Distribution of Wages in the Regions of the Czech Republic

Distribuce mezd v krajích České republiky

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Abstract

Regions as higher territorial self-governing units were established in the Czech Republic on the basis of Constitutional Act No. 347/1997 Coll. Their territory was delimited by the territory of the listed districts. The regions show various differences in social, demographic, but naturally also economic development. The text focuses on differences in the development of wages, covering the period of 2011–2018. Wages in all regions were growing in these years, but this growth was not uniform: the lowest wages (the 1st decile wages) were growing most, the highest wages (the 9th decile wages) showed the lowest growth. Four groups (clusters) of regions were identified by the cluster analysis according to the typical development of the lowest and the highest wages. In these groups, we focused on typical factors of the wage level formation: the economic level (measured as GDP per capita), the unemployment rate and the educational level (the share of the population with basic and university education). The results of the correlation analysis showed a moderate direct relationship between the economic level and the 9th decile wages, a moderate to strong indirect dependence between the low wages of the 1st decile and the unemployment rate, but the results of the correlation analysis between the variables the educational level and wages were not very conclusive.

Abstrakt

Kraje jako vyšší územně samosprávné celky vznikly v České republice na základě ústavního zákona č. 347/1997 Sb., jejich území bylo vymezeno územím vyjmenovaných okresů. Kraje vykazují různé odlišnosti v sociálním, demografickém, ale samozřejmě i ekonomickém vývoji. Text se zaměřuje na odlišnosti ve vývoji mzdovém, zachycuje období let 2011–2018. Mzdy sice ve všech krajích v těchto letech rostly, ale tento růst nebyl rovnoměrný: nejvíce rostly nejnižší mzdy (mzdy 1. decilu), nejpomaleji mzdy nejvyšší (mzdy 9. decilu). Pomocí shlukové analýzy byly dále identifikovány čtyři skupiny krajů podle typického vývoje nejnižších a nejvyšších mezd. V těchto skupinách jsme se zaměřili na typické faktory utváření mzdové hladiny: ekonomickou úroveň (měřenou jako HDP/obyv.), míru nezaměstnanosti a vzdělanostní úroveň (podíl obyvatel se základním a s vysokoškolským

vzděláním). Výsledky korelační analýzy ukázaly středně silnou přímou závislost mezi ekonomickou úrovní a mzdami 9. decilu, středně silnou až silnou nepřímou závislost mezi nízkými mzdami 1. decilu a mírou nezaměstnanosti, nicméně výsledky korelační analýzy mezi proměnnými vzdělanostní úroveň a mzdami příliš průkazné nebyly.

Klíčová slova

kraje, mzdová distribuce, medián, shluková analýza, ekonomická úroveň, míra nezaměstnanosti

Introduction

Regional differences in all countries are the focus of not only empirical theoretical research but also of practical policy or at least public debate. Their (un)justification, sources and factors are sought; these differences are described and explained. All this should then serve as recommendations on how to reduce particularly unjustified differences, bring the regions closer together and equalize them. No country can allow differences between regions to be too great (or even deepen), as this could jeopardize the stability of the society.

Regions as higher territorial self-governing units in the Czech Republic were established on the basis of Constitutional Act No. 347/1997 Coll., but their real establishment is connected with the adoption of Act No. 129/2000 Coll., on Regions (Regional Establishment), and with the first elections to regional councils (year 2000). The regions were delimited from the beginning by the territory of the listed districts, but these boundaries did not always respect the natural or historical catchment area. Although some partial adjustments were made to the regional boundaries (the biggest change was the integration of 25 municipalities from the Vysočina Region into the South Moravian Region in 2005), the present regions of the Czech Republic can still be considered as artificially created units.

Significant differences in various socio-economic, demographic, sociological and other characteristics among regions in the Czech Republic are highlighted by various entities (e.g. the Czech Statistical Office) (https://www.czso.cz), this comparison is usually accompanied by warnings about risks of the differences deepening even further. The following text aims to point out the differences in the distribution of wages within the regions, trying to find further similarities of those regions that show similar characteristics in wage development.

1   Theoretical background

There are quite a lot of texts and articles dealing with the context of the distribution of wages; they are of different qualities and use different methodological bases. Some observe the effects of demographic characteristics of workers on the distribution of wages (Wahlberg, 2010), (Bílková, 2011), some examine the influence of company sizes (Cosic,

2018). However, if we focus only on texts describing differences in the distribution of wages between regions or even countries (Atkinson, 2007), (Fernández-Macías, Vacas-Soriano, 2015), the choice is somewhat modest, although especially in some countries (in Europe, e.g. Portugal, Spain), this problem is regularly addressed by the authors (García, Molina, 2002), (Pereira, Galego, 2011), (Pereira, Galego, 2014).

In these texts, the differences in the distribution of wages between urban and non-urban areas are often highlighted. Empirical research shows that wages in densely populated urban areas are higher than in non-urban areas (DiAddario, Petacchini, 2008), (Matano, Naticchioni, 2013). In the case of Portugal, Pereira and Galego (2011) even find differences of 20–30% in wages between Lisbon and other regions. These differences are explained, for example, by higher living costs in cities (and hence higher demands on earnings), by attracting highly skilled labour to city centres, or by increasing human capital in the case of incoming formerly less-skilled workers. Cahill and Gager (2014) explain regional differences in wages in Canada by human capital. Although comparing levels of wages in the Canadian provinces and the US, Hunt and Mueller (2002) conclude that the average earnings are very similar, they still point to a greater "return on" qualification and education in the US. The link between higher unemployment rates in areas outside large centres (and, on the contrary, lower unemployment rates in these regional centres) and levels of wages is shown by Zierahn (2013).

The link to the demand as a factor increasing wages in regions around large centres is emphasizes by Krugman (1991). Vamvakidis (2009) notes the relationship between regional differences in wages and the wage bargaining system in the European Union countries: there are smaller regional differences in wages where regional wage bargaining is more coordinated.

The impact of the minimum wage on the distribution of earnings also attracts attention. Campolieti (2015) compared the impact of the minimum wage on the distribution of wages in Canada and the US with the conclusion that its effects in Canada are less significant than in the US. The effect of the increase in the minimum wage on the distribution of wages (especially on the increase in wages not only of low-paid workers but also of others) is described by Lopresti and Mumford (2016) or Ferraro *et al.* (2018), in the Czech conditions, e.g. by Duspivová and Matějka (2013).

2   Data and methods

The aim of the article is to evaluate the development of wages in the regions of the Czech Republic (except Prague) in the sector of wages in 2011–2018. Particular attention is paid to wages of the 1st and the 9th deciles, marginally also to median wages. The capital city of Prague was not included in the studied sample: it is both a region and a city, while its characteristics are so different from other regions of the Czech Republic that the results would necessarily be distorted.

The period of 2011–2018 was chosen due to the following reasons: the studied source data on wages are collected using a uniform methodology (until 2010, the so-called

business and non-business sectors, not the wage and salary spheres, had been monitored in a slightly different way). During these eight years, the Czech economy experienced a period of recession and economic growth. At the same time, unlike in previous years, the effective minimum wage was significantly increased several times.

Due to the nature of the data examined, only secondary data could be used, in the case of wages, the data from the Regional Labour Cost Statistics, i.e. the system of regular monitoring of the current wages level and working hours of employees in the individual regions of the Czech Republic in the form of a statistical survey. This survey is included in the program of statistical surveys announced by the Czech Statistical Office in the Collection of Laws for the relevant calendar year. The survey is carried out by the state statistical service of the Ministry of Labour and Social Affairs, the course and development of the survey is managed by a committee composed of representatives of various institutions (e.g. the Ministry of Labour and Social Affairs, the Czech Statistical Office, the Ministry of Finance, Czech National Bank, etc.). The processor of the Regional Labour Cost Statistics is Trexima, s. r. o. (https://portal.mpsv.cz/sz/stat/vydelky).

Data on the regions of the Czech Republic (the economic level measured by the GDP per capita indicator, the unemployment rate measured as the share of unemployed persons in the population aged 15–64, the educational level as the share of the population with the relevant level of education in the population over 15 years of age) are taken from the Czech Statistical Office (especially statistical yearbooks of the individual regions).

The obtained secondary data are processed by standard statistical methods of descriptive statistics, by means of the cluster and correlation analysis.

3   Results and discussion

3.1   Development of individual categories of wages, results of the descriptive statistics

From the results of the survey of wages in the framework of the Regional Labour Cost Statistics, we can state that wages in the wage sector of all regions of the Czech Republic were growing during the whole monitored period (2011–2018). However, this growth was not even in all regions, nor was it equally fast. While the highest wages (9th decile) showed the slowest growth in all regions, the lowest wages (1st decile) grew relatively fast. However, the statutory minimum wage grew fastest: it increased by an incredible 52.5% over the eight-year period. While we may admit that part of this high growth makes up for the previous years when the minimum wage was not adjusted (2007–2013), the big difference compared to the growth of other wages is still unusual.

This significant rise in the legal minimum undoubtedly had an impact on the growth of the lowest wages (1st decile). They grew in all regions, the growth ranging from 34.3% (Karlovy Vary Region) to 50.3% (Pilsen Region), with the most frequent growth being 37–39%. While at the beginning of the monitored period (2011), the lowest 1st decile wages

were in the Ústí (CZK 10,434) and Moravian-Silesian (CZK 10,659) Regions, in 2018, this unflattering first place position was occupied by the Hradec Králové Region (CZK 14,455) and again the Moravian-Silesian Region (CZK 14,797). Interestingly, however, we can find the permanently lowest amounts of the 1st decile earnings not only in regions where the level of wages has been below the Czech Republic's average for a long time (Karlovy Vary Region), but also in the South Moravian Region, where the level of wages is otherwise significantly higher. The highest 1st decile wages have been found in the Vysočina Region and the Pilsen Region for the whole period (see Table 1).

Table 1: Wages of the 1st decile in 2011–2018 (CZK)

Region	2011	2012	2013	2014	2015	2016	2017	2018
Central Bohemian	11,479	11,491	11,597	11,906	12,078	13,229	14,292	15,791
Pilsen	11,177	12,049	12,062	12,261	12,647	13,460	15,186	16,798
South Bohemian	11,357	12,001	12,086	12,284	12,726	13,463	14,334	15,570
Karlovy Vary	11,140	11,434	11,414	11,713	12,027	12,648	13,785	14,960
Ústí	10,434	10,730	11,042	11,434	12,253	13,027	14,046	15,401
Liberec	11,179	11,448	11,964	12,627	12,776	13,779	14,626	15,852
Hradec Králové	11,473	11,908	12,120	12,452	12,655	13,254	14,108	14,455
Pardubice	11,477	11,764	11,885	12,394	12,568	13,167	14,507	15,954
Vysočina	11,904	11,821	11,927	12,346	12,444	13,448	14,994	16,298
South Moravian	10,783	11,119	11,191	11,688	11,884	12,656	13,791	14,992
Zlín	11,188	11,274	11,426	11,911	11,940	13,031	14,225	15,482
Olomouc	10,802	11,050	11,650	11,927	11,741	12,571	13,597	14,933
Moravian-Silesian	10,659	11,109	11,161	11,322	11,633	12,448	13,503	14,797

Source: Ministry of Labour and Social Affairs

The fact that the growth of the statutory minimum wage pushed the growth of the lowest wages, and the level of the statutory minimum wage and the 1st decile wages were getting closer can also be supported by the development of the ratio of the minimum wage to the 1st decile wages (see Table 2). While in 2011, this ratio was around 70% in all regions (the highest was in the Ústí Region – 76.6% and in the Moravian-Silesian Region – 75.5%), in 2018, it was significantly higher in all regions and ranged from 72.6% in the Pilsen Region to 82.4% in the Moravian-Silesian Region (cf. Duspivová, Matějka, 2013). The question is whether this convergence of the 1st decile wages and the statutory minimum wage is motivational and desirable: if the trend continued, the share of workers remunerated only by the minimum wage without further possible increase in wages as motivation for quality work would increase (or part of wages could be paid only as money down, within the informal economy).

Table 2: The rate of the statutory minimum wage and the 1st decile wage (%)

Region	2011	2013	2015	2016	2017	2018
Central Bohemian	69.7	73.3	76.2	74.8	77.0	77.3
Pilsen	71.6	70.5	72.7	73.6	72.0	72.6
South Bohemian	70.4	70.3	72.3	73.5	76.7	78.4
Karlovy Vary	71.8	74.5	76.5	78.3	79.8	81.6
Ústí	76.6	76.9	75.1	76.0	78.0	79.2
Liberec	71.6	71.0	72.0	71.8	75.2	76.9
Hradec Králové	69.7	70.1	72.7	74.7	77.9	78.9
Pardubice	69.7	71.5	73.2	75.2	75.8	76.5
Vysočina	67.7	71.3	73.9	73.6	73.4	74.9
South Moravian	71.9	76.0	77.4	78.2	79.8	81.4
Zlín	71.5	74.4	77.0	76.0	77.3	78.8
Olomouc	74.1	73.0	78.3	78.7	80.9	81.7
Moravian-Silesian	75.5	76.2	79.1	79.5	81.5	82.4

Source: Own calculation

The slowest growth of median wages was found in the Moravian-Silesian Region (by 26.7%), the fastest in the Hradec Králové Region (by 40.6%), with the most frequent growth being in the range of 35 to 39%. The lowest median wages in the whole monitored period were in the Karlovy Vary Region (CZK 18,263 in 2011, CZK 25,274 in 2018), the highest in the Central Bohemian Region (CZK 22,300 in 2011, CZK 29,654 in 2018) and the Pilsen Region (CZK 20,993 in 2011, CZK 29,245 in 2018).

The highest wages (9th decile) showed the slowest growth of all categories of wages: the most frequent growth was by 32–35% (but only by 19.9% in the Moravian-Silesian Region). In some regions (Olomouc, Moravian-Silesian, Ústí, Karlovy Vary), even the highest wages dropped several times in absolute terms year-on-year. While the 9th decile wages in the Central Bohemian Region exceeded CZK 40 thousand in 2011, in the Karlovy Vary, Olomouc, Pardubice, Moravian-Silesian and Zlín Regions, this limit was not exceeded before 2017. The highest 9th decile wages have been reached by the Central Bohemian and South Moravian Regions on a long-time basis: in both regions, it is certainly due to the effect of the urban centres (Prague and Brno), in the Central Bohemia Region also the influence of important employers (especially Škoda Auto). This is also consistent with the conclusions of foreign studies (DiAddario, Petacchini, 2008), (Matano, Naticchioni, 2013), (Zierahn, 2013) that wages in large cities (or agglomerations) are higher than in areas further away from these centres.

The development of the decile ratio (D9/D1) is also quite interesting (see Table 3). Its slight decrease in most regions suggests that even the highest and lowest wages are converging, i.e. a certain levelling occurs. The highest decile ratio was in 2018 in the Central Bohemian (3.5) and South Moravian (3.4) Regions, in many regions, the decile ratio was below 3.0 (e.g. in the Pardubice and Vysočina Regions) at the end of the monitored

period. It is interesting that this trend of levelling the level of wages within the regions in the Czech Republic does not correspond to the increasing inequality of wages within the EU countries, that has become evident especially since the beginning of the financial crisis (Fernández-Macías, Vacas-Soriano, 2015). In other words: while, within a transnational scale, the scissors of inequality are opening between the countries, on the contrary, they are closing within the Czech Republic.

Table 3: Decile ratio development (D9/D1)

Region	2011	2012	2013	2014	2015	2016	2017	2018
Central Bohemian	3.5	3.6	3.7	3.6	3.7	3.5	3.5	3.5
Pilsen	3.3	3.1	3.2	3.3	3.3	3.2	3.1	2.9
South Bohemian	3.2	3.0	3.1	3.0	3.1	3.0	2.9	2.9
Karlovy Vary	2.9	2.9	2.9	2.9	3.0	2.9	2.9	2.9
Ústí	3.5	3.4	3.3	3.3	3.2	3.1	3.1	3.0
Liberec	3.2	3.1	3.1	3.0	3.1	3.0	3.0	3.0
Hradec Králové	3.0	3.0	3.0	2.9	3.1	3.0	3.1	3.2
Pardubice	3.0	3.0	3.0	2.9	3.0	3.0	2.9	2.8
Vysočina	2.8	3.0	3.0	2.9	3.2	3.0	2.9	2.8
South Moravian	3.7	3.6	3.7	3.6	3.7	3.6	3.5	3.4
Zlín	3.1	3.1	3.1	3.0	3.2	3.0	2.9	2.9
Olomouc	3.1	3.0	2.9	3.0	3.2	3.0	3.0	2.9
Moravian-Silesian	3.5	3.4	3.4	3.3	3.4	3.2	3.1	3.0

Source: Own calculation

3.2   Results of the cluster analysis

The cluster analysis (Ward's method was used, the Euclidean distance square was chosen as the measure of distance) was applied to create the typology of regions according to the lowest (1st decile) and highest (9th decile) wages. According to the development of these two variables, four unequally numerous groups (clusters) of regions can be identified:

G1: South Moravian Region, Hradec Králové Region,

G2: Moravian-Silesian Region, Olomouc Region, Karlovy Vary Region,

G3: Vysočina Region, Pardubice Region, Liberec Region, Ústí Region, Zlín Region, South Bohemian Region; as a subgroup we can identify the Vysočina Region and the Pardubice Region (see below),

G4: Pilsen Region, Central Bohemian Region.

The first group (G1) consists of two regions characterized by the 1st decile wages that are permanently below-average, but on the other hand, by high wages of the 9th decile (i.e. also by the high decile ratio).

The second group (G2) consists of regions with the lowest level of wages on a long-term basis both for the lowest wages (1st decile) and the highest wages (9th decile).

The third (the most numerous) group (G3) can be called the "average": the lowest and the highest wages are around mean values within all the regions. However, there are two regions with relatively similar wages (Vysočina Region and Pardubice Region): they have above-average lowest wages compared to other regions in the group (the Vysočina Region even has the highest 1st decile wages of all regions within the Czech Republic).

The last group (G4) is characterized by a long-term high level of wages – both for the 1st decile wages and for the highest wages (thus, in fact, it represents a certain counterbalance to the G2 group).

But what else do regions belonging to the individual groups have in common? The following text tries to find common characteristics of those regions where the level of the distribution of wages is similar. Here, we focus mainly on indicators of economic level (measured as GDP per capita), unemployment rate (measured as the share of unemployed persons in the population aged 15–64) and educational characteristics (share of persons with basic and uncompleted education, and university education in the population over 15 years of age). As a rule, these characteristics are accepted as those that affect levels of wages (Perugini, Pompei, 2017), (Hällsten, 2013), (Zierahn, 2013).

The regions of the first group (South Moravian and Hradec Králové) have a similar above-average economic level, but the unemployment rate differs considerably (in the South Moravian Region, the unemployment rate has been higher in the long term). Interestingly, while the share of the population with basic education or even without education was very similar, the share of the population with university education was significantly higher in the South Moravian Region than in the Hradec Králové Region (the South Moravian Region had the highest share of the population with university education, not counting Prague).

The regions of the second group (Moravian-Silesian, Olomouc, Karlovy Vary) are also characterized by a similar economic level – in this case, considerably below the average of the whole Czech Republic. They have a very similar unemployment rate as well. At the same time, these regions have shown considerable internal differences in the education of the population in the long term: they all have an above-average share of inhabitants with basic or uncompleted basic education, but their centres, i.e. the environs of regional cities, have relatively higher share of the population with university education.

The Pardubice and Vysočina regions are very similar and close (not only geographically). They have the same economic level (slightly below the Czech Republic average), almost the same unemployment rate, and a very similar structure of the population education. Other regions of the G3 group (Ústí, South Bohemian, Liberec, Zlín) are less similar in other characteristics – the similarity is perhaps only the "average" characteristics.

The Central Bohemian and Pilsen Regions are similar in terms of the high economic level, low unemployment rate and higher educational level of the population (below-average share of inhabitants with basic education or even without education and, on the other hand, the above-average share of people with university education).

3.3   Results of the correlation analysis

Above we have briefly described how the individual groups of regions differ according to the 1st and the 9th decile wages and also according to three selected characteristics: economic level, unemployment rate and educational level. Let us now focus on at least the correlation coefficients between the pairs of variables: the 1st and the 9th decile wages and other characteristics (GDP per capita, unemployment rate, the share of persons with relevant education). The assumptions are as follows:

    a) the higher the economic level of the region, the higher the wages, i.e. we will expect a strong direct dependence between the GDP per capita and the 9th decile wages variables,

    b) we will also expect that higher unemployment is influenced by low wages (i.e. the higher the unemployment rate, the lower the 1st decile wages), i.e. we will expect a strong indirect dependence between the 1st decile wages and the unemployment rate,

    c) for the educational level, suppose that high wages are directly influenced by higher education and low wages by low education of the population, i.e. we find at least moderate direct dependence between high wages and the share of the population with university education and at least moderate indirect dependence between low wages of the 1st decile and the share of the population with basic education.

The results of the correlation analysis are summarized in Table 4, Table 5 and Table 6.

Table 4: Spearman's correlation coefficient – part 1 (variables: wages and economic level)

Variables	2011	2012	2013	2014	2015	2016	2017
GDP/ capita// 1st decile	0.104396	0.313187	0.247253	-0.054945	-0.021978	0.142857	0.115385
GDP/ capita// 9th decile	*0.675824*	*0.758242*	*0.697802*	*0.609890*	*0.681319*	*0.560440*	*0.620879*

Note: The indicated values are statistically significant at p <0.05

Source: Own calculation

Based on the calculated values of the Spearman's coefficient between the pair of GDP per capita and the 9th decile wages, our first assumption was basically confirmed: we can find a statistically significant medium-strong dependency (order correspondence) between GDP per capita and the 9th decile wages (results are statistically significant

at a 5% significance level). Especially in 2012 and 2013, this dependence was relatively strong. Nevertheless, there was an assumption of a stronger dependence, but this was not confirmed (especially in 2014 and 2016, we can only speak of *moderate* dependence). However, it can be assumed that the economic level of the region has an impact on high wages. Spearman's coefficient values for the pair of variables GDP per capita and the 1st decile wages are merely a confirmation that the economic level of the region does not affect the lowest wage: the values are close to zero, and we can say that these two variables are rather independent.

Table 5: Spearman's correlation coefficient – part 2 (variables: wages and unemployment rate)

Variables	2011	2012	2013	2014	2015	2016	2017
Unempl.// 1st decile	*-0.774725*	*-0.917582*	*-0.747253*	*-0.629987*	*-0.624485*	*-0.674003*	*-0.604396*
Unempl.// 9th decile	-0.203297	-0.285714	-0.307692	-0.085282	-0.176066	-0.140303	-0.219780

Note 1: Unemployment monitored as the share of unemployed persons in the population aged 15–64

Note 2: The indicated values are statistically significant at $p < 0.05$

Source: Own calculation

Here, based on the calculated values of the Spearman's coefficient, our assumptions were confirmed again: we observe a statistically significant moderate to strong indirect dependence (order correspondence) between the unemployment rate and the 1st decile wages (results are statistically significant at 5% significance level). This means that the higher the unemployment rate in the region, the lower the lowest wages (1st decile). This indirect dependence is strongest in 2012 and 2013 again (in 2012, we can even talk about a very strong indirect dependence). On the contrary, it is apparent that unemployment does not affect the high wages of the 9th decile (Spearman's coefficient values close to zero, statistically insignificant).

However, from the above results (see Table 4 and Table 5), one observation is interesting: in 2012 and 2013, there was a decline in GDP in the Czech Republic (in 2012, this decline was even stronger), i.e., we can talk about the economic recession. In these years, the most demonstrable results of the above correlation analysis also became apparent. In other words, if the economy is not doing well, low wages in regions are significantly affected by the unemployment rate (i.e. they are lower with increasing unemployment rate), but high wages increase with the economic level of the region (the higher the economic level of the region, the higher the 9th decile wages can be expected). In years when the economy is doing better, these sharper features are blunting.

Table 6: Spearman's correlation coefficient – part 3 (variables: wages and educational level)

Variables	2011	2013	2015	2017
University education // 1st decile	0.019257	0.109890	-0.440146	-0.134987
University education // 9th decile	0.484182	*0.719780*	0.396149	0.454547
Basic education // 1st decile	*-0.555709*	*-0.565934*	-0.124139	-0.340659
Basic education // 9th decile	*-0.360385*	-0.401099	-0.422073	*-0.620879*

Note: The indicated values are statistically significant at $p < 0.05$
Source: Own calculation

As to the results in Table 6, it is necessary to explain that the correlation coefficients were calculated for every two years because the level of education does not change so significantly year-on-year. And in this case, the results of our calculations are rather surprising. The share of the population with university education had a demonstrable effect (statistically significant stronger dependence) on high wages only in 2013 (it has to be noted again that in this year, the Czech economy did not do well). On the contrary, this dependency was not proved in the following years under investigation. The fact that a higher level of education did not have much influence on low wages was expected, but the negative signs of the Spearman's correlation coefficient values in 2015 and 2017 are interesting: they suggest that the higher level of education (higher share of the population with university education) lead rather to lower wages of the 1st decile.

Even in the case of the relation of the share of the population with basic education or without education and low wages, the results are not very demonstrable. Although the values of the correlation coefficient were statistically significant in 2011 and 2013, we can speak of at least moderate indirect dependence, but this is not the case in the following years. Surprisingly, the outcome for 2017 and the pair of variables population with basic education and the 9th decile wages is definitely a surprise: we can say that in this case, the moderate indirect dependence is statistically significant; i.e. the higher the proportion of persons with basic education or without education in the region, the lower the 9th decile wages.

Conclusions

The regions in the Czech Republic are considered to be higher territorial self-governing units, which were delimited by the territory of the exhaustively listed districts at the time of their establishment. This territory of the regions did not always respect the natural catchment and historical boundaries, but at present, we can already say that this system is basically "established".

Regions differ in many aspects – demographic, social, etc., but naturally, also economic. The subject of the text was the wage development in the wage sector in 2011–2018

(a period when the Czech Republic experienced not only an economic recession but also economic growth). The results of the survey of Regional Labour Cost Statistics in the wage sphere were used for the survey; all the regions of the Czech Republic were included in the studied sample with the exception of Prague (which is a region and a city at the same time).

Statistical surveys show that wages in this sector (wages of the 1st and the 9th deciles, median wages) grew in all regions in the given period, but unevenly, and also unevenly between regions. The lowest wages showed the fastest growth (the fastest growth of all regions was recorded in the Pilsen Region, the slowest in the Karlovy Vary Region), while the highest wages grew slower (the 9th decile wages showed the fastest growth in the Hradec Králové Region, the slowest in the Moravian-Silesian Region). As the statutory minimum wage grew most in this period, it gradually began to approach the wages of the 1st decile (in four regions, the ratio of the minimum wage to the wage of the 1st decile in 2018 exceeded 80%). This unequal development of wages in most regions leads to a decreasing decile ratio: the highest and lowest wages are thus converging, i.e. a certain levelling of wages occurs.

Based on the cluster analysis, we have identified four groups of regions, each characterized by a different development of the lowest and highest wages, but also by other characteristics (economic level, unemployment rate and level of education of the population). These characteristics were further analysed in relation to wages of the 1st and the 9th deciles. The results have confirmed our assumptions that there is moderate direct dependence, moderate to strong indirect dependence between the unemployment rate and the wages of the first decile, but surprisingly, the relationship between the educational level and wages has not been unambiguously confirmed (in some of the monitored years, statistically significant moderate dependence was reported, but not in other years).

However, the correlation analysis showed an interesting conclusion: in the years when the Czech Republic experienced an economic recession (2012 and 2013), low wages (1st decile) in the regions were significantly affected by the unemployment rate and the share of low-educated people, while high wages (9th decile) were more influenced by the higher economic level of the region and the share of the population with university education. Conversely, in years when the economy is doing better, these sharper attributes are blunting. It would certainly be interesting to explore the relationship between the level and development of wages in the regions and the economic cycle: foreign studies suggest that wage development may not be cyclical (Abraham, Haltiwanger, 1995), (Marczak, Beissinger, 2013); at least, they probably differ in a short and long term.

These conclusions are therefore an interesting promise for further examination: in addition to the relationship between the business cycle and wages in the regions, factors affecting wages and changing with the business cycle could also deserve attention.

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