

# WAGES AND SALARIES OF CZECHS AND SLOVAKS AFTER TEN YEARS SINCE THE SPLIT OF CZECHOSLOVAKIA

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## Abstract

This paper deals with the development of wage distribution by gender in the Czech and Slovak Republics in the years 2005–2012. Special attention is given to the changing in the behavior of the wage distribution in relation to the onset of the global economic recession. The different behavior of the wage distribution of Czech and Slovak employees during the period is the subject of research. The article discusses the differences in the wage level between men and women in the Czech and Slovak Republics. There are the total wage distributions of men and women together, both in the Czech Republic and in the Slovak Republic on the one hand, and wage distributions according to the gender separately for men and for women on the other hand. Special attention was paid to the development of Gini coefficient of the concentration in both countries according to the gender in the period under review, too.

**Key words:** Wage distribution according to the gender, financial crisis, wages of Czech and Slovak employees, Gini coefficient of concentration, forecasts of wage distribution

**JEL Code:** J31, G01, E24

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## Introduction

Development of employee wage of Czech and Slovak Republics in the last two decades requires us to pay more attention to the issues of their differentiation in the research. This leads to strong changes in this area. Wage structure of the population changes, the level and differentiation grow. Groups of people with very high wages arise here and they are gradually becoming more pronounced. In the research of wage differentiation it is not enough to focus only on the assessment of the current situation and forecast future development based on the average wage broken down by different socio-economic, time-spatial and demographic

considerations, but it is helpful to move from the level characteristics to the whole of frequency distribution.

Considerable attention is paid to the wage and income distribution in the statistical literature. A number of authors in the Czech and Slovak Republics dealt with the analysis of wage and income distribution (Bílková, 2012), (Bílková, 2012), (Marek, 2010), (Marek, 2013), (Marek & Vrabec, 2013) or (Marek & Vrabec, 2014). Many other methods may be used when analyzing economic data and also in the analysis of wage distribution (Löster & Pavelka, 2013), (Malec & Malec, 2013), (Pivoňka & Löster, 2013) or (Řezanková & Löster, 2013). The development of a wide range of other indicators of the national economy is related to the development of the wage (Löster & Langhamrová, 2011) or (Löster & Langhamrová, 2012).

The theoretical nature of the methods used in this article is not described here. Used descriptive characteristics of the wage distribution are explained for example in (Triola, 2003). Three-parametric lognormal curves are the basic model distribution. The nature of lognormal curves is explained for example in (Bílková, 2012). Method of L-moments was used when estimating the parameters of these curves, see (Hosking & Wales, 1997) or (Kyselý & Pícek, 2007).

## 1 Database

Processed data come from the official website of the Czech Statistical Office and of the Statistical Office of the Slovak Republic. There are the data in the form of the interval frequency distribution with open extreme intervals. The researched variable is the gross monthly wage in EUR. Conversion of CZK to EUR and SKK to EUR (2005–2008) was made using the exchange rate to half of that calendar year, see Table 1.

**Tab. 1: Exchange rates in the middle of a calendar year**

Exchange rate	On							
	July 1, 2005	June 30, 2006	June 29, 2007	July 1, 2008	July 1, 2009	July 1, 2010	July 1, 2011	June 29, 2012
CZK/1 EUR	30.000	28.495	28.715	23.825	25.775	25.760	24.315	25.640
SKK/100CZK	78.153	74.302	85.360	78.902	–	–	–	–

Source: <http://www.cnb.cz>

Because the focus of research is the nominal wage, Table 2 presents the development of average annual rate of inflation in both countries during the period. Since the level of minimum wage markedly affects the wage distribution, Table 2 also provides an idea of the development of minimum wage in both states in the researched period.

**Tab. 2: Minimum wage (in EUR), unemployment rate (in %), average annual inflation rate (in %), gross domestic product at current prices calculated by income approach (in mil. EUR)**

Year	Czech Republic				Slovak Republic			
	Minimum wage	Unemployment rate	Inflation rate	Gross domestic product	Minimum wage	Unemployment rate	Inflation rate	Gross domestic product
2005	239.5	7.9	1.9	103,868.5	169.3 <sup>1</sup>	16.2	2.7	49,315.2
2006	265.7 <sup>2</sup>	7.1	2.5	117,655.7	179.9 <sup>4</sup>	13.3	4.5	55,081.9
	279.2 <sup>3</sup>							
2007	278.6	5.3	2.8	127,549.1	225.9 <sup>5</sup>	11.0	2.8	61,501.1
2008	335.8	4.4	6.3	161,528.3	268.3	9.6	4.6	66,842.3
2009	310.4	6.7	1.0	145,838.2	295.5	12.1	1.6	62,794.4
2010	310.6	7.3	1.5	147,161.5	307.7	14.4	1.0	65,869.5
2011	329.0	6.7	1.9	157,244.5	317.0	13.5	3.9	69,108.3
2012	312.0	7.0	3.3	149,997.1	327.2	14.0	3.6	71,463.0

Source: <http://www.czso.cz>, <http://portal.statistics.sk>, own research

**Fig. 1: Growth rate of gross domestic product at market prices (in %) in Czech Republic in period 2005–2012**

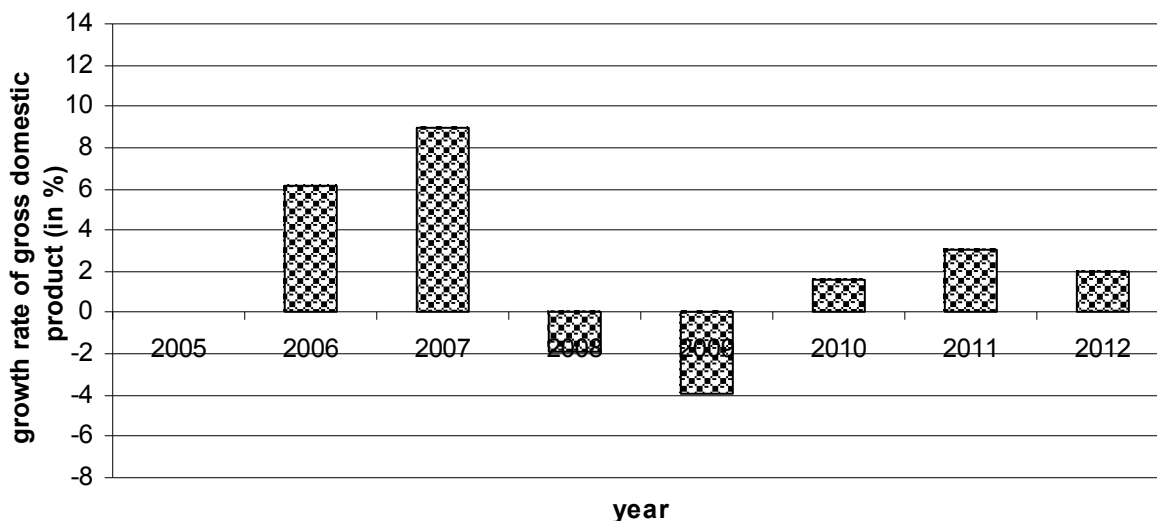
<sup>1</sup> from 1 October 2004 to 1 October 2005

<sup>2</sup> from 1 January 2006 to 30 June 2006

<sup>3</sup> from 1 July 2006 to 31 December 2006

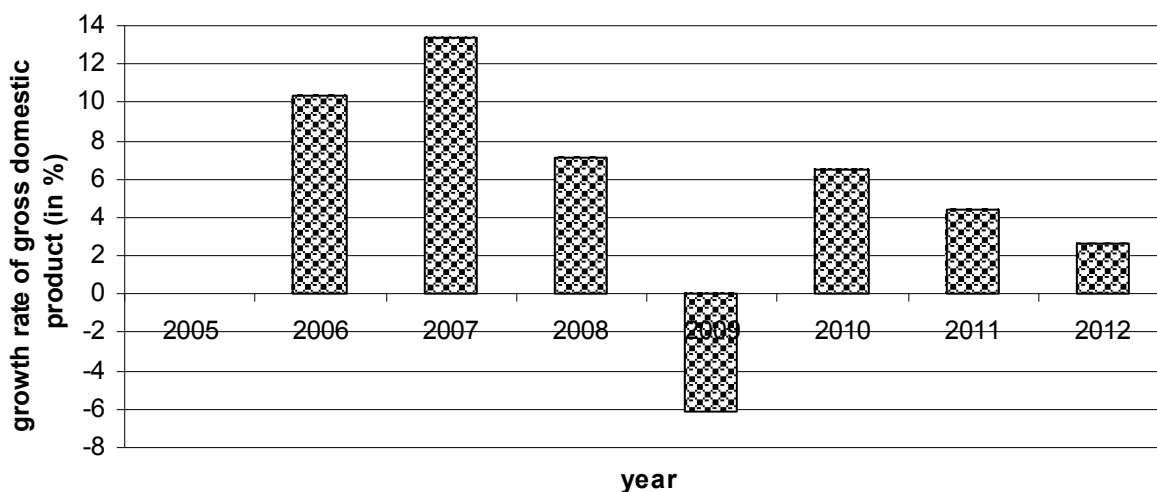
<sup>4</sup> from 1 October 2005 to 1 October 2006

<sup>5</sup> from 1 October 2006 to 1 October 2007



Source: <http://epp.eurostat.ec.europa.eu>

**Fig. 2: Growth rate of gross domestic product at market prices (in %) in Slovak Republic in period 2005–2012**



Source: <http://epp.eurostat.ec.europa.eu>

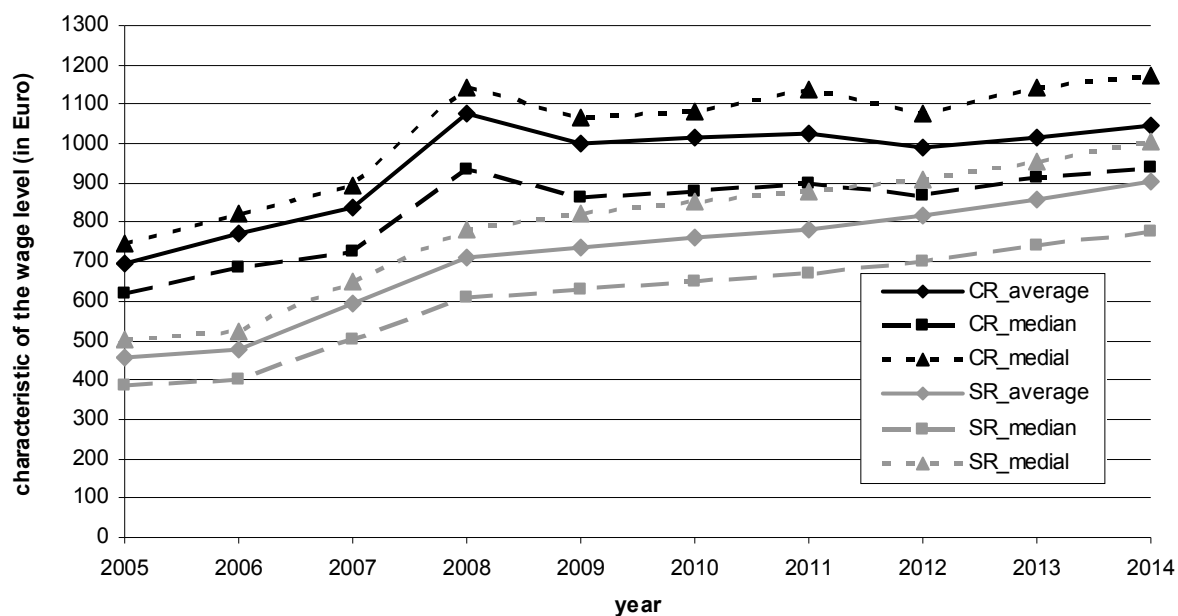
In 2013 the minimum wage is 312.0 EUR in the Czech Republic and 337.7 EUR in the Slovak Republic. As the wage development is strongly tied to the development of such indicators as unemployment rate and gross domestic product (GDP), Table 2 provides an overview of the development of these indicators for the comparison. Figures 1 and 2 show the growth rate of GDP in the period.

Data were processed using the spreadsheet Microsoft Excel and statistical program packages SAS and Statgraphics.

## 2 Comparison of the Development of Wage Level in the Czech and Slovak Republics

Figure 3 shows the development of location characteristics of total wage distribution (for men and women together) in the Czech and Slovak Republics in the researched period 2005–2012 including forecasts for 2013 and 2014. Figures 4 and 5 show the same thing, but for men and women separately. Tables 3 and 4 represents growth annual coefficients and average growth annual coefficients of the arithmetic mean, median and medial of gross monthly wage in the period 2005–2012 including the predictions for 2013 and 2014 in the Czech and Slovak Republics according to the gender.

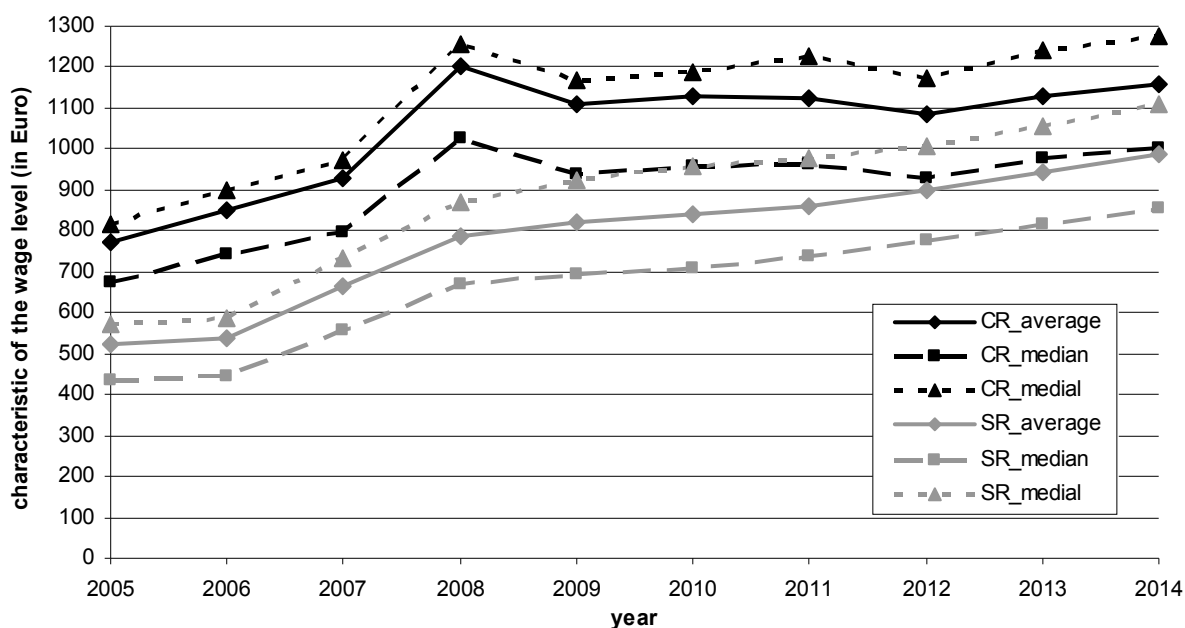
**Fig. 3: Development of location characteristics of wage distribution of Czech and Slovak employees (total set) between 2005 and 2012 including prediction for 2013 and 2014**



Source: Own research

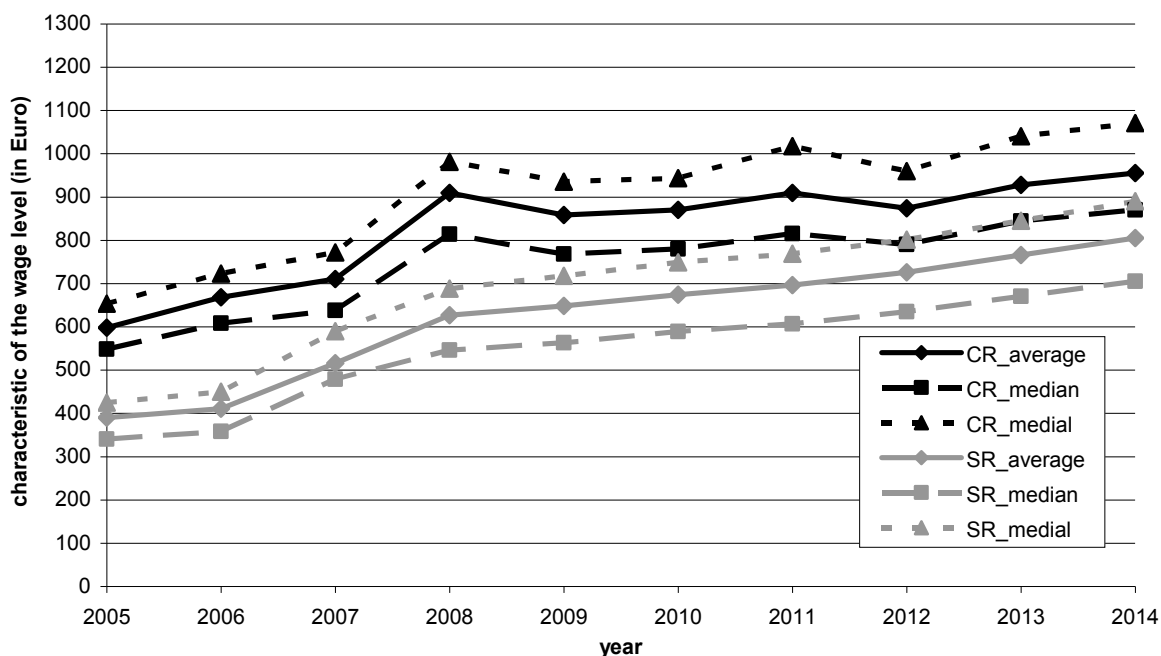
**Fig. 4: Development of location characteristics of wage distribution of Czech and Slovak employees (set of men) between 2005 and 2012 including prediction for 2013 and 2014**

2014



Source: Own research

**Fig. 5: Development of location characteristics of wage distribution of Czech and Slovak employees (set of women) between 2005 and 2012 including prediction for 2013 and 2014**



Source: Own research

Medial is such a characteristic of wage level that workers with wages less than or equal to medial get half of the total amount of wages and workers with wages greater than or equal to medial get the other half of the total amount of wages.

Comparison of the development of wage level between the Czech and Slovak Republics is interesting. While in the first year of the financial crisis in 2009 we record appreciable drop in the wage level in the Czech Republic, both in terms of total wage distribution for men and women together, and in terms of separate wage distribution individually for men and women, wages in the Slovak Republic in 2009 continue to grow, even though they are far below the growth rate before the financial crisis, see Figures 3–5 and Tables 3–4.

We can see a similar drop in the wage level in the Czech Republic in 2012, unlike the Slovak Republic, where wage increases in this year. We can say that wage growth in the Czech Republic has virtually stopped during the global economic crisis, while the Slovak wage also grows in the period of financial recession, in spite of they are far below the growth rate before the financial crisis. However, we must remember that it is a recalculation of CZK to EUR in terms of the Czech Republic, and therefore the results can be affected by exchange rate CZK/EUR. The same problem arises in terms of the Slovak Republic at the beginning of the researched period. However, it can be assumed that wage development is very closely tied to the development of gross domestic product. We can see from Figures 1 and 2 that the Slovak Republic evinces more positive development of GDP in 2010 of the financial crisis than the Czech Republic. Figures 3–5 also show a strongly higher wage level in the Czech Republic compared to the wage level in the Slovak Republic. The obtained results also show that although the development of wage level in the Czech Republic during the world economic crisis shows an average annual decline and the development of wage level in the Slovak Republic in this period shows an average annual growth, the level of nominal wage in the Slovak Republic is still markedly below the nominal wage in the Czech Republic now. However, Figure 6 shows that the difference between the wage level in the Czech Republic and in the Slovak Republic is decreasing with time.

**Tab. 3: Growth annual coefficients and average growth annual coefficients of arithmetic mean, median and medial of gross monthly wage in period 2005–2012 including predictions for 2013 and 2014 in Czech Republic according to gender**

Year	Total			Men			Women		
	Arithm. mean	Median	Medial	Arithm. mean	Median	Medial	Arithm. mean	Median	Medial
2005	–	–	–	–	–	–	–	–	–
2006	1.109	1.105	1.102	1.103	1.101	1.103	1.117	1.109	1.107
2007	1.083	1.063	1.084	1.095	1.070	1.081	1.063	1.049	1.068
2008	1.287	1.282	1.284	1.292	1.289	1.295	1.280	1.276	1.271
2009	0.929	0.925	0.932	0.923	0.914	0.928	0.944	0.943	0.953
2010	1.015	1.017	1.014	1.016	1.022	1.021	1.014	1.016	1.009
2011	1.012	1.023	1.050	0.995	1.006	1.030	1.045	1.045	1.078
2012	0.966	0.965	0.946	0.969	0.965	0.958	0.961	0.969	0.944
2013	1.026	1.053	1.062	1.038	1.048	1.056	1.062	1.068	1.083
2014	1.109	1.105	1.102	1.103	1.101	1.103	1.117	1.109	1.107
Ø 2005-08	1.156	1.146	1.153	1.160	1.149	1.156	1.150	1.141	1.145
Ø 2008-12	0.980	0.982	0.984	0.975	0.976	0.983	0.990	0.993	0.995
Ø 2005-12	1.052	1.049	1.053	1.050	1.047	1.054	1.056	1.054	1.057
Ø 2012-14	1.026	1.04	1.044	1.032	1.036	1.042	1.045	1.049	1.056
Ø 2005-14	1.046	1.047	1.051	1.046	1.044	1.051	1.053	1.053	1.057

Source: Own research

**Tab. 4: Growth annual coefficients and average growth annual coefficients of arithmetic mean, median and medial of gross monthly wage in period 2005–2012 including predictions for 2013 and 2014 in Slovak Republic according to gender**

Year	Total			Men			Women		
	Arithm. mean	Median	Medial	Arithm. mean	Median	Medial	Arithm. mean	Median	Medial
2005	–	–	–	–	–	–	–	–	–
2006	1.041	1.041	1.040	1.029	1.023	1.024	1.054	1.053	1.059
2007	1.243	1.251	1.244	1.236	1.251	1.245	1.255	1.338	1.311
2008	1.197	1.209	1.210	1.185	1.201	1.192	1.215	1.140	1.166
2009	1.038	1.035	1.050	1.039	1.034	1.060	1.033	1.031	1.044
2010	1.035	1.035	1.039	1.028	1.026	1.037	1.040	1.046	1.043
2011	1.028	1.031	1.026	1.024	1.035	1.020	1.033	1.031	1.027
2012	1.042	1.048	1.035	1.045	1.053	1.032	1.043	1.046	1.042
2013	1.051	1.053	1.053	1.047	1.050	1.051	1.055	1.055	1.055
2014	1.041	1.041	1.040	1.029	1.023	1.024	1.054	1.053	1.059

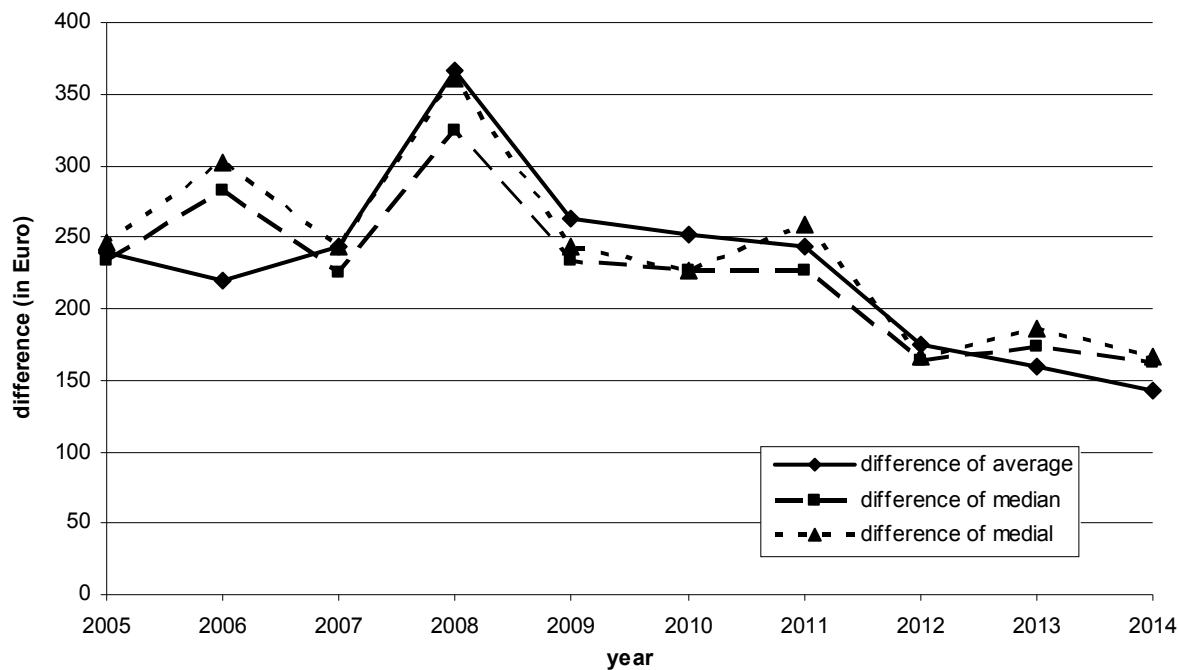


Ø 2005-08	1.157	1.164	1.161	1.146	1.154	1.150	1.171	1.171	1.174
Ø 2008-12	1.036	1.037	1.037	1.034	1.037	1.037	1.037	1.038	1.039
Ø 2005-12	1.086	1.089	1.089	1.081	1.086	1.084	1.093	1.093	1.095
Ø 2012-14	1.051	1.051	1.052	1.046	1.049	1.050	1.053	1.054	1.054
Ø 2005-14	1.078	1.081	1.08	1.073	1.077	1.076	1.084	1.084	1.086

Source: Own research

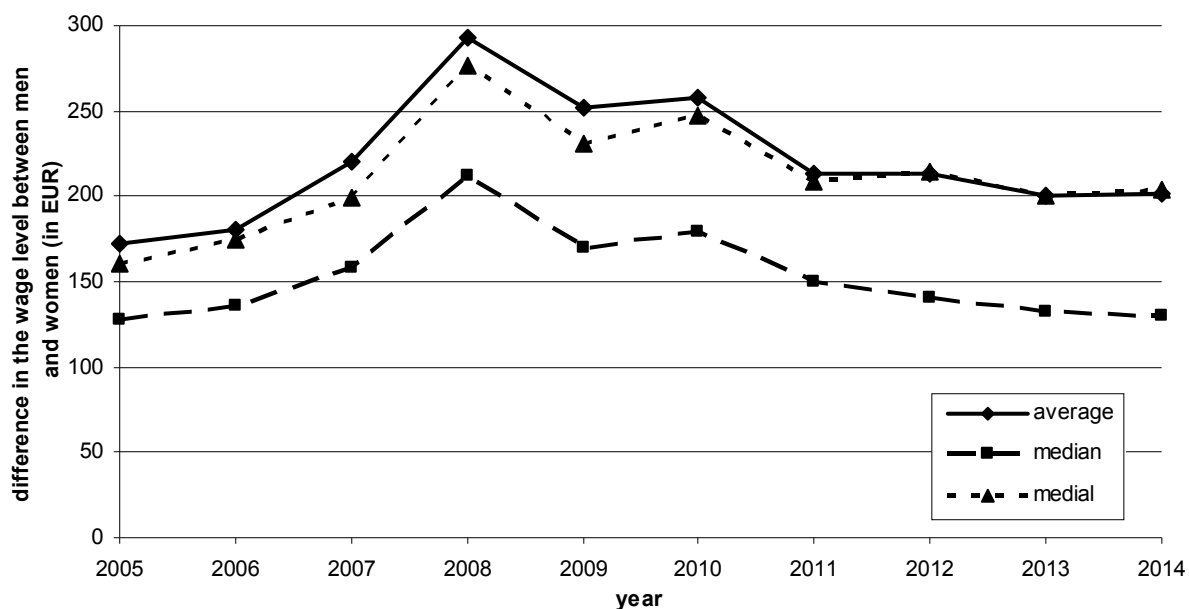
Figures 7 and 8 represent a different development of differences in wage levels between men and women in the Czech Republic and in the Slovak Republic. We can observe from these figures that while the difference in wage levels between men and women in the Czech Republic is on a downward trend since the beginning of the financial crisis, the difference of wage levels between men and women in the Slovak Republic has a growing tendency even in times of global financial crisis, which is likely related to the increase in the level of wages in the Slovak Republic during the crisis. Difference in wage levels between men and women is now approximately the same in the Czech and Slovak Republics, see Figures 7–8.

**Fig. 6: Differences of location characteristics of wage distribution between Czech and Slovak employees (total set) between 2005 and 2012 including prediction for 2013 and 2014**



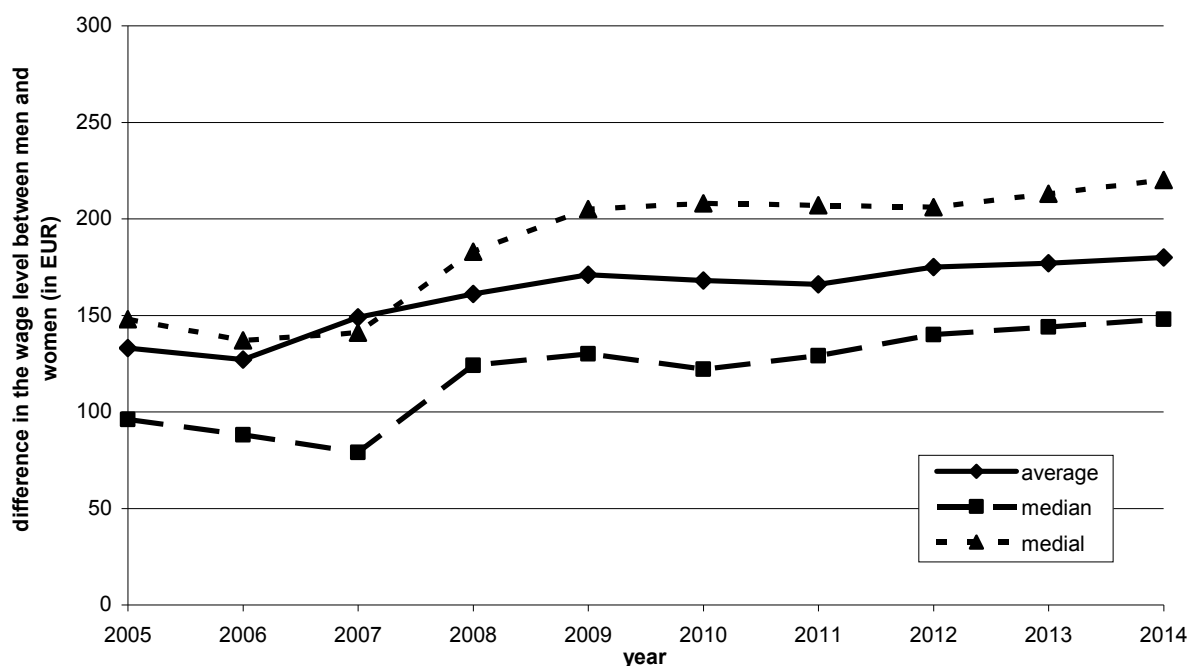
Source: Own research

**Fig. 7: Differences in wage level (in EUR) between Czech men and women employees in period 2005–2012 including prediction for 2013 and 2014**



Source: Own research

**Fig. 8: Differences in wage level (in EUR) between Slovak men and women employees in period 2005–2012 including prediction for 2013 and 2014**



Source: Own research

### 3 Development of Wage Differentiation, Skewness and Concentration

**Tab. 5: Development of sample characteristics of variation and skewness of gross monthly wage (standard deviation in EUR, coefficient of variation in % and moment measure of skewness without unit) of Czech employees in period 2005–2012 by gender**

Year	Men			Women		
	Standard deviation	Coefficient of variation	Moment skewness	Standard deviation	Coefficient of variation	Moment skewness
2005	390	50.65	2.052	306	51.17	0.877
2006	424	49.94	1.947	337	50.45	0.855
2007	564	60.65	2.868	408	57.46	1.914
2008	717	59.65	2.717	523	57.54	1.728
2009	675	60.81	2.673	490	57.11	1.721
2010	680	60.28	2.610	493	56.67	1.706
2011	717	63.90	2.426	519	57.10	1.777
2012	683	62.83	2.480	498	56.98	1.838

Source: Own research

**Tab. 6: Development of sample characteristics of variation and skewness of gross monthly wage (standard deviation in EUR, coefficient of variation in % and moment measure of skewness without unit) of Slovak employees in period 2005–2012 by gender**

Year	Men			Women		
	Standard deviation	Coefficient of variation	Moment skewness	Standard deviation	Coefficient of variation	Moment skewness
2005	347	66.35	2.630	227	58.21	2.626
2006	364	67.66	2.578	248	60.34	2.659
2007	431	64.81	2.408	306	59.30	2.465
2008	495	62.82	2.259	364	58.05	2.168
2009	517	63.13	2.182	373	57.56	2.047
2010	527	62.59	2.077	385	57.12	1.921
2011	527	61.14	2.042	393	56.47	1.885
2012	531	58.93	2.029	395	54.41	1.821

Source: Own research

Known characteristics of differentiation and skewness were used to descriptive the development of wage distributions of men and women in the Czech and Slovak Republics in the years 2005–2012, see Tables 5–6.

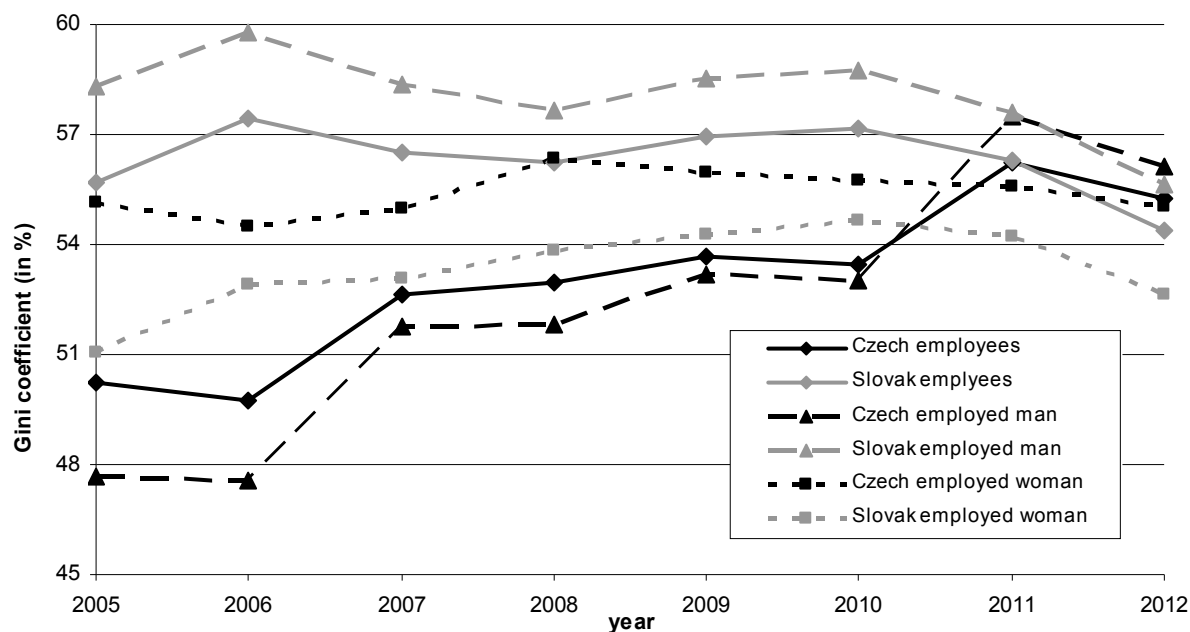
We observe an increasing absolute variability (standard deviation) of wages of Czech men and women in the period before the economic crisis, while the absolute variability of wages of Czech men and women rather fluctuates during the economic recession. Absolute variability of Slovak men and women grows all over the researched period.

Because the absolute variability of wages increases with the level of wages, the use of relative characteristic (coefficient of variation) of wages is useful in this regard. While relative variability of wages of men and women in the Czech Republic has rather a growing trend in all monitored period, the relative variability of wages of men and women in the Slovak Republic has rather a downward tendency in this period. This is evident from the results that the global economic crisis does not considerably affect the wage distributions in terms of their relative variability in the Czech and Slovak Republics. Tables 5–6 provide an overview of the development of moment measure of skewness of wage distributions, too.

We can observe again the different behavior of the wage distributions in terms of their concentration both, among the Czech and Slovak Republics, and between men and women in

both these countries, see Figure 9. While the concentration of total wage distribution in the Czech Republic for men and women together gradually increases with the exception of the last year 2012, the concentration of total wage distribution in the Slovak Republic for men and women together is still approximately at the same level throughout the followed period (with a slightly decreasing trend). Although the concentration of this total wage distribution in the Czech Republic is sharply lower than in the Slovak Republic at the beginning of researched period, it is approximately at the same level at the end of this period. The concentration of wage distributions of men develops approximately the same way as the concentration of corresponding total wage distribution in the state (in both countries), see Figure 9. In both countries the concentration of wage distributions of women develops in very different ways than that of wage distribution of men and it is approximately at the same level throughout the period, with slight fluctuations. However, it would be noted that the results may be again affected by to conversion CZK to Eur and by the conversion SK to Eur at the beginning of the period.

**Fig. 9: Development of Gini coefficient of concentration (in %) of Czech and Slovak employees in period 2005–2012 according to gender**



Source: Own research

## Conclusion

The wage distribution of men and women in the Czech and Slovak Republics changes over time. Their absolute amount grows with relatively fast pace in the period before the global economic crisis (2005–2008). Wage growth in the Czech Republic has virtually stopped in the period immediately after the onset of economic recession. But it can be state here that this stopping in the wage growth in the Czech Republic is caused mainly with the development of the exchange rate CZK/EUR and it is not caused in decreasing of nominal wage. Later this sharp impact of the economic recession on wage growth eases in the Czech Republic in both genders and absolute wage levels begin to rise again (with the exception of 2012), but it is far below the rate of growth before the crisis. In contrast, in the Slovak republic, wage growth continues despite the period of economic recession in both genders, although wage growth has noticeably slowed down during the financial crisis. Although the level of nominal wages in the Czech Republic is still strongly higher than in the Slovak Republic, Slovak wages are closer to the level of Czech wages due to the different response of gross monthly wage in connection with the onset of economic recession in the Czech and Slovak Republics since the start of the financial crisis.

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