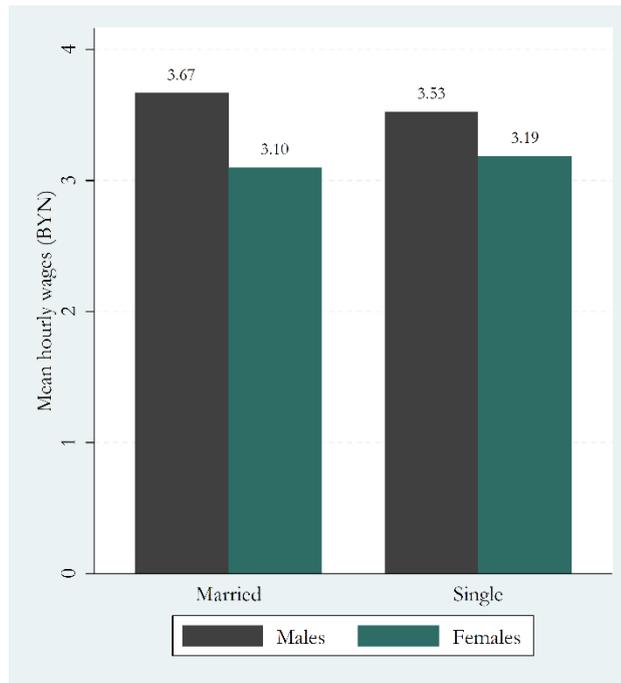
Figure 2. Mean hourly wages by marital status

Source: authors estimates based on GGS-2017.
Note: estimates reflect weighted data.

Concerning educational attainments – mean hourly wages for men are significantly higher in comparison with women for all educational levels (see Figure 3). The highest differential corresponds to the higher education.
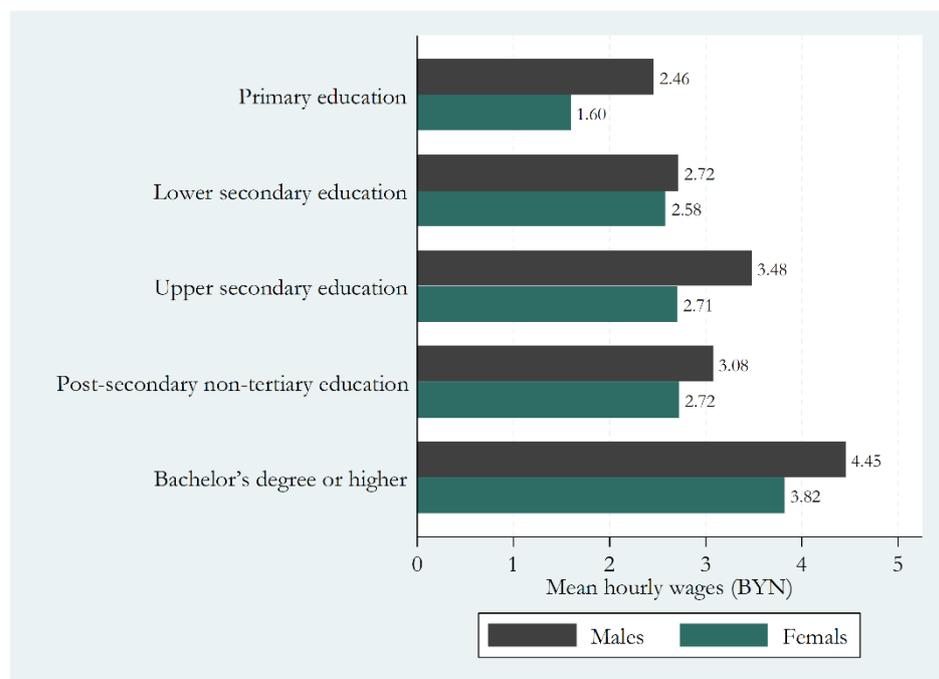
Figure 3. Mean hourly wages by education and gender

Source: authors estimates based on GGS-2017.
Note: estimates reflect weighted data.

Figure 4 illustrates that there are gender differences in wages in all occupational levels. Mean hourly wages of women are equal or higher in only two lowest paid occupations: skilled agricultural,

forestry and fishery workers, and elementary occupations, correspondingly. In contrast, male wages in other comparatively higher paid occupations (armed forces occupations, managers, and professionals) exceed on average female mean hourly wages at lowest by 8.3% for armed forces occupations, and at highest by 35.1% for managers.
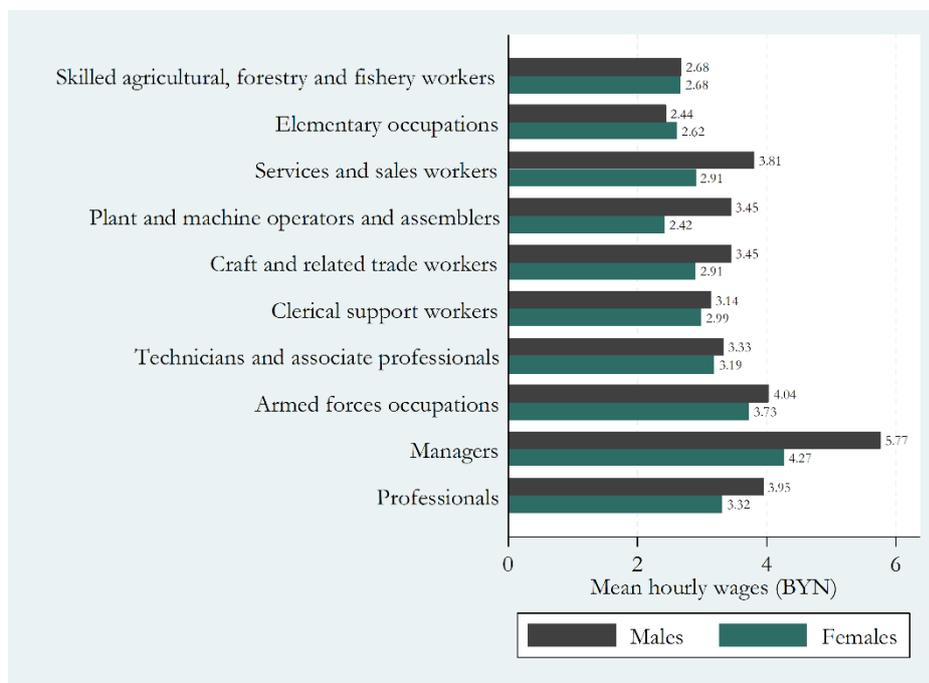

Figure 4. Mean hourly wages by occupations and gender

Source: authors estimates based on GGS-2017.
Note: estimates reflect weighted data.

Moreover, the data also shows that Belarusian women are not underrepresented in two comparatively higher paid occupations in Belarus namely managers and professionals (see Figure 5). From this point of view, one of the key determinants of the differences in wages between males and females is the degree of gender segregation by occupation (Bergmann, 1974). It may either be horizontal or vertical leading to the concentration of women in the relatively poorer paid jobs[6]. Thus, as can be seen from the Figure 4 and Figure 5 vertical gender segregation seems not to be a characteristic feature of Belarusian labor market.

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[6] Occupational gender segregation refers to the unequal distribution between men and women in the work place. It has two forms: vertical segregation – means clustering of men at the top of occupational hierarchies and of women at the bottom; horizontal segregation – means that at the same occupational level men and women have different job responsibilities (Marshall & Scott, 1998).
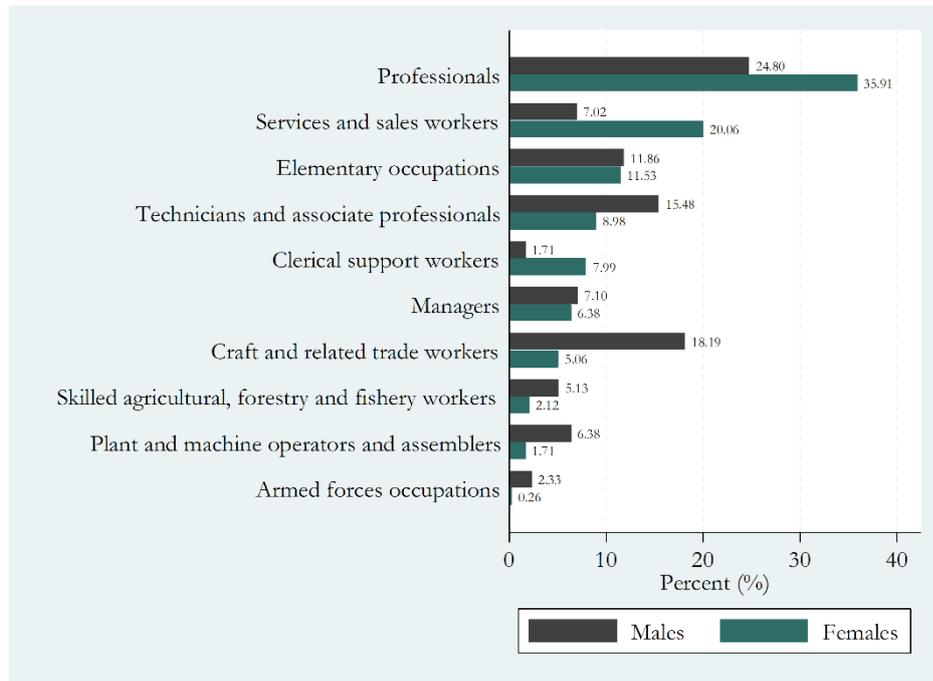
Figure 5. Occupation affiliation by gender

Source: authors estimates based on GGS-2017.
Note: estimates reflect weighted data.

5. Results

5.1. Wage differentials

In our analysis, the earnings measure is represented by the (log) hourly wage rather than a monthly wage.[7] Hourly wages are estimated by dividing monthly wages (in Belarusian rubles) of the respondents as the regular waged workers by the total hours of work (including overtime) per month.[8] The natural logarithms wage rates are used in the augmented Mincerian wage equations, which control for different personal characteristics of the studied respondents (see Table 1 and Table 2 for variable description and selected summary statistics).

However, prior to providing further details of the dataset used in the current study, it is useful to see the historical dynamics of gender wage gap in Belarus and how this experience compares to other countries. Table 3 presents data on gender wage gap[9] for 1960-2017 for a number of developed countries (according to OECD classification), USSR (1960-1990), Russia, and Belarus. Although, the gender wage gap is narrowing in almost all developed countries presented in Table 3,[10] it remains relatively stable and comparatively high in Russia (taking into account the Soviet Union over first thirty-year period), and increases in Belarus in the period 2000-2014.

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[7] Using hourly wages instead of monthly wages as a dependent variable helps to take into account differences in intensive margin, which eliminates the need to control for hours endogenously.
[8] The GGS-2017 collected data on the usual hours worked per week, but not the number of weeks usually worked during month. Consequently, the monthly hours of work are estimated by multiplying the usual hours worked per week by 52/12 (weeks per year/12 months).
[9] The gender wage gap is defined here according to OECD methodology as the difference between male and female median wages divided by the male median wages.
[10] The reduction in the gender wage gap in the developed countries can be attributed to the introduction of equal pay legislation in the 1960-1970s.

Table 3. Gender wage gap across different countries

Country	1960	1980	1990	2000	2010	Latest
Australia	41.00	25.00	12.00	17.20	14.04	14.30[e]
France	36.00	29.00	19.00	14.57	9.01	9.90[d]
Germany	35.00	28.00	26.00	19.60	16.70	15.50[e]
United States	34.00	34.00	17.00	23.09	18.81	18.10[f]
OECD average	--	--	--	17.80	14.50	14.10[e]
Estonia	--	--	--	25.00[b]	27.80	28.30[d]
Latvia	--	--	--	18.90[b]	19.10	21.10[d]
Lithuania	--	--	--	14.60[b]	10.60	12.50[d]
Poland	--	--	--	14.30[a]	7.20	11.10[d]
USSR	30.00	30.00	29.00			
Russia	--	--	--	37.00	35.00	32.80[c]
Belarus	--	--	--	15.00[a]	22.00	24.00[d]

Source: https://stats.oecd.org/index.aspx?queryid=54751; Pastore & Verashchagina, 2005; Akulava, 2016; Kazakova, 2007; Atencio & Posadas, 2015; Newell and Reilly, 1996.
Note: [a] 2001; [b] 2002; [c] 2012; [d] 2014; [e] 2016; [f] 2017.

To better describe the wage disparities between the two groups, we present the kernel density estimates of logarithmic hourly wages for each group in Figure 6, from which we can see the contrasted wage distributions between males and females in Belarus. Particularly, the results demonstrate, first, the *Male curve* is shifted to the left relative to the *Female curve*, and, second, the *Female curve* is more compressed in comparison with the *Male curve*, i.e. the female sample contain more workers with low wages. This once again means that the hourly wages of males in Belarus are overall higher than hourly wages of females.
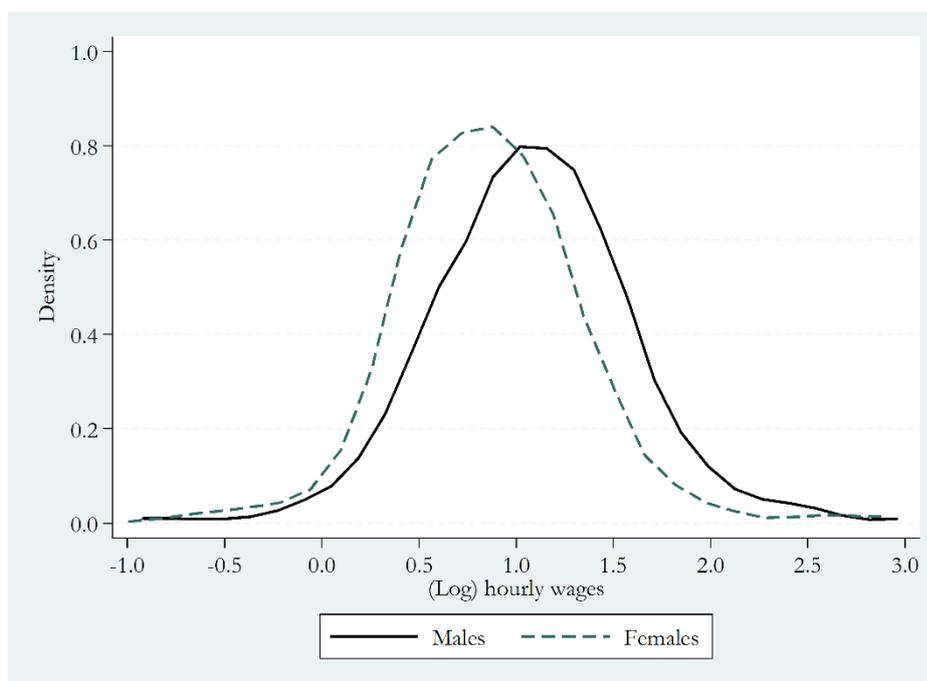
Figure 6. Distribution of (log) hourly wages by gender
Source: authors estimates based on GGS-2017.
Note: estimates reflect weighted data.

Figure 7 plots the difference in the distributions shown in Figure 6. This is the raw (unadjusted) gap in log hourly wages between male and female employees at each quantile of the distribution. The gender (log) hourly wage gap is different in the upper and lower tails of the wage distribution. The

underpayment of women is lower for low earnings workers, but increases up to the end of the wage distribution (see Figure 7).
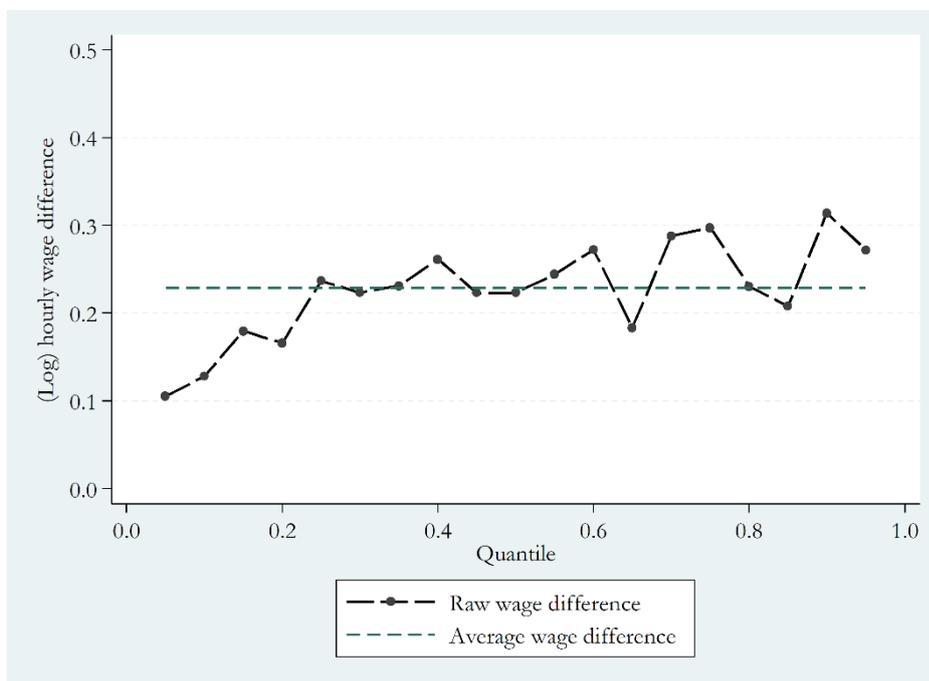
Figure 7. Gender differential by quantile

Source: authors estimates based on GGS-2017.
Note: estimates reflect weighted data.

5.2. Gender differences in characteristics

Next, we examine several factors that may cause the gender wage gaps within regular waged workers in Belarus. Such observable characteristics include educational attainment, occupation, age, organization type and marital status. The main results are summarized in Table 4.

Table 4 demonstrates that gender wage gaps exist within all categories of education. However, the statistically significant gender wage gaps are higher at the upper end than at the lower end of the educational scale. Also, there are clear gender wage differences in occupations. Women earn substantially less than men within four upper higher-paid occupational categories (high skilled occupations) – the statistically significant difference ranges from 26.9% for "Technicians and associate professionals" up to 33.4% for "Managers". Overly, this evidence may indicate the presence of horizontal segregation within these four occupational categories.

Moreover, the gender wage gap is by 2.2 percentage points higher for respondents working in public organizations than in private companies. Table 4 also shows the presence of a clear gender differences in wages across all studied age cohorts. The gap equals only to 9.8% and is characterized by weakest statistical significance for oldest generation (1955-1964), increases up to 16.6% for 1965-1974 birth cohort, and almost doubles for two youngest generations. Finally, changes in the marital status also lead to statistically significant increase by 9.5 percentage points in the wage differential among men and women.

Table 4. Shares and wages by gender across educational levels, occupational types, organization type, age cohorts and marital status

Educational levels							
	Educational distribution (in %)			Average hourly wages (in BYN)			Gender log wage gap (in % at the mean)[a]
	Males	Females	All persons	Males	Females	All persons	
Primary education	1.79	1.29	1.55	2.46	1.60	2.11	69.59**
Lower secondary education	18.37	11.63	15.08	2.72	2.58	2.67	13.83**
Upper secondary education	36.76	40.05	38.36	3.48	2.71	3.09	28.89***
Post-secondary non-tertiary education	10.64	6.37	8.49	3.08	2.72	2.95	21.70**
Bachelor's degree or higher	32.44	40.66	36.52	4.45	3.82	4.11	28.88***
Total	100.00	100.00	100.00				
Occupational types							
	Occupational distribution (in %)			Average hourly wages (in BYN)			Gender log wage gap (in % at the mean)[a]
	Males	Females	All persons	Males	Females	All persons	
Skilled agricultural, forestry and fishery workers	5.13	2.12	3.68	2.69	2.68	2.68	31.24
Elementary occupations	11.86	11.53	11.66	2.44	2.62	2.53	12.17*
Services and sales workers	7.02	20.06	13.41	3.81	2.91	3.16	30.17***
Plant and machine operators and assemblers	6.38	1.71	4.04	3.45	2.42	3.24	21.09
Craft and related trade workers	18.19	5.06	11.69	3.45	2.91	3.34	11.08
Clerical support workers	1.71	7.99	4.72	3.14	2.99	3.02	20.49**
Technicians and associate professionals	15.48	8.98	12.22	3.34	3.19	3.28	26.85***
Armed forces occupations	2.33	0.26	1.69	4.04	3.73	3.98	18.61
Managers	7.10	6.38	6.66	5.77	4.27	5.08	33.36***
Professionals	24.80	35.91	30.24	3.95	3.32	3.58	27.19***
Total	100.00	100.00	100.00				
Organization type							
	Organization type distribution (in %)			Average hourly wages (in BYN)			Gender log wage gap (in % at the mean)[a]
	Males	Females	All persons	Males	Females	All persons	
Private	24.80	18.89	21.60	4.21	3.81	4.04	19.39***
Public	75.20	81.11	78.40	3.41	2.97	3.19	21.63***
Total	100.00	100.00	100.00				
Age cohorts							
	Cohorts distribution (in %)			Average hourly wages (in BYN)			Gender log wage gap (in % at the mean)[a]
	Males	Females	All persons	Males	Females	All persons	
1955-1964	20.81	18.18	19.53	3.31	3.13	3.23	9.76*
1965-1974	22.61	35.33	28.82	3.42	3.15	3.26	16.62***
1975-1984	24.94	26.52	25.71	3.99	3.38	3.68	28.45***
1985-1994	31.64	19.97	25.94	3.59	2.78	3.29	32.49***
Total	100.00	100.00	100.00				
Marital status							
	Marital status distribution (in %)			Average hourly wages (in BYN)			Gender log wage gap (in % at the mean)[a]
	Males	Females	All persons	Males	Females	All persons	
Married	70.64	56.92	63.94	3.67	3.10	3.42	24.92***
With partner	10.06	10.78	10.36	3.18	3.13	3.15	15.12**
Single	19.30	32.30	25.69	3.53	3.19	3.32	15.44***
Total	100.00	100.00	100.00				
Overall				3.60	3.13	3.37	22.59***

Source: authors estimates based on GGS-2017.

Note: Estimates reflect weighted data. Significance: ***: 1%;**: 5%;*: 10%.

[a] The raw (unconditional) hourly wage gap – the difference between the average (log) hourly wages for men and women.

5.3. OLS and quantile regression results

In this section, we analyze the usual Mincerian equation in order to check the return of various observable factors on log hourly wage (see Table 5). Estimations are made for the whole dataset (model called pooled) and separately for both genders to allow for heterogeneous return on the independent variables.

The earnings are explained by the educational level, working experience, occupational type, organization type, family characteristics, region, as well as various personal beliefs and attitude to life. The regression on the entire sample contains a female dummy, which defines the gender wage gap conditional on observable characteristics and taking into account the assumption that the returns to the characteristics are the same for men and women.

First, we estimate the only gender effect on wages and the results show that the unadjusted gender wage gap equals to 22.6% ((exp (0.204)-1)*100). Next, we proceed with the calculation of the wage gap adjusted for the impact of various exogenous factors. The results of the pooled model show that gender factor has a negative and significant effect meaning that Belarusian women earn on average 25.4% ((exp(0.226)-1)*100) less than Belarusian men do.

Concerning indicators of general human capital (i.e. education, experience, and experience squared), the overall return on education is significant for upper secondary and tertiary ("Bachelor's degree or higher") educational categories. Higher education attainment are associated with higher wages. However, all educational categories increase the level of female earnings, while tertiary educational level is the only that positively and significantly influences males' earnings. At the same time in this category, the return differs substantially between sexes. As it was found in studies for other countries (e.g. Japan, USA (see Brown *et al.*, 1997), the hourly wage difference for women with university studies compared to those with lowest level of education (in case of Belarus – "Primary education") seems to be substantially much higher than the corresponding difference for men. Moreover, the reason for the mostly insignificant returns to education for men in Belarus may be an over-supply of human capital. Additionally, these insignificant rates may reflect the consequences of the egalitarian policies[11] in Belarus intended to limit wage disparity across individuals in the country (Kruk & Bornukova, 2015; Lisenkova & Bornukova, 2015). Similar evidence provide Bird *et al.* (1994) for the former German Democratic Republic, Byron & Manalotto (1990) for China, and Newell & Reilly (1996) for Russia.

The results indicate further that wage development as a function of experience for Belarusian men and women is statistically significant. The effect is positive (with a diminishing marginal effect) but is triply higher for female population (an additional year of work raises the level of hourly wages by 0.037 log points for women and by 0.012 log points for men). However, women's wages decline to a greater extent than men's at higher ages. The results follow the literature on that question (Psacharopolos, 1985; Dougherty, 2003; Pastore & Verashchagina, 2011; Pastore *et al.*, 2013).

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[11] Egalitarianism (from French egal, meaning 'equal') – or equalitarianism – is a school of thought that prioritizes equality for all people.

Table 5. OLS wage equation estimates

Variables	Males		Females		Pooled	
Constant	0.833***	[0.153]	0.112	[0.257]	0.618***	[0.135]
Female					-0.226***	[0.025]
Experience	0.012*	[0.007]	0.037***	[0.008]	0.026***	[0.005]
Experience squared * 10³	-0.296**	[0.142]	-0.787***	[0.192]	-0. 549***	[0.110]
Family:						
Having kids	0.079*	[0.039]	0.078**	[0.037]	0.081***	[0.026]
Married	0.034	[0.043]	-0.053*	[0.033]	-0.021	[0.026]
Living with parents	-0.044	[0.059]	-0.086	[0.070]	-0.068	[0.044]
Having kids and living with parents	-0.096	[0.074]	-0.166**	[0.077]	-0.128**	[0.055]
Beliefs and moral attitude:						
Religiosity	-0.018	[0.020]	-0.041**	[0.019]	-0.029**	[0.014]
Fairness	0.047	[0.038]	0.100***	[0.036]	0.071***	[0.026]
Trust	0.043	[0.038]	0.041	[0.036]	0.044*	[0.026]
Planning	-0.020	[0.022]	-0.004	[0.020]	-0.011	[0.015]
Tradition	0.035	[0.030]	-0.039	[0.032]	-0.004	[0.022]
Education:						
Lower secondary education (OV: Primary education)	-0.038	[0.079]	0.403**	[0.177]	0.145	[0.090]
Upper secondary education	0.055	[0.080]	0.389**	[0.173]	0.193**	[0.089]
Post-secondary non-tertiary education	0.002	[0.093]	0.333*	[0.180]	0.144	[0.096]
Bachelor's degree or higher	0.215**	[0.086]	0.652***	[0.178]	0.416***	[0.094]
Occupation:						
Elementary occupations (OV: Skilled agricultural, forestry and fishery workers)	-0.106	[0.094]	0.076	[0.162]	-0.035	[0.081]
Services and sales workers	0.154	[0.109]	0.176	[0.158]	0.136*	[0.082]
Plant and machine operators and assemblers	0.099	[0.121]	0.287	[0.193]	0.144	[0.104]
Craft and related trade workers	0.210**	[0.089]	0.363**	[0.164]	0.259***	[0.079]
Clerical support workers	0.085	[0.112]	0.192	[0.170]	0.126	[0.095]
Technicians and associate professionals	0.217**	[0.089]	0.313*	[0.160]	0.245***	[0.079]
Armed forces occupations	0.317***	[0.115]	0.319	[0.593]	0.322***	[0.115]
Managers	0.503***	[0.104]	0.431***	[0.175]	0.458***	[0.090]
Professionals	0.182*	[0.097]	0.230	[0.164]	0.186**	[0.083]
Organization type:						
Private company	0.122***	[0.039]	0.165***	[0.043]	0.135***	[0.028]
Region:						
Brest region (OV: Minsk city)	-0.303***	[0.059]	-0.322***	[0.058]	-0.309***	[0.041]
Gomel region	-0.241***	[0.061]	-0.327***	[0.072]	-0.288***	[0.048]
Grodno region	-0.386***	[0.060]	-0.418***	[0.056]	-0.400***	[0.041]
Minsk region	-0.208***	[0.053]	-0.251***	[0.058]	-0.229***	[0.039]
Mogilev region	-0.368***	[0.075]	-0.349***	[0.056]	-0.362***	[0.047]
Vitebsk region	-0.256***	[0.067]	-0.237***	[0.064]	-0.251***	[0.046]
R^2		0.216		0.201		0.219
Observations		1,260		1,316		2,576

Source: authors estimates based on GGS-2017.
Note: Estimates reflect weighted data. Robust standard errors in square brackets. Significance: ***: 1%; **: 5%; *: 10%.

Proceeding further, the examination of family factors shows that marriage (cohabitation) and living with parents have no significant effect on wages of both genders in Belarus.[12] Whereas the effect of number of children has a statistically significant positive effect equal to 0.079 log points and 0.078 log points for both male and female population. Similar studies for other countries generally show a small positive fatherhood premium: Lundberg & Rose (2000) found a premium of 9% on average, and Killewald (2013) – a premium of 4%.

Having kids and living with parents decreases the level of women's earnings by 18.1% ((exp(0.168)-1)*100), while Belarusian men do not experience nor a wage premium, nor a wage penalty in this

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[12] The analogous results for men were found for Japan (Kumlin, 2007).

case. The potential explanation here is that Belarus follows the traditional patriarchal family model where men are considered as the main breadwinners. Thus, having both children and opportunity to live with parents and spend less on rent or housing does not lower the motives to change the earning strategy towards the more relaxed attitude works as a motive for them to increase their level of income (Blau& Kahn, 2017).

Following various religious views decrease the level of female wages by 0.041 log points at the same time being fair is a strong plus for women that raise their wages by 0.01 log points. As for male wages, they are unaffected by various personal beliefs and moral norms.

As for the occupational effect, the GGS distinguishes between ten types of occupation. Men involved in five forms of activity (craft workers, technicians, armed forces, managers and professionals) earn from 0.201 to 0.503 log points more compared with their mean level of income. As for females, they benefit from working as managers (0.431 log points) or being employed as technicians (0.313 log points) or craft and trade workers (0.363 log points). We can also note that high skilled occupations are associated with higher wages.

Working in a private company positively and significantly impacts on overall wages (0.135 log points) and wages of both genders (0.122 log points for men and 0.165 log points for women). Living in the region negatively affects earnings' level of both men and women and goes in line with the official statistics.

Next, we include quantile regressions in the analysis in order to see the return of influencing factors within different income deciles (see Table 6). The quantile regression results in Table 6 allow looking at the impact of covariates on the conditional hourly wages on different deciles of the earnings distribution. The estimations do not reveal any striking difference with the impact on mean wages. However, there are certain interesting features observed.

The gender wage gap tends to display a substantial increase with movement across the conditional distribution. It equals 18.3% ((exp(0.168)-1)*100) at the bottom, rises up to 26.9% ((exp(0.238)-1)*100) at the median, reaches its' maximum of 27.5% ((exp(0.243)-1)*100) at the 75% of earnings distribution and then goes slightly down to 26.9% ((exp(0.238)-1)*100) at the top (see Table 6). Thus, this may suggests that gender wage inequality is larger in the high-paid, than the low-paid jobs. Moreover, these results might be a preliminary sign of a so-called "glass ceiling" phenomenon (the wage gap expands at the top of the wage distribution) for women at the market, which is comparable to what is commonly observed in other transitional economies (Reilly, 1999; Newell & Reilly, 2001).

Table 6. Quantile regression estimates

Variables	q10		q25		q50		q75		q90	
Constant	-0.429*	[0.251]	0.471***	[0.176]	0.875***	[0.114]	1.156***	[0.118]	1.165***	[0.143]
Female	-0.168***	[0.023]	-0.202***	[0.019]	-0.238***	[0.019]	-0.243***	[0.019]	-0.238***	[0.034]
Experience	0.026***	[0.006]	0.013***	[0.004]	0.008**	[0.004]	0.012***	[0.003]	0.025***	[0.005]
Experience squared * 10³	-0.526***	[0.116]	-0.319***	[0.074]	-0.204**	[0.084]	-0.261***	[0.076]	-0.510***	[0.102]
Family:										
Having kids	0.081***	[0.023]	0.037*	[0.020]	0.058***	[0.021]	0.080***	[0.019]	0.065*	[0.035]
Married	0.013	[0.025]	0.016	[0.018]	0.016	[0.020]	-0.013	[0.019]	-0.045	[0.038]
Living with parents	-0.023	[0.053]	-0.067*	[0.035]	-0.060*	[0.034]	-0.017	[0.042]	-0.013	[0.052]
Having kids and living with parents	-0.053	[0.052]	-0.057*	[0.034]	-0.093***	[0.023]	-0.161***	[0.030]	-0.099**	[0.048]
Beliefs and moral attitude::										
Religiosity	-0.003	[0.011]	-0.032***	[0.011]	-0.031***	[0.011]	-0.045***	[0.011]	-0.049**	[0.020]
Fairness	0.106***	[0.023]	0.020	[0.021]	0.021	[0.021]	0.026	[0.019]	0.043	[0.033]
Trust	0.036*	[0.021]	0.050***	[0.018]	0.030	[0.019]	-0.002	[0.019]	0.025	[0.032]
Planning	-0.013	[0.012]	-0.012	[0.011]	0.020*	[0.011]	0.014	[0.011]	0.035*	[0.020]
Tradition	-0.015	[0.017]	-0.017	[0.014]	0.018	[0.014]	0.027	[0.016]	0.035	[0.028]
Education:										
Lower secondary education (OV: Primary education)	0.298	[0.230]	0.108	[0.156]	0.042	[0.070]	0.009	[0.097]	0.137	[0.084]
Upper secondary education	0.332	[0.230]	0.158	[0.155]	0.123*	[0.067]	0.069	[0.095]	0.140*	[0.084]
Post-secondary non-tertiary education	0.244	[0.236]	0.127	[0.157]	0.072	[0.074]	0.073	[0.097]	0.158	[0.102]
Bachelor's degree or higher	0.540**	[0.231]	0.337**	[0.156]	0.279***	[0.070]	0.293***	[0.097]	0.422***	[0.087]
Occupation:										
Elementary occupations (OV: Skilled agricultural, forestry and fishery workers)	0.190***	[0.073]	0.016	[0.064]	-0.052	[0.080]	-0.155***	[0.052]	-0.075	[0.108]
Services and sales workers	0.380***	[0.069]	0.157**	[0.062]	0.035	[0.079]	-0.004	[0.053]	0.108	[0.106]
Plant and machine operators and assemblers	0.184	[0.199]	0.189**	[0.096]	0.177**	[0.083]	0.139**	[0.070]	0.224	[0.138]
Craft and related trade workers	0.514***	[0.066]	0.293***	[0.062]	0.171**	[0.080]	0.187***	[0.054]	0.259***	[0.081]
Clerical support workers	0.462***	[0.071]	0.294***	[0.073]	0.132	[0.083]	0.021	[0.053]	-0.004	[0.113]
Technicians and associate professionals	0.525***	[0.067]	0.320***	[0.064]	0.155**	[0.078]	0.077	[0.054]	0.156*	[0.080]
Armed forces occupations	0.436***	[0.101]	0.454**	[0.219]	0.270**	[0.107]	0.297***	[0.077]	0.382**	[0.171]
Managers	0.623***	[0.071]	0.519***	[0.081]	0.437***	[0.082]	0.398***	[0.061]	0.491***	[0.132]
Professionals	0.402***	[0.074]	0.284***	[0.064]	0.194***	[0.078]	0.142***	[0.051]	0.172**	[0.080]
Organization type:										
Private company	0.088***	[0.029]	0.148***	[0.022]	0.138***	[0.019]	0.163***	[0.023]	0.190***	[0.049]
Region:										
Brest region (OV: Minsk city)	-0.158***	[0.030]	-0.232***	[0.031]	-0.270***	[0.027]	-0.247***	[0.026]	-0.341***	[0.070]
Gomel region	-0.229***	[0.039]	-0.238***	[0.034]	-0.320***	[0.033]	-0.289***	[0.035]	-0.296***	[0.074]
Grodno region	-0.218***	[0.031]	-0.289***	[0.031]	-0.355***	[0.030]	-0.358***	[0.032]	-0.481***	[0.054]
Minsk region	-0.212***	[0.043]	-0.161***	[0.032]	-0.185***	[0.029]	-0.152***	[0.027]	-0.244***	[0.055]
Mogilev region	-0.231***	[0.029]	-0.279***	[0.046]	-0.292***	[0.036]	-0.307***	[0.040]	-0.393***	[0.062]
Vitebsk region	-0.138***	[0.031]	-0.193***	[0.030]	-0.284***	[0.030]	-0.232***	[0.035]	-0.301***	[0.093]
Pseudo R^2	0.119		0.158		0.185		0.180		0.153	
Observations	2,576		2,576		2,576		2,576		2,576	

Source: authors estimates based on GGS-2017.

Note: Estimates reflect weighted data. Robust standard errors in square brackets. Significance: ***: 1%; **: 5%; *: 10%.

The return to educational attainment has a U-shape and is higher for the lower and top deciles of the earnings distribution than in the middle. Such pattern at the bottom could possibly mean the substitutability between the observed educational level and unobserved individual abilities (Denny & O'Sullivan, 2007). At the same time effect at the top of earnings distribution signals about the complementarity between the ability and education, i.e. person with the higher abilities has higher remuneration rates in the upper deciles of earnings distribution (Harmon, Oosterbeek & Walker, 2003; Pereira & Martins, 2004). However, occupational effect appears to lose its positive influence moving to the top of the wage distribution.

The payoff to the potential experience has also a U-shape form and reaches its minimum of less than 1% at the median and its maximum of around 2.5% at the top and the bottom of wages distribution. Employment in the private company has an increasing and positive effect across wage distribution from 9.2% at the bottom to approximately 20.9% ((exp(0.190)-1)*100) at the top.

5.4. The Oaxaca-Blinder gender wage gap decomposition

Next, we proceed with the decomposition of the wage gap and apply the Oaxaca-Blinder (1973) technique. The Oaxaca-Blinder decomposition equation is calculated based on the wage equation estimates presented in the previous section (see Table 5). We implement the twofold decomposition technique in order to distinguish the difference in remuneration due to different personal characteristics, and the discrimination.

As a first step, we present results of wage gap decomposition without characteristic effects based on the female wage structure (see Table 7).[13]Assuming female reference as nondiscriminatory allows estimating the size of the wage gap in case of men's characteristics are equal to women's, but the remuneration rate is different. In this case the endowments' component explains difference in wages due to gender-specific characteristics, while the unexplained part measures the difference between the estimated and real female wages because of unequal remuneration, i.e. proxies the level of discrimination.

Table 7. Oaxaca-Blinder twofold decomposition results without characteristic effects

Differential of a mean value of logarithm of earnings/hour	Coef.	Std. Err.	z-stat	P>z	Earnings/hour	% of the wage gap
Males	1.080***	0.017	62.790	0.000	2.946	
Females	0.877***	0.017	50.130	0.000	2.403	
Difference	0.204***	0.025	8.300	0.000	1.226	
Explained (characteristics)	-0.010	0.021	-0.450	0.650		-4.78%
Unexplained	0.213***	0.029	7.380	0.000		104.78%

Source: authors estimates based on GGS-2017.
Note: Estimates reflect weighted data. Significance: ***: 1%; **: 5%; *: 10%.

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[13]Using the Oaxaca-Blinder decomposition technique it is difficult to define the nondiscriminatory wage structure (Eq. (3) or Eq. (4)), since it is unclear on what basis the salary would be determined if there was no discrimination. If female wage structure is nondiscriminatory, we have pure discrimination where males earn more than they should. On the other hand, male wage structure gives nepotism in which females earn less than they should. Therefore, using the female wage structure as reference group, we assume that policy should focus on increasing women's wage rather than decreasing men's.

The estimated wage gap (difference in Table 7) between men and women amounts to 20.4 log points, which corresponds to a wage differential of (exp(0.204)-1)·100 = 22.6% or 0.54 BYN per working hour. Positive sign of the wage gap indicates presence of inequality in rewards, i.e. men receive more than they supposed to get according to their observed personal characteristics. Correspondingly, the mean value of real hourly wages equals to 2.95 BYN for males and 2.40 BYN for females.

Moreover, the estimated results demonstrate that by far the major share of the gender wage gap in Belarus is formed by the unexplained part, which is basically difference in remuneration and discrimination. The discrimination effect amounts to 104.8% (see Table 7), meaning that due to some "favoritism" at work men with similar characteristics obtain 0.57 BYN per working hour more than they are supposed to obtain according to their characteristics or vice versa women get 0.57 BYN less per working hour. At the same time, characteristics (explained part) diminishes the size of the gap between men and women by 4.8%. The negative value of the explained gap revealed that females in Belarus have more favorable observed characteristics. In other words, if observed characteristics were the only factors used to define wages, and these characteristics were remunerated equally for both genders, then on average females should obtain higher earnings compared to males. More precisely, their hourly rate would be around 0.03 BYN higher due to their better personal characteristics. However, we do not notice higher average earnings for females in the data.

More detailed evaluation of the characteristic effects is presented in Table 8. The factors were united into different groups (regional, family, educational characteristics, work experience, occupation, various personal beliefs and moral attitudes). It is evident that the negative explained gap is heavily influenced by the educational and work experience factors (also the only factors that are statistically significant). The increase in women educational attainment and job-related experience reduce the level of the wage gap in the market by 10.5% and 6.0% respectively. These negative contributions suggest that if the education and experience were the only factors defining male and female earnings, then on average, females would earn higher than males.

Table 8. Oaxaca-Blinder twofold earnings decomposition results of the characteristics effects

Factors	Coef.	Std. Err.	z-stat	P>z	% ofthe wage gap
Regional characteristics	-0.002	0.006	-0.3	0.763	-0.82%
Family characteristics	0.002	0.008	0.2	0.839	0.77%
Beliefs and moral attitude	0.006	0.008	0.75	0.452	3.12%
Educational level	-0.020***	0.006	-3.47	0.001	-10.46%
Job-related experience	-0.012***	0.006	-2.18	0.029	-6.03%
Type of occupation	0.018	0.015	1.15	0.248	8.65%
Total	-0.010	0.021	-0.45	0.649	-4.78%

Source: authors estimates based on GGS-2017.
Note: Estimates reflect weighted data. Significance: ***: 1%; **: 5%; *: 10%.

As for the unexplained portion of the gap (see Table 9) again almost all groups of factors appear to be insignificant except for the educational attainment and job-related experience. The educational background diminishes the level of the pay gap by 188.2% and actual experience favors women and reduces the wage gap by 116.8%, i.e. the labor market does not undervalue the knowledge and

experience of qualified female professionals in the market. However, there are other unobserved characteristics that outweigh the effect of education and experience and as a result increase the overall level of the wage gap.

Table 9. Oaxaca-Blinder twofold earnings decomposition results of the unexplained component

Factors	Coef.	Std. Err.	z-stat	P>z	% of the wage gap
Regional characteristics	-0.065	0.066	-1.000	0.320	-32.11%
Family characteristics	0.058	0.040	1.440	0.150	28.36%
Beliefs and moral attitude	0.109	0.095	1.150	0.252	53.34%
Educational level	-0.383**	0.183	-2.090	0.036	-188.24%
Job-related experience	-0.238**	0.086	-2.770	0.006	-116.84%
Type of occupation	-0.074	0.130	-0.570	0.570	-36.30%
Constant	0.808*	0.269	3.010	0.003	396.56%
Total	0.213	0.029	7.380	0.000	104.78%

Source: authors estimates based on GGS-2017.
Note: Estimates reflect weighted data. Significance: ***: 1%; **: 5%; *: 10%.

Next, we examine the results of twofold Oaxaca decomposition subject to certain age, educational and occupational characteristics. Table 10 presents the results of the earnings decomposition by different 10-year birth cohorts. The results show that the wage gap is decreasing going from the youngest age cohort (1985-1994) to the oldest (1955-1964). Moreover, our estimations show presence of the significant discrimination effect among the 1965-1974, 1975-1984 and 1985-1994 age cohorts that is responsible for the wage differential between genders. The potential explanation here is that women are paid less due to their child-bearing age or responsibility for taking care of their children. This can be the evidence of existing child-bearing and motherhood penalty in the market. At the same time, personal characteristics of women from 1975-1984 birth cohort decrease the level of the wage gap meaning that the productive potential of women outweigh similar men's potential.

Table 10. Oaxaca-Blinder twofold earnings decomposition by age cohorts

Decomposition	Total	Characteristics (%)	Unexplained (%)
1955-1964			
Males	0.963		
Females	0.862		
Difference	0.101	-0.112 (-111.29%)	0.213 (211.29%)
1965-1974			
Males	1.038		
Females	0.885		
Difference	0.152	-0.017 (-11.43%)	0.170** (111.43%)
1975-1984			
Males	1.171		
Females	0.920		
Difference	0.251	-0.108 (-43.14%)	0.359*** (143.14%)
1985-1994			
Males	1.116		
Females	0.817		
Difference	0.299	0.050 (16.84%)	0.249*** (83.16%)

Source: authors estimates based on GGS-2017.
Note: Estimates reflect weighted data. Significance: ***: 1%; **: 5%; *: 10%.

Regarding the occupational type (Table 11) the obtained results show presence of significant discriminatory factor that increases the size of the gender wage gap in case of four occupational types out of ten: services and sales, technicians, managers and professionals. Taking into account the

gender structure of those occupational types (see Table 4 and Figure 5), here we cannot find evidence that discrimination occurs only in male-dominated jobs. Thus, the level of male wages is higher not just at jobs related to certain physical activity, but also where female characteristics are equal or even outweigh male ones indicating presence of women discrimination. As for the characteristics effect craft and related trade activities is the only occupational type, where male characteristics outweigh female and increase the level of the wage gap in that type of activities.

Table 11. Oaxaca-Blinder twofold earnings decomposition by occupational types

Decomposition	Total	Characteristics (%)	Unexplained (%)
Skilled agricultural, forestry and fishery workers			
Males	0.749		
Females	0.476		
Difference	0.274	0.195 (71.12%)	0.079 (28.88%)
Elementary occupations			
Males	0.720		
Females	0.604		
Difference	0.116	0.014 (12.12%)	0.102 (87.88%)
Services and sales workers			
Males	1.051		
Females	0.783		
Difference	0.269	-0.143 (-53.29%)	0.412** (153.29%)
Plant and machine operators and assemblers			
Males	0.956		
Females	0.764		
Difference	0.191	0.083 (43.40%)	0.108 (56.60%)
Craft and related trade workers			
Males	1.034		
Females	0.928		
Difference	0.105	0.088* (83.57%)	0.017 (16.43%)
Clerical support workers			
Males	1.072		
Females	0.885		
Difference	0.186	-0.008 (-4.12%)	0.194 (104.12%)
Technicians and associate professionals			
Males	1.117		
Females	0.876		
Difference	0.240	0.033 (13.82%)	0.207*** (86.18%)
Armed forces occupations			
Males	1.367		
Females	1.040		
Difference	0.327	0.244 (74.74%)	0.083 (25.26%)
Managers			
Males	1.541		
Females	1.245		
Difference	0.295	0.042 (14.34%)	0.253*** (85.66%)
Professionals			
Males	1.215		
Females	0.970		
Difference	0.245	0.030 (12.18%)	0.215*** (87.82%)

Source: authors estimates based on GGS-2017.
Note: Estimates reflect weighted data. Significance: ***: 1%; **: 5%; *: 10%.

As for the wage gap subject to the educational level (see Table 12), the unexplained component is significant and favors men with the upper secondary education or tertiary (higher) education and undervalues women competing with similar educational background.

Table 12. Oaxaca-Blinder twofold earnings decomposition by educational attainment

Decomposition	Total	Characteristics (%)	Unexplained (%)
Primary education			
Male	0.830		
Female	0.294		
Difference	0.536	-5.094*** (-950.14%)	5.630***(1050.14%)
Lower secondary education			
Male	0.846		
Female	0.719		
Difference	0.127	0.048 (37.65%)	0.079 (62.35%)
Upper secondary education			
Male	1.040		
Female	0.781		
Difference	0.259	0.003 (1.01%)	0.256*** (98.99%)
Post-secondary non-tertiary education			
Male	0.921		
Female	0.719		
Difference	0.202	-0.006 (-2.93%)	0.208* (102.93%)
Bachelor's degree or higher			
Male	1.325		
Female	1.062		
Difference	0.263	0.067* (25.61%)	0.196*** (74.39%)

Source: authors estimates based on GGS-2017.
Note: Estimates reflect weighted data. Significance: ***: 1%; **: 5%; *: 10%.

5.5. The Juhn, Murphy and Pierce gender wage gap decomposition

Next, the Juhn, Murphy and Pierce (JMP) decomposition allows looking not only at the average wage gap, but also at various earnings' percentiles (see Table 13). Similar to results of Oaxaca, the gap is mostly due to price effect (the way male and female efforts are remunerated) and the return on male efforts is higher than on female at all levels of earnings distribution. The size of the gap increases along the wage distribution from the lower to the higher earnings' percentiles. So, that it equals to 0.118 log points at the 10th percentile of earnings and amounts to 0.314 at the 90th percentile. The maximum gap is observed at the 75th percentile and amounts to 0.336. Personal characteristics matter and decrease the level of the wage gap all over the earnings' distribution, especially at the bottom and top of the earnings distribution, except for the 90th income deciles. At the same time, the impact of unobserved factors changes the direction while moving from the bottom to top. The potential explanation of more than triple growth of the wage gap at the top deciles compared with the bottom is the minimum wage policy implemented in the country together with female characteristics that outweigh male in the lowest deciles of wage distribution.

Moreover, the gender wage gap is substantially higher in state sector in comparison with private sector at almost all percentiles tending to increase at the top of the wage distribution (see Table 13).

Table 13. Threefold earnings JMP decomposition results

Decomposition	Total	Characteristics (%)	Coefficients (%)	Unobserved (%)
		All data		
Mean	0.204	-0.012 (-5.96%)	0.213 (104.78%)	0.002 (1.19%)
p10	0.118	-0.043 (-36.50%)	0.173 (146.85%)	-0.012(-10.35%)
p25	0.210	0.007 (3.33%)	0.187 (89.12%)	0.016 (7.54%)
p50	0.223	-0.016 (-7.20%)	0.201 (89.93%)	0.039 (17.27%)
p75	0.336	-0.010 (-2.88%)	0.285 (84.67%)	0.061 (18.21%)
p90	0.314	0.007 (2.09%)	0.255 (81.16%)	0.053 (16.75%)
		Private sector		
Mean	0.177	-0.038 (-21.18%)	0.207 (116.58%)	0.008 (4.59%)
p10	0.049	-0.005 (-10.49%)	0.093 (190.10%)	-0.039 (-79.61%)
p25	0.195	-0.025 (-12.61%)	0.230 (117.77%)	-0.010 (-5.15%)
p50	0.183	0.030 (16.41%)	0.158 (86.19%)	-0.005 (-2.60%)
p75	0.134	-0.127 (-94.69%)	0.245 (182.50%)	0.016 (12.19%)
p90	0.106	-0.321 (-303.45%)	0.369 (347.92%)	0.059 (55.53%)
		State sector		
Mean	0.187	-0.008 (-4.15%)	0.192 (102.30%)	0.003 (1.85%)
p10	0.086	-0.019 (-21.80%)	0.132 (153.03%)	-0.027 (-31.23%)
p25	0.154	0.008 (5.02%)	0.179 (115.92%)	-0.032 (-20.94%)
p50	0.222	0.046 (20.78%)	0.179 (80.54%)	-0.003 (-1.31%)
p75	0.287	0.038 (13.35%)	0.199 (69.45%)	0.049 (17.19%)
p90	0.243	-0.017 (-7.12%)	0.209 (86.03%)	0.051 (21.08%)

Source: authors estimates based on GGS-2017.
Note: Estimates reflect weighted data.

Correspondingly, the wage gap decomposition at different points of wage distribution also allows investigating presence of either glass ceiling or sticky floor phenomenon in the economy, i.e. whether the wage gap expands at the bottom or top of wage distribution (see Table 14).

The Table 14 shows evidence of glass ceiling in Belarus (the gender wage gap for all data is higher at the 90th and 75th percentiles of the wage distribution than at any of the lower percentiles), i.e. women at the upper part of the wage distribution are found to have been more disadvantaged, than those at the bottom of the wage distribution. Such result goes in line with the studies (Arumpalam *et al.*, 2007; Christofides *et al.*, 2010) that showed that presence of the glass ceiling is more typical for the countries with the generous maternity policies while sticky floors are more frequently observed in the lower income countries, where the female labor force participation rate is relatively low. In addition, the minimum wage policy implemented in Belarus is also negatively associated with the sticky floor effect (Dolado et al., 1996).

It should be noted that the presence of the glass ceiling effect is only observed if we analyze just respondents employed in the state sector. Here, women at the 75th decile of the earnings distribution suffer the most due to presence of disadvantages in the labor market. At the same time, no evidence of either glass ceiling or sticky floor is observed in the private sector, which distinguishes our results from the majority of studies on that issue in other countries. There a few papers with similar results (Gangulli & Terell, 2005; Jolliffe & Campos, 2005), while mostly the results are opposite, i.e. the size of the gender wage gap at the top of income distribution in the private sector is larger compared with the state sector of the economy (Lucifora & Meurs, 2004; Arulampalam *et al.*, 2007; Booth, 2006). The main explanatory reason of why the pay gap is usually larger in the private sector is that

public sector aims to follow certain government goals including reduction of discrimination in the labor market through various wage regulations.

Table 14. Summary of wage gap type

Configuration	Results
All data	
Glass ceiling measured by:[a]	
p90-p75	-0.022
p90-p50	0.091
p90-p25	0.104
p90-p10	0.196
Sticky floor measured by:[b]	
p10-p50	-0.105
p10-p25	-0.092
Profile of wage gap along distribution	increasing
Range of wage gap	0.118-0.336
Private sector	
Glass ceiling measured by:[a]	
p90-p75	-0.028
p90-p50	-0.077
p90-p25	-0.089
p90-p10	0.057
Sticky floor measured by:[b]	
p10-p50	-0.135
p10-p25	-0.146
Profile of wage gap along distribution	
Range of wage gap	0.049-0.195
State sector	
Glass ceiling measured by:[a]	
p90-p75	-0.044
p90-p50	0.021
p90-p25	0.089
p90-p10	0.156
Sticky floor measured by:[b]	
p10-p50	-0.136
p10-p25	-0.068
Profile of wage gap along distribution	increasing
Range of wage gap	0.086-0.287

Source: authors estimates based on GGS-2017.

Note: [a] A glass ceiling rule: the 90th percentile wage gap is higher than any other reference gap by at least 2 percentage points. A wider glass ceiling rule: the 90th percentile wage gap is higher than the 75th or 50th wage gap by at least 2 percentage points.

[b] A sticky floor rule: the 10th percentile wage gap is higher than any other reference gap by at least 2 percentage points. A wider sticky floor rule: the 10th percentile wage gap is higher than the 25th or 50th wage gap by at least 2 percentage points.

In our case the potential explanation of such results is the endowments' effect that diminishes the size of the gap in case of women employed in the private sector and doing opposite in the state segment. Women occupied at the 75th and 90th deciles of the private sector have better characteristics than men allowing them to lower the size of the pay gap. On contrary, female employees occupied at the top deciles of wage distribution in the state sector are worse than their male colleagues leading to the growth of the gender pay gap at the top tail and presence of the glass ceiling. Likely, this could be the evidence of the outflow of qualified female human capital towards the corporate segment that favors personal characteristics and knowledge that can lead to additional profits of the company unconditional to gender. At the same time females in general and without any outstanding characteristics in particular are less mobile in the labor market (Takahashi &

Takahashi, 2011) and that might provide an opportunity to their employers to pay them less compared to men (Ransom, 1993).

6. Conclusions

6.1. Main findings

In this paper, we looked at the situation with gender wage gap along the wage distribution using the data from Generations and Gender Survey (GGS) conducted in Belarus in 2017. The data analysis revealed certain major findings.

First, the characteristic feature of the Belarusian labor market is low gender gap in employment – 6 percentage points, but high gender gap in pay. In particular, the obtained results showed that women wages are lower than men wages all over the wage distribution and the unadjusted gender wage gap amounts to 22.6%. The level of female earnings is lower than male regardless of occupational type, educational background, age and other influencing factors.

Second, when decomposing the gender wage gap into endowment and discrimination effects using OLS estimates and Oaxaca-Blinder technique, it was found that 104.8% of the total wage gap is attributable to the discrimination, i.e. the difference between the prices that the market pays to male and female endowments. The remaining 4.8% that diminishes the wage gap is attributable to the difference in the possessed endowments (personal characteristics) between male and female employees. The main statistically significant endowments include educational attainment and job-related experience.

Third, regarding the occupational type the obtained results show presence of significant discriminatory factor that increases the size of the gender wage gap in case of four occupational types out of ten: services and sales, technicians, managers and professionals. Taking into account the gender structure of those occupational types, here we cannot find evidence that discrimination occurs only in male-dominated jobs. Thus, the level of male wages is higher not just at jobs related to certain physical activity, but also where female characteristics are equal or even outweigh males, again indicating presence of women discrimination.

Fourth, the analysis of the wage gap by age reveals that women from the youngest age cohort (1985-1994) suffer the most due to presence of discrimination in the labor market. This can be the evidence of existing child-bearing and motherhood penalty in the market.

Fifth, the level of remuneration is larger among the private employees. At the same time, the level of the wage gap is larger in the state sector than in the private companies. The size of the wage gap in the state sector is not only due to difference in remuneration, but also due to differences in personal characteristics. Moreover, the JMP decomposition estimates demonstrate that the gender wage gap in the state sector shows evidence of the glass ceiling effect, while no evidence of either glass ceiling or sticky floor in the private sector. The results also suggest that females are better of being in the private sector at the lowest and the highest deciles. Women located in the top segment of wage distribution in the state sector are qualitatively behind their male colleagues.

These findings raise the interesting question as to why private companies in Belarus try to narrow gender discrimination. The possible answer is that institutional differences in market regulation seem to play an important role. Particularly, Belarusian private firms work under stronger competition trying to identify individual productivity more correctly, which leads to narrowing the gender difference in pay. In contrast, the equalization policy in public sector leads to the outflow of the employees with outstanding characteristics and skills towards the private sector that hunts for qualitative human capital.

6.2. Policy implications

The positive and significant discrimination component of the wage gap among the youngest age cohorts can be a signal of female underpayment due to their diversity in social roles. Being the main responsible for child-bearing and raising children causes presence of diversity in remuneration implemented by the employers. At that it is necessary to estimate the optimum of the parental policy implemented by the authorities. The existing 3-year maternity leave impacts on the level of female qualification, effectiveness and commitment. It leads to the deterioration of the level of human capital and prolongs the adjustment period when it is time to go back to work. Under these circumstances it is important to introduce other initiatives and measures of the parental policy that will strength the male role in infant and childcare and make women less vulnerable in the labor market.

The presence of the glass ceiling in the public sector signals about the gender inequality for the society. The major role of the price effect explaining the growing size of the wage gap indicates presence of female undervalue and discrimination by the state that likely forces the most valuable among them to find a better workplace in the corporate segment, i.e. the brain drain. Following Gangulli & Terrell (2005), the government should reconsider the role model for other players in the economy by being an example of employer that evaluates its' employees by their qualification and knowledge unconditional to gender. Therefore, it is vital to revise the remuneration model in the state segment in order to lower the present size of the wage gap.

Finally, on the one hand, empirical evidence confirms that the private sector is a "fair player" in Belarus, decreasing both gender wage differences and restricting pay dispersion with respect to the state sector in Belarus. On the other hand, the existence of a negative state-private wage differential, along most of the wage distribution, also means that the state sector pays less than is needed to interest, keep and motivate high skilled employees.

Therefore, in order to decrease the gender differences in wages between state and private sectors in it necessary to reduce the monopoly influence of state sector in the labor market by speeding up a set of ownership reforms, such as SOEs ownership reform, deregulation of entry to the monopoly sector for private-owned enterprises. However, this will happen only if the future market reforms in Belarus increase the demand for better personal characteristics of the employees, which in turn is dependent on subsequent rate of economic growth.

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