

## COMPARISON OF DEMOGRAPHIC INDICATORS IN THE CZECH REPUBLIC AND THE SLOVAK REPUBLIC AND THEIR INTERCONNECTION WITH THE LABOR MARKET

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**Abstract:** When it comes to the development of society, it speaks of its demographic structure. It has a large impact on the population living in their age distribution, fertility and birth rates, mortality, gender distribution, education, and various other demographic indicators. These have a direct interconnection on the labor market and its indicators. One of the problems are predicted statistics that predict that the structure of the demographic composition of the population will continue to change and population inflows into the post-productive age and the decline in the working-age population. Another problem is the migration of productive population abroad, and increasing the gap of missing the work force.

**Keywords:** Czech Republic, demography, labor market, sectors of national economy Slovakia

### 1 Introduction

Continuous changes in society development are a natural act caused by several factors. The most important factors inducing changes within society are, particularly, demographic development influenced not only by natural movement of the population, the political organization of the state, the educational level of the population, the level of innovation and the level of social and health security directly affecting the quality of life.

In recent years, unfavorable demographic development has often been spoken of, as one of main causes of the aging problem and its connection with the labor market. Worldwide differences in social, economic and population development have been increasing. Differences in development could be seen also in the two chosen countries, the Czech and Slovak Republic which until 1993 were parts of the Czechoslovak Republic.

This paper offers a comprehensive view on the development of demographic indicators in the Czech and Slovak Republic. Based on analyzes of demographic indicators, we would like to point at the prediction of the situation in the labor market, especially in terms of the predispositions of both countries. Via this paper we will point mainly to the ability to adapt state-supplied services not only to current, but also to future needs of their citizens.

### 2 Theoretical Background

The problem of demographic development and its connection with the labor market is currently the main theme of an increasing number of authors who confirm this to be a globally dangerous phenomenon due to its topicality and seriousness.

Continuous changes in the demographic structure of the population are a natural part of social development. These changes negatively influence the policy of employment (Strunz, Vojtovič, 2014)

The Czech and Slovak Republics are, by their territorial assumptions as well as their economic structure focused mainly on the primary and secondary sector of the national economy. These countries could be considered as rural landscapes, regarding their administrative, territorial, and demographic point of view. In addition to the primary and secondary sector, the national economy as a historically established set of economic subjects and economic relations, is divided into the tertiary and

quaternary sector. Primary sector of the national economy includes agriculture, forestry, and mining. A lot of activities of secondary sector include activities in processing industry. Territorial and quaternary sector are defined as sectors of services, while the quaternary sector includes education, research, science, or medicine activities (Vincúr, 2001).

The current trends in demographic development in the Slovak Republic are manifested in the form of slight population growth but also in population aging (Benkovičová, 2009).

Aging is a global demographic process that results from the previous economic and social development of the society (Vojtovič, Krajňáková, 2016).

The social trend of population aging suggests that, currently, the most numerous part of the population in these countries is formed by the citizens of the 55+ age group. If this problem is connected to the decline in birth rate or to migration, we will need to think about who will be working, if this subject leaves the labor market. With dominance of aging (as a component of labor market) and its necessity, we consider them a risky and most endangered group despite its stability, long-term work experiences or willingness to work for lower wage rates (Krajňáková, Vojtovič, 2017).

Demography is also associated with migration. It is a worldwide phenomenon, which is observable also in Czech and Slovak conditions. The migration of working-age people is an increasing problem for many countries. One of the most serious problems related to migration is the emigration of students who leave for foreign schools. These students (graduates) mostly stay living abroad also at their working-age, which means that the home country loses potential of creators of values (Grenčíková, Španková, 2016).

On the other hand, foreign migration experts in the V4 countries, which include both the Czech and Slovak Republic, think that the improvement in social and economic situation of these countries, especially in labor market, makes these countries more interesting for immigrants from other countries (Skibiński, Rączaszek, 2017). These immigrants could slowly fill the gap on the labor market which was caused mainly by the demographic development of society.

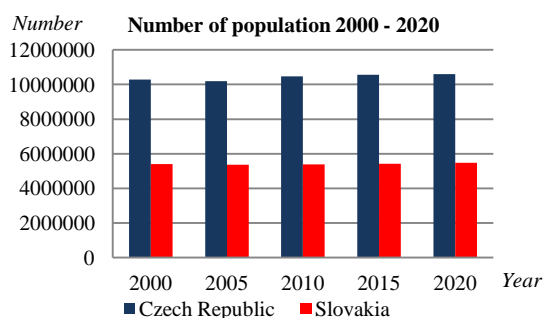
In addition to the negative demographic trends in both countries we must speak also about negative trend in labor market related to relatively high unemployment rate, which is one of the most serious problems of the current economy (Krajčo, 2014).

### 3. Comparison of demographic indicators in the Czech Republic and the Slovak Republic and their interconnection with the labor market

The current situation in labor market is undoubtedly a reflection of the political and socio-economic situation. The next part of the paper will focus on the comprehensive assessment of current demographic trends in Czech and Slovak republic related to conditions and position of employees on the labor market.

Figure 1 interprets the population development of the countries from 2000 to 2020. Both analyzed countries have had a slight increase in population over the period under review. Similarly, this trend should continue until 2020. In the Czech Republic, population should increase by 241 734 inhabitants in 2020, compared to the beginning of the monitored period. In the Slovak Republic there should be an increase of 189 963 inhabitants at the same period.

Figure 1: Population development of Czech Republic and Slovakia from year 2000 to year 2015 and prognosis for 2020

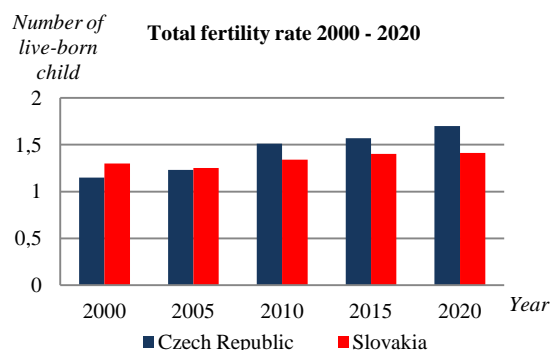


Source: own work of authors based on Eurostat data

Fertility in each of the countries is also an important demographic indicator. In most industrialized countries declining in fertility rates is the main reason for aging populations. (Fougere, Merette, 1999) We have selected fertility rates for the total fertility rate (Figure 2), which represents the average number of live births per one woman throughout her reproduction period, while maintaining the fertility level of the reference year and assuming zero mortality. (Megyesi, Bačo, Poništ, 2012)

Based on the above data, it can be stated that the development of total fertility is volatile, but in the current period but also within the forecasts it is possible to expect an increase.

Figure 2: Total fertility rate of Czech Republic and Slovakia from year 2000 to year 2015 and prognosis for 2020



Source: own work of authors based on Eurostat data

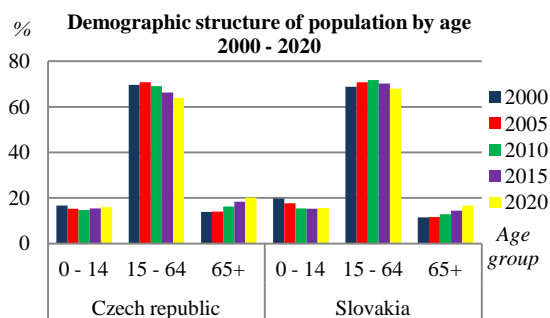
It is very important to know the structure of the population of the state: the percentage of the population in the pre-productive age (0-14 years of life), productive age (15-64 years of life) and post-productive age (65+ years of life).

The changes within the structure of the population in the Czech Republic and Slovakia can be seen in Figure 3. It also includes the calculated forecasts from the Eurostat database for the 2020.

Both monitored countries link the trend of a gradual decline in the number of productive inhabitants, a more pronounced increase in the number of post-productive populations and a decrease in the number of pre-productive populations.

This phenomenon defines the first problem, namely that the total number of the economically inactive population reaches almost the same value as the total number of the economically active population, which ultimately poses a serious threat to the economy linked to the absence of labor force.

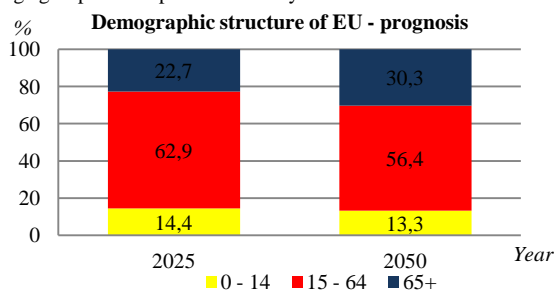
Figure 3: Development of demographic structure of population by age group of Czech Republic and Slovakia from year 2000 to year 2015 and prognosis for 2020



Source: own work of authors based on Eurostat data

The aging of the population is not a problem only in the Czech Republic and the Slovak Republic but also throughout the European Union. According to the prognosis of United Nations World Population Prospects (Figure 4), post-productive population should become the fastest growing age group. It is necessary to reflect on how these changes in the structure of the population should be linked to the ever-changing conditions in the labor market.

Figure 4: Prognosis of demographic structure of population by age group of European union for years 2025 and 2050



Source: own work of authors based on United Nations World Population Prospects

The labor market situation determines demographic indicators. Based on the data obtained from the statistical databases, we have created a table of indicators in Table 1 to reflect the level of economic burden. To calculate these indicators (Mládek, 2006) we used the following formulas:

$$\text{Economic dependency ratio} = \frac{\text{Pre-productive age group (0-14)} + \text{Post-productive age group (65+)}}{\text{Productive age group (15-64)}} * 100 \quad (1)$$

$$\text{Young age dependency ratio} = \frac{\text{Pre-productive age group (0-14)}}{\text{Productive age group}} * 100 \quad (2)$$

$$\text{Old age dependency ratio} = \frac{\text{Post-productive age group (65+)}}{\text{Productive age group (15-64)}} * 100 \quad (3)$$

The first monitored index was the Economic dependency ratio. The highest value of this index was in the Czech Republic in 2015. The prognosis shows that this should increase more. The value of this index points to the ratio of the economic burden of the economically active population. In the Czech Republic, this index reached 50.8 in 2015, representing approximately 51 productive inhabitants, working as if 100 people worked. In Slovakia, this index is significantly lower, creating a positive image for the future.

Young age dependency ratio and Old age dependency ratio are the other two monitored indexes. By comparing the two analyzed countries, it can be argued that the Slovak Republic, despite the increase in both indexes of dependency, have more favorable result than the Czech Republic.

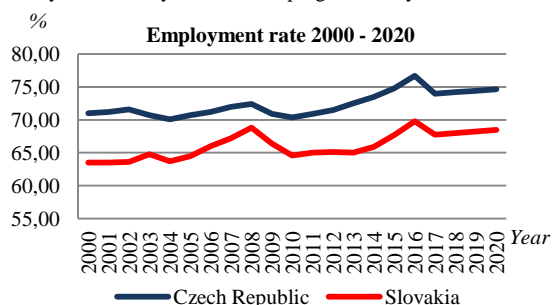
Table 1 Economic dependency ratio, Young age dependency ratio and Old age dependency ratio of Czech Republic and Slovakia from year 2000 to year 2015 and prognosis for 2020

Index	Country	2000	2005	2010	2015	2020
Economic dependency ratio	Czech republic	43,7	41,2	44,7	50,8	56,5
	Slovakia	45,3	41,2	39,3	42,3	47,3
Young age dependency ratio	Czech republic	23,9	21,5	21,3	23,2	25,0
	Slovakia	28,8	24,9	21,4	21,8	22,8
Old age dependency ratio	Czech republic	19,8	19,8	23,4	27,6	31,5
	Slovakia	16,6	16,4	17,8	20,5	24,4

Source: own calculation of authors based on Eurostat data

Figure 5 illustrates the progress and development of employment rates in the Czech Republic and in the Slovak Republic. This indicator has been monitored since 2000 with forecasts from 2017 to 2020. The indicators show that the employment rate in individual countries is very fluctuating. However, the forecast indicates a slight increase in employment compared to the current situation. It is also obvious that the employment rate in the Czech Republic is higher than that of the Slovak Republic.

Figure 5: Employment rate of Czech Republic and Slovakia from year 2000 to year 2016 and prognosis for years 2017 - 2020

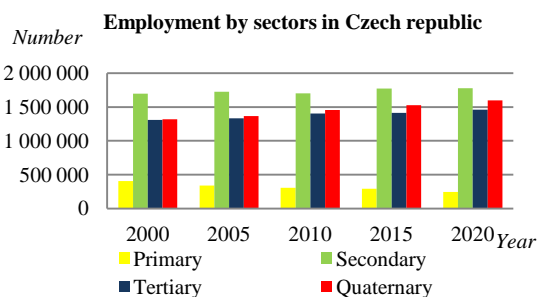


Source: own work of authors based on Eurostat data

Observing the development of the employment rate indicator, it is also necessary to monitor its sectoral distribution.

Figure 6 reflects the overview of the employment in sectors in the Czech Republic, together with the forecast for 2020. It can be seen from this picture that the dominant sector in the labor market is the secondary sector starting with industry. On the contrary, the primary sector is the least dominant sector in the Czech Republic, despite its assumption.

Figure 6: Employment by sectors of national economy in Czech Republic from year 2000 to year 2015 and prognosis for 2020



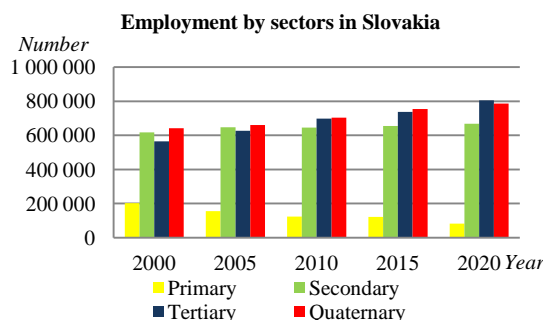
Source: own work of authors based on Czech statistical office

Regarding the development of sectoral employment in the Czech Republic, there is a gradual decline in employment in the primary sector and, on the contrary, a marked increase in employment in the secondary and tertiary sectors. From the perspective of forecasts, by 2020, there should be no significant change in sectoral employment, except for further employment

growth in the secondary and quaternary sectors, coupled with decrease in employment in the primary sector.

The development of employment by sectors in the Slovak Republic with a forecast for 2020 is processed in Figure 7. Looking at the scheme, as in the Czech Republic, we can observe the gradual reduction of the number of jobs in the primary sector of the national economy, while the secondary sector and the quaternary sector have an ever-increasing trend. The tertiary sector of the national economy, which includes of trade and services, maintains a relatively stable position. In terms of the forecast for 2020, Slovakia as well as the Czech Republic will achieve employment growth in the secondary and quaternary sectors of the national economy; on the contrary, in the primary sector, employment and therefore the number of employees should decrease again.

Figure 7: Employment by sectors of national economy in Slovakia from year 2000 to year 2015 and prognosis for 2020

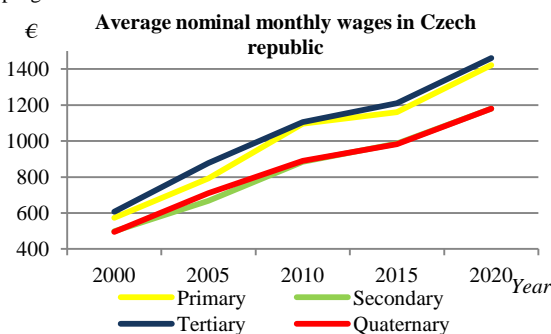


Source: own work of authors based on Statistical office of the Slovak republic

Another observed indicator in the sectors of the national economy is the average nominal monthly wages in the Czech Republic (Figure 8) and the Slovak Republic (Figure 9).

Development of average nominal monthly wages in the Czech Republic represent a gradual increase in income in all sectors of the national economy, with the highest average wage in the Czech Republic being in the tertiary sector, currently at the level of €1,250, while the lowest average nominal monthly wages is achieved by employees working in the quaternary sector; their average wage currently represents €850. From the perspective of the forecasts for 2020, the scheme indicates a sharp increase in revenues in all sectors of the Czech economy.

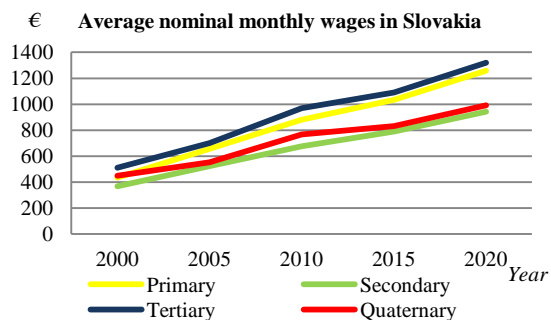
Figure 8: Average nominal monthly wages by sectors of national economy in Czech Republic from year 2000 to year 2015 and prognosis for 2020



Source: own work of authors based on Czech statistical office

Similarly, as in the Czech Republic, the level of wages achieved in Slovakia is increasing and this trend should continue until 2020. The highest level of income earned in Slovakia is achieved by workers in the tertiary sector, while the lowest level of income is achieved by the employed population in the secondary sector.

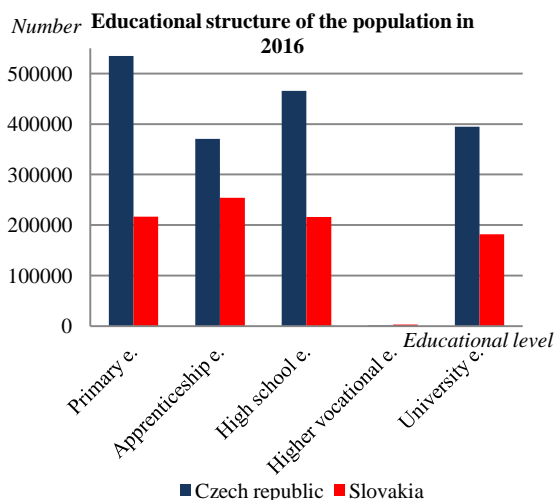
Figure 9: Average nominal monthly wages by sectors of national economy in Slovakia from year 2000 to year 2015 and prognosis for 2020



Source: own work of authors based on Statistical office of the Slovak republic

Between demography and the labor market is certainly linked to the educational structure of the population. We, therefore, processed the number of graduates in each degree of education in Figure 10. In the Czech Republic, the number of people with primary education prevails, while the number of graduates in higher vocational education in the Czech Republic is negligible. In the Slovak Republic, the number of people with the completed apprenticeship prevails. As in the Czech Republic, the number of citizens with higher vocational education is negligible.

Figure 10: Educational structure of the population of the Czech Republic and Slovakia in 2016



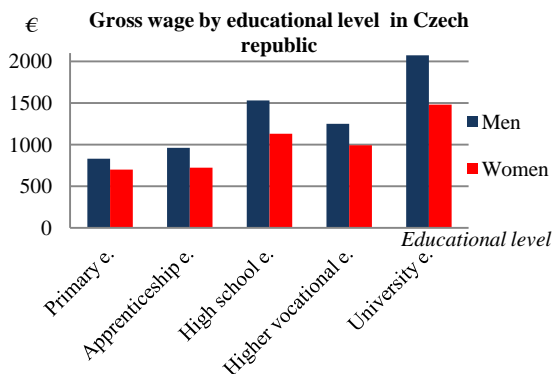
Source: own work of authors based on Statistical office of the Slovak republic and Czech statistical office

From the available data, we calculated the education index. The Education Index is calculated from the Mean years of schooling index and the Expected years of schooling index. (Human Development Reports, 2017) The education index of the monitored countries is 0.866 for the Czech Republic and 0.802 for the Slovak Republic.

As well as in the national economy also at the educational level, we have processed gross wage figures for the Czech Republic (Figure 11) and for the Slovakia (Figure 12).

From a general point of view, it can be stated that in the Czech Republic men are the better-paid employees than women. Under the conditions of the Czech Republic, the best wage valuation is obtained by graduates with the university education, while the lowest wage score is achieved by employees who are graduates with the primary education and with the apprenticeship education.

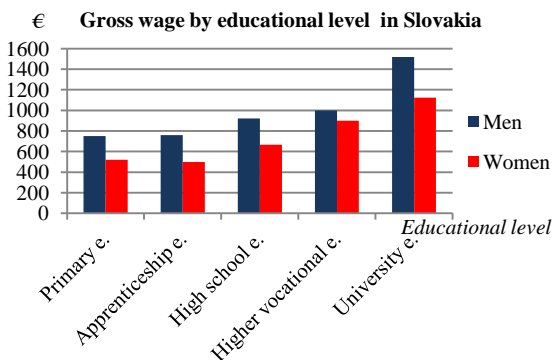
Figure 11 Gross wage by educational level in the Czech Republic in 2016 in €



Source: own work of authors based on Czech statistical office

Based on the statistical data obtained, men belong to the highest salaried workers unlike women, not only in the Czech Republic but also in the Slovak Republic. The highest wage rate for men in the Slovak Republic is achieved by university graduates, while the lowest wage score is reached by men with the highest level of education attained by the primary education. The highest wage for women in the Slovak Republic is achieved by university graduates as it is with men. The lowest wage evaluation is achieved by graduates with apprenticeship education.

Figure 12 Gross wage by educational level in Slovakia in 2016 in €



Source: own work of authors based on Statistical office of the Slovak republic

To assess the dynamics of structural changes in the labor market from a sectoral point of view, we chose the shift - share analysis method - the analysis of structural changes. The structural change analysis method can extract the competitive position of the regions from the economic context and points to the dynamics of the development or the lagging behind of the individual sectors of the national economy in the given region, at the national average, over a given period of time. The purpose of applying this method is therefore to assess the structural changes in the different sectors and countries in the period from 2000 to 2020, which is a forecast year.

When applying the method of structural change analysis, we implied measurement through the competitiveness effect, which shows whether in the given region, in our case in the country, the average change in employment for each sector of the national economy was higher than the average change in employment for the same sectors in both Czech and Slovak Republic.

Competitiveness Effect has the formula:

$$DIF = \sum_{E_{r0}}^{E_{r1}} * \left( \frac{E_{r1}}{E_{r0}} - \frac{E_{n1}}{E_{n0}} \right) \tag{4}$$

Table 2 interprets the results of the structural change analysis in the Czech Republic and in the Slovak Republic.

Table 2: Results of shift-share analysis

	Czech republic	Slovakia
Primary sector	-0,0099	-0,0233
Secondary sector	0,0042	0,0099
Tertiary sector	0,0325	0,0758
Quaternary sector	0,0009	0,0021

Source: own calculation of authors based on Statistical office of the Slovak republic and Czech statistical office

In the Czech Republic, the average change in employment in the primary sector was lower than the average change in employment of the sector in both the Czech Republic and the Slovak Republic. Similar changes occurred in the Slovak Republic, where the average change in employment in the primary sector was lower than the average change in employment in both countries in aggregate. This phenomenon arises by a persistent drop in the number of workers in the primary sector. In the end, employment decline in individual sectors of the national economy can only be seen as a decline in jobs in the primary sector only.

Concerning employment in other sectors of the national economy, there have been less significant changes, but have been reflected in employment growth. In the tertiary sector, the average employment rate has risen to the highest. This phenomenon can be explained by the fact that the sectors of the tertiary sector are the leading industries in the Czech and Slovak Republics providing the largest number of jobs. We also designate them as competitive industries. If we were to return to the primary sector, there was a significant reduction in employment, which naturally also indicates the loss of competitiveness of sectors such as agriculture and forestry that belong to this sector.

The shift-share analysis results suggest that countries such as the Czech Republic and the Slovak Republic with their potential for the primary sector change their orientation towards the tertiary and quaternary sectors where the so-called soft sectors - trade and services. In this sense, it will be very interesting to look at the changes that occur in the field of income generation as it is obvious that the lower-wage sector's primary sector produces lower wages. The decline in the labor force in the primary sector can be explained differently, whether in view of the shortage of workers in the labor market in general, in terms of their qualifications or in terms of the demanding and wage valuation of their work. Of course, this phenomenon may have several reasons that are not directly related to the labor market, but to the EU's common agricultural policy or to the protection of the environment.

Wage or income is one of the key factors in the labor market, which affects many others, not only economic and demographic indicators. The existence of income inequality is a common occurrence in every society.

The need to measure income inequality in comparison of labor market disparities results from the assessment of the level of income achieved by employees in individual sectors of the national economy in the Czech and Slovak Republics. Due to current demographic trends such as population aging, gradual increase in employment, educational attainment, or economic burden, there are changes affecting the overall quality of life of individuals. One of the basic indicators of quality of life is income. Previous surveys show that the pensions of the population of the Czech Republic and the Slovak Republic are gradually rising, reaching the maximum by 2020. Another very important factor in the changes in the labor market is the change in sectoral employment and the shift of employees from lower salaries to higher. Sectoral employment changes arise from gradual job liberalization due to demographic trends, such as migration, retirement age, but also economic trends such as increasing demands for living standards or innovations.

To measure income differentiation, we chose the Gini coefficient method.

$$G = \frac{\sum_{i=1}^Y [M_i(h) - M_i(d)] * k_{(p_i)} * [1 - k_{(p_i)}]}{\sum_{i=1}^{Y-1} [M_i(h) - M_i(d)] * [1 - k_{(p_i)}]} \quad (5)$$

The coefficient ranges from 0 to 1, with the value 0 representing absolute equality in the breakdown of pensions, and vice versa, the value of the coefficient approximating to 1 represents an increase in inequality in the distribution of income. The purpose of applying this method is to point out the income gaps achieved in individual sectors of the national economy.

Based on the above results, Table 3 shows that income inequality is relatively low, but has been growing steadily since 2000, reaching almost 0.29 in both countries by 2020. This means that, by 2020, the disparities in earnings should be gradually worsened.

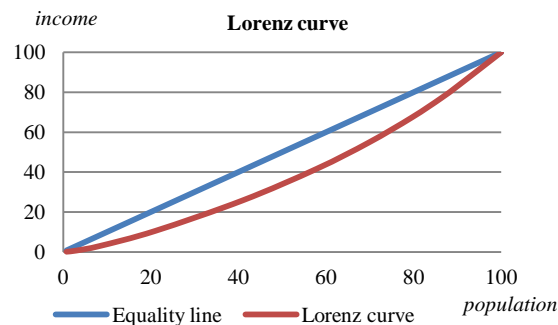
Table 3 Gini coefficient in Czech Republic and Slovakia

	2000	2020
Czech republic	0,239	0,289
Slovakia	0,248	0,284

Source: own calculation of authors based on Statistical office of the Slovak republic and Czech statistical office

The Lorenz curve points to the fact that the 70% of population of Czech Republic and Slovakia own together 50% of the total state wealth. (Figure 13).

Graf 13 Lorenz curve of Czech Republic and Slovakia



Source: own calculation of authors based on Statistical office of the Slovak republic and Czech statistical office

### 3 Conclusion

One of the biggest problems that can be encountered on the labor market in the Czech Republic and the Slovak Republic is the lack of workforce. The number of employers facing this shortage is unstoppable. We can now argue with certainty that this negative trend will cause cracks in all branches of the national economy by constantly deepening it. Fewer and fewer job seekers will respond to job offers, which will put pressure on wage increases. Potential rescue for this unfavorable situation may be, for example, "labor migration", but it still does not have to eliminate the damage caused by unfavorable demographic developments. It is also necessary to consider voluntary unemployment, changes in sectoral employment, the development of wages in individual sectors of the national economy, permanent emigration, or a rapid increase in university graduates. Given the potential of these countries, we pose the greatest threat to the primary and secondary sectors.

An increase in the number of post-productive populations from the total population will cause a significant drop in the labor force accompanied by an increase in average age, resulting in a sharp increase in the economic burden on the population. Thus, an economically active resident will be increasingly economically inactive. A major problem will also be the increase in the number and share of older people in the economically active population. These will need to be considered, especially in

matters of economic governance and social security and healthcare.

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**Secondary Paper Section: AH, AO**