

Are Wages in Czech Education and Health Care Sectors the Same?

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Abstract. This paper deals with the development of wages in Czech education and health care sectors since the beginning of the global economic crisis to the present. Data for this research come from the official website of the Czech Statistical Office and they include employees of the Czech Republic. The variable surveyed is the gross nominal monthly wage of the employee. Capturing development in wage levels in these two sectors, including a comparison with two the best-paid and two the worst-paid sectors, is the main objective of this study, as the issue concerning wage in education and health care sectors is a frequently debated topic in the Czech Republic. Depiction of the development of wage differentiation and diversification characteristics in Czech education and health care sectors is no less important objective of this research. Data from the CSO include employees in the business and non-business sphere in the Czech Republic. The wage is paid to the employee for the work done in the private (business) sphere, the salary in the budget (state, public, non-business) sector. In terms of data presented on the CSO website, wages in the business sector and salaries in the non-business sector are below the wage term.

Keywords: Gross Monthly Wage, Average Wage, Median Wage, Gini Coefficient, Wage Diversification, Wage Differentiation.

1 Introduction

The situation regarding wages in education and health care sectors is very often discussed in the Czech Republic, as a large proportion of employees with tertiary education is employed here, but wages are relatively low compared to other sectors where people with completed university education are employed predominantly. The trend that people have dropped out their branch after graduation from Faculty of Education and run somewhere else because of low wages, is a relatively frequent phenomenon in the Czech Republic during the last period.

Education and health care sectors attract the attention of number of experts and scientists due to low wages in these two sectors of the Czech economy, where comparison with other countries being offered here. Comparison with other sectors is offered, too. For example, [2] treats the sector of employment as endogenous and

control for selectivity in the wage equations. There was found that wages of women in the private sector do not increase with experience or schooling. However, wages of men in the private sector increase with experience at a higher rate than in the public sector and increase with higher education at comparable rates in both sectors. [6] measures and decomposes the differences in earning distributions between public sector and private sector employees in Germany for the years 1984–2001. [5] states that quantile regression estimates of returns to education are used to address the relation between schooling and wage inequality. Empirical evidence for male workers from 16 countries for the mid-1990s suggests a robust stylised fact: Returns to schooling are higher for the more skilled individuals, conditional on their observable characteristics. [8] shows that the real wage rate for the unskilled workers has continued to fall. Factor share equations for skilled and unskilled labour are estimated, which show the rise in skilled wages leading to substitution to unskilled labour but no rise in the share of skilled labour in income. [7] deals with public sector wages and private sector in Latin America.

This paper focuses on research of wage development in Czech education and health care sectors since the beginning of the global economic crisis to the present. The aim is to capture the level and the differentiation of wages. A comparison of the wage levels in education and health care sectors with wage levels of two the best-paid sectors and of two the worst-paid sectors in the Czech economy is a part of this study.

Although the beginning of the global economic crisis can be dated to the autumn of 2008, so the consequences of its accession were economically manifested especially in 2009, when the Czech economy recorded a decline of 4.8 % as result of the global economic recession. For this reason, the study covers the period 2009–2017. The education and health care sectors are recently the most discussed sectors of the Czech economy with regard to the level of wages in these sectors in relation to the level of education of the majority of employees in both these sectors.

2 Data Base

Data for this research come from the official website of the Czech Statistical Office (CSO). There are annual data in the form of an interval frequency distribution with extreme open intervals. The researched variable is the gross (nominal) monthly wage in CZK. Employees of the Czech Republic represent the statistical units surveyed.

Data from the CSO include employees in the business and non-business sphere in the Czech Republic. The wage is paid to the employee for the work done in the private (business) sphere, the salary in the budget (state, public, non-business) sector. In general, salaries in the non-business sphere are much more nivelised than wages in the business sphere, where very high wage variability exists. In terms of data presented on the CSO website, wages in the business sector and salaries in the non-business sector are below the wage term.




Abbreviated (modified) names of the analysed sectors are used in the following text (figures and tables). The exact names according to the official CSO website and abbreviated (modified) names of the analysed sectors are presented in Table 1.

Table 1. Exact and abbreviated (modified) names of the sectors analysed [1].

Exact name	Modified name
Education	Education system
Human health and social work activities	Health service
Financial and insurance activities	Finance and insurance
Information and communication	Informatics and communications
Accommodation and food service activities	Accommodation activities
Administrative and support service activities	Administrative activities

3 Theory and Methods

Simple descriptive characteristics are used to characterize the development of the empirical distribution of the gross monthly wage since 2009, see [4]. The Gini coefficient was used to characterize the development of the diversification of wage distribution of education and health care sectors in the given period.

The Gini coefficient is related to the famous Lorenz curve (see Fig. 1), which is indicated in bold here (including its two extreme alternative shapes in cases of both zero and maximum possible diversification). The Lorenz curve is plotted in a rectangular chart with two scales from zero to a hundred percent. Cumulative relative frequencies (in percentages of units) representing the research variable are on the horizontal coordinate axis. Employees represent the gross monthly wage variable in this case. Cumulative totals of the concentrated variable (in percentages) are located on the axis of ordinates, gross monthly wage being the concentrated variable in this case. Cumulative relative frequencies of units and their corresponding cumulative totals of the concentrated variable thus represent the coordinates of points on the Lorenz curve. The curve merges with the diagonal of the graph in the case of zero diversification, when the same proportion of the total sum of values of the research variable relates to each unit. This would be the case of all employees having the same gross monthly wage. The more the Lorenz curve bends, the higher is the diversification of the research variable, i.e. the concentration of a considerably large part of the total sum of variable values in a small number of statistical units. The highest diversification occurs when the total sum of values of the variable is concentrated into just a single unit. The Gini diversification coefficient is the ratio of the area content that defines the diagonal of the graph and the Lorenz curve, which indicates  (λ) in Fig. 1, and the content of the total area of the triangle below the diagonal, which is indicated by an area of  +  ($\lambda + \omega$) in Fig. 1

$$G = \frac{\lambda}{\lambda + \omega}. \quad (1)$$

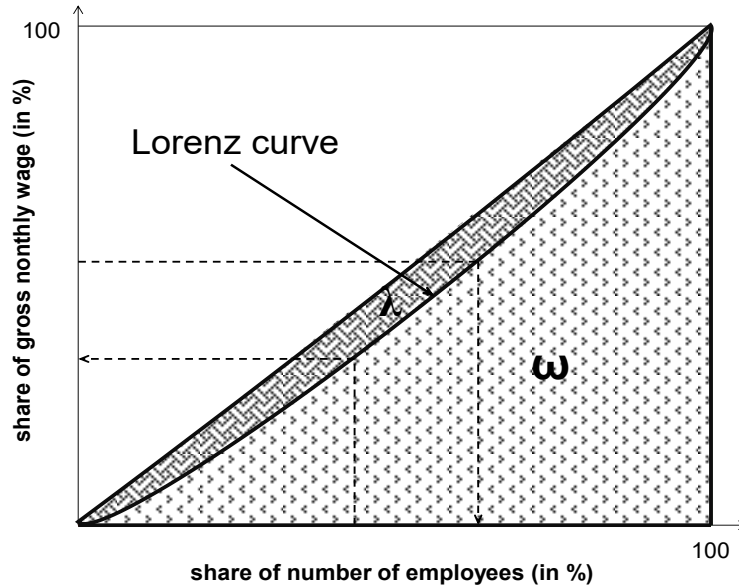


Fig. 1. Lorenz curve [3].

The value of the Gini coefficient after multiplying by one hundred thus ranges from zero to one hundred percent; i.e. from extreme levelling (zero diversification), where all employees have the same wage, to extreme diversification (maximum possible concentration), where the whole wage belongs to one employee.

4 Results and Discussion

Figure 2 represents the development of the wage level in education and health care sectors. We can see from this figure that the wage level is approximately the same in both sectors analysed. Figure 3 is related to Fig. 2. Both these figures show a significant rise in wages in the education sector in 2011, which is probably due to a significant increase in wages especially for young teachers at the beginning of 2011. We observe the annual growth rate of average wage in the education sector of 8.57 % in 2011 and in median wage even 11.4 %.

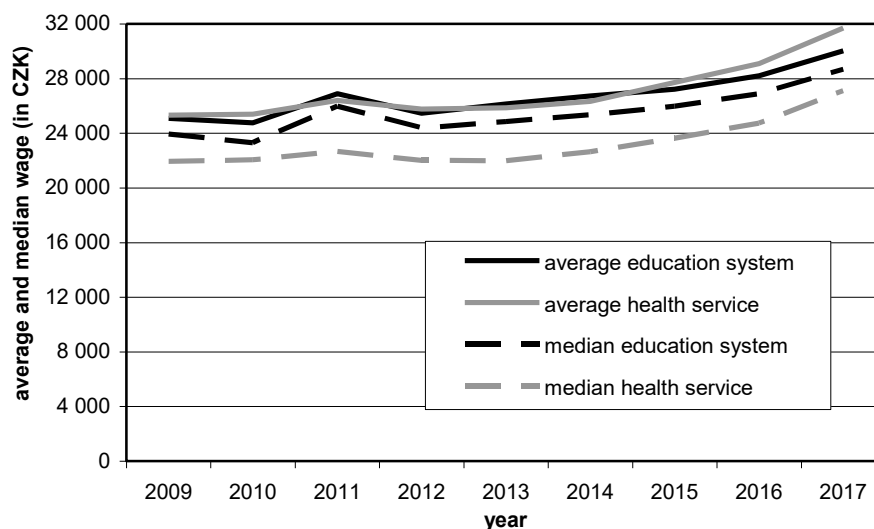


Fig. 2. Development of average and median wage (in CZK) in education and health care sectors.

Similarly, we are seeing a certain boom in the wage level in 2011 for the health care sector, although this is not as significant as in education. This situation was probably caused by a significant wage increase of medical doctors of nearly 15 %. However, this figure applies only to the public health care sector, i.e. to medical doctors paid by the Ministry of Health, regions, municipalities and towns and other authorities, and it covered only about 12 thousand medical doctors, therefore the overall wage level shift in this sector in 2011 is not extremely significant. The year 2012 was absolutely the opposite for both sectors analysed, with the wage levels declining more strongly in the education sector than in the health care sector.

Since 2013, the wage level in both sectors has been rising more rapidly, with exception of a slight drop in median wage in the health care sector in 2013.

Figures 4–7 enable a comparison of the development of average wage in education and health care sectors with the development of average wage in two the best-paid sectors (sector of finance and insurance and sector of informatics and communications) and in two the worst-paid sectors (sector of accommodation activities and sector of administrative activities).

The values in Table 2, which represent the average annual growth rate of the average and median gross monthly wages in the period of global economic crisis (2009–2013), in the period past the global economic crisis (2013–2017), during the whole period of research (2009–2017) and supposed average annual growth rate of the average and median gross monthly wages in the period (2017–2020), are indicative of the conclusions in Fig. 2 and 3, too. We can observe only a slight average annual increase in wage levels during the world economic crisis, which is still mitigated by 2011 for both sectors. Only the average annual growth rate of the

average gross monthly wage in the education sector exceeds 1 %. In the period following the global economic crisis, the wage level is rising mainly in the health care sector, where average annual growth rates of both average and median gross monthly wages do not fall below 5 %. From the education sector's point of view, wage level growth is slower, and the annual growth rates of both average and median gross monthly wages do not fall below 3.5 %. We are cautious in terms of view of average annual wage growth rate for future three years in terms of both sectors analysed.

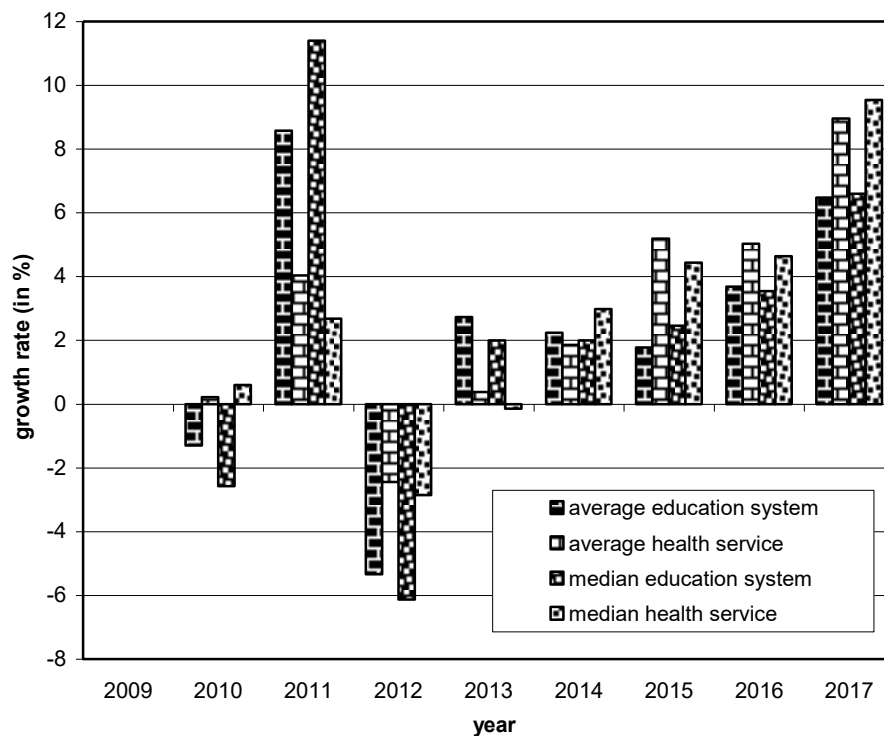


Fig. 3. Development growth rate of average and median wage (in percentages) in education and health care sectors.

Figure 8 provides a certain idea of the development of the absolute and relative variability characteristics in both sectors analysed, including the projected trend by 2020. It is clear from this figure that wages in the health care sector are much more variable than in the education sector in terms of both absolute variability and relative variability.

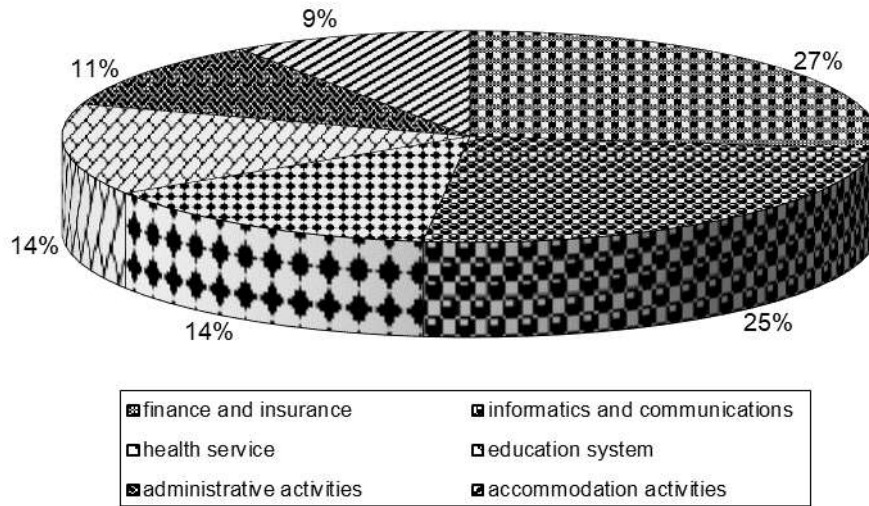


Fig. 4. Comparison of average wage in education and health care sectors with average wage in the best-paid and the worst-paid sectors in 2009.

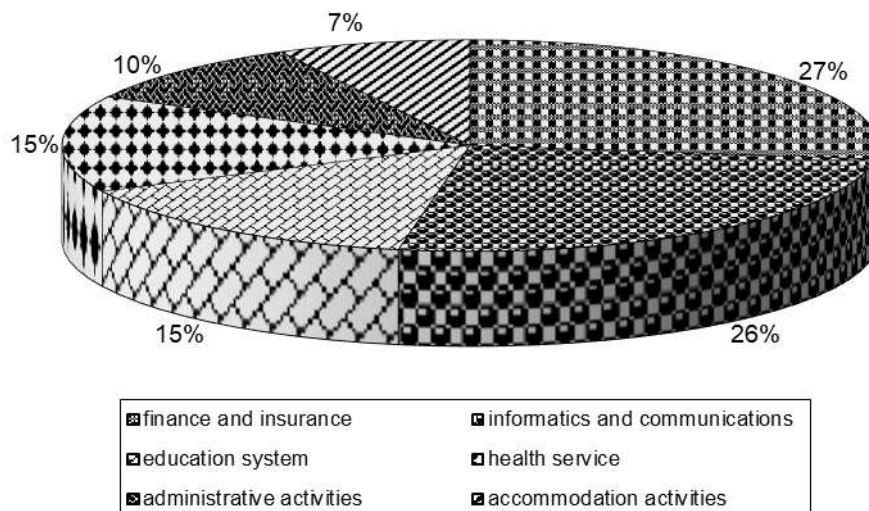


Fig. 5. Comparison of average wage in education and health care sectors with average wage in the best-paid and the worst-paid sectors in 2011.

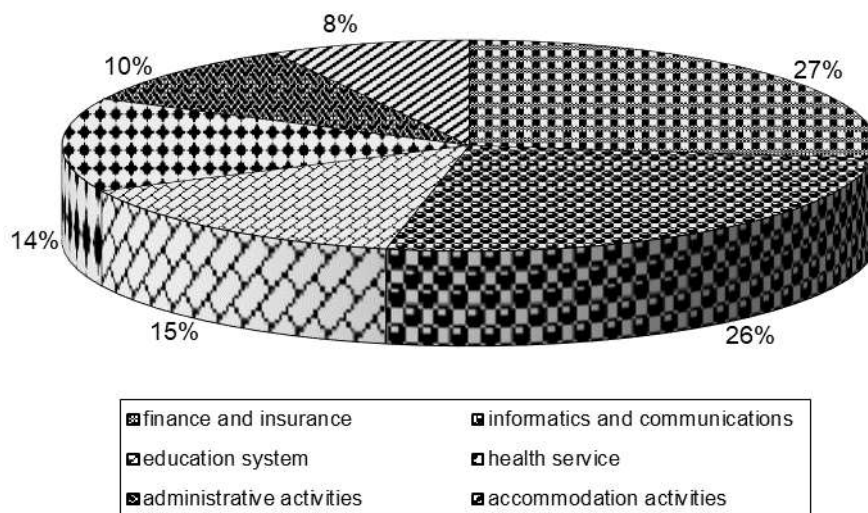


Fig. 6. Comparison of average wage in education and health care sectors with average wage in the best-paid and the worst-paid sectors in 2014.

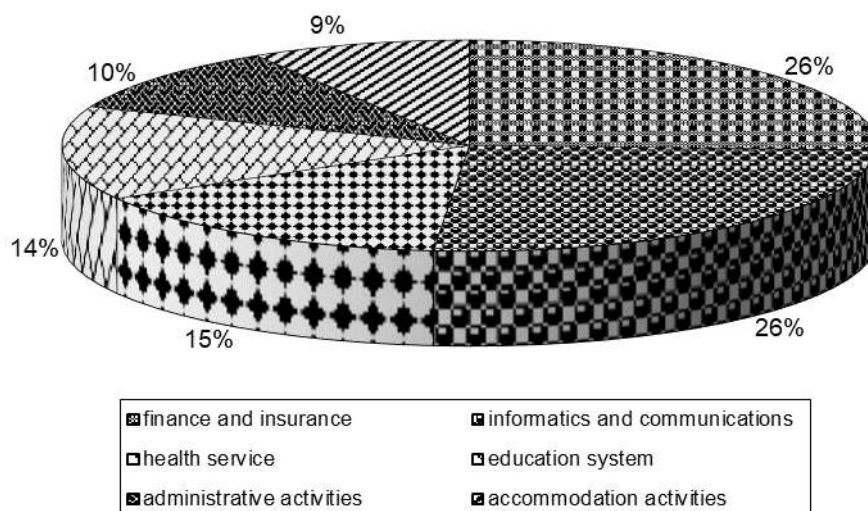


Fig. 7. Comparison of average wage in education and health care sectors with average wage in the best-paid and the worst-paid sectors in 2017.

Table 2. Average annual increase (in percentages) of the average and median gross monthly wage.

Period	Education sector		Health care sector	
	Average	Median	Average	Median
Ø 2009–2013	1.04	0.96	0.52	0.05
Ø 2013–2017	3.53	3.63	5.23	5.37
Ø 2009–2017	2.27	2.29	2.85	2.68
Ø 2017–2020	1.99	1.77	3.39	3.33

Wage standard deviation is a characteristic of absolute wage variability, and this represents the quadratic mean of all wage deviations of individual employees from their arithmetic wage mean. It therefore represents the extent to which wages of individual employees on average differ from their arithmetic mean. The characteristics of absolute wage variability tend to grow with wage level growth. This is reason, it is recommended to use the relative variability characteristics. The variation coefficient is a characteristic of the relative variability, and it is the ratio of the wage standard deviation and the arithmetic mean of wages. This determines, after multiplying by hundred, from what percentages the wage standard deviation participates in the wage arithmetic mean. The coefficient of variation is not defined for the case of the arithmetic mean equal to the zero, but the situation cannot be set in area of wages. Absolute wage variability has a growing tendency in terms of both sectors, which can be expected to be in line with wage level growth, while relative wage variability varies with both sectors analysed, see Fig. 8.

Figure 9 provides an idea of the development of wage diversification in both sectors under consideration, including projected developments until 2020.

The greater the value of Gini coefficient is closer to zero percent, the wage distribution of employees comes to be absolutely egalitarian, i.e. the value of the Gini coefficient equal to zero percent theoretically becomes at extreme nivelisation. The values of Gini coefficient close to 100 percent point out to a state of absolute inequality in employee wages, i.e. the value of the Gini coefficient equal to 100 percent theoretically occurs extreme diversification, where the whole wage belongs to one employee. However, the Gini coefficient values in the extremes of that interval are not achievable in the real world, because in the real world, individuals earning more on one side and individuals earning less on the other side will always exist.

It is clear from Fig. 9 that wages in the health care sector are somewhat more diversified than in the education sector except of 2014. We expect significantly greater wage diversification in the health care sector than in the education sector with a decreasing trend in both sectors in the future.

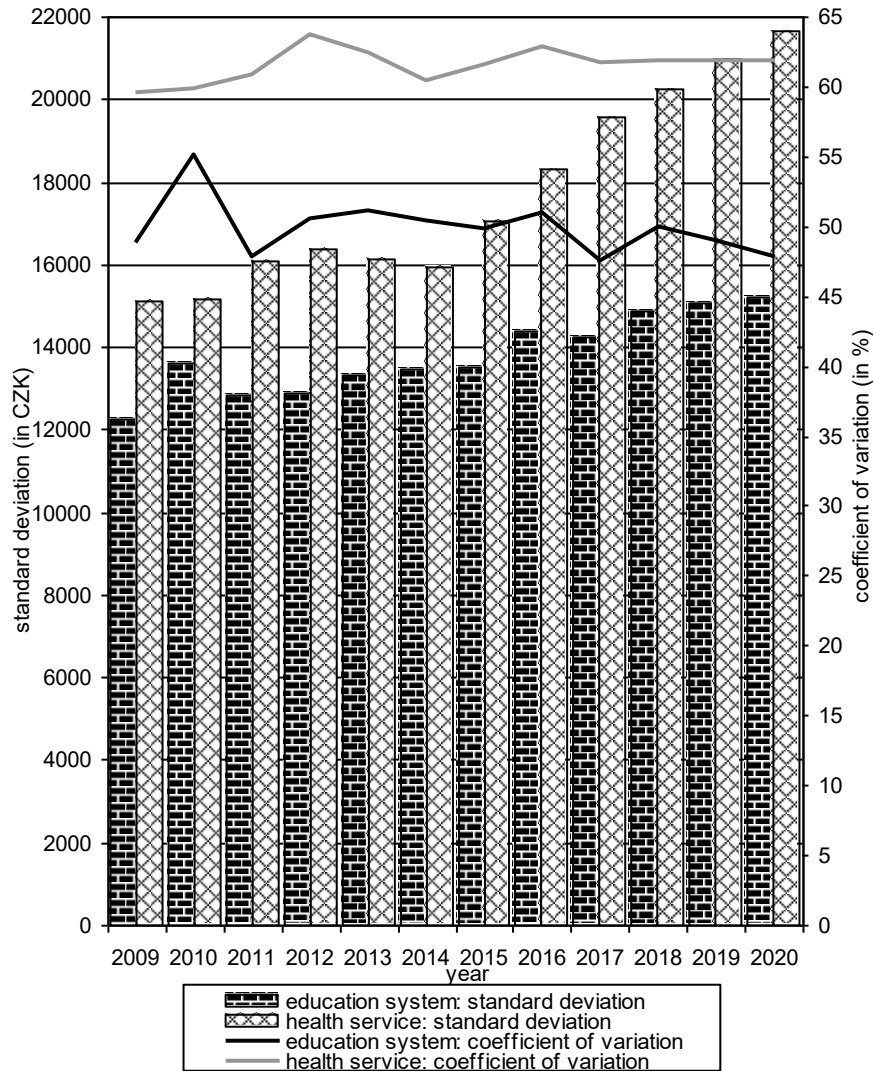


Fig. 8. Development of characteristics of absolute and relative variability (standard deviation in CZK and coefficient of variation in percentages) of gross monthly wage in education and health care sectors, including predictions to 2020.

5 Conclusion

We can conclude that wages in the education and health care sectors are relatively similar. Wages in Czech education and health care sectors currently rise the fastest since the beginning of the global economic crisis, especially in the health care sector.

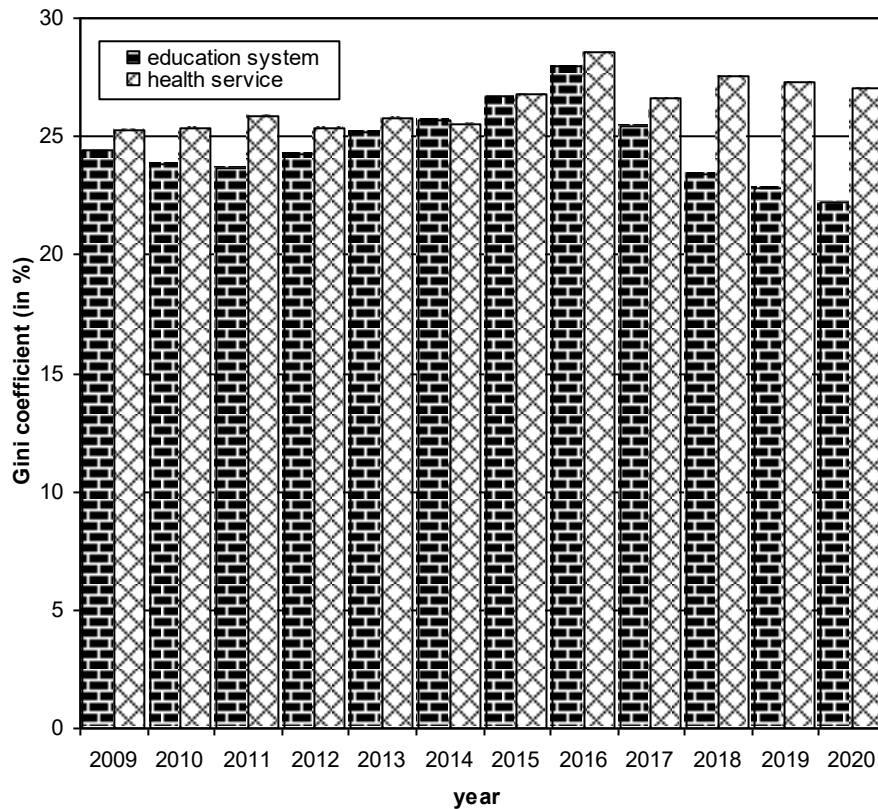


Fig. 9. Development of Gini coefficient (in percentages) of gross monthly wage in education and health care sectors, including predictions to 2020.

The average gross monthly wage in the health care sector grew by 8.96 % per year in 2017 and the median gross monthly wage even by 9.54 %. The average gross monthly wage in the education sector grew by 6.48 % per year in 2017 and the median gross monthly wage even by 6.60 %. The exception is only a certain leap in wage developments during the global economic crisis in 2011, which was more pronounced in the education sector than in the health care sector, which is mainly due to a significant increase in wages mainly for young teachers at the beginning of 2011. In the health care sector, there has been also a significant increase in the wages of medical doctors by almost of 15 % in 2011. However, this figure applies only to public health care and it covers approximately only 12 thousand medical doctors. Therefore, the overall increase in wage level in this sector is not extremely significant in 2011. When comparing the wage levels of the education and health care sectors with two the best-paid sectors and two the worst-paid sectors in the Czech economy, the median gross monthly wage in the education sector is higher than the median gross monthly wage in the health care sector throughout the monitored period. In terms of average wage, however, the situation is different and the average gross

monthly wage in the education sector is higher than the average gross monthly wage in the health care sector in 2011, when a significant increase in wages mainly for young teachers became, and in 2014, after the end of the global economic crisis. At the beginning of the global economic crisis and at the end of the monitored period, the average gross monthly wage in the education sector is lower than in the health care sector. Both the average and median gross monthly wages in the education and health care sectors are significantly lower compared with two the best-paid sectors in the Czech economy (finance and insurance sector and informatics and communications sector), while the difference from two the worst-paid sectors is not so remarkable.

For the future, it is necessary to attract young teachers to education sector so that they do not run out of this sector either right after graduating from the Faculty of Education or after starting a family due to lack of finances. The same can be said from the point of view of nurses. Young doctors usually do not come from their sector, but abroad. However, if they graduate for state money in the Czech Republic, they would be bound to work a certain number of years in the Czech health service or to return tuition fees.

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