The Gender Wage Gap in EU Countries and its Relation to the Educational Attainment and Type of Employment

Genderové rozdíly v odměňování v EU a jejich vazba na úroveň vzdělání a typ pracovního úvazku

MARIE LIGOCKÁ

Abstract

The issue of wage inequality between men and women is widely discussed today. Different developments in individual EU countries characterize different wage values between men and women. As the empirical literature shows, the causes of the gender pay gap are not clear. The paper aimed to examine whether the level of education attained and the type of working hours can affect the value of the gender pay gap in EU countries from 2006 to 2020. Using the GMM method and Granger's causality test, it was possible to find that the selected variables focused on educational attainment and type of employment did not explain any part of the gender pay gap in most cases. These results could be related to the fact that education is available for both sexes practically without significant restrictions. In some workplaces, a minimum percentage of women may be required. The quality of parental leave policy, the daycare system, and the legislative protection of women on parental or maternity leave, which have affected the labor market situation, may be important. These findings indicate that there may be other variables that may affect the values of the gender pay gap in the analyzed regions of the European Union. Granger causality in the opposite direction is attributed to significant labor flows.

Keywords

educational attainment, EU countries, full-time work, gender wage gap, part-time work, GMM method, Granger causality

JEL Codes

G00, G10, E20

DOI

http://dx.doi.org/10.37355/acta-2022/1-02

Abstrakt

Problematika mzdové nerovnosti mužů i žen je v dnešní době velmi diskutovaná. V jednotlivých zemích EU je typický odlišný vývoj hodnoty mzdového rozdílu mezi muži a ženami. Jak ukazuje empirická literatura, příčiny rozdílů v odměňování žen a mužů nejsou jednoznačné. Cílem příspěvku bylo prozkoumat, zda může mít úroveň dosaženého vzdělání a typ pracovního úvazku vliv na hodnotu genderového mzdového rozdílu v zemích EU

v letech 2006–2020. S využitím metody GMM a Grangerova testu kauzality bylo možné zjistit, že ve většině případů vybrané proměnné zaměřené na dosažené vzdělání a typ zaměstnání nevysvětlovaly žádnou část genderového mzdového rozdílu. Tyto výsledky by mohly souviset s tím, že vzdělání je pro obě pohlaví dostupné prakticky bez větších omezení. Na některých pracovištích může být požadováno minimální procentní zastoupení ženami; význam může mít kvalita politiky rodičovské dovolené, systém denní péče a legislativní ochrana žen na rodičovské či mateřské dovolené, která ovlivnila situaci na trhu práce. Tato zjištění ukazují, že mohou existovat jiné proměnné, které mohou ovlivnit hodnoty genderového mzdového rozdílu v analyzovaných regionech Evropské unie. Existující Grangerova kauzalita v opačném směru je přisuzována významným tokům pracovní síly.

Klíčová slova
úroveň dosaženého vzdělání, země EU, práce na plný úvazek, genderové rozdíly v odměňování, práce na částečný úvazek, metoda GMM, Grangerova kauzalita

Introduction

According to the European Commission (2019), women in the EU are less present in the labor market than men; the gender employment gap stood at 11.7% in 2019. Women also earned on average 14.1% less per hour than men in 2018, which means that women earn less per hour than men. In the European Union countries, the development of the gender wage gap is detected. According to European Parliament (2022), *"the gender pay gap is the difference in average gross hourly earnings between women and men. It is based on salaries paid directly to employees before income tax and social security contributions are deducted."*

A prevailed decrease in gender wage gap size in 2020 compared to 2006 (as a figure in Appendix 1 shows). The falling of the value gender wage gap is determined in all countries under examination except Bulgaria, Hungary, France, and Latvia, which detected an increasing value of the gender wage gap in 2020 compared with 2006. However, the highest absolute values of the gender wage gap were in Netherland, Austria, Slovakia, and Estonia in 2006. The highest gender wage gap values are evident in Germany, Austria, Latvia, and Estonia in 2020. There are obvious changes in the development of men's and women's remuneration in the monitored countries in the monitored period.

On the other hand, the lowest values of the gender wage gap were monitored in Poland, Romania, Slovenia, and Belgium in 2006; in 2020, it was in Slovenia, Poland, Luxembourg, and Romania. The most significant relative decrease in the value of the gender wage gap is evident in Luxembourg (93%), Romania (69%), Slovenia (61%), and Ireland (52%) in comparison with 2006 and 2020. In contrast, a relative increase in the value of the gender wage gap is evident in Bulgaria (2%), France (3%), Hungary (19%), and Latvia (48%) in comparison with 2006 and 2020. Despite different gender wage gap development, this paper tries to detect if selected factors could explain some gender wage gaps.

However, many different factors are discussed in relation to the gender wage gap. Socio-economic variables (changes in education, potential experience, industry, tenure, etc.) are

considered essential sources of wage inequality by Al-farhan (2010). Possible experience and personal characteristics could explain part of the gender wage gap. Workers with good characteristics who are paid more tend to work in workplaces that pay more, as Mumford and Smith (2004) argued. The importance of workplace characteristics, experience, skills, and its related investment to human capital in explaining the gender wage gap is also shown by Fitzenberger and Wunderlich (2000), Pointner and Stiglbauer (2010), Antonczyk et al. (2010), and Redmond and McGuinness (2017). Then education can be another factor that influences wage differentials (Lauer 2000; Livanos and Pouliakas, 2012; Machin and Puhani, 2003). Moreover, there could be lower-wage gaps for highly-educated women than for low-educated women (Addabbo and Favaro 2011). Low-educated women could suffer from monopolistic wage discrimination due to their preferences and lower degree of mobility (Mussida and Picchio 2013). The low degree of mobility could be related to gender preferences. The role of women in family development is often emphasized; it is also connected with the adverse effects of career interruptions and household responsibilities (Böheim et al., 2013; Livanos and Pouliakas, 2012; Myck and Paull, 2004). This factor potentially has an ambiguous effect as more successful women can afford a career break, but the cost of being out of the labor market is higher (Chevalier, 2007).

An important factor could play parental leave policy and the daycare system (Albrecht et al., 2001; Kanellopoulos and Mavromaras, 2002), labor market characteristics (Albrecht et al., 2004), and different training costs due to the expectation of future career interruptions in women (de la Rica et al., 2005; de la Rica et al., 2008). Women tend to be more represented in part-time work, which is poorly remunerated and is connected with less training and investment in human capital (Blackaby et al., 2005; Harkness, 1996; Matteazzi et al., 2017). The progress in instituting a legal and institutional framework can be less critical (Jolliffe and Campos, 2005; Yaish and Kraus, 2003). The central part of the gap remains unexplained as Böheim, et al. (2020), García-Aracil (2007), Addabbo and Favaro (2011), and Böheim et al. (2007) claimed; that the difference could be caused by attitude, commitment, unfair discrimination against women, and other factors.

The reasons behind the gender pay gap are not simple and clear. In relation to the findings of the empirical literature, the paper is focused on examining the effect of the educational attainment and type of employment on the value of the gender wage gap in EU countries from 2006 to 2020. The contribution is divided into the following sections. The first section is the Introduction, then the Review of the literature follows. The other section is Data and methodology; further, the sections Results and Discussion are presented, and the final section is the Conclusion.

1 Review of the Literature

According to the OECD (2020), compared to men, women are less likely to work full-time, more likely to be employed in lower-paid occupations, and less likely to progress in their careers. Then, the level of education is associated with the level of wages. Theoretically, workers with higher educational attainment should be paid more than those with lower levels of education; generally, there is evidence of differences in wages for men and women with the same level of education (Livanos and Nunez 2010). This paper is focused

on analyzing whether these facts could affect the value of the gender wage gap in EU countries. Following this, the literature presented in this section focuses exclusively on the relationship between the gender wage gap and the educational attainment and type of employment in European countries.

The size of the gender wage gap is changing over time; the development in the gender wage gap changes is different in individual countries. A decreasing value of wage inequality is, according to Böheim et al. (2020), caused by the relative improvement of women's observed and unobserved characteristics. The decreasing tendency of the gender pay gap is also evident in the study of Myck and Paull (2004), Böheim et al. (2013), and Böheim et al. (2007). In contrast with Böheim et al. (2020), Böheim et al. (2013) found that the raw gender wage gap is still mainly due to the labor market experience, occupation, industrial segregation, and labor market attachment.

Many studies show that educational attainment can explain a specific part of the gender wage gap; for example, Mussida and Picchio (2013) showed that low educated women have lower incomes than men. Mussida and Picchio (2013) also found evidence of sticky floors for ordinary educated women and unchanged evidence of a glass ceiling for highly educated women. The persistence of the glass ceiling effect found evidence also Albrecht et al. (2001). The results suggest that the gender wage gap cannot be explained by the gender differences in age, education, sector, industry, and industry. Similar findings as Mussida and Picchio (2013) detected by de la Rica et al. (2008) and Addabbo and Favaro (2011), and it that the gender wage gap depends on workers' education attainment. After that de la Rica et al. (2005) showed that there is a different size of gender wage gap depending on educational attainments. Then, Lauer (2000) showed that female human capital is less valued in terms of wages; educational attainment explains a large part of the gender wage gap. The same to Lauer (2000) also, Livanos, and Pouliakas (2012) determined that gender differences in the type of degree studied could be the factor that affects the gender pay gap.

Moreover, Livanos and Nunez (2010) show that educational attainment is different across analyzed countries. Finally, in consistence with de la Rica et al. (2008) and Addabbo and Favaro (2011) is García-Aracil (2007). They detected that education (foreign language proficiency and computer skills) is significant in explaining the value of the gender wage gap. However, the most important seems to be job characteristics.

The importance of explaining the value of the gender wage gap could also play the type of employment. In the empirical literature, Chevalier (2007) presents that the gender gap is also influenced by career break expectations and argues that women with a more traditional view concerning childrearing have less intensive search behavior. The gender wage gap is by type of employment explained by Albrecht et al. (2004). Albrecht et al. (2004) present a positive selection of women in full-time work; this selection is due to the education and experience of about two-thirds, and the remainder is unobservable. The importance of the type of employment suggests Blackaby et al. (2005). They determine that women are disproportionately represented in temporary appointments and that these posts are poorly remunerated compared to permanent positions. Harkness (1996)

shows that part-time work belongs to factors that can influence the gender wage gap; this suggests that part-time women are low-paid because they are low-skilled and face less discrimination than full-time working women. Different impact of full-time and part-time working females is detected by Fitzenberger and Wunderlich (2000). Fitzenberger and Wunderlich (2000) also argued that the gender pay gap could be caused by different work careers, skills, and investments in human capital. Matteazzi et al. (2017) demonstrated that the gender wage gap tends to be higher in countries where part-time employment is more widespread at the macro level. The results also suggest that the full-time gender pay gap remains unexplained primarily.

Some findings also show that employment and educational attainment could not explain the value of the gender wage gap. Rosholm and Smith (1996) determined that the gender pay gap is not affected by an adverse selection effect. Then, the examination of García et al. (2001) did not confirm the importance of educational attainment in the value of the gender wage gap explanation. The findings of Redmond and McGuinness (2017) demonstrated that the gender wage gap is unexplained in some countries, predominantly in Eastern Europe. Similarly, Redmond and McGuinness (2017), Grandner and Gstach (2012), and Kanellopoulos and Mavromaras (2002) think that wage inequality is exclusively a matter of discrimination. Other significant findings are evident in Antonczyk et al. (2010) study, which shows that wage policy-related effects contribute to an increase in the gender wage gap. García et al. (2001) detected that the gender gap is related to job characteristics rather than worker characteristics such as education. Complex information provides the results of Machin and Puhani (2003). Machin and Puhani (2003) demonstrated differences between wages of men and women in consideration of age, industry, region, part-time, and public sector employment. It also seems to be the workplace where the employee works, consistent with Mumford and Smith (2004). Moreover, Al-farhan (2010) shows that wage inequality could be explained by changes in workers' characteristics and changes in the wage structure. Further, Antonczyk et al. (2009) explained wage inequality through personal characteristics differences.

2 Data and Methods

In the paper, there is an analyzed relationship between the gender wage gap in European countries and educational attainment and type of employment over the period 2006–2020. The initial year 2006 is defined because this year is an available complex oldest dataset for countries under examination. On the other hand, the end year is 2020 because of the availability of complex latest data. In this way, it was possible to include the most significant sample of data for the analyzed problematics and the geographic locality. The subject of the analysis are European Union countries with the required available dataset; specifically, Austria, Germany, Poland, Czechia, Slovak Republic, Hungary, Bulgaria, Romania, Slovenia, Estonia, Latvia, Lithuania, Belgium, France, Netherlands, Luxembourg, Sweden, Denmark, Finland, and Ireland. For research purposes, countries are divided into groups Central Europe (Austria, Poland, Czechia, Slovak Republic, and Hungary), East Europe (Romania, Slovenia, Estonia, Latvia, and Lithuania), West Europe (Germany, Belgium, France, Netherlands, Luxembourg) and North Europe (Sweden, Denmark, Finland, Ireland). Other EU countries could not be included due to missing data for some of the monitored

indicators (in particular, the countries of southern Europe). In the case of Spain, Italy, and Portugal, data were available, but the sample of Southern European countries would be too small for subsequent statistical analysis. Selected exogenous factors are the percentage of women with below upper secondary education (L1), percentage of women with upper secondary and post-secondary non-tertiary education (L2), percentage of women with comprehensive tertiary education (L3), percentage of women on full-time employed (PU) and percentage of women on part-time employed (CU). However, analyzed exogenous variables are defined in accordance with empirical literature, the relation between the value of gender wage gap and variables focused on educational attainment and type of employment in European conditions investigated, for example, Mussida and Picchio (2013), de la Rica et al. (2008), Lauer (2000), Albrecht et al. (2004), Harkness (1996) and Machin and Puhani (2003). The annual data are from the database Eurostat and OECD databases.

In the beginning, the time series were subjected to the unit root test. There was selected the Levin - Lin - Chu panel unit root test. The empirical research shows that the Levin - Lin - Chu panel unit root test has (Hlouskova and Wagner, 2005) the slightest tendency to distort data and is characterized by the highest power. Like Hlouskova and Wagner (2005), Westerlund and Breitung (2009) determined that the local power of the Levin - Lin - Chu panel unit root test is higher than the power of the Im-Pesaran-Shin panel unit root test. Therefore, Breitung and Pesaran (2005) emphasized using panel unit root tests due to the statistical power. Similarly, as Hlouskova and Wagner (2005), Breitung and Pesaran (2005) considered the Levin - Lin - Chu panel unit root test as least prone to data bias, they emphasized a significant advantage of its use on smaller data samples.

Further, the linear relationship between the gender wage gap and selected variables focused on educational attainment and type of employment follows. For analysis, there can be used Pearson correlation coefficient can be expressed as (Pesaran 2015):

$$\hat{\rho}_{YX} = \frac{\sum_{t=1}^{T}\left(x_t - \bar{x}\right)\left(y_t - \bar{y}\right)}{\left[\sum_{t=1}^{T}\left(x_t - \bar{x}\right)^2 \sum_{t-1}^{T}\left(y_t - \bar{y}\right)\right]^{1/2}} = \frac{S_{XY}}{\left(S_{YY} S_{XX}\right)^{1/2}} \qquad (1)$$

where *X* (gender wage gap) and *Y* (variables focused on educational attainment and type of employment) are observations of the gender wage gap and analyzed variables focused on educational attainment and type of employment, the Pearson correlation coefficient reaches values <-1, 1>.

For a deeper analysis of the relationship between variables, the Generalized method of moments (GMM) estimation is employed. A considerable advantage of the GMM method is that it does not require full knowledge and probability distribution, for example, as the maximum likelihood. The GMM estimations only demand the specification of a set of

moment conditions that the model should satisfy Mátyás (1999). In the empirical literature, for example, on the simplicity of implementing the GMM method and obtaining the required estimates, show Garcia et al. (2003). Then, the use of the GMM method in finance is emphasized by Jagannathan et al. (2002). Jagannathan et al. (2002) state that the GMM method overcomes dynamic asset pricing models. Therefore, strong distributional assumptions may not be made because the variables analyzed may be serially correlated and conditionally heteroscedastic. Hansen (1982) argues that the GMM method has made an econometric evaluation of asset-pricing models possible under more realistic assumptions regarding the nature of the stochastic process governing the temporal evolution of exogenous variables. The relationship between factors under examination can be mathematically expressed as follows (Hall 2005):

$$Y_{it} = \beta_0 + \beta_1 * \Delta Y_{it-1} + \beta_2 * X_{1it} + \beta_3 * X_{2it} + \cdots + \beta_n * X_{nit} + \varepsilon_{it} \qquad (2)$$

where Y_{it} presents endogenous dependent variable (gender wage gap), β_0 is constant, $\beta_1 \ldots \beta_n$ demonstrate estimated coefficients and ε_{it} is error term of the model. The exogenous variable present, ΔY_{it-1} which means the delayed value of gender wage gap from the previous year and factors $X_1 \ldots X_n$ represents analysed variables focused on educational attainment and type of employment. Variable *t* is the time period and *i* present analysed regions.

The analysis of the short-term causality of the relationship between the gender wage gap and selected variables follows. The definition of causality implies that $Y_{i,t}$ is causing $X_{i,t}$ provided some β_{2i} is not zero. Similarly $X_{i,t}$ is causing $Y_{i,t}$ if some φ1k is not zero. There is also necessary to note that causality, in Granger's sense, cannot be identified as the relation determining that the cause can induce the effect (Granger, 1969; Osińska, 2011). The causal model can be mathematically expressed as follows (Beyzatlar et al., 2014; Granger, 1969):

$$\Delta Y_{i,t} = \beta_0 + \sum_{k=1}^{p} \beta_{1k} \Delta Y_{i,t-k} + \sum_{k=0}^{p} \beta_{2k} \Delta X_{i,t-k} + \varepsilon_{i,1t} \qquad (3)$$

$$\Delta X_{i,t} = \varphi_0 + \sum_{k=1}^{p} \varphi_{1k} \Delta X_{i,t-k} + \sum_{k=0}^{p} \varphi_{2k} \Delta Y_{i,t-k} + \varepsilon_{i,2t} \qquad (4)$$

where Y_t and X_t represent the gender wage gap, respectively analyzed variables reflected educational attainment and type of employment. The cross-section unit is symbolized by *i*, and *k* is the number of periods. Coefficients ε_{1t} and ε_{2t} are uncorrelated stationary random variables and *t* denotes the time period. The number of lags is present by *p*. The autoregressive coefficients are symbolized by βk, and the regression coefficients by φk. According to the Akaike information criterion, the Schwarz Criterion is optimal lag length 1.

3 Results

First, all-time series were tested for stationarity using the Levin, Lin & Chu Panel Unit Root Test. As can be seen from Table 1, stationarity at the level was detected at the gender wage gap at a significance level of 1% for Central Europe, L1 at a significance level of 1% for Eastern Europe, and 5% for Central Europe and Northern Europe. After that, stationarity at the level was found for factor L3 at a significance level of 1% for Central Europe and

Eastern Europe, and variable PU at a significance level of 1% for Eastern Europe. The other monitored variables were stationary for the first difference at the significance level of 1% and 5%. It means that the time series with a gender wage gap was stationary at the first difference at the 1% level of significance in the case of Eastern Europe, West Europe, and Northern Europe. The time series with the L1 indicator were stationary at the significance level of 1% for West Europe, and the L2 factor was stationary at the significance level for all monitored regions. For the L3 variable, the stationarity at the first difference at the 1% significance level is evident for West Europe. While the stationarity at the 5% significance level is evident for Northern Europe. The stationarity for the first difference at the significance level of 1% is monitored for the CU indicator in all analyzed regions. While for PU time series, the first difference in stationarity is visible for Central Europe and West Europe at a significance level of 1% and for Northern Europe at a significance level of 5%.

Table 1: Results of Levin, Lin & Chu Panel Unit Root Test

Variables	Central Europe	Eastern Europe	West Europe	Northern Europe
Gender wage gap	-6.1973* I(0)	-4.4766* I(1)	-6.4963* I(1)	-6.2147* I(1)
L1	-1.9938** I(0)	-7.1861* I(0)	-4.7864* I(1)	-1.8268** I(0)
L2	-6.5835* I(1)	-6.2787* I(1)	-5.7728* I(1)	-4.3625* I(1)
L3	-2.3583* I(0)	-9.3391* I(0)	-3.8362* I(1)	-1.6696** I(1)
CU	-5.5742* I(1)	-4.8750* I(1)	-5.4365* I(1)	-2.2592* I(1)
PU	-5.6181* I(1)	-4.8901* I(0)	-4.9507* I(1)	-2.3204** I(1)

Source: Author's calculations

Note: *, ** and *** denote significance at the 1%, 5% and 10% levels. There is the Levin, Lin & Chu test statistic in the table. I(0) means stationary at the level, and I(1) means stationary at first difference.

Descriptive statistics for the time series used are available in Annex 2. As can be seen from the data, the highest maximum wage gap between men and women is found in the case region of Central Europe. Then, it turns out that the highest value of women with lower secondary education is in Western Europe (37.9%). On the other hand, the most significant percentage of women with a complete tertiary education is evident in Northern Europe (56.02%). Closer descriptive statistics of women with upper secondary and post-secondary non-tertiary education show that the most significant percentage of women with this education is in Eastern Europe (74.6%). In the case of part-time employed, the maximum value of 75.49% for women is visible in region Western Europe for part-time employed.

In comparison, the highest value of 97.9% is found in the region of Central Europe for full-time employed. Looking at the Jarque-Bera statistics, it is clear that some time series are characterized by skewness and sharpness, which do not correspond to the normal distribution. This fact is not non-standard for financial data, which sometimes face a slight difference in the observed values compared to the previous period. In this case, it has been assumed that there is a leptokurtic distribution of the data.

Then, the correlation coefficients between the gender wage gap and the educational attainment and type of employment are calculated in Table 2. The results indicate a linear relationship between the gender wage gap in analyzed EU regions and factors L1–L3 reflected educational attainment and variables CU and PU, which characterized type of employment. The negative correlation between the L1 indicator and the gender wage gap indicates that the growth of women with lower upper education should reduce the value of the gender pay gap. It is evident in the countries of Central Europe, Eastern Europe, and Northern Europe. The opposite situation is evident in the countries of Eastern Europe. In the case of the L2 factor and the gender wage gap, an exceptionally positive correlation is detected (Eastern Europe, West Europe, Northern Europe). It means that the growing proportion of women with upper secondary and post-secondary non-tertiary education should increase the value of the gender wage gap. In the case of the linear relationship between the L3 indicator and the gender wage gap, negative correlations prevail (Eastern Europe, West Europe, Northern Europe). It means that the growing proportion of women with comprehensive tertiary education should reduce the value of the gender wage gap. Then, it can be seen that there is a predominant positive correlation between the gender wage gap and part-time work (Central Europe, Eastern Europe, Northern Europe). It means that an increase in the share of women part-time employed should increase the value of the gender wage gap. In contrast, the growing proportion of full-time women employed should decrease the value of the gender wage gap. There was no statistically significant correlation coefficient between L1 and the gender wage gap in Northern Europe, and therefore, the linear relationship between the analyzed variables was not strong.

Table 2: Correlation coefficients between gender wage gap and analysed variables

Variables	Central Europe	Eastern Europe	West Europe	Northern Europe
L1	-0.5942*	0.3104*	-0.2889**	-0.0057
L2	-0.4410*	0.3485*	0.7760*	0.6898*
L3	0.6313*	-0.6533*	-0.7529*	-0.3267**
CU	0.1934***	0.3023*	0.3761*	-0.4498*
PU	-0.1944***	-0.3023*	-0.3758*	0.4489*

Source: Author's calculations

Note: *, ** and *** denote significance at the 1%, 5% and 10% levels.

Then, the linear relationships between analyzed variables are not confirmed by deeper analysis using the GMM method, as Table 3 shows. The results suggest that analysis variables focused on educational attainment and type of employment did not explain any part of the gender wage gap. It means that any part of the gender wage gap couldn't be explained by educational attainment and by type of employment. These results are not consistent, for example, with Harkness (1996) and Blackaby et al. (2005), who showed that part-time women are low-paid and low-skilled. Then, the results are not consistent with Addabbo and Favaro (2011) and Laur (2000), who detected that women's educational attainment is significant in explaining the value of the gender wage gap.

Table 3: Results of GMM method

Variables	Central Europe	Eastern Europe	West Europe	Northern Europe
L1	-1.3034	-0.7455	-1.0100	-0.3030
L2	-2.3683	-2.7779	-0.8393	-0.2512
L3	-2.3700	-3.0158	-1.1621	-0.3383
CU	-9.2998	-8.7202	3.7013	-0.5975
PU	-9.2949	-11.1676	3.8885	-0.6788
S. E. of regression	2.1743	10.6352	3.1765	4.1316
J-statistic	6.7128	1.2065	5.0238	3.4179

Source: Author's calculations

Subsequently, the presence of causality in the granger sense was tested between the variables. It is due to the possibility of comparing the results of applications of another method. As mentioned in the section Data and Methodologies, it is necessary to work with the assumption that causality in Granger's sense cannot be identified as the relation determining that the cause can induce the effect (Osińska, 2011). As shown in Table 4, the null hypothesis was generally confirmed. Namely that there was no causality in the Granger sense between the gender wage gap and the observed variables L1, L2, L3, CU, and PU. However, there are two cases where the causality in the opposite direction going from the gender wage gap to the variables L2 and L3 was detected in West Europe. The linear relationship between variables confirmed is also evident. The causality in the opposite direction going from the gender wage gap to the variable L3 was significant at the 10% level.

Table 4: Results of Granger causality test

Null Hypothesis	F-Statistic	Prob.
Central Europe		
CU → gender wage gap	0.2097	0.6480
Gender wage gap → CU	0.0618	0.8042
L1 → gender wage gap	0.6307	0.4291
Gender wage gap → L1	0.0721	0.7888
L2 → gender wage gap	0.1141	0.7362
Gender wage gap → L2	0.5418	0.4635
PU → gender wage gap	0.2134	0.6452
Gender wage gap → PU	0.0602	0.8067
L3 → gender wage gap	1.4279	0.2351
Gender wage gap → L3	0.3432	0.5594

Eastern Europe		
L1→ gender wage gap	0.94110	0.3341
Gender wage gap→L1	0.30327	0.5830
CU→ gender wage gap	0.66436	0.4168
Gender wage gap→CU	0.50871	0.4772
L2→ gender wage gap	0.00225	0.9623
Gender wage gap→L2	2.53068	0.1145
PU→ gender wage gap	0.55123	0.4594
Gender wage gap→PU	0.51508	0.4745
L3→ gender wage gap	0.31227	0.5774
Gender wage gap→L3	0.32508	0.5697
West Europe		
L1→ gender wage gap	0.3152	0.5758
Gender wage gap→L1	0.5296	0.4685
CU→ gender wage gap	0.0732	0.7872
Gender wage gap→CU	1.3433	0.2493
L2→ gender wage gap	0.0187	0.8913
Gender wage gap→L2	5.0515**	0.0269
PU→ gender wage gap	0.0714	0.7899
Gender wage gap→PU	1.3711	0.2445
L3→ gender wage gap	0.6912	0.4078
Gender wage gap→L3	3.2389***	0.0751
Northern Europe		
L1→ gender wage gap	0.0177	0.8943
Gender wage gap→L1	0.0106	0.9181
CU→ gender wage gap	0.0082	0.9278
Gender wage gap→CU	0.2987	0.5862
L2→ gender wage gap	1.8181	0.1813
Gender wage gap→L2	2.6681	0.1063
PU→ gender wage gap	0.0078	0.9296
Gender wage gap→PU	0.2852	0.5947
L3→ gender wage gap	0.0873	0.7684
Gender wage gap→L3	0.0026	0.9588

Source: Author's calculations

Note: *, ** and *** denote significance at the 1%, 5% and 10% levels.

4 Discussion

First, the correlation coefficient between the gender wage gap and selected factors was calculated. The results showed that the negative correlation between the L1 indicator and the gender wage gap prevails. It could be related to the fact that wage differences may not manifest themselves significantly in the case of low-skilled work. However, the different correlation outcomes in Eastern Europe may reflect, for example, another system of tax advantages, specific labor market differences in Eastern and Western European countries, different types of working conditions, and financial valuations. To some extent, this may be due to certain specifics that have not completely disappeared along with the economic and social transformation.

A prevailing positive correlation is evident in the case of upper secondary education (L2) and the gender wage gap. This linear relationship could be affected by structure and quality of education, study programs studied by men and women, type of employment, specific labor market, financial compensation of people in these jobs, and share of women and men in these work positions. Depending on the evolution of these factors, countries could be more discriminated against by low-educated women because they could suffer from occupational segregation and wage discrimination (Mussida and Picchio, 2013). Another reason could be the discrepancy between education and practice. For example, after completing her education, a woman could go on maternity and parental leave, which made it impossible for her to continue her education in the field. It could theoretically translate into lower financial rewards compared to male counterparts.

The higher share of women with comprehensive tertiary education (L3) could mean that women could have better training, other types of investment in human capital, and better pay conditions (Fitzenberger and Wunderlich, 2000). This tendency is detected in the countries of Eastern Europe and Northern and Western Europe. It could be related that highly-educated and highly-qualified women could be affected by lower-wage gaps (Addabbo and Favaro, 2011). Then, the opposite linear relationship between the gender wage gap and factor L3 is detected in Central European countries. It means that an increase in the share of women with comprehensive tertiary education should cause an increase in the value of the gender wage gap. There could be the possibility of the problem of a "glass ceiling", misogyny, different types of prejudices, occupational sex segregation and types of studied fields, and subsequent career opportunities in the given areas.

There is also a positive correlation between the gender pay gap and part-time employed women in most cases and a negative correlation between the gender pay gap and full--time employed women. Negative perceptions of part-time work may be related to the need to reconcile work and family. Theoretically, part-time work would not have to be associated with greater career advancement and greater initiative on the part of the employee. It may not be attractive to employers and could result in lower financial rewards and fewer incentives to train and fund other training programs for part-time employees. Only possible reasons for linear relationships between variables are discussed above. The deeper analysis was further made using the GMM method and Granger causality for the possibility of comparing different methods.

As the results of both methods showed, the above-assumed relationships were generally not confirmed. The application of different methods showed only slight differences in the results. The findings suggest that more important variables could affect the value of the gender wage gap. It means that results could be influenced by the fact that the findings of empirical literature show that all of the significant parts of the value of the gender wage gap remain unexplained (Böheim et al., 2007; Matteazzi et al., 2017; Redmond and McGuinness, 2017). The unexplained part is often related to unfair discrimination against women (Böheim et al., 2007; Livanos and Nunez, 2010), characteristics of individual countries (for example, labor market status, competencies required at work, specifics of the workplace, the impact of higher education on the labor market, etc.) (Antonczyk et al., 2010; García-Aracil, 2007). Important also could be unobserved characteristics such as differences in tastes. For example, differences in risk aversion, women could be discouraged from obtaining specific skills, attitudes, and commitments (Böheim et al., 2020; Böheim et al., 2013), the existence of human capital endowments, gender convergence in wage determining characteristics (Redmond and McGuinness, 2017), industry specifics, habits, traditions in society, and other factors. Only in the case of the application of Gender causality was the existence of the causality in the opposite direction going from the gender wage gap to the variables L2 and L3 in West Europe determined. This result may be because the countries included in the group of Western European countries had the highest average annual wages (in 2020). There may be more competition in the labor market and more pressure on higher education and qualifications, which may lead to a difference in financial rewards. It is confirmed by the Dorn and Zweimüller study (2020), which demonstrates that Europe has labor flows from poorer to richer countries. That is, from east to west. At the same time, Dorn and Zweimüller (2020) state that migrants from Eastern Europe have lower education on average, so this could be reflected in financial rewards. And this could lead to a growing need to supplement education.

Conclusion

The paper's objective was to examine the effect of the educational attainment and type of employment on the value of the gender wage gap in EU countries from 2006 to 2020. In European countries, there are different tendencies in gender wage gap development. The empirical research focuses on detecting the variables that could help find factors that affect the value of the gender wage gap. This paper was focused comprehensively on European Union regions (Central Europe, Eastern Europe, West Europe, and Northern Europe). First, a linear relationship was determined between some analyzed variables of educational attainment, type of employment, and values of the gender wage gap.

Further, a deeper analysis using the GMM method and Granger causality test was applied. But the application of the methods shows that selected variables focused on educational attainment (L1–L3) and type of employment (CU, PU) did not explain any part of this gender wage gap in most cases. These results could be related to the fact that education is available for both genders practically without limitations (it means women are not prohibited from studying in any programs). There may also be a specified share of women in some workplaces (for example, according to the corporate governance codices (in some countries), publicly traded companies have to have a minimum percentage representation

of women on the supervisory board). There may be recommended representation of women on the board of directors), quality of parental leave policy, the day-care system, legislative protection of women on parental or maternity leave, which influenced participation in the labor force. These findings show different variables could affect the values of the gender wage gap in analyzed European Union regions. Only in the case of Granger causality was causality evident in the opposite direction going from the gender wage gap to the variables L2 and L3 in West Europe. This fact is connected with significant labor flows.

The results also indicate that this is not simple and clear to determine factors that could affect the value of the gender wage gap. The findings of empirical research also show that most of the existence of the gender wage gap remains unexplained (Böheim et al., 2007; Matteazzi et al., 2017). The unexplained part could be explained by many different types of factors, for example, unfair discrimination against women, characteristics of the labor market, specifics of workplaces, experiences, risk aversion, attitude, etc. (Antonczyk et al., 2010; García-Aracil, 2007; Böheim et al., 2013; Böheim et al., 2007; Livanos and Nunez, 2010).

The research also had some limitations, first was the availability of datasets for countries under examination, length of time series, and the integrity of the dataset used for a possible explanation of the gender wage gap values. There is space for future research. The problematics of educational attainment and type of employment can be examined in other countries or possibly different types of factors and their relation to the value of the gender wage gap.

Acknowledgements

Publication of this paper was supported by the institutional support "VŠE FPH IP300040". The support is greatly acknowledged.

References

ADDABBO, T. and D. FAVARO (2011). Gender wage differentials by education in Italy. *Applied Economics.* Vol. 43, No. 29, pp. 4589–4605. doi: http://dx.doi.org/10.1080/00036846.2010.491475

ALBRECHT, J. et al. (2004). Decomposing the Gender Wage Gap in the Netherlands with Sample Selection Adjustments. *Discussion Paper Series* IZA DP No. 1400. November 2004. Available at: https://www.iza.org/publications/dp/1400/decomposing-the-gender-wage-gap-in-the-netherlands-with-sample-selection-adjustments [Access: December 14, 2021].

AL-FARHAN, U. (2010). A Detailed Decomposition of Changes in Wage Inequality in Reunified Post-Transition Germany 1999–2006: Accounting for Sample Selection. *SOEP paper.* No. 269, February 2010. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1551188 [Access: December 3, 2021].

ANTONCZYK, D. et al. (2009). Can a Task-Based Approach Explain the Recent Changes in the German Wage Structure? *ZEW Discussion Paper.* No. 4050, February 2009. Available at: https://www.iza.org/publications/dp/4050/can-a-task-based-approach-explain-the-recent-changes-in-the-german-wage-structure [Access: November 13, 2021].

ANTONCZYK, D. et al. (2010). Rising Wage Inequality, the Decline of Collective Bargaining, and the Gender Wage Gap. *Discussion Paper Series* IZA DP. No. 4911. April 2010. Available at: http://ftp.iza.org/dp4911.pdf [Access: November 20, 2021].

BEYZATLAR, M. A. et al. (2014). Granger-causality between transportation and GDP: A panel data approach. Transportation Research Part A. *Policy and Practice.* Vol. 63, pp. 43–55. doi: http://dx.doi.org/10.1016/j.tra.2014.03.001

BLACKABY, D. et al. (2005). Outside Offers and the Gender Pay Gap: Empirical Evidence from the UK Academic Labour Market. *The Economic Journal.* Vol. 115, No. 501, pp. F81–F107. doi: http://dx.doi.org/10.1111/j.0013-0133.2005.00973.x

BÖHEIM, R. et al. (2020). About time: the narrowing gender wage gap in Austria. *Empirica.* Pp. 1–41. doi: http://dx.doi.org/10.1007/s10663-020-09492-4

BÖHEIM, R. et al. (2013). The gender pay gap in Austria: Eppur si muove! *Empirica.* Vol. 40, No. 4, pp. 585–606. Available at: https://link.springer.com/article/10.1007/s10663-012-9203-x [Access: November 20, 2021].

BÖHEIM, R. et al. (2007). Wage differences between Austrian men and women: semper idem? *Empirica.* Vol. 34, No. 3, pp. 213–229. doi: http://dx.doi.org/10.1007/s10663-007-9038-z

BREITUNG, J. and M. H. PESARAN (2019). Unit Roots and Cointegration in Panels. *CESifo Working Paper.* No. 1565. Available at: https://www.econstor.eu/bitstream/10419/19627/1/200542dkp.pdf [Access: April 20, 2021].

DE LA RICA, S. et al. (2007). Ceilings or floors? Gender wage gaps by education in Spain. *Journal of Population Economics.* Vol. 21, pp. 751–776. doi: http://dx.doi.org/10.1007/s00148-006-0128-1

DE LA RICA, S. et al. (2005). Ceilings and Floors? Gender Wage Gaps by Education in Spain. *DFAEII Working Papers.* No. 2005-01. January 2005. Available at: http://ftp.iza.org/dp1483.pdf [Access: November 28, 2021].

DORN, D. and J. ZWEIMÜLLER (2020). Migration and Labor Market Integration in Europe. *Journal of Economic Perspectives.* Vol. 35, No. 2, pp. 49–76. doi: http://dx.doi.org/10.1257/jep.35.2.49

EUROPEAN COMMISSION (2019). *Gender pay gap situation in EU.* Available at: https://ec.europa.eu/info/policies/justice-and-fundamental-rights/gender-equality/equal-pay/gender-pay-gap-situation-eu_en [Access: August 28, 2021].

EUROSTAT DATABASE (2020). *Time series.* Available at: https://ec.europa.eu/eurostat/data/database [Access: August 15, 2021].

EUROPEAN PARLIAMENT (2022). *Understanding the gender pay gap: definition and causes*. Available at: https://www.europarl.europa.eu/news/en/headlines/society/20200109STO69925/understanding-the-gender-pay-gap-definition-and-causes [Access: May 27, 2022].

FITZENBERGER, B. and G. WUNDERLICH (2000). Gender Wage Differences in West Germany: A Cohort Analysis. *German Economic Review.* Vol. 3, No. 4, pp. 379–414. doi: http://dx.doi.org/10.1111/1468-0475.00065

GARCÍA-ARACIL, A. (2007). Gender Earnings Gap among Young European Higher Education Graduates. *Higher Education.* Vol. 53, pp. 431–455. doi: http://dx.doi.org/10.1007/s10734-005-3864-3

GARCÍA, J. et al. (2001). How wide is the gap? An investigation of gender wage differences using quantile regression. *Empirical Economics.* Vol. 26, No. 1, pp. 149–167. doi: http://dx.doi.org/10.1007/s001810000050

GARCIA, R. et al. (2009). *Handbook of Financial Econometrics: Tools and Techniques.* Holland: North Holland.

GRANDNER, T. and D. GSTACH (2012). Decomposing wage discrimination in Germany and Austria with counterfactual densities. *Empirica.* Vol. 42, pp. 49–79. doi: http://dx.doi.org/10.1007/s10663-014-9244-4

GRANGER, C. W. J. (1969). Investigating Causal Relations by Econometric Models and Cross-spectral Methods. *Econometrica.* Vol. 37, No. 3, pp. 424–438. doi: http://dx.doi.org/10.2307/1912791

HALL, A. R. (2004). *Generalized Method of Moments.* New York: Oxford University Press.

HANSEN, L. P. (1982). Large Sample Properties of Generalized Method of Moments Estimators. *Econometrica.* Vol. 50, No. 4, pp. 1029–1054. doi: http://dx.doi.org/10.2307/1912775

HARKNESS, S. (1996). The Gender Earnings Gap: Evidence from the UK. *Fiscal Studies.* Vol. 17, No. 2, 1–36. doi: http://dx.doi.org/10.1111/j.1475-5890.1996.tb00241.x

HLOUSKOVA, J. and M. WAGNER (2005). The Performance of Panel Unit Root and Stationarity Tests: Results from a Large-Scale Simulation Study. *EUI Working Paper ECO.* No.

2005/5. April 2005. Available at: https://cadmus.eui.eu/bitstream/handle/1814/3318/ECO2005 5.pdf?sequence=1

CHEVALIER, A. (2007). Education, Occupation and Career Expectations: Determinants of the Gender Pay Gap for UK Graduates. *Oxford Bulletin of Economics and Statistics*. Vol. 69, No. 6, pp. 819–842. https://doi.org/10.1111/j.1468-0084.2007.00483.x

JAGANNATHAN, R. et al. (2002). Generalized Method of Moments: Applications in Finance. *Journal of Business & Economic Statistics*. Vol. 20, No. 4, pp. 470–481. doi: http://dx.doi.org/10.1198/073500102288618612

JOLLIFFE, D. and N. F. CAMPOS (2005). Does market liberalisation reduce gender discrimination? Econometric evidence from Hungary, 1986–1998. *Labour Economics*. Vol. 12, No. 1, pp. 1–22. doi: http://dx.doi.org/10.1016/j.labeco.2003.12.003

KANELLOPOULOS, C. N. and K. G. MAVROMARAS (2002). Male-female Labour Market Participation and Wage Differentials in Greece. *Labour*. Vol. 16, No. 4, pp. 771–801. doi: http://dx.doi.org/10.1111/1467-9914.00216

LAUER, C. (2000). Gender Wage Gap in West Germany: How Far Do Gender Differences in Human Capital Matter? *ZEW Working Paper*. No. 00-07. Available at: https://ideas.repec.org/p/zbw/zewdip/5283.html [Access: August 25, 2021].

LIVANOS, I. and I. NUNEZ (2010). The Effect of Higher Education on Gender Wage-Gap. *MPRA Paper*. No. 25487. Available at: https://mpra.ub.uni-muenchen.de/25487/ [Access: August 25, 2021].

LIVANOS, I. and K. POULAKIS (2012). Educational segregation and the gender wage gap in Greece. *Journal of Economic Studies*. Vol. 39, No. 5, pp. 554–575. doi: http://dx.doi.org/10.1108/01443581211259473

MACHIN, S. and P. PUHANI (2003). Subject of degree and the gender wage differential: evidence from the UK and Germany. *Economics Letters*. Vol. 79, pp. 393–400. doi: http://dx.doi.org/10.1016/S0165-1765(03)00027-2

MATTEAZZI, E. et al. (2017). Part-time employment, the gender wage gap and the role of wage-setting institutions: Evidence from 11 European countries. *European Journal of Industrial Relations*. Vol. 24, No. 3, pp. 1–21. doi: http://dx.doi.org/10.1177/0959680117738857

MÁTYÁS, L. (1999). *Generalized method of moments estimation*. United Kingdom: Cambridge University Press.

MUMFORD, K. and P. N. SMITH (2004). The Gender Earnings Gap in Britain. *Discussion Paper Series* IZA DP. No. 1109. April 2004. Available at: https://www.econstor.eu/bitstream/10419/20344/1/dp1109.pdf [Access: August 25, 2021].

MUSSIDA, C. and M. PICCHIO (2013). The gender wage gap by education in Italy. *The Journal of Economic Inequality.* Vol. 12, pp. 117–147. doi: http://dx.doi.org/10.1007/s10888-013-9242-y

MYCK, M. and G. PAULL (2004). The role of employment experience in explaining the gender wage gap. *Institute for fiscal studies working paper.* No. 04/16. July 2004. Available at: https://ifs.org.uk/wps/wp0416.pdf [Access: August 15, 2021].

OECD STATISTICS (2021). *Time series.* Available at: https://stats.oecd.org/ [Access: August 15, 2021].

OSIŃSKA, M. (2011). On the Interpretation of Causality in Granger's Sense. *Dynamic Econometric Models.* Vol. 11, No. 0, pp. 129–139. doi: http://dx.doi.org/10.12775/DEM.2011.009

PESARAN, M. H. (2015). *Time Series and Panel Data Econometrics.* Oxford: Oxford University Press.

POINTNER, W. and A. STIGLBAUER (2010). Changes in the Austrian structure of wages, 1996–2002: evidence from linked employer-employee data. *Empirica.* Vol. 37, pp. 105–125.

REDMOND, P. and S. McGUINNESS (2017). The Gender Wage Gap in Europe: Job Preferences, Gender Convergence and Distributional Effects. *Discussion Paper Series IZA DP.* No. 10933. November 2017. Available at: https://www.iza.org/publications/dp/10933/the-gender-wage-gap-in-europe-job-preferences-gender-convergence-and-distributional-effects [Access: August 1, 2021].

ROSHOLM, M. and N. SMITH (1996). The Danish Gender Wage Gap in the 1980s: A Panel Data Study. *Oxford Economic Papers.* Vol. 48, No. 2, pp. 254–279. doi: http://dx.doi.org/10.1093/oxfordjournals.oep.a028568

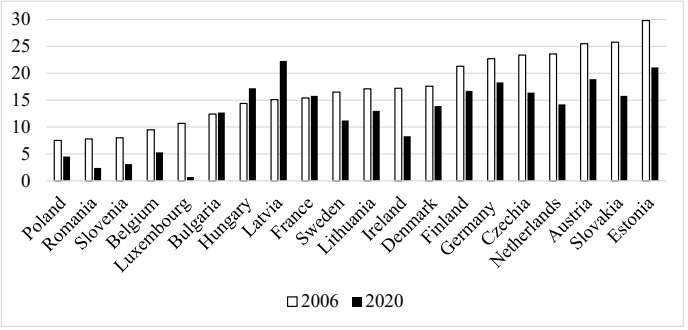
WESTERLUND, J. and J. BREITUNG (2009). Myths and Facts about Panel Unit Root Tests. *Working Papers in Economics.* No. 380. March 2009. Available at: http://conference.iza.org/conference_files/pada2009/breitung_j1604.pdf [Access: August 1, 2021].

YAISH, M. and V. KRAUS (2003). The Consequences of Economic Restructuring for the Gender Earnings Gap in Israel, 1972–1995. *Work, employment and society.* Vol. 17, No. 1, pp. 5–28. doi: http://dx.doi.org/10.1177/0950017003017001250

Contact address

Ing. Marie Ligocká, Ph.D.
Prague University of Economics and Business
Faculty of Business Administration, Department of Managerial Economics
nám. W. Churchilla 1938/4
130 67 Prague 3
(marie.ligocka@vse.cz)

Appendix 1: Comparison of gender wage gap size in analysed countries in 2006 and 2020 (at median)



Source: OECD (2022), author's calculations

Appendix 2: Descriptive statistics

Central Europe

Variable	Gender wage gap	L1	L2	L3	CU	PU
Mean	13.7833	14.3910	51.6669	33.9420	10.2406	89.7604
Median	13.3000	11.8979	51.3000	34.1500	10.8371	89.2000
Maximum	30.9000	30.9000	62.4000	52.4366	18.28238	97.9000
Minimum	-0.9000	3.7000	41.1756	11.3000	2.1436	81.7176
Std. Dev.	7.5900	8.0994	4.7086	10.9175	4.0655	4.0701
Skewness	0.4895	0.5679	-0.0616	-0.3525	-0.6481	0.6472
Kurtosis	2.6579	2.0443	2.4226	2.2726	2.7944	2.7961
Jarque-Bera	4.0342	8.2641**	1.3068	3.8483	6.4605**	6.4393**
Probability	0.1330	0.0160	0.5202	0.1459	0.0395	0.0399

Eastern Europe

Variable	Gender wage gap	L1	L2	L3	CU	PU
Mean	17.6933	14.3824	61.5204	24.0957	16.1174	83.8787
Median	19.6000	12.8000	60.3000	24.1000	9.8900	90.1000
Maximum	26.2000	26.2000	74.6000	38.8356	47.7219	95.8000
Minimum	4.5000	6.4004	49.0582	12.3000	4.2034	52.3000
Std. Dev.	6.0062	5.7515	7.1587	6.5614	14.7965	14.7955
Skewness	-0.7878	0.4870	0.1474	0.1376	1.4487	-1.4487
Kurtosis	2.5407	1.9381	1.9236	2.2257	3.2527	3.2529
Jarque-Bera	8.4182**	6.4884**	3.8922	2.1099	26.4342*	26.435*
Probability	0.0148	0.0389	0.1428	0.3481	0.0000	0.0000

West Europe

Variable	Gender wage gap	L1	L2	L3	CU	PU
Mean	13.8346	24.1693	42.0063	33.8215	45.5450	54.4512
Median	15.4000	24.3000	39.9000	34.0000	41.3646	58.6000
Maximum	23.6000	37.9000	61.4000	53.3740	75.4925	72.5655
Minimum	0.7000	14.2248	21.3576	20.2000	27.4344	24.5000
Std. Dev.	6.0928	6.0232	9.5477	7.5225	15.7088	15.7163
Skewness	-0.1774	0.1616	0.8736	0.2815	1.0008	-1.0011
Kurtosis	1.9489	2.3200	3.0922	2.5351	2.6361	2.6368
Jarque-Bera	3.8455	12.9360*	1.7715	9.5666*	1.6658	12.9413*
Probability	0.1462	0.0015	0.4123	0.0083	0.4347	0.0015

Northern Europe

Variable	Gender wage gap	L1	L2	L3	CU	PU
Mean	15.6261	17.7354	38.4964	43.7647	30.1868	69.8165
Median	15.6500	16.9500	38.6500	43.6500	32.2767	67.7500
Maximum	21.3000	30.0000	43.7000	56.0232	38.4492	81.8000
Minimum	8.3000	6.4586	33.0076	33.5000	18.1930	61.6000
Std. Dev.	2.6589	5.6114	2.8497	5.8781	6.3559	6.3506
Skewness	-0.0395	0.2048	-0.1860	0.0146	-0.7183	0.7161
Kurtosis	2.8989	2.4727	1.9553	2.0186	1.9991	1.9968
Jarque-Bera	0.0411	7.6639**	1.1146	3.0744	2.4099	7.6445**
Probability	0.9796	0.0216	0.5727	0.2149	0.2997	0.0218

Source: Author's calculations

Note: *, ** and *** denote significance at the 1%, 5% and 10% levels.