Effect of High Wages on Average Wages in the Czech Republic[1]

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Abstract

A standard indicator for the amount of wages is the average value, i.e., the arithmetic mean. The average wages are regularly published as one of the economic quantities in which all employees are interested. As a matter of course it is often said that about two-thirds of employees do not achieve the average value of wages. One of the reasons for this fact may be the existence of high wages – that is, wages substantially higher than most of the others. We will see in this paper that, even if there are not many such wages, they may have a strong effect on the average value. Our calculations will show this effect on particular data. We will exclude the high wages from the complete set and recalculate the average values after such exclusions. We will also study the proportion of the high wages in the quantity and amount of all wages. We will also be interested in the value of the median and how this value is changed by excluding the high wages. Another observation is that the high wages and their effects on the average values is predominantly a domain of men – this influence is much smaller for women.

Keywords: *average wage, extreme wage, percentile measures, median*

JEL Classification: A10, C01

Introduction

The wages are analysed by many authors around the world. The level of wages in each country is mainly influenced by the economic situation of this country – see articles Neumann, Budde and Ehlert (2014) or Dombi (2013). The related problem in Slovakia was studied by some authors. Naming, for example, the

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article of prof. Terek (2016), in which the issue of outliers and measures of location in analyses of wages and incomes is solved. Many authors are interested in this topic – we can list articles Babecký, Galuščák and Žigraiová (2017); Balcar and Gottvald (2016); Grotkowska, Wincenciak and Gajderowicz (2018) or Wang, Caminada and Wang (2017). On wages affect a variety of factors – see articles Smyk, Tyrowicz and Liberda (2014); Dunsch (2017); Gottvald, Rievajová and Šipikalová (2013) or Guo and Yu (2017).

In this paper we will compare the average value of wages in the Czech Republic (in CZK) with the hypothetical average values, calculated from our data set by excluding the wages above a certain limit. For this limit we will take the values of 100,000; 90,000; 80,000; 70,000; and 60,000 CZK. In other words, we will be concerned with the average values of the wages up to 100,000 CZK; 90,000 CZK; etc. We will determine the proportion of the high wages regarding the quantity and the amount, and assess the effect of the high wages on the average values of wages. We will study these comparisons for the Czech Republic as a whole, as well as in two groups divided by gender. It turns out that in the group of men the influence of high wages is significantly higher than in the group of women. We will further calculate the changes of the hypothetical average values with respect to the percentiles. If the expectation of the entire Czech Republic is that the average is approximately the 67% percentile, this value should go down after the exclusion of the high wages. Another point of interest is the change of the median value after the exclusion of the high wages. The quantity of high wages is small; hence we do not expect a significant change of the median. This conjecture will be confirmed by calculations.

1. Methodology

We have at our disposal a data set of wages for the period from 1995 to 2016 by the company Trexima (2016). The period is rather long; during this time the scope of the data set has grown. There were about 321,000 observations in 1995 and 2,119,000 in 2016. This data set is sufficiently representative to enable us to generalize the conclusions obtained. The resolution of data is very fine: the width of the observation interval is 500 CZK. The basic descriptive statistics are available to us – averages, percentiles (10%, 25%, 50%, 75%, and 90% percentiles) – as well as the standard deviations to measure variability. The data are recorded in current prices in CZK. Most records are compared within the same year, or by quotients; hence cleaning with respect to inflation is unnecessary (the comparison would not be affected). All calculations were carried out in MS Excel.

2. Wages in the Czech Republic

2.1. Basic Characteristics of Wages

The basic characteristics of wages are in Table 1. We can see that all characteristics all characteristics change over time.

T a b l e 1

Basic Characteristics of Wages

Year	Average	StanDev	D1	Q1	Median	Q3	D9
1995	8,311	4,133	4,879	5,963	7,500	9,691	12,314
1996	9,962	5,393	5,645	7,047	8,956	11,505	14,748
1997	11,322	6,490	6,178	7,910	10,171	13,083	16,774
1998	12,026	8,261	6,287	8,114	10,563	13,801	17,911
1999	12,982	8,262	6,894	8,859	11,506	14,911	19,499
2000	13,541	9,651	6,981	9,077	11,860	15,570	20,435
2001	14,743	10,372	7,693	9,870	12,901	16,794	22,234
2002	15,964	12,994	8,181	10,564	13,857	18,058	24,003
2003	17,748	13,504	9,143	11,829	15,519	20,070	26,271
2004	17,759	13,062	9,185	12,073	15,789	20,168	26,143
2005	18,640	13,796	9,371	12,403	16,432	21,376	27,754
2006	19,526	17,696	9,710	12,882	17,143	22,192	28,828
2007	20,953	18,055	10,381	13,659	18,185	23,602	31,257
2008	22,338	20,714	11,060	14,583	19,267	25,094	33,306
2009	23,418	19,014	11,681	15,339	20,138	26,241	35,093
2010	24,077	19,316	12,084	15,778	20,753	27,009	36,143
2011	24,484	24,802	12,199	15,996	21,020	27,225	36,677
2012	24,829	20,109	12,255	16,281	21,319	27,583	37,328
2013	25,448	20,564	12,416	16,595	21,779	28,322	38,598
2014	25,728	19,612	12,570	16,821	22,074	28,794	39,182
2015	26,369	19,903	12,978	17,290	22,658	29,566	40,162
2016	27,668	20,478	13,944	18,391	23,757	30,963	42,026
2017	29,166	20,749	14,982	19,547	25,135	32,610	44,334

Note: The symbols in table have the following meaning: Average – average of wage; StanDev – standard deviation; D1 – 10% percentile; Q1 – 25% percentile; Median – 50% percentile; Q3 – 75% percentile; D9 – 90% percentile. How the individual characteristics change over time is also well illustrated by Boxplot in Figure 1 and in Figure 2 and by polygon in Figure 3. Boxplots for other years are in the article attachment.

Source: Author and Trexima.

2.2. Average Wages

We have at our disposal a table with the interval distribution of wage frequencies at an interval resolution of 500 CZK. We can calculate all descriptive statistics from this table, including all percentiles, cf. Cyhelský (1981). From the viewpoint of quantitative assessment, the most interesting characteristics are the average wages, standard deviations (to measure variability), and percentiles (especially the median, and the upper and lower quartiles). The statistical characteristics of wages and income are e.g. in articles Piyapromdee (2018) or Jansen, Lennon and Piermartini (2016). Specifically wages in Slovakia and their size are

analysed with articles Pacáková, Linda and Sipková (2012) and Pauhofová and Želinský (2017). It would be interesting to model the wages with the aid of a probability distribution (Bartosová and Longford, 2014) and (Malá, 2015).
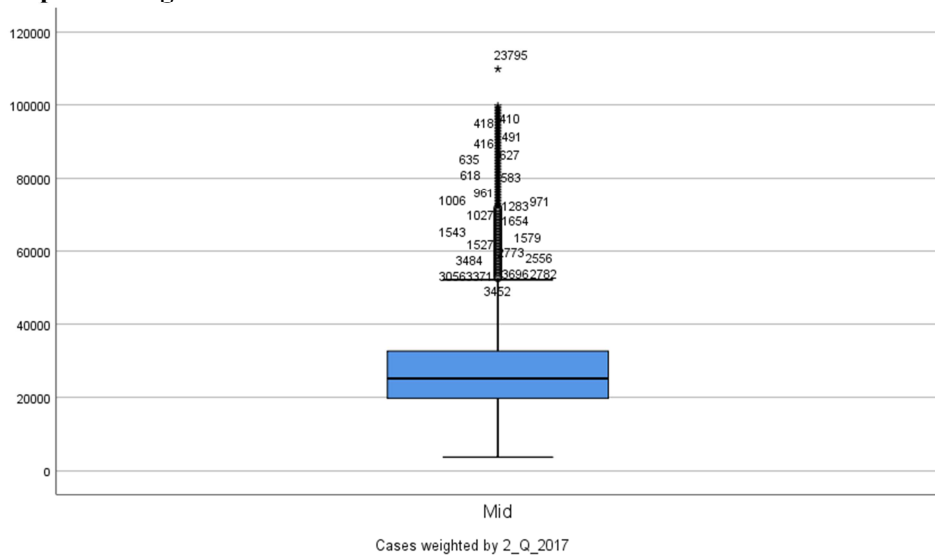
F i g u r e 1
Boxplot of Wages – Year 2000
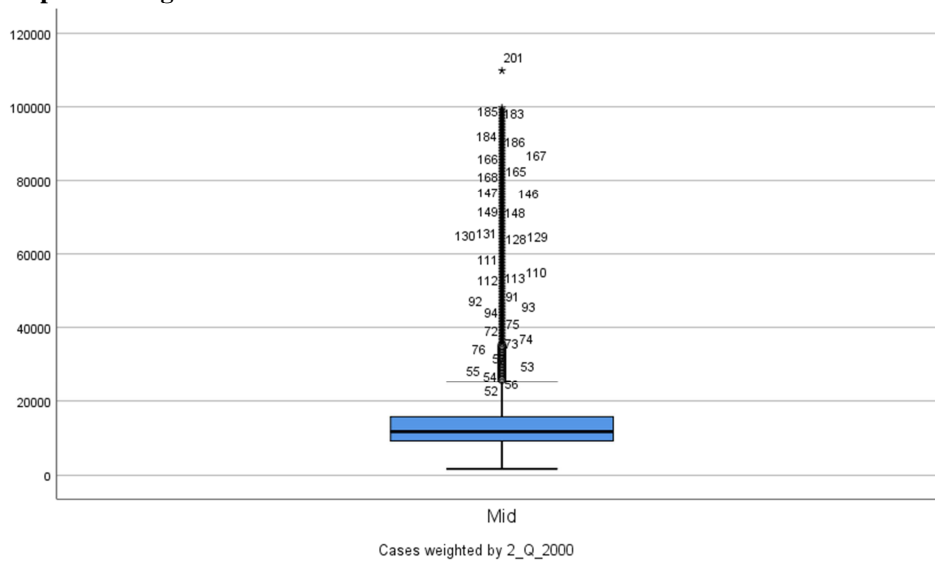
Source: Author.

F i g u r e 2
Boxplot of Wages – Year 2017

Source: Author.

In Figure 3 we can see the polygon of frequencies for the average wages in the Czech Republic from 1995 to 2016. The symbol 2_Q_year in legend denotes data for the 2nd quarter of the year. At first sight we can see that the characteristics of the wage distribution have been changing over time – its location is shifting (the average wages are growing), the variability is increasing (the wage differences from each other and from the average values are growing), the skewness is changing (the distribution is more and more positively skewed), and the kurtosis is decreasing (also in consequence of the growing variability).

F i g u r e 3
Polygon of Wages
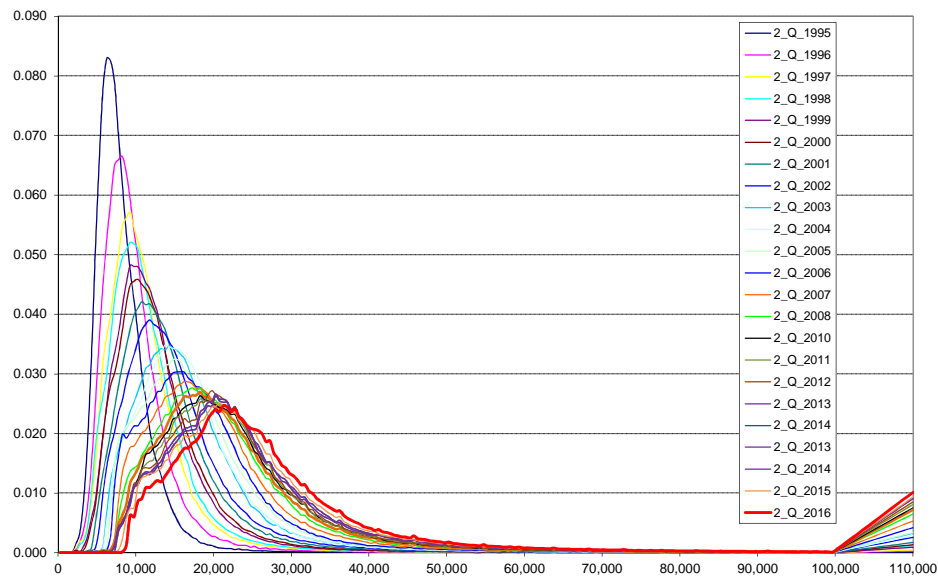
Source: Author.

The right-hand side, showing high wages, is of particular interest. The proportion of high wages was negligible in the early years, but this proportion has been growing steadily. There was only 0.0068% (practically zero) of wages above 100,000 CZK („high wages" below) in 1995, but this proportion grew to 1.0125% in 2016. It is also interesting that there are very few wages between 60,000 and 100,000 CZK. A detailed comparison is shown in Tables 2 and 3.

Table 2 shows the average values of wages as collected by the company Trexima, as well as the average values after exclusion of high wages – hypothetical average values, calculated from our data set by excluding the wages above a certain limit. For this limit we will take the values of 100,000; 90,000; 80,000; 70,000; and 60,000 CZK. In Marek (2010) and in Marek (2013) we can find general considerations concerning the time evolution of wages.

T a b l e 2

Average Wages after Exclusion of High Wages

| Year	CR	Up to 100	diff	Up to 90	diff	Up to 80	diff	Up to 70	diff	Up to 60	diff
1995	8,311	8,301	10	8,297	14	8,291	20	8,292	19	8,273	39
1996	9,962	9,932	31	9,922	40	9,909	53	9,911	51	9,875	87
1997	11,322	11,266	55	11,251	71	11,230	92	11,235	87	11,167	155
1998	12,026	11,874	152	11,833	193	11,796	230	11,805	221	11,691	335
1999	12,982	12,862	121	12,833	150	12,796	186	12,806	176	12,679	303
2000	13,541	13,347	193	13,313	228	13,271	270	13,284	257	13,132	408
2001	14,743	14,507	236	14,462	281	14,407	336	14,425	318	14,230	512
2002	15,964	15,581	383	15,527	437	15,459	505	15,481	482	15,246	718
2003	17,748	17,271	477	17,204	544	17,118	630	17,152	596	16,843	904
2004	17,759	17,325	434	17,268	491	17,194	564	17,223	536	16,961	797
2005	18,640	18,134	506	18,067	573	17,982	658	18,019	621	17,705	935
2006	19,526	18,864	662	18,780	746	18,674	852	18,720	806	18,353	1,173
2007	20,953	20,316	637	20,208	745	20,077	876	20,142	811	19,668	1,285
2008	22,338	21,552	786	21,425	913	21,270	1,068	21,352	986	20,790	1,548
2009	23,418	22,338	1,080	22,192	1,226	22,015	1,403	22,112	1,306	21,469	1,949
2010	24,077	22,964	1,113	22,812	1,265	22,624	1,453	22,730	1,347	22,047	2,030
2011	24,484	23,251	1,232	23,090	1,394	22,886	1,597	23,006	1,477	22,252	2,231
2012	24,829	23,589	1,240	23,413	1,417	23,198	1,632	23,325	1,504	22,532	2,297
2013	25,448	24,129	1,319	23,944	1,504	23,711	1,737	23,855	1,593	22,981	2,467
2014	25,728	24,475	1,253	24,281	1,448	24,034	1,694	24,188	1,540	23,277	2,452
2015	26,369	25,104	1,265	24,900	1,469	24,644	1,726	24,811	1,558	23,842	2,527
2016	27,668	26,310	1,358	26,089	1,578	25,805	1,863	26,004	1,664	24,921	2,746

Source: Author.

The „CR" column shows the officially published average wages; „up to 100" the average wages after the exclusion of wages above 100,000 CZK. The „diff" column is the difference between „CR" and „up to 100", that is, the difference of the average wages over the entire Czech Republic from the average after the exclusion of wages above 100,000 CZK. The meanings of the other columns are similar. If we exclude wages above 100,000 CZK, the average wage in 1995 goes down by a mere 10 CZK, while in 2016 this difference amounts to 1,358 CZK. A similar effect can be observed for other exclusions. From Figure 3 we might think that there are nearly no wages between 60,000 CZK and 100,000 CZK. However, after exclusion of wages above 60,000 CZK, the considered difference in 2016 is increased to 2,746 CZK, which is a substantial amount. The situation is also well illustrated by Boxplots in the article attachment.

Figure 4 illustrates the growing gap between the average wages and the average wages after the exclusion of the high wages (above 100,000 CZK and above 60,000 CZK). For the sake of clarity, not all columns of Table 2 are shown in this Figure.

Most extreme wages are reached in Prague. Many companies of the big (often foreign) companies run their business from there and the wages are mostly comparable to the wages in other countries. The wages of executive officers are usually

much higher than the wages of other employees. In other regions, the effect is not so noticeable, as there are much fewer high wages – see article Marek (2016). There are multiple factors influencing the value of the high wages. A major factor is sex – which will be demonstrated in the second part of the article. Other factors such as profession and education can be observed – i.e. the combination of tertiary education and IT profession implies higher than average wages. This is further discussed in Doucek and Marek (2016a; 2016b; 2016c).

F i g u r e 4

Comparison of Average Wages
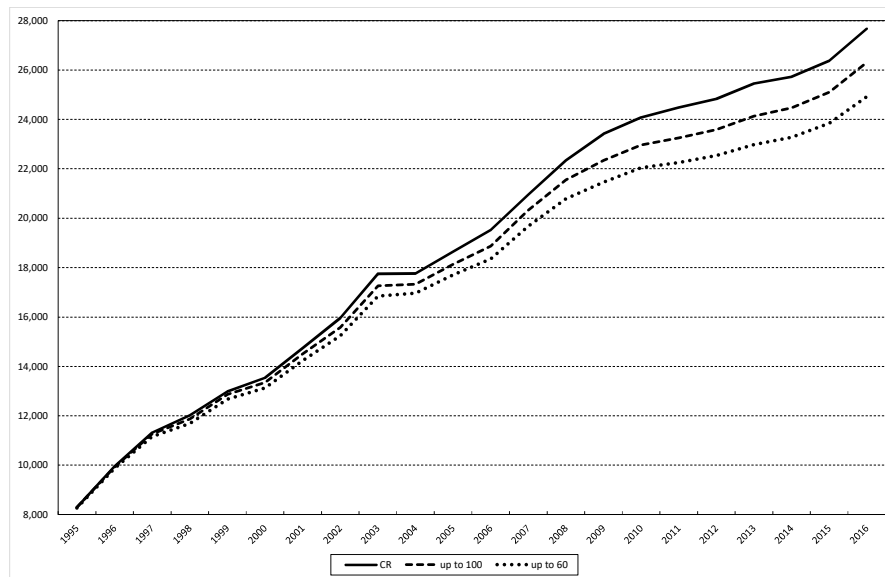
Source: Author.

2.3. Proportions of High Wages

We are also interested in their proportions in the total quantity and total amount of wages. In Table 3 we can see the percentage proportions of the high wages in the total quantities and total amounts of all wages. Figure 3 clearly indicates that the effect of the wages between 60,000 CZK and 100,000 CZK is very small regarding the quantity.

We can see that relative frequencies of high wages are small. This fact can also be easily seen in Figure 3 (the tail of distribution). It is clear that the number of high wages is ever growing. Their effect was negligible in the early years, but it has been growing since then. The 2016 values were substantially larger than the beginning ones. The wages above 100,000 CZK made up 1.013% in 2016; and the proportion was 3.8055 for those above 60,000 CZK.
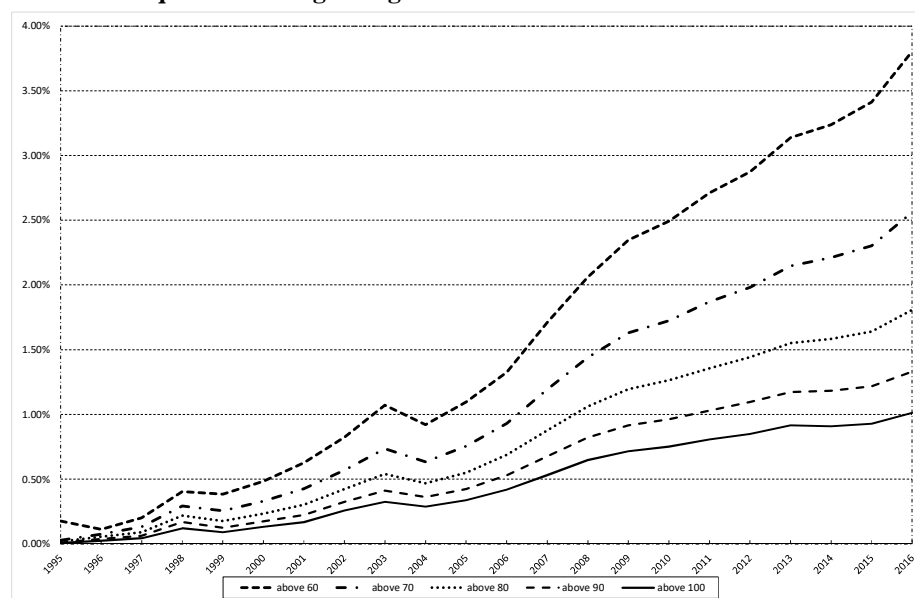
T a b l e 3

Relative Frequencies of High Wages (in %)

Year	Above 100	Above 90	Above 80	Above 70	Above 60
1995	0.007	0.011	0.019	0.030	0.177
1996	0.026	0.037	0.055	0.076	0.114
1997	0.045	0.063	0.092	0.132	0.202
1998	0.121	0.169	0.220	0.294	0.404
1999	0.090	0.126	0.177	0.258	0.385
2000	0.132	0.175	0.233	0.330	0.482
2001	0.168	0.224	0.302	0.427	0.626
2002	0.257	0.326	0.424	0.570	0.824
2003	0.326	0.412	0.539	0.737	1.070
2004	0.288	0.361	0.470	0.635	0.922
2005	0.337	0.424	0.551	0.756	1.096
2006	0.420	0.530	0.690	0.931	1.328
2007	0.532	0.676	0.877	1.194	1.711
2008	0.648	0.821	1.063	1.441	2.061
2009	0.717	0.916	1.196	1.629	2.348
2010	0.753	0.963	1.263	1.725	2.492
2011	0.807	1.031	1.356	1.870	2.711
2012	0.850	1.096	1.442	1.982	2.875
2013	0.916	1.175	1.552	2.146	3.138
2014	0.909	1.183	1.585	2.211	3.238
2015	0.929	1.219	1.641	2.304	3.414
2016	1.013	1.331	1.809	2.562	3.805

Source: Author.

Figure 5 illustrates the achieved results in a lucid form.

F i g u r e 5

Relative Frequencies of High Wages

Source: Author.

We may be somewhat surprised when having a look at another table. The relative frequency of high wages is small, but the proportion in the total amount of wages is surprisingly higher than the proportion in the total quantity. The proportion of the wages above 100,000 CZK in the total amount was 5.871% in 2016; for those above 60,000 CZK it is even 13.354%. This proportion is substantially higher than that in the total quantity – for wages above 100,000 CZK in 2016, more than five times higher. However, in the early years (the 1990s) this proportion was negligible.

T a b l e 4
Proportion of High Wages in the Total Amount (in %)

Year	Above 100	Above 90	Above 80	Above 70	Above 60
1995	0.128	0.178	0.259	0.357	0.514
1996	0.333	0.439	0.587	0.743	0.988
1997	0.532	0.688	0.900	1.166	1.567
1998	1.386	1.770	2.128	2.586	3.181
1999	1.018	1.277	1.609	2.074	2.707
2000	1.557	1.856	2.221	2.754	3.483
2001	1.766	2.127	2.575	3.207	4.080
2002	2.648	3.054	3.574	4.254	5.283
2003	3.003	3.465	4.070	4.901	6.112
2004	2.722	3.115	3.633	4.326	5.370
2005	3.044	3.483	4.060	4.879	6.057
2006	3.795	4.331	5.022	5.945	7.255
2007	3.555	4.207	5.021	6.148	7.740
2008	4.142	4.876	5.791	7.057	8.848
2009	5.298	6.103	7.115	8.495	10.475
2010	5.342	6.168	7.223	8.654	10.711
2011	5.800	6.664	7.790	9.357	11.577
2012	5.803	6.739	7.919	9.541	11.861
2013	6.053	7.016	8.270	10.011	12.529
2014	5.736	6.743	8.064	9.882	12.459
2015	5.683	6.722	8.078	9.954	12.671
2016	5.871	6.960	8.421	10.452	13.354

Source: Author.

Figure 6 illustrates the growing proportion of the high wages in the total amount. Similar to Figure 5, the growing gap between the wage categories is clearly visible as well. Multiple processes can be observed. The number of high wages increases with time. The share of high wages in the total volume of wages increases even faster, than the number of high wages. It can be assumed that this trend will continue in the future. We are using data from 2016 to 2018 – there has been a significant economy growth in 2017, which still continues in early 2018. This growth causes a high demand for workers, which in turn causes the wages to grow. This will cause either the growth of average wage and the number and importance of high wages. It will be worth making a similar analysis in 2 – 3 years and compare the results with the current ones.

F i g u r e 6

Proportion of High Wages in the Total Amount
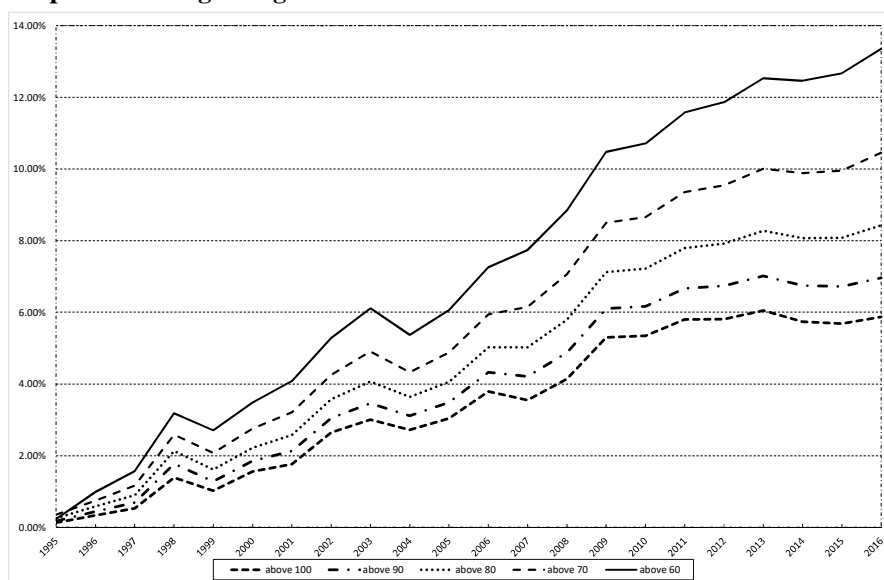
Source: Author.

2.4. Median of Wages

A question thus arises: what characteristic should be chosen? There are multiple options available. One can use alternative statistics such as trimmed mean, Winsorized mean or others (Terek, 2016). These statistics try to solve the problem by eliminating outliers (which also include high wages in our case), but are somewhat not suitable for the layman's view. It is not as simple as the usually used single number, which is simple and easily understandable – the arithmetic mean. However, the arithmetic mean could be presented together with some percentiles, especially the median. It is not influences by outliers and even by excluding the high wages (given the low count), the median does not change significantly. For example see Table 5.

Percentile characteristics, and especially the median, come to mind. They should not be affected by outliers. Even if we exclude the high wages from the calculations, the small number should lead to practically unchanged values of the median. This idea is confirmed in Table 5.

The columns in this Table have the following meanings: „median CR" is the officially published value of the median; „median 100" is the median after exclusion of the wages above 100,000 CZK; „median 60" is the median after exclusion of the wages above 60,000 CZK; and the „diff" columns show the differences between „median CR" and the hypothetical median values. In the

early years of our observations, the median values remain nearly unchanged after the exclusion of (either) high wages. And even in the last year, 2016, the change is negligible: a difference of 108 CZK (after the exclusion of the wages above 100,000 CZK) or of 418 CZK (above 60,000 CZK) is rather small.

T a b l e 5

Median

Year	Median CR	Median 100	diff	Median 60	diff
1995	7,500	7,499	1	7,497	2
1996	8,956	8,957	−1	8,953	2
1997	10,171	10,175	−4	10,167	4
1998	10,563	10,556	7	10,541	21
1999	11,506	11,500	5	11,484	21
2000	11,860	11,852	8	11,832	28
2001	12,901	12,892	8	12,863	37
2002	13,857	13,841	15	13,803	54
2003	15,519	15,494	25	15,439	80
2004	15,789	15,771	18	15,724	65
2005	16,432	16,406	26	16,344	88
2006	17,143	17,108	35	17,029	114
2007	18,185	18,341	−156	18,235	−49
2008	19,267	19,437	−170	19,300	−34
2009	20,138	20,287	−149	19,902	237
2010	20,753	20,841	−88	20,500	254
2011	21,020	20,942	78	20,752	269
2012	21,319	21,237	82	21,040	279
2013	21,779	21,687	92	21,468	311
2014	22,074	21,979	95	21,747	327
2015	22,658	22,567	91	22,303	355
2016	23,757	23,649	108	23,339	418

Source: Author.

In other words, the median values' response to the exclusion of the high wages is hardly perceptible. Therefore, the median values would be suitable to be referred to together with the average values of wages.

2.5. Average as Percentile

It is usually observed that two-thirds of employees do not achieve the average wage. This would put the average around a 67% percentile. We will verify on real data whether it is really true. The high wages obviously do affect the average – a natural question arises what level of percentile will correspond to the average after the exclusion of the high wages. Logically, the average should approach the median. Table 6 shows the results of the calculations in this direction. The „CR" column shows the official average wages, „up to 100" the average wages after exclusion of wages above 100,000 CZK, and „up to 60" after exclusion of wages above 60,000 CZK. The „percentile" column shows to what level percentile the respective average value corresponds. In the beginning years, the average is

about a 63% percentile in all instances; the percentile value is then gradually growing. In the most recent years, the generally accepted assertion that the average wages are at the 37% level of percentile is confirmed for the „CR" column.

The situation is significantly changed after the exclusion of wages above 10,000 CZK. The percentile level of the average value remains between 61% and 63% for the entire period of observations. Let us now exclude the wages above 60,000 CZK. The average value gets down to 58% and is much closer to the median value. In other words, the percentile characteristics also confirm the assertions formulated above.

Based on the data, one can see that the average wage is the 67% percentile and thus the claim, that 2/3 of wages are lower than the average, holds. It will stay the same for the future. The wage distribution is positively skewed (due to high wages, which are outliers) and thus the mean will always be higher than the median. If the trend of wage distributions stays the same (which it did for the past 21 years), the rank of the mean as a percentile will further increase. It can be assumed that the mean will be a 68 – 69% percentile. However, the growth will be rather slow. A rapid change is unlikely – as can be seen in Table 6, the rank of the mean as a percentile is very stable. The average growth rate (column percentile) for the past 10 years is 0.21%, for the past 5 years only 0.26%. It can be seen that for the past 5 years, the growth stagnates and the mean stays around the value of the 67% percentile.

T a b l e 6

Average as Percentile

Year	CR	Percentile	Up to 100	Percentile	Up to 60	Percentile
1995	8,311	0.632	8,301	0.632	8,273	0.632
1996	9,962	0.619	9,932	0.619	9,875	0.619
1997	11,322	0.631	11,266	0.631	11,167	0.632
1998	12,026	0.665	11,874	0.628	11,691	0.630
1999	12,982	0.626	12,862	0.627	12,679	0.629
2000	13,541	0.663	13,347	0.630	13,132	0.632
2001	14,743	0.652	14,507	0.653	14,230	0.656
2002	15,964	0.644	15,581	0.646	15,246	0.618
2003	17,748	0.652	17,271	0.627	16,843	0.602
2004	17,759	0.641	17,325	0.613	16,961	0.585
2005	18,640	0.644	18,134	0.620	17,705	0.597
2006	19,526	0.654	18,864	0.605	18,353	0.584
2007	20,953	0.635	20,316	0.614	19,668	0.596
2008	22,338	0.645	21,552	0.627	20,790	0.588
2009	23,418	0.655	22,338	0.616	21,469	0.580
2010	24,077	0.669	22,964	0.611	22,047	0.598
2011	24,484	0.659	23,251	0.623	22,252	0.588
2012	24,829	0.667	23,589	0.633	22,532	0.600
2013	25,448	0.664	24,129	0.632	22,981	0.578
2014	25,728	0.668	24,475	0.617	23,277	0.587
2015	26,369	0.660	25,104	0.629	23,842	0.580
2016	27,668	0.668	26,310	0.620	24,921	0.575

Source: Author.

3. Wages in the Czech Republic – Analysis by Gender

Analysis of wages by various factors in different areas devotes many authors at home and abroad. We can mention articles Bensidoun and Sztulman (2011); Du Caju, Rycx and Tojerow (2012); Kośny (2013); Özgüzer and Oğuş-binatli (2016) or Kukk and Staehr (2014).

In this section we will carry out an analysis similar to above, but for two classes of data, in which we divide the wages by gender. Our goal is to show that the high wages affect the average wages much more for men than for women. More detailed studies of how gender and some other factors affect the amount of the average wages can be found in Marek (2013).

It would be interesting to compare the average wages of men and women based on professions. However, this article uses generic comparisons – we did analyse some professions – i.e. IT, which is developing rapidly and the wages grow fast – cf. Doucek and Marek (2016a). The comparison based on every profession is possible based on our data. It does, however, exceed the scope of this article.

3.1. Average Wages – Men vs. Women

The differences between the distributions of men's and women's wages are visible at first sight. These distributions differ in all characteristics: location, variability, skewness, and kurtosis. The high values above 100,000 CZK are much fewer in the women's wage group. Consequently, women's average wages will be less affected than men's by the high wages. Table 7 sums up the results of the calculations after the exclusion of the high wages. For the sake of clarity, only the results for the exclusions above 100,000 CZK and 60,000 CZK are given in the Table, but we have calculated the similar data for the levels of 90,000; 80,000; and 70,000 CZK.

The meanings of the columns in Table 7 are similar to Table 2. The exclusion of the wages above 100,000 CZK results in a difference of 2,314 CZK for men in 2016, while for women the same difference amounts to a mere 415 CZK. This difference after the exclusion of the wages above 60,000 CZK is a significant amount of 4,400 CZK for men and a mere 1,082 CZK (four times less) for women. Again, the high wages do not significantly affect the average values in the early years but their effects have been growing, with a faster growth for men's wages. The situation is illustrated in Figure 9, in which the differences between men's and women's wages are clearly visible.
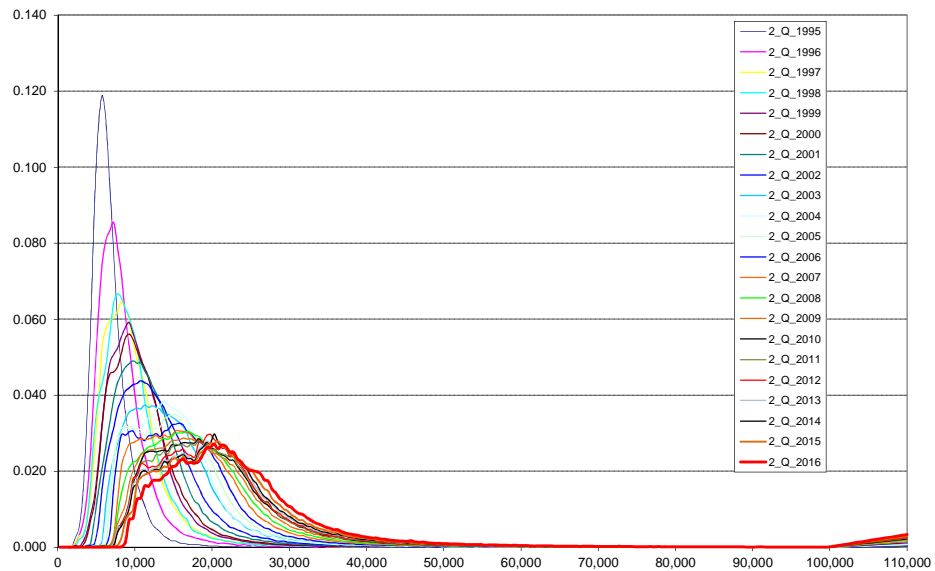
How the individual characteristics change over time is also well illustrated by boxplots the article attachment.

F i g u r e 7
Polygon of Wages – Men
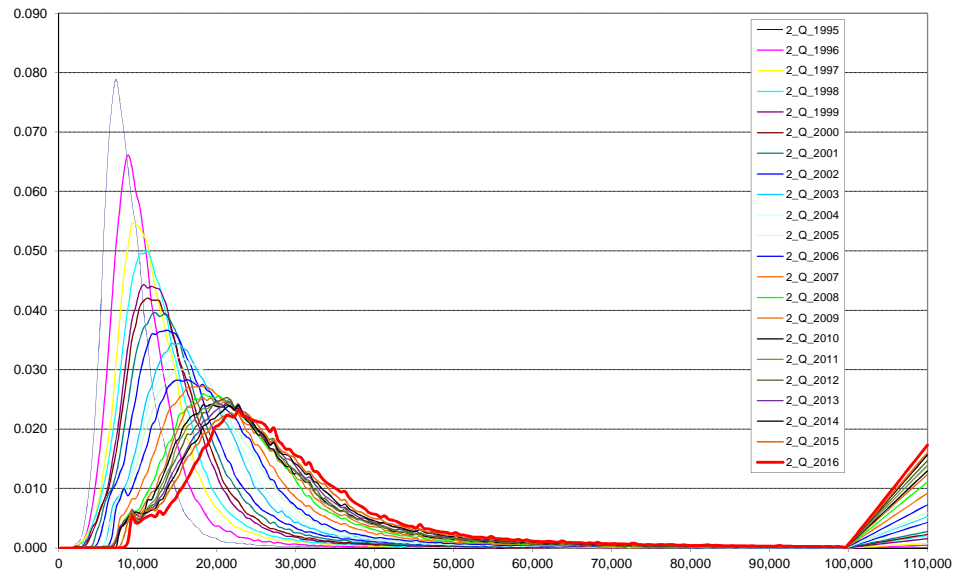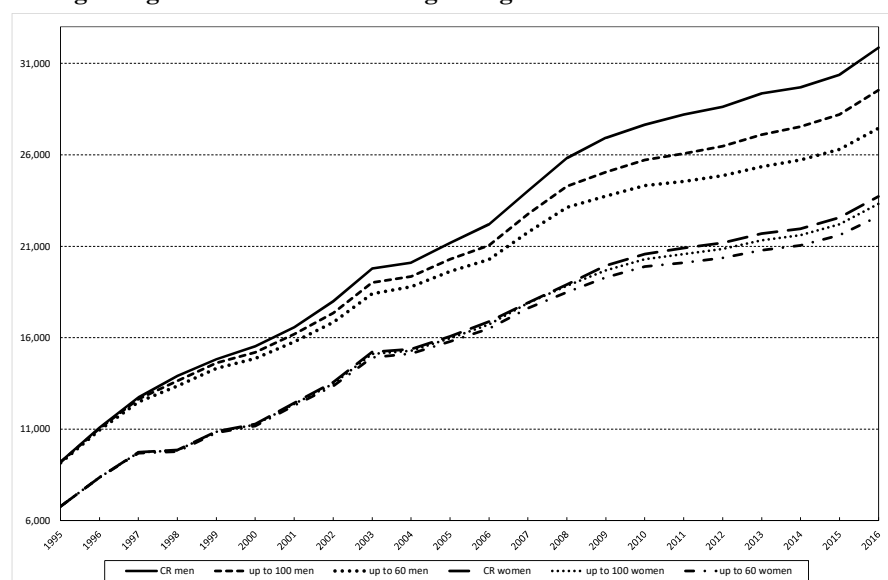

Source: Author.

F i g u r e 8
Polygon of Wages – Women

Source: Author.

T a b l e 7

Average Wages after Exclusion of High Wages

Year	Men					Women				
	CR	up to 100	diff	up to 60	diff	CR	up to 100	diff	up to 60	diff
1995	9,221	9,207	14	9,166	55	6,794	6,791	3	6,785	8
1996	11,100	11,047	53	10,958	142	8,363	8,363	0	8,354	10
1997	12,737	12,643	94	12,483	254	9,740	9,726	14	9,700	40
1998	13,914	13,651	263	13,365	549	9,872	9,850	22	9,791	81
1999	14,835	14,626	209	14,336	499	10,878	10,861	17	10,809	69
2000	15,537	15,205	331	14,863	673	11,281	11,248	32	11,186	95
2001	16,580	16,193	386	15,777	803	12,435	12,393	42	12,304	132
2002	17,987	17,352	636	16,842	1,145	13,565	13,490	75	13,374	191
2003	19,784	19,018	766	18,403	1,380	15,217	15,110	107	14,928	289
2004	20,109	19,349	760	18,787	1,321	15,380	15,286	94	15,135	245
2005	21,188	20,292	896	19,636	1,552	16,076	15,973	103	15,789	287
2006	22,203	21,050	1,153	20,270	1,934	16,882	16,719	163	16,492	390
2007	24,026	22,760	1,267	21,768	2,259	17,916	17,888	28	17,610	306
2008	25,821	24,282	1,539	23,132	2,689	18,912	18,839	73	18,500	412
2009	26,929	25,058	1,871	23,741	3,188	19,957	19,684	273	19,294	662
2010	27,644	25,716	1,928	24,320	3,324	20,585	20,298	286	19,891	693
2011	28,196	26,066	2,130	24,552	3,643	20,903	20,567	336	20,107	796
2012	28,617	26,464	2,153	24,864	3,753	21,189	20,860	329	20,370	820
2013	29,360	27,091	2,270	25,360	4,001	21,694	21,323	371	20,785	909
2014	29,697	27,542	2,155	25,726	3,971	21,957	21,599	359	21,041	916
2015	30,376	28,202	2,173	26,296	4,079	22,569	22,204	365	21,610	959
2016	31,856	29,542	2,314	27,456	4,400	23,724	23,309	415	22,643	1,082

Source: Author.

F i g u r e 9

Average Wages after Exclusion of High Wages – Men vs. Women

Source: Author.

It is clear that the growth in all of the categories is mostly linear. It is interesting that the wages kept growing during the crisis, even though the rate decreased. If one tried to model a trend linear function, he would obtain a fit with a determination index of 0.98 and more.

3.2. Proportions of Large High Wages

Let us now have a look at the proportions of the high wages in both groups. We have already indicated that this proportion will be much larger in the men's group – both in the quantity and the amount. Table 8 fully confirms this expectation.

T a b l e 8

Relative Frequencies of High Wages (in %)

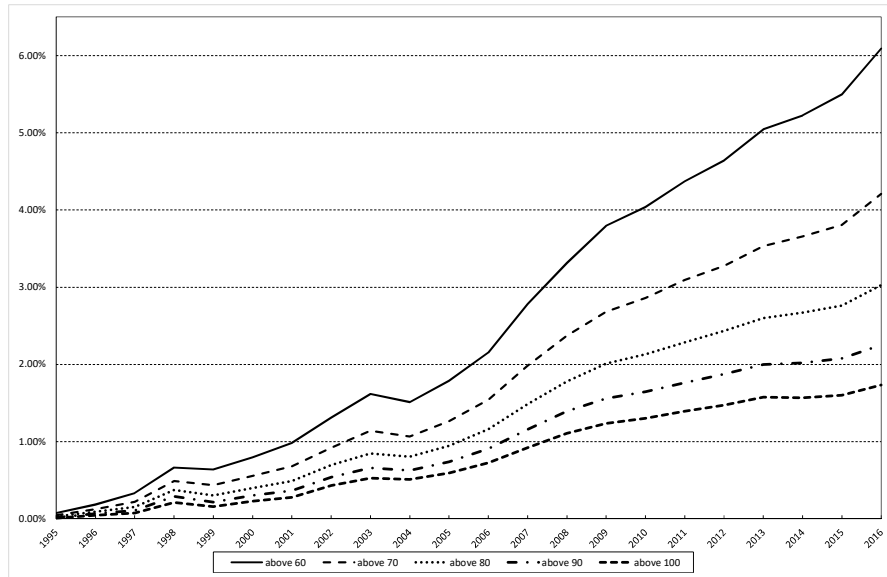| Year	Men					Women				
	above 100	above 90	above 80	above 70	above 60	above 100	above 90	above 80	above 70	above 60
1995	0.01	0.02	0.03	0.05	0.07	0.00	0.00	0.00	0.00	0.01
1996	0.05	0.06	0.09	0.13	0.18	0.00	0.00	0.00	0.01	0.02
1997	0.08	0.11	0.15	0.22	0.33	0.01	0.01	0.02	0.03	0.05
1998	0.21	0.29	0.37	0.49	0.66	0.02	0.03	0.04	0.07	0.11
1999	0.16	0.22	0.30	0.44	0.64	0.01	0.02	0.03	0.05	0.10
2000	0.23	0.30	0.40	0.56	0.80	0.02	0.03	0.05	0.07	0.12
2001	0.28	0.37	0.49	0.68	0.98	0.03	0.05	0.07	0.11	0.18
2002	0.43	0.54	0.70	0.92	1.31	0.05	0.07	0.10	0.15	0.25
2003	0.52	0.66	0.85	1.14	1.62	0.08	0.11	0.16	0.24	0.39
2004	0.51	0.63	0.80	1.07	1.51	0.07	0.09	0.13	0.20	0.33
2005	0.59	0.74	0.94	1.26	1.79	0.08	0.11	0.16	0.25	0.40
2006	0.73	0.91	1.16	1.54	2.15	0.12	0.16	0.22	0.33	0.51
2007	0.92	1.16	1.49	1.98	2.78	0.14	0.19	0.27	0.40	0.64
2008	1.11	1.39	1.78	2.37	3.31	0.19	0.25	0.35	0.51	0.80
2009	1.24	1.56	2.01	2.68	3.80	0.20	0.28	0.39	0.59	0.92
2010	1.30	1.65	2.13	2.86	4.04	0.22	0.29	0.41	0.61	0.98
2011	1.39	1.76	2.29	3.09	4.37	0.24	0.32	0.46	0.69	1.11
2012	1.47	1.88	2.43	3.28	4.64	0.25	0.35	0.49	0.74	1.18
2013	1.57	2.00	2.60	3.53	5.04	0.29	0.39	0.55	0.81	1.31
2014	1.57	2.02	2.67	3.66	5.23	0.28	0.39	0.55	0.84	1.35
2015	1.60	2.08	2.76	3.81	5.50	0.29	0.40	0.58	0.88	1.44
2016	1.73	2.25	3.03	4.21	6.09	0.34	0.46	0.66	1.01	1.65

Source: Author.

The early years of the observation period are not very interesting because there were very few high wages then. Their number was gradually growing; in 2016, the proportion of the wages above 100,000 CZK was 1.73% for men and 0.34% for women, i.e., about five times more for men than for women. If we consider the wages above 60,000 CZK, it was 6.09% for men, i.e., about four times more than 1.65% for women. These results are illustrated in Figures 10 and 11.

The growth for both men and women is linear in all categories after 2005. A line could be used for modelling the trend function. The proportion in the total
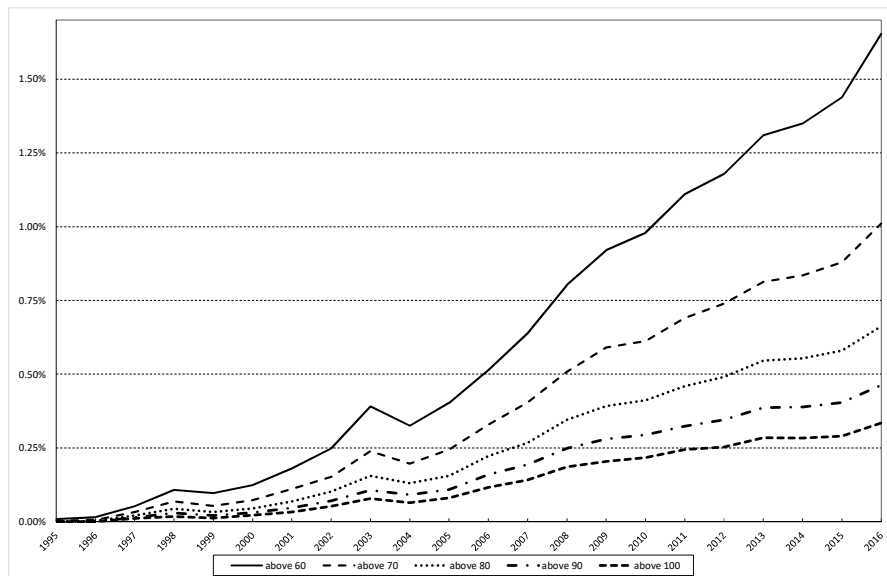
amount of wages is even higher, especially for men. The calculated proportions are summed up in Table 9.

F i g u r e 10

Relative Frequencies of High Wages – Men

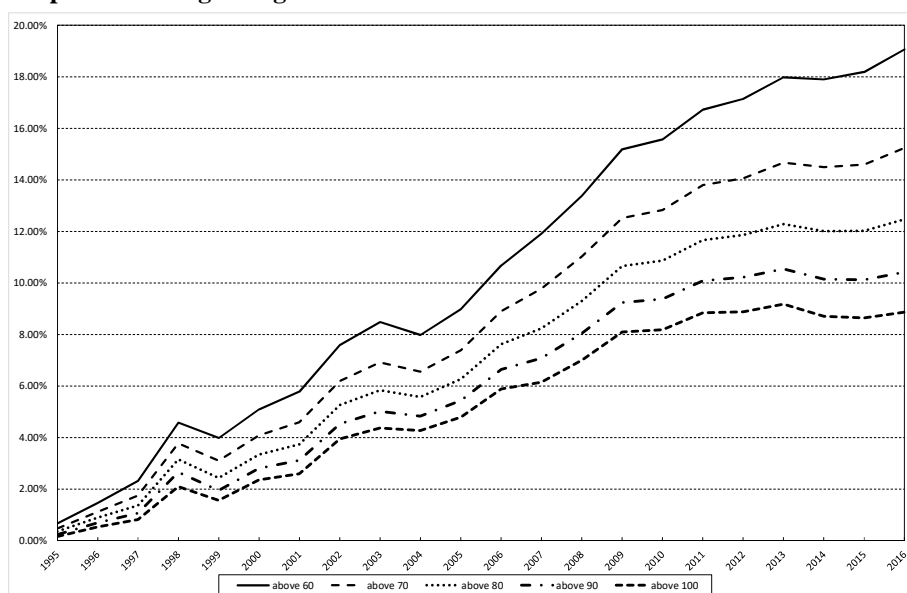*Source*: Author.

F i g u r e 11

Relative Frequencies of High Wages – Women

Source: Author.

T a b l e 9

Proportion of High Wages in Total Amount (in %)

| Year	Men					Women				
	above 100	above 90	above 80	above 70	above 60	above 100	above 90	above 80	above 70	above 60
1995	0.16	0.23	0.35	0.47	0.67	0.05	0.05	0.05	0.08	0.13
1996	0.52	0.69	0.89	1.12	1.46	0.01	0.01	0.03	0.06	0.13
1997	0.81	1.05	1.36	1.74	2.32	0.15	0.18	0.25	0.34	0.46
1998	2.10	2.65	3.15	3.77	4.58	0.24	0.35	0.48	0.67	0.92
1999	1.57	1.94	2.43	3.11	3.98	0.16	0.24	0.33	0.47	0.73
2000	2.36	2.80	3.33	4.09	5.10	0.31	0.38	0.48	0.67	0.97
2001	2.60	3.11	3.74	4.60	5.78	0.37	0.47	0.63	0.88	1.24
2002	3.95	4.53	5.26	6.20	7.59	0.60	0.73	0.93	1.20	1.65
2003	4.37	5.01	5.83	6.92	8.48	0.78	0.96	1.23	1.64	2.28
2004	4.27	4.83	5.58	6.55	7.98	0.68	0.84	1.06	1.38	1.91
2005	4.80	5.44	6.26	7.39	8.98	0.72	0.89	1.14	1.55	2.18
2006	5.88	6.65	7.63	8.90	10.67	1.08	1.32	1.64	2.11	2.82
2007	6.14	7.08	8.23	9.78	11.92	0.30	0.57	0.92	1.49	2.34
2008	7.00	8.04	9.31	11.02	13.38	0.57	0.89	1.32	1.96	2.96
2009	8.10	9.24	10.66	12.52	15.18	1.57	1.93	2.40	3.14	4.21
2010	8.18	9.37	10.86	12.83	15.58	1.61	1.96	2.44	3.16	4.32
2011	8.84	10.09	11.66	13.80	16.73	1.85	2.21	2.76	3.58	4.87
2012	8.88	10.22	11.87	14.07	17.15	1.80	2.22	2.79	3.67	5.00
2013	9.18	10.54	12.29	14.66	17.98	1.99	2.43	3.05	3.97	5.45
2014	8.71	10.15	12.01	14.49	17.90	1.91	2.37	3.00	3.96	5.47
2015	8.64	10.12	12.03	14.60	18.19	1.90	2.38	3.04	4.03	5.63
2016	8.87	10.42	12.47	15.25	19.06	2.08	2.59	3.30	4.39	6.14

Source: Author.

F i g u r e 12

Proportion of High Wages in the Total Amount – Men

Source: Author.

F i g u r e 13

Proportion of High Wages in the Total Amount – Women
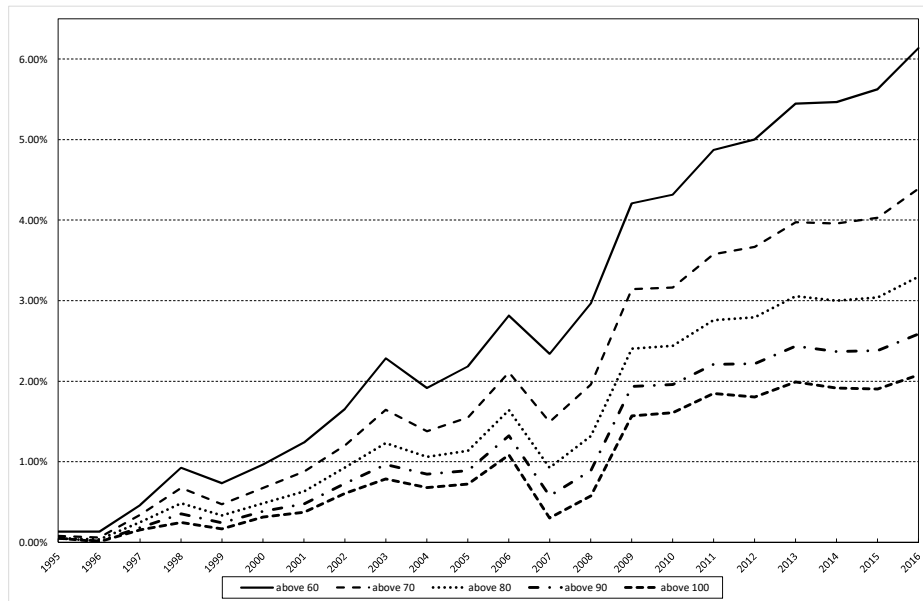
Source: Author.

From the charts a major difference can be observed. While both of the proportions of high wages drop in 2007, the drop is very significant for women, while not so clear for men. After 2009 the values stopped fluctuating and grew in a linear way.

3.3. Average as Percentile

We will again be interested in the percentile levels to which the average values of wages correspond, both for the original averages and for the averages after the exclusion of the high wages. The results have been calculated for both groups and are shown in Table 10. In the first year of observations, the average value of wages was about a 64% percentile for both groups, without a significant difference between men and women. In the eight most recent years, however, the men's average has been around a 68% percentile, and the women's average has been around 61 to 62%. After exclusion of the wages above 100,000 CZK, the average in the most recent years has gone down to a 63% level of percentile (which is a significant change), but for women this value is 60%. In the early years, the percentile level of the average values did not change much from year to year. The same was true for the values after exclusion of wages above 60,000 CZK. However, the results are surprising for exclusion of wages above 60,000

CZK in the most recent years: the average is at a 57% percentile level for men and a 59% percentile for women. Our hypothesis has thus been confirmed that the men's wages have a different structure and the high wages affect this group in a more pronounced way.

T a b l e 10

Average as Percentile

Year	Men						Women					
	CR	perc.	up to 100	perc.	up to 60	perc.	CR	perc.	up to 100	perc.	up to 60	perc.
1995	9,221	0.637	9,207	0.637	9,166	0.638	6,794	0.643	6,791	0.643	6,785	0.643
1996	11,100	0.661	11,047	0.661	10,958	0.615	8,363	0.628	8,363	0.628	8,354	0.628
1997	12,737	0.645	12,643	0.646	12,483	0.606	9,740	0.625	9,726	0.625	9,700	0.626
1998	13,914	0.653	13,651	0.654	13,365	0.618	9,872	0.622	9,850	0.622	9,791	0.623
1999	14,835	0.648	14,626	0.649	14,336	0.618	10,878	0.606	10,861	0.607	10,809	0.607
2000	15,537	0.671	15,205	0.643	14,863	0.614	11,281	0.622	11,248	0.622	11,186	0.623
2001	16,580	0.674	16,193	0.648	15,777	0.622	12,435	0.608	12,393	0.608	12,304	0.609
2002	17,987	0.664	17,352	0.640	16,842	0.617	13,565	0.635	13,490	0.599	13,374	0.600
2003	19,784	0.669	19,018	0.648	18,403	0.601	15,217	0.616	15,110	0.616	14,928	0.584
2004	20,109	0.666	19,349	0.619	18,787	0.598	15,380	0.587	15,286	0.587	15,135	0.589
2005	21,188	0.657	20,292	0.615	19,636	0.599	16,076	0.608	15,973	0.577	15,789	0.579
2006	22,203	0.6.69	21,050	0.629	20,270	0.589	16,882	0.590	16,719	0.560	16,492	0.562
2007	24,026	0.684	22,760	0.630	21,768	0.595	17,916	0.585	17,888	0.586	17,610	0.589
2008	25,821	0.674	24,282	0.623	23,132	0.593	18,912	0.593	18,839	0.594	18,500	0.598
2009	26,929	0.680	25,058	0.635	23,741	0.590	19,957	0.602	19,684	0.603	19,294	0.581
2010	27,644	0.687	25,716	0.629	24,320	0.586	20,585	0.618	20,298	0.595	19,891	0.573
2011	28,196	0.696	26,066	0.639	24,552	0.598	20,903	0.605	20,567	0.606	20,107	0.587
2012	28,617	0.697	26,464	0.624	24,864	0.584	21,189	0.616	20,860	0.618	20,370	0.570
2013	29,360	0.688	27,091	0.636	25,360	0.583	21,694	0.620	21,323	0.621	20,785	0.574
2014	29,697	0.686	27,542	0.635	25,726	0.586	21,957	0.606	21,599	0.608	21,041	0.587
2015	30,376	0.679	28,202	0.628	26,296	0.580	22,569	0.625	22,204	0.602	21,610	0.585
2016	31,856	0.682	29,542	0.634	27,456	0.573	23,724	0.622	23,309	0.601	22,643	0.586

Source: Author.

Conclusions and Discussion

Let us first evaluate the results for the Czech Republic as a whole. The number of high wages has been steadily growing, and these wages have affected the average wages to an increasing extent. However, the proportion of the high wages in the total quantity has been growing much more slowly than that in the total amount. Our calculations confirm that, in the most recent years, the average wages have been at about a 67% percentile level. After the exclusion of the high wages, the average value gets closer to the median.

When evaluating the results for men and women, the general conclusions are very similar. The high wages much more strongly affect men's wages in all viewed aspects. The effect of the high wages is much smaller for women's wages. In other words, the average values are better characteristics for women's wages

than for men's. The differences between both groups are rather significant. For these two groups, publication of the medians is also desirable in addition to the averages. In general, we can say that the differences between the beginning and recent years are substantial. The numbers of high wages will be growing in the future as well, with a growing effect on the average values. That is another reason why information about the median values, as well as other percentiles, should accompany the average wage data.

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