WAGE INEQUALITIES WITHIN GENDERS: EVIDENCE FROM THE SLOVAK REPUBLIC

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Abstract

The paper examines wage inequalities in the context of gender in the Slovak Republic in the years 2005-2020 at the level of eight regions of Slovakia. The data source is the DataCube statistical database of the Slovak Statistical Office. Wage inequalities in the labor market have been a long-term problem in the current society. The purpose of this paper is to clarify and identify the labor market and socio-demographic factors influencing wage inequalities on the labor market in the Slovak Republic. We assume that a higher labor supply will lead to an increase in wage inequality, since employers have more potential workers available for one job, which pushes wages down. New workers in the labor market usually have less experience compared to those who have gained experience throughout a longer period. As a result, their wage rate is lower and wage inequalities are increasing. The number of hours worked is also an indicator on the labor supply side. The limitations of this research lie in the very poor availability of data on gender inequalities in the Slovak Republic. However, this is the first study that analyzes the phenomenon within the framework of gender inequalities in conditions prevailing in the Slovak Republic. We propose a new model for controlling demand and supply in the labor market and socio-demographic factors affecting inequalities. Our contribution opens up space for further research in the area.

Keywords: wage inequalities, gender, labour market

JEL Classification: J30, J31, J01

Introduction and theoretical background

Gender inequalities between the genders are a very often discussed topic in economics, and is being addressed by more and more experts. In all developed economies, women make up a minority of employees and women generally earn less than men. Women are also more likely to be discriminated against, to work fewer hours on average or to bear the costs of running a household and maternity, which also affect their lifetime earnings. However, in the literature, we are less likely to encounter theories and analyses that look at gender inequalities. This paper deals with gender inequalities in the labor market in the Slovak Republic. The paper identifies spatial differences in the eight regions of the Slovak Republic and uses regression analysis to estimate the effects of determinants of wage differences within genders from the labor market and social sphere. A key question in the debate on gender inequality is whether the gender pay gap reflects free choice, natural differences, or discrimination. If some women earn less because they choose lower work intensity, lower education, or lower paid occupations then there may be nothing to deal with. If individuals make these decisions freely, they must take their consequences into account. Remuneration differences have been present in society since ancient times. In the economic literature, these differences are partly attributed to the fact that some labor market participants have low labor skills. One of the factors is the presence of discrimination in the labor market. Many countries have seen declining trends in the gender pay gap in the past (Blau and Kahn, 1992). According to Meza González (2001), these trends are particularly evident in developing countries and are mainly because women are increasing their skills and becoming more involved in the labor market. Most research on pay inequality has focused on growing disparities between genders and at different levels of education, age and income, but much of the growing inequality occurred within these groups (McCall, 2000). Inequality within a group can be defined as the dispersion of individual income controlling socio-demographic, human and work characteristics. VanHeuvelen (2018) argues that if the average pay gap between those with secondary and tertiary education, workers with different levels of experience and in different sectors and occupational categories could be compensated, the averages in these social categories would be indistinguishable from zero and inequality would be reduced. However, research has shown that even under such conditions, inequalities fall by only 1/3 on average (Author, Katz, and Kearney, 2008).

According to some authors, inequalities occur due to the different returns of investments in education for different individuals that employers can observe (Mouw and Kalleberg, 2010). It is true that large differences persist between men and women in the orientation of study programs. We have more female graduates than male graduates in education or social work and, conversely, a lot more men graduate from engineering and industrial production than women. If these differences are decisive for the wage gap, they could be expected to be reflected primarily in the choice of occupation. Technological innovations, complemented mainly by workers in higher hierarchical positions, enable an increase in productivity. Higher productivity consequently leads to higher salaries compared to workers with lower education. Thus, inequality is reflected in increased returns on investments in education for highly skilled workers compared to low-skilled workers. This statement is supported by the fact that highly-skilled workers are constantly in high demand, pushing wages upwards. A similar statement applies to work experience (Lemieux, 2006), where workers with many years of experience are expected to work more efficiently and profitably.

Another factor that contributes to the inequalities is deinstitutionalisation, which represents a declining protection of employees in the labor market. It is particularly characterized by low employee participation in trade unions (Western and Rosenfeld, 2011). It is also manifested in institutional changes in labor market policies or in the setting of the minimum wage. One of the negative effects of deinstitutionalisation is the emergence of job insecurity at all levels of employment. Following that, inequality can be perceived as a certain indicator of uncertainty or risk of job loss (VanHeuvelen, 2018). Institutional labor market arrangements and policy systems that increase occupational safety and reduce flexibility should reduce gender inequalities.

Another factor, the family aspect, considers families to be small organizations that spread risk among family members by spouses or other family members entering the labor market to cope with the loss of income associated with unemployment, illness or caring for family members (Western, Bloome and Percheski, 2008). Marriage thus divides parental and economic responsibilities between spouses. However, the problem arises if the parent is alone to raise the child. Such families have lower economic security and often have to rely on help from parents or more distant family members. Families of this type are often supported by social benefits, which provide a degree of economic security. The opposite effect of social benefits is that they reduce the willingness to work because the individual receives a financial reward. Families form inequality within a group by creating income insecurity. More generally, the configuration of families and labor market institutions affects individuals' income insecurity. Where incomes are more variable and show greater differences from year to year, inequality will be higher. Thus, a significant increase in inequality within a group may reflect an increase in income uncertainty.

Juhn, Murphy, and Pierce (1993) observe an increase in male pay inequality in the United States between 1963 and 1989. Their finding supports the theory of inequalities caused by the return on investment in education. The authors argue that the explanation for the general increase in returns from education is that the demand for skills has increased in the United States during this period.

McCall's (2000) study focuses on wage inequality across cohorts in more than 500 U.S. labor markets in 1990. The analysis shows that two frequently cited explanations for growing wage inequality over time have little impact on wage inequality within a certain group - technological change and trade openness. On the contrary, flexible and precarious employment conditions (unemployment or fixed-term employment) are associated with a high level of wage inequality, especially among women.

Gray, Mills, and Zandvakili (2003) observed the decomposition of wage inequalities into components representing inequalities between groups and components representing inequalities within groups in Canada between 1991 and 1997. The data showed a clear trend of increasing inequality in household income. Although most of the increase in measured inequality is attributed to the "within-group" component, the change in inequality "between groups" is still significant, especially for education, age, and marital status.

Cunningham and Jacobsen (2008) have observed wage inequality in four Latin American countries. Their results show that inequality in earnings within a group contributes to overall income inequality rather than intergroup inequality. The authors also created a simulation where a disadvantaged group becomes favored and found that the overall income inequality rate had only slightly decreased or even increased.

Williams (2012) argues that one of the reasons for inequality is the different types of professions. Based on data for Great Britain in the period 1970-2000 examines the wage inequalities within occupations. By dividing the factors into two groups,

the author found that although most wage inequalities are within occupations, a greater share of changes is between occupations.

The authors Xie, Killewald and Near (2016) examine historical trends in income inequality between and within occupations for a group of high-ranked scientists. They found that the return on investment in education has increased significantly over time, which supports the theory of inequality caused by different returns in education. Results also suggest that inequalities between and within occupations increased at the same rate among university graduates, so the share of inequality attributable to differences in occupations remained constant. An important finding is that trends in inequality vary by occupation and education, which makes it difficult to summarize the impact of education and occupation on the overall increase in income inequality.

Jaumotte, Buitron (2015) observe the impact of labor market institutions on wage inequality. The authors found evidence that the weakening of labor market institutions is associated with an increase in income inequality. The key findings are that the decline in the influence of trade unions is linked to an increase in the proportions of people with the highest incomes and less redistribution, while the weakening of the minimum wage is linked to a significant increase in overall inequality. There is also evidence that the extension of collective agreements to non-union members is associated with higher inequality, probably due to higher unemployment. The results also suggest that financial deregulation and lower taxes are associated with higher inequality.

The study by Kristal and Cohen (2017) analyzing 43 US industries from 1968 to 2012, is in a similar vein. The authors found that the decline in unions and real value of the minimum wage explained about half of the growing inequality, while informatization about one quarter. This suggests that much of the growing inequality in the US is due to the weakening of workers rather than market forces.

VanHeuvelen (2018) uses the large Luxembourg Income Study dataset, which contains 28 countries over a period of 40 years. The results of the study suggest that in almost all countries, gender inequality is the primary driving force behind inequality levels and trends. As inequality grows, so does the relative importance of inequality within the group. The large amount of data has shown considerable heterogeneity based on different labor market institutions and employment protection legislation across countries.

In extensive study of inequalities in South Africa, economist Thunde (2019) finds that the increase in wage inequality was due to an increase in inequality within the group, as inequalities between groups decreased over the period. In the research, the author identified that union membership, educational attainment, and the industry in which an individual works are factors influencing inequality within the group, while unions and educational attainment contribute to growing overall inequality.

Campos-Vazquez et al. (2016) examine wage inequalities in men's age cohorts in Mexico, specifically, between younger and older men. Research suggests that wage inequalities have decreased. However, the decline occurred in an undesirable way, as the wages of older workers fell and their decline was more pronounced than that of young men. The results of this study suggest that the skills of older workers may be outdated in the labor market, and therefore retraining courses are important to keep older workers attractive for the labor market.

Material and methods

The paper examines the within gender wage inequalities in the Slovak Republic in the period 2005-2020 at the level of eight regions of Slovakia. The source of data is the DataCube statistical databases of the Statistical Office of the Slovak Republic.

The main variables examined are ratio indicators pointing to wage inequalities in the labor market, namely decile indicators and one quartile indicator, which compare groups of people with different wage levels. The most frequently examined ratio is the share of the top 10% of earners and the bottom 10% of wage distribution - D9/D1. Statutory conclusions can also be drawn from the share of the 9th decile and median earners, as there are groups of people who earn the minimum wage around the level of the median wage – D9/D5. The last decile indicator is the ratio of median to first decile - D5/D1. Regarding the quartile indicator, we use a comparison of the 3rd quartile with the 1st quartile - Q75/Q25. This indicator compares 25% of the highest-earning people with the 25% of the lowest-earning workers.

We assume that wage inequality is influenced by both demand and supply factors in the labor market. To control labor market demand factors, the average wage is used as a proxy for labor costs and the unemployment rate, which can partially control employee demand but is primarily used as a proxy for the economic cycle (Harman, 2021). To control the supply on the labor market the number of job seekers is used as a proxy. We assume that a higher labor supply will lead to an increase in wage inequality, since employers have more potential workers available for one job, what pushes wages down. The second variable considering the labor supply is the rate of economic activity in the labor market. Higher levels of economic activity are expected to exacerbate inequalities, especially for women. New workers in the labor market tend to have less experience compared to workers with experience. As a result, their wage valuation is lower and wage inequalities are increasing. The number of hours worked is also an indicator on the labor supply side. We assume that this indicator reduces inequalities.

Table 1: Descriptive statistics

	Men				Women			
Variable	Mean	St. Dev.	Min	Max	Mean	St. Dev.	Min	Max
Dependent variables								
D9D1	3.618	0.689	2.662	5.747	3.041	0.464	2.473	4.892
D9D5	1.923	0.187	1.668	2.468	1.764	0.120	1.567	2.276
D5D1	1.868	0.165	1.594	2.362	1.716	0.142	1.498	2.177
P75P25	1.888	0.159	1.606	2.357	1.802	0.105	1.595	2.144
Independent variables								
Labour market factors								
Unemployment rate	8.898	5.089	1.740	20.46	10.771	5.307	2.200	21.2
Average wage	975.908	283.249	439.084	1896	762.711	226.612	342.032	1498.000
Jobseekers (ln)	9.629	0.684	8.105	10.786	9.693	0.587	8.287	10.595
Economic activity rate	68.048	2.106	62.800	73.3	51.502	3.358	45.700	60.5
Hours worked	181.198	5.656	156.803	186.520	177.110	5.165	155.667	180.800

Socio-demographic factors								
Children (ln)	9.796	0.369	6.084	10.154	9.796	0.369	6.084	10.154
Aging Index	68.796	16.208	38.030	108.27	115.916	24.043	65.760	169.98
Age	37.029	2.437	31.200	42.000	40.188	2.463	33.900	45.3

Source: own calculations, SOSR.

In addition to demand and supply factors in the labor market, wage inequalities are also affected by socio-demographic factors. Three variables are used to control these factors. The first is the number of children who were enrolled in kindergartens and nurseries. The impact of this indicator should be positive, since a higher number of children means that their parents had to leave the labour market for a certain period of time in the form of - maternity or parental leave. As a result, projected incomes are falling, creating inequality in the labor market compared to childless workers (Owens, 2016). Workers' experience is an important factor influencing wage inequality. Due to the unavailability of data, we decided to use the median age as a proxy variable. We anticipate that experience will be of some benefit to elderly workers and exacerbate inequalities between them and their younger counterparts. However, we assume that the productivity of elderly employees decreases in relation to younger ones from a certain age, as the lower ability of older employees to keep up with technological trends is reflected (Heywood et al., 1999; Lallemand and Rycx, 2009). For this reason, age squared is also used. The last variable considering the demographic structure of the population is the Aging Index (Sauvy Index). This expresses the number of people in the post-productive age per 100 people in the pre-productive age. All variables are broken down by gender. Using the subscripts i and t to denote the region and year:

$$Y_{it} = \beta_0 + \beta_1 Unemployment_{it} + \beta_2 (ln) Average\_wage_{it} + \beta_3 (ln) Jobseekers_{it}$$
$$+ \beta_4 EA\_rate_{it} + \beta_5 (ln) Hours\_worked_{it} + \beta_6 (ln) Children_{it} \qquad (1)$$
$$+ \beta_7 Aging\_index_{it} + \beta_8 Age_{it} + \beta_9 Age^2{}_{it} + FE_{it} + TE_{it} + \varepsilon_{it}$$

where Y_{it} are dependent variables representing wage inequalities within a gender. $Average_{wageit}$ is a log of the average wage. $Jobseekersit$ is a log of the number of jobseekers. EA_{rateit} is a variable considering economic activity rate. $Childrenit$ represents the number of children enrolled in kindergartens and nurseries. $Aging_{indexit}$ is the Aging Index. $Ageit$ accounts for median age of population. FE_{it} are fixed effects and TE_{it} are time-fixed effects. ε_{it} is error term.

Table 1 provides an overview of the descriptive statistics of the observed variables. There is lower inequality within women compared to men, especially when comparing the top 10% earnings with the bottom 10%. The difference at the lower end of the wage distribution is more favourable for both genders, but the differences are still significant. Income for men in the lower percentile is up to 86% lower than the median, almost 72% for women. The unemployment rate is lower among men and the economic activity rate is higher among men. However, the difference is significant - almost 17 percentage points. Socio-demographic indicators suggest that we can expect a faster aging of population for women. This finding is provided by the Aging Index, which shows that on average, 1 woman in the pre-productive age population has 1.15 people in the post-productive age. For men, this ratio is more favourable - 0.76. The median age of women is 3 years higher than that of men.

Results and discussion

The aim of the paper is to identify and compare the effects of labor market factors and socio-demographic factors on within-gender wage inequalities. Figures 1 and 2 show a wage growth of income groups in the Slovak Republic from 2005 to 2020. The figures show that women's wages grew faster than men's. The wages of the lowest earners (D1) increased by almost 70% during the observed period, growing by about 15 percentage points per year since 2018. As for men, the growth of this income group was significantly higher compared to other income groups. This shows that wage inequality in Slovakia is decreasing. The upper side of the income distribution also grew significantly but did not outpace the growth of the median income (D5) or the third quartile (P75). For women, we observe almost the same wage growth rates until 2017, when low-income groups break away from the rest and start to grow faster. To a large extent, this effect can be attributed to a significant jump in the minimum wage.

Figure 1: Wage growth by income groups, 2005=100, Men	*Figure 2: Wage growth by income groups, 2005=100, Women*
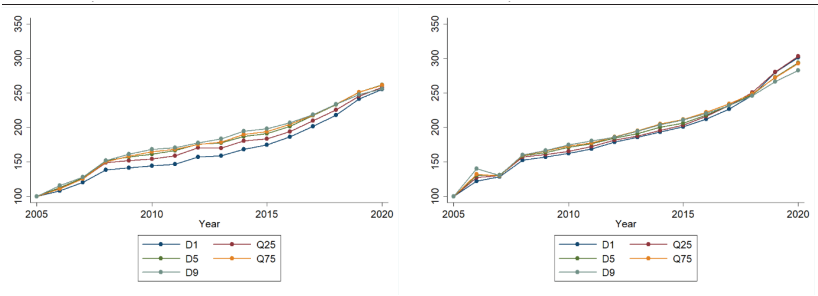
Source: own calculations, SOSR.

Figures 3 and 4 show the wage inequalities for men and women. In case of both genders, wage inequality shows declining trends. Inequalities observed among men are more pronounced, but their decline is also steeper. In 2010, workers on the right side of the distribution earned about four times more than those on the left, while by 2020 this ratio had fallen to about 3.5 times lower values. This fact can be partly attributed to the sharp rise in the minimum wage and social transfers. A comparison with the median says that this ratio does not change significantly over time. The same goes for the ratios of the median and the low-income group or for the comparison of the 75th percentile to the 25th percentile. For women, the trend is also declining compared to the top 10% of earners with the bottom 10% , but not to the same extent as for men. In 2005, this ratio was 3.3. By 2020, this inequality had narrowed and the best-earning incomes were about 3 times higher. The ratio of median wages to the bottom 10% does not change significantly over time. Inequality between other income groups is declining at a slow pace. From the figures we can observe that there is more inequality between higher-income groups than between low-income groups, which means that most of the wealth is concentrated in the hands of high-income groups.
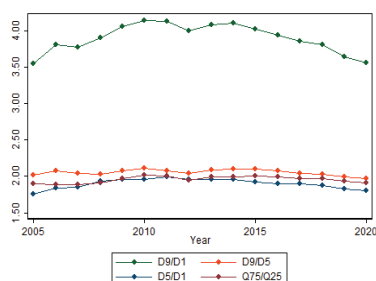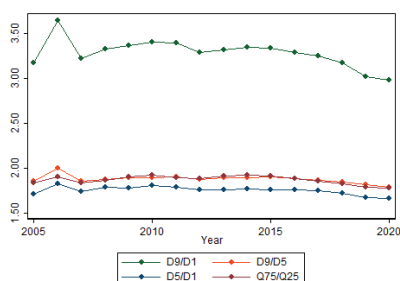
Figure 3: Development of wage inequality - Men

Figure 4: Development of wage inequality - Women

Source: own calculations, SOSR.

Tables 2 and 3 show that inequalities are not the same across Slovakia. In the Bratislava region, inequalities were expected to decrease to the greatest extent, which is mainly due to the inflow of foreign capital into the capital as the most attractive region in Slovakia. It is foreign capital and multinational corporations that bring job opportunities to the Bratislava region, which favours the labor market in this region over the rest of the Slovak Republic. The arrival of the large car manufacturer Jaguar Land Rover around the city of Nitra has brought jobs with higher wages for low-skilled workers. Despite this investment in the area, inequalities between the 9th and 1st deciles have deepened. Looking at the comparison of the group with the median wage and low income, we observe smaller differences. It is worth mentioning the Košice region, where the differences decreased most significantly. The Banská Bystrica region, which has long suffered from the highest unemployment, has seen a significant increase in the concentration of wealth in the hands of the top 10%, as has the Prešov region.

Table 2: Changes in wage inequalities by region - Men

	D9/D1			D9/D5			D5/D1			P75/P25		
	2005	2020	Diff.	2005	2020	Diff.	2005	2020	Diff.	2005	2020	Diff.
BB	2,66	2,98	**0,32**	1,67	1,81	**0,15**	1,6	1,64	**0,05**	1,61	1,72	**0,11**
BA	4,83	4,54	**-0,29**	2,18	2,17	**-0,01**	2,21	2,09	**-0,12**	2,18	2,17	**-0,01**
KE	3,77	3,41	**-0,36**	2,08	1,85	**-0,23**	1,81	1,85	**0,04**	2,04	1,93	**-0,11**
NR	2,77	3,04	**0,27**	1,7	1,82	**0,12**	1,63	1,67	**0,04**	1,68	1,83	**0,15**
PO	2,69	3,02	**0,33**	1,68	1,8	**0,12**	1,59	1,68	**0,08**	1,64	1,81	**0,17**
TN	3,03	2,86	**-0,17**	1,82	1,72	**-0,09**	1,66	1,66	**-0,01**	1,8	1,71	**-0,09**
TT	3,28	3,11	**-0,17**	1,98	1,77	**-0,21**	1,65	1,76	**0,11**	1,82	1,78	**-0,04**
ZA	2,97	3,06	**0,09**	1,73	1,77	**0,04**	1,72	1,73	**0,01**	1,67	1,74	**0,07**

Region abbreviations are as follow: BB – Banská Bystrica, BA – Bratislava, KE – Košice, NR – Nitra, PO – Prešov, TN – Trenčín, TT – Trnava, ZA - Žilina; Source: own calculations, ŠÚSR

In the case of women in the labor market, we observe similar trends. However, the differences between the individual income groups are not as significant as for men. The biggest step towards equality for women took place in the Bratislava Region, which provides the most job opportunities with the highest wages in the Slovak Republic. We also observe a significant decrease in inequality in Bratislava in the case of comparing the median wage and low-income groups (-0.17. We do not observe such a jump in other regions (except BB), which we attribute to the fact that in the rest of Slovakia many women work for a wage very close to the minimum. For this reason, inequalities have not changed much. In the Trenčín and Trnava regions, we even observe a slight increase in the concentration of wealth in the group of high-income women. An important finding resulting from the comparison over time is that inequalities in almost the whole of Slovakia are decreasing.

Table 3: Changes in wage inequalities by region - Women

	D9/D1			D9/D5			D5/D1			P75/P25		
	2005	2020	Diff.	2005	2020	Diff.	2005	2020	Diff.	2005	2020	Diff.
BB	2,81	2,74	-0,07	1,57	1,71	0,15	1,79	1,60	-0,19	1,83	1,72	-0,11
BA	3,99	3,49	-0,50	1,99	1,90	-0,09	2,00	1,84	-0,17	2,05	1,86	-0,19
KE	3,32	2,86	-0,46	1,91	1,72	-0,18	1,74	1,66	-0,08	1,86	1,74	-0,11
NR	2,65	2,62	-0,02	1,65	1,67	0,02	1,61	1,57	-0,04	1,64	1,68	0,04
PO	2,56	2,70	0,13	1,65	1,74	0,09	1,55	1,55	0,00	1,72	1,71	-0,01
TN	2,47	2,56	0,08	1,65	1,67	0,02	1,50	1,53	0,03	1,59	1,60	0,01
TT	2,79	2,85	0,06	1,69	1,70	0,01	1,65	1,67	0,02	1,69	1,73	0,04
ZA	2,86	2,70	-0,16	1,72	1,70	-0,03	1,66	1,60	-0,07	1,76	1,65	-0,11

Region abbreviations are as follow: BB – Banská Bystrica, BA – Bratislava, KE – Košice, NR – Nitra, PO – Prešov, TN – Trenčín, TT – Trnava, ZA – Žilina; Source: own calculations, SOSR

Table 4 shows the pairwise correlations between the observed variables. The correlation analysis showed a statistically significant negative relationship between unemployment and wage inequality factors, in the case of decile ratios. On the contrary, the rate of economic activity is strongly positively correlated with all wage inequality variables ($P<0.000$). In the case of the average wage in the economy, the relationship is also positive ($P<0.000$), so with wage growth, inequalities increase because they are allocated on the right side of the wage distribution. In the case of labor supply expressed by the number of jobseekers, we would expect a positive correlation, as higher labor supply reduces wages, especially on the left side of the wage distribution and thus deepens inequalities. However, the correlation coefficients are negative and significant, which negates our assumption. The relationship with the median age proved to be negative but statistically insignificant, as was the Aging Index. The correlation coefficients in the relationship between inequalities and children enrolment are positive, but they did not prove to be statistically significant in three cases.

Table 4: Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) D9D1	1.000											
(2) D9D5	0.963	1.000										
	(0.000)											
(3) D5D1	0.963	0.858	1.000									
	(0.000)	(0.000)										
(4) Q75Q25	0.960	0.931	0.928	1.000								
	(0.000)	(0.000)	(0.000)									
(5) Unemployment	-0.258	-0.228	-0.247	-0.137	1.000							
	(0.003)	(0.010)	(0.005)	(0.124)								
(6) Average wage	0.342	0.352	0.296	0.369	-0.442	1.000						
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)							
(7) Jobseekers	-0.324	-0.282	-0.320	-0.202	0.952	-0.422	1.000					
	(0.000)	(0.001)	(0.000)	(0.022)	(0.000)	(0.000)						
(8) EA rate	0.603	0.500	0.644	0.534	-0.507	0.382	-0.589	1.000				
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)					
(9) Hours worked	0.028	-0.006	0.065	0.060	-0.100	0.491	-0.083	0.057	1.000			
	(0.751)	(0.950)	(0.464)	(0.502)	(0.260)	(0.000)	(0.349)	(0.524)				
(10) Children	0.121	0.116	0.120	0.182	0.164	0.036	0.194	0.005	0.018	1.000		
	(0.175)	(0.194)	(0.176)	(0.039)	(0.065)	(0.687)	(0.028)	(0.952)	(0.840)			
(11) Aging index	-0.055	-0.051	-0.082	-0.124	-0.574	0.570	-0.579	0.246	0.288	-0.207	1.000	
	(0.536)	(0.571)	(0.357)	(0.163)	(0.000)	(0.000)	(0.000)	(0.005)	(0.001)	(0.019)		
(12) Age	-0.027	-0.009	-0.063	-0.058	-0.538	0.726	-0.534	0.262	0.330	-0.164	0.961	1.000
	(0.766)	(0.921)	(0.481)	(0.514)	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)	(0.065)	(0.000)	

P-value in parentheses. Source: own calculations.

Table 5 shows the results of the regression analysis. In terms of labor market factors, unemployment is estimated to have a slightly negative impact on inequalities, which means that it increases them. The coefficients of the average wage are positive and statistically significant at a high level indicating a large deepening of inequalities among men. This means that more income is allocated on the right side of wage distribution. This is also confirmed by the highest coefficient at the ratio of the top 10% of earning people with 10% of the lowest wage workers. The increase in the number of jobseekers has a statistically significant effect on wage inequality in the case of the three indicators, namely reducing them. Higher economic activity also increases inequality, albeit only to a small extent, as most of the newly economically active people are employed in lower paid positions. The number of hours worked has a highly significant effect on inequalities, always reducing them.

Socio-demographic factors are causing a rise in wage inequality. As expected, children increase wage inequalities. Men being on a parental leave is becoming a rising trend in society, which is consequently reflected in lower incomes. This effect is partly reflected in higher wage inequalities between men. Population aging is currently an important issue in the economy. The aging index is positive and statistically

significant, which means that a greater future burden on productive people increases wage inequality. Similarly, the median age has shown that the relationship between inequality and population aging is growing and has an inverted U-shape.

Table 5: OLS – Men

	(1)	(2)	(3)	(4)
	D9D5	D9D1	D5D1	P75P25
Labor market factors				
Unemployment rate	0.016***	0.048***	0.008**	0.014***
	(0.005)	(0.016)	(0.004)	(0.005)
Average wage (ln)	0.755***	2.886***	0.655***	0.678***
	(0.072)	(0.241)	(0.054)	(0.060)
Jobseekers (ln)	-0.093*	-0.270*	-0.049	-0.097**
	(0.051)	(0.152)	(0.037)	(0.042)
Economic activity rate	0.021***	0.100***	0.026***	0.010*
	(0.007)	(0.021)	(0.004)	(0.005)
Hours worked (ln)	-1.282***	-3.614***	-0.357	-1.058***
	(0.314)	(0.940)	(0.295)	(0.306)
Socio-demographic factors				
Children (ln)	0.035*	0.149***	0.038***	0.041***
	(0.019)	(0.055)	(0.012)	(0.014)
Aging index	0.016***	0.067***	0.014***	0.009***
	(0.003)	(0.010)	(0.002)	(0.002)
Age	0.468***	1.767***	0.431***	0.394***
	(0.104)	(0.305)	(0.071)	(0.082)
Age^2	-0.009***	-0.033***	-0.008***	-0.007***
	(0.001)	(0.004)	(0.001)	(0.001)
Constant	-4.287*	-28.335***	-8.688***	-3.322
	(2.477)	(7.275)	(1.797)	(2.182)
Observations	128	128	128	128
R^2	0.631	0.746	0.774	0.674

*Robust standard errors in parentheses. Source: own calculations. *** $p<0.01$, ** $p<0.05$, * $p<0.1$*

The use of balanced panel data allows us to control the effects of cross-sectional units over time, which are characteristic only for them and can be correlated with explanatory variables. In the case of correlation, omitting them would bias the estimate. Since the panel data consists of several observations of the same subject over a longer period, it is possible to eliminate the so-called time effects. It is therefore possible to control any unobserved shocks that affect the whole country. It is also possible to control the effects of individual monitored entities. Table 6 shows the estimated models using the fixed effects method. The validity of the fixed effects is tested by the Hausman test, which confirmed their validity. The results have changed

significantly compared to OLS estimates. Unemployment has proven to be an impact that reduces labor market inequalities between men. On the contrary, the supply of jobseekers has a negative impact on inequalities and thus increases them. The effect of average wage changed slightly. The same applies to the number of hours worked, which significantly reduces inequalities. In the case of socio-demographic factors, statistical significance has disappeared to some extent. The number of children in families has a significant impact in only two cases, one of which is marginal. The Aging Index shows similar trends. On the contrary, age plays an important role in the labor market for all indicators of inequality.

Table 6: Fixed effects - Men

	(1)	(2)	(3)	(4)
	D9D5	**D9D1**	**D5D1**	**P75P25**
Labour market factors				
Unemployment rate	-0.010**	-0.032**	-0.005	-0.004
	(0.005)	(0.014)	(0.004)	(0.004)
Average wage (ln)	0.857***	3.370***	0.817***	0.740***
	(0.061)	(0.194)	(0.054)	(0.058)
Jobseekers (ln)	0.071*	0.267**	0.060*	0.014
	(0.038)	(0.120)	(0.034)	(0.036)
Economic activity rate	0.013***	0.071***	0.019***	0.005
	(0.004)	(0.013)	(0.004)	(0.004)
Hours worked (ln)	-0.775***	-2.209***	-0.187	-0.703***
	(0.238)	(0.755)	(0.211)	(0.225)
Socio-demographic factors				
Children (ln)	0.017	0.106*	0.036**	0.028
	(0.019)	(0.061)	(0.017)	(0.018)
Aging index	0.003	0.022**	0.005*	0.000
	(0.003)	(0.008)	(0.002)	(0.002)
Age	0.147*	0.686***	0.199***	0.178**
	(0.082)	(0.260)	(0.073)	(0.077)
Age^2	-0.003**	-0.013***	-0.003***	-0.003**
	(0.001)	(0.004)	(0.001)	(0.001)
Constant	65.634***	226.695***	54.045***	42.748***
	(10.983)	(34.913)	(9.773)	(10.382)
Hausman χ^2	46.02	114.26	53.61	128.33
F-Statistic (FE)	87.38	76.74	29.43	46.80
Observations	128	128	128	128
R^2	0.853	0.891	0.850	0.819

Robust standard errors in parentheses. Source: own calculations.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 7 shows the same regression models estimated for women. Unemployment rate coefficients are significant, but close to zero. Higher unemployment leads to higher inequalities. One of the reasons is that women on the left side of the wage distribution are laid off more often. Wage growth in the economy leads to higher inequalities, in case of all indicators. However, the effect is lower compared to the group of men, which means that wages are more evenly distributed among women than men. From the supply side of the labor market, coefficients of the economic activity rate are statistically significant, all of which are positive, but close to zero. The number of jobseekers also has a statistically significant effect on inequalities, but in the opposite direction. The number of hours worked has a major impact on inequalities. More hours worked lead to a reduction in inequalities. Socio-demographic indicators have also proved to be highly important for women. However, children enrolment only affects women with higher than median incomes. The burden of future generations on increased payments for old-age pensions, caused by an aging population, is exacerbated by inequalities for all indicators. As the ratio of pensioners to children increases, so do inequalities. The aging of women as measured by the median age suggests that inequalities increase only to some extent, meaning this relationship has an inverted U-shape.

Table 7: OLS - Women

	(1)	(2)	(3)	(4)
	D9D5	D9D1	D5D1	P75P25
Labour market factors				
Unemployment rate	0.010*	0.049***	0.017***	0.017***
	(0.005)	(0.018)	(0.005)	(0.004)
Average wage (ln)	0.496***	1.781***	0.460***	0.327***
	(0.074)	(0.288)	(0.095)	(0.061)
Jobseekers (ln)	-0.098*	-0.438**	-0.136***	-0.103**
	(0.057)	(0.192)	(0.050)	(0.043)
Economic activity rate	0.008***	0.053***	0.021***	0.016***
	(0.003)	(0.010)	(0.003)	(0.002)
Hours worked (ln)	-1.457***	-5.282***	-1.343***	-0.726**
	(0.406)	(1.383)	(0.423)	(0.330)
Socio-demographic factors				
Children (ln)	0.026***	0.061**	0.007	0.023***
	(0.006)	(0.026)	(0.013)	(0.008)
Aging index	0.009***	0.038***	0.011***	0.006***
	(0.002)	(0.008)	(0.003)	(0.002)
Age	0.245***	1.225***	0.429***	0.237***
	(0.061)	(0.236)	(0.081)	(0.058)
Age^2	-0.005***	-0.022***	-0.007***	-0.004***
	(0.001)	(0.003)	(0.001)	(0.001)

Constant	2.910	0.836	-1.147	-0.404
	(2.461)	(7.957)	(2.323)	(1.798)
Observations	128	128	128	128
R²	0.531	0.639	0.662	0.616

Robust standard errors in parentheses. Source: own calculations.
*** p<0.01, ** p<0.05, * p<0.1

Since we collected panel data for both genders, we can control the fixed and time-fixed effects for women as well. Hausman's test and F-statistics confirmed the importance of these effects. Unemployment has not proven to be a statistically significant factor in reducing inequalities. On the contrary, the average wage has a major negative impact, as positive coefficients indicate an increase in inequalities. The supply side of the labor market in the form of the number of jobseekers has a statistically significant impact on only two indicators, with one being only marginal. Positive signs also indicate a deepening of inequalities through the entry of new workers into the labor market, meaning that new people in the labor market are employed in lower paid positions. A similar scenario is confirmed by the coefficients in the rate of economic activity. On the contrary, a higher number of hours worked reduces inequalities within the gender. Socio-demographic factors have not been shown to have a significant impact on women's inequalities. We attribute this phenomenon to the fact that most women go through motherhood, and so the influence of newborns is basically present in almost every woman's life. The burden of aging society does not have a significant effect on pay gaps between women. Nor does age.

Table 8: Fixed effects - Women

	(1)	(2)	(3)	(4)
	D9D5	**D9D1**	**D5D1**	**P75P25**
Labour market factors				
Unemployment rate	-0.005	-0.016	-0.004	0.005
	(0.005)	(0.012)	(0.004)	(0.004)
Average wage (ln)	0.699***	2.748***	0.790***	0.520***
	(0.075)	(0.205)	(0.059)	(0.060)
Jobseekers (ln)	0.040	0.241*	0.101**	0.033
	(0.050)	(0.136)	(0.039)	(0.039)
Economic activity rate	-0.001	0.024***	0.014***	0.011***
	(0.003)	(0.008)	(0.002)	(0.002)
Hours worked (ln)	-0.904***	-2.858***	-0.575**	-0.256
	(0.316)	(0.861)	(0.247)	(0.250)
Socio-demographic factors				
Children (ln)	0.026	0.064	0.009	0.024*
	(0.017)	(0.046)	(0.013)	(0.013)
Aging index	-0.002	-0.014*	-0.007***	-0.004*

	(0.003)	(0.008)	(0.002)	(0.002)
Age	-0.052	-0.187	-0.052	-0.044
	(0.087)	(0.238)	(0.068)	(0.069)
Age²	0.001	0.004	0.002	0.001
	(0.001)	(0.004)	(0.001)	(0.001)
Constant	79.015***	361.128***	120.824***	71.280***
	(14.379)	(39.218)	(11.249)	(11.396)
Hausman χ²	514.01	101.59	101.35	102.64
F-Statistic (FE)	42.03	96.80	107.84	41.53
Observations	128	128	128	128
R²	0.728	0.865	0.882	0.776

Robust standard errors in parentheses. Source: own calculations.
*** p<0.01, ** p<0.05, * p<0.1

Conclusion

The aim of this paper was to identify the factors influencing wage inequalities in the labor market in the Slovak Republic during the years 2005-2020. Most of the literature on inequalities in the labor market deals with wage inequalities between the genders. This paper is different in a way that it looks at gender inequalities within genders and the labor market and socio-demographic factors that affect them. In the conditions of the Slovak Republic, we did not find any relevant research focusing on this issue, which creates space for research in this area and raising the awareness of within gender inequalities.

Changes in indicators of wage inequality by region, and also at the aggregate level, indicate that the distribution of wages is equalizing and inequalities are decreasing for both genders. This result also shows the figure where inequalities have been decreasing over the last ten years. The largest decrease occurred in the wage ratio of the 10% of the highest-earning workers and the 10% of the lowest-earning workers of both genders. As for the reduction of inequalities by region, wages have levelled off the most in Bratislava, Košice and Trnava. We can state that the curve of wage equality has increased throughout Slovakia.

The results of the regression analysis showed that labor market factors on both the demand and supply sides have a significant impact on inequality for both genders. The level of the average wage and the level of economic activity have a negative effect on wage inequality for both genders. The unemployment coefficients are significant but very close to zero. The number of job applicants also has a significant impact on both genders. Socio-demographic factors have shown to be important in determining wage inequality, especially for men. This is because men do not tend to stay on maternity leave. The structure of the family in terms of the number of children mainly affects inequalities between men, and the aging of the population significantly affects inequalities within both genders. The burden of the young generation providing higher financial care for unproductive individuals in society appears to be significant also in relation to wage inequality, especially among men.

The results of this contribution can be used as a basis for future research in the field of wage inequalities on the labor market in the Slovak Republic, but also

as a basis for labor market policies, the aim of which is to reduce wage inequalities and thus give room for the unification of wage evaluation for both genders.

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