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**Working Paper**

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IES Working Paper, No. 11/2011

**Provided in Cooperation with:**

Charles University, Institute of Economic Studies (IES)

*Suggested Citation:* Mysíková, Martina (2011) : Personal earnings inequality in the Czech Republic, IES Working Paper, No. 11/2011, Charles University in Prague, Institute of Economic Studies (IES), Prague

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# Personal Earnings Inequality in the Czech Republic

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IES Working Paper: 11/2011



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Mysíková, M. (2011). "Personal Earnings Inequality in the Czech Republic" IES Working Paper 11/2011. IES FSV. Charles University.

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# Personal Earnings Inequality in the Czech Republic

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April 2011

## **Abstract:**

This paper analyzes the inequality of personal earnings in the Czech Republic since the early transition from communism, using relative distribution method. It applies data from two surveys, Microcensus and Living Conditions, covering the period from 1988 to 2008. The trend suggested by many recent empirics, “hollowing of the middle”, was confirmed in the early stages of transition, but later subsided. Earnings polarization was apparent for all sex and education subgroups between the years 1988 and 1996. For international comparison the European dataset EU-SILC 2008 has been used, focusing on four countries: Austria, Germany, Hungary, and Poland. Earnings distributions by gender and education have been analyzed, establishing that male earnings distribution is more homogenous than female, and earnings of highly educated people are more concentrated in the middle than earnings of less educated people.

**Keywords:** earnings distribution, inequality, transition

**JEL:** D31, J39, O15

## **Acknowledgements:**

This paper was written with the support of the Grant Agency of the Czech Republic, Grant No. 403/08/0109 (“From Destratification to Stratification? The Development of the Social Stratification System in the Czech Republic, 1991–2009”). The author wishes to thank Jiří Večerník (Institute of Sociology of the Academy of Sciences of the Czech Republic, Prague), for his valuable advice. The usual disclaimer applies.

## **1. Introduction**

Income inequality and its development in transition countries have drawn attention of many researchers. Recent empirics focus both on individual earnings and household income disparities. Recently, the phenomenon of increasing income inequality has been analyzed, especially in transition countries, where income inequality was expected to grow. For example, Milanovic (1999) observed that the public sector middle class was “hollowing out”, as some workers moved to private sector with higher earnings, while others lost jobs. In terms of wages, the shift from communist wage-setting to market-determined wages was expected to change earnings distribution.

Earnings inequality was one of the lowest in communist Czechoslovakia, even compared to other European communist countries (Večerník, 2009). Before 1989, wages were determined centrally, mainly according to demographic characteristics of workers, job tenure, physical demand in some industries, ideological importance of certain jobs, etc. During the transition period after 1989, wages started to reflect education, experience, and skills, and earnings inequality began to grow.

Rutkowski (2001) examined the trends in earnings distribution in the 1990s in Central and Eastern Europe (CEE). His study showed that the widening of the earnings distribution at its both ends, although relatively modest at the bottom in the Czech Republic, occurred mainly in the first years of the transition period and slowed down in the late 1990s. At that time earnings inequality levels in most transitional CEE countries moved to the upper part of the OECD range with the Czech Republic at the lower tail within CEE. The factors that contributed most to income inequality were education and inter-industry wage differentials, while other factors, like gender or work experience, were less important, or even insignificant.

Empirics on the impact of education on wages during the transition period in post-communist countries typically showed increasing returns to education (for summary, see e.g. Švejnar, 1999). The effect of education on wages was reinforced in the first years after 1989 and stagnated in the late 1990s (Večerník, 2009: 80–81). For example, according to Chase (1998) returns to education for Czech men rose from 2.4% in 1984 to 5.2% in 1993; particularly large income increases were experienced by individuals with secondary education. The same study proved that while returns to education increased, returns to experience declined. Filer et al. (1999) revealed that by 1997 benefits generated by education grew even larger. It took almost eight years of transition for the value of education in the Czech (and Slovak) Republic to reach levels common in developed market economies.

Communist regime rewarded production branches more than services due to physical demand of the former, while in the market economy it is productivity that gains more importance. Večerník (2009) stated that during the transition period wages became influenced by occupation, rather than by industrial sector.

In terms of household disposable income, the inequality in former Czechoslovakia was mainly determined by the number of economically active household members. In Western countries, female employment was lower and personal earnings disparities higher. As a consequence, the inequality of income per capita was relatively low in former Czechoslovakia and was growing quickly during the transition period, while inequality of income per household was comparable to figures in Western countries and only slowly increased later (Večerník, 2009).

Alderson and Doran (2010) analyzed household disposable income distributions in five transitional countries and four high-income societies, using the data from Luxembourg Income Study that contained available data in the period 1979 to 2005. Their results suggest that, compared to the past, households are moving up and down the income distribution, thus creating the so called “hollowing of the middle”. In the Czech Republic, this pattern prevailed

between the analysed years 1992 and 1996, where the movement to the top of income distribution exceeded the movement in the opposite direction. In other analyzed countries, their findings suggest a persisting polarization trend for household income even for longer periods.

Income polarization has recently raised the interest of many researchers. For example, Massari, Pittau and Zelli (2008) described income polarization in Italy in the 2000s; Hussain (2007) showed an increasing income polarization over 1984 to 2002 in Denmark; Gasparini et al. (2008) illustrated income polarization in Latin America, while Beach and Chaykowski (1997) examined increased polarization of U.S. male earnings between 1968 and 1990.

While Alderson and Doran (2010) examined the issue of household income distribution in 1992–1996, I shall cover a longer period of the development of personal earnings in the Czech Republic, beginning after the fall of communism.

I open by turning my attention to the development of earnings distribution in the early transition period, where, supposedly, most substantial changes occurred. I shall explore the existence of the “hollowing of the middle” in individual earnings, a phenomenon similar to that suggested by Alderson and Doran (2010) for household disposable income. Given that household disposable income is supposed to be highly correlated with and consists mainly of wages of household members (see e.g. Večerník, 2009), I expect that the analysis of personal earnings shall deliver results similar to those of Alderson and Doran (2010). Regardless of whether this phenomenon is confirmed or not, I shall analyze the changes undergone by earnings distribution from the late 1990s onwards to find out whether the expected pattern of distribution changes that started in the early transition period continued in the same pace or slowed down. I am particularly interested in the impact of education on earnings inequality, since this factor contributed the most to the growing income disparities in the early transition

period. Further, I shall analyze earnings distributions separately for men and women to find out how gender inequality developed in the last decade.

Finally, I shall compare the current earnings inequality in the Czech Republic to some European countries, including other transitional economies. This international comparison is expected to provide some insight into the stage of earnings inequality development in the Czech Republic, whether income inequality in the Czech Republic has already drawn level with Western Europe and thus if the Czech Republic has finished the transformation in this sense. In order to do that different gender and education subgroups shall be defined and analyzed in terms of differences in shape and location of their earnings distributions, which otherwise remain unrevealed during overall earnings inequality measures.

## **2. Data**

This paper aims to follow the development of earnings inequality in the Czech Republic since the early post-communist transition, and compares the current situation in European countries. It does so by applying six accessible datasets describing the situation in the Czech Republic since the late 1980s up to the present: Microcensus (MC) 1988, 1992, 1996, and 2002, and Living Conditions (LC) 2006 and 2008. The 1988 and 1992 datasets of individuals do not provide individual weights, and as a consequence the results might not fully correspond to the whole population.

After the last Microcensus from the year 2002, the Czech Republic joined the EU household survey Statistics on Income and Living Conditions (EU-SILC). It is a uniform survey, compulsory for all EU Member States, and thus provides data suitable for cross-country comparisons. It collects information on both households (mainly information on living conditions, joint income, and joint social allowances) and individuals (personal and job characteristics, wages, income, and social allowances). Essentially, this survey collected



information rather similar to the previous national Microcensus surveys. This survey has been conducted by the Czech Statistical Office since 2005, and has provided data for a national dataset called Living Conditions (Životní podmínky), as well as European harmonized EU-SILC dataset handled by Eurostat.

The income data applied in the present study contain annual gross personal earnings from main dependent employment and self-employment, as well as from second and other jobs. These two income sources may suffer with certain inconsistency and joining of these two income sources is rather rare in the empirical research.<sup>1</sup> In spite of the possible inconsistency, I intend to employ both these income sources, as the earnings from self-employment represent a significant part of aggregated earnings and also its importance has risen during the transition period.<sup>2</sup>

Although both the above described datasets, the Living Conditions and EU-SILC for the Czech Republic, stem from the same survey, they may differ in target variables available, since national interest may vary from the harmonized European intentions. For instance, income variables may be provided either on individual or household level, but they also can be aggregated into one variable. The difference between the two datasets that is most substantial for the purposes of this study is the self-employment income variable. Compared with the Czech dataset, the European dataset EU-SILC contains several additional components concerning this income source, such as the value of goods and services produced for own consumption. The last section of this study employs the EU-SILC 2008 dataset to compare income inequalities across the European Union.

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<sup>1</sup> The researchers usually aim to avoid including the earnings from self-employment for several reasons: it includes irregularities, might be artificially lowered by the taxpayers or underreported by respondents. However, as quoted for instance by Večerník (2010, Chapter 4) self-employment replaced many dependent jobs and created many new ones and the share of self-employed as a percentage of total employment had been rising until the first half of 2000's in the Czech Republic. Therefore, this income source is not negligible.

<sup>2</sup> I started the analysis by examining the total market income. I wondered whether other market income, e.g. income from rental of a property, contributes to the income inequality, or whether income inequality arises already at earnings level. As other market income represented only a negligible income source in total inequality, it was not included in further analysis, and instead all attention was turned to earnings.

This study concentrated on individuals aged 16 to 64, with reported positive annual earnings coming from employment. The top and bottom percentiles of total earnings distributions were excluded. The sizes of the samples, along with the earnings inequality results, are stated in Sections 4 and 5.

### **3. Methodology**

The most common and the most frequently applied measure of income inequality is the Gini coefficient. The problem with the Gini coefficient is that it captures total inequality but fails to tell us where exactly the inequality occurs along the distribution. Therefore, I apply relative distribution methods developed by Handcock and Morris (1999) and used by, among others, Alderson and Doran (2010). This method allows us to follow distributional changes along the whole income distribution. It is based on comparison of income distributions in periods  $t$  and  $t+1$ , where the values of period  $t+1$  are expressed as positions in the distribution of period  $t$ . The relative probability distribution function is simply the density ratio at each quantile. If distributions in the two periods were the same, the relative distribution would be uniform.

To illustrate this, let's say that the density at the median of individual earnings was 1.14 in 1988 (period  $t$ ). The median value of earnings logarithm (in CZK) corresponds to 10.58. The 1996 earnings distribution density (period  $t+1$ ) at the same point (i.e. at the median of 1988, period  $t$ , distribution) equals 0.11. The density ratio is  $0.11/1.14 = 0.10$ , which means that the number of individuals at this point of distribution, i.e. at the median value of 1988, dropped to one tenth in 1996 compared to 1988.<sup>3</sup>

As the nominal values of earnings shift to the right over time, the two compared distributions differ in two ways: in shape and in location. This method allows us to separate these two shifts in a way which follows.

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<sup>3</sup> The example values here correspond to the figures in Graph 1 (see upper left and right panels).

First, the shape shift can be isolated by cancelling out differences in location. To put it simply, we adjust the  $t$  distribution by the difference in medians of  $t+1$  and  $t$  distributions, where both distributions sustain their shape with medians located at the same point (for illustration, see the middle left panel in Graph 1). Cancelling out the shift in location and fitting the  $t+1$  data to the  $t$  quantile cut points allows us to easily compare the densities at each quantile (for illustration, see the middle right panel in Graph 1). If the relative density is less than 1, there were fewer individuals at a particular quantile in  $t+1$  than there were in  $t$ . The U shape of the relative density function suggests that the middle is hollowing out or, in other words, that the distribution in  $t+1$  is more polarized. This means that individuals move towards both far ends of the distribution, relative to period  $t$ . Inverted U shape, to the contrary, implies that individuals are more concentrated in the middle, compared to the past.

Second, we can separate the location shift. The  $t+1$  distribution adopts the shape of  $t$  distribution and both distributions sustain their locations (for illustration, see the bottom left panel in Graph 1). In this case, when comparing distributions over two time periods, it is obvious that the relative distribution function must be increasing, since the distributions capture nominal absolute values of earnings rising over time. This is why I concentrate less on the location shift and focus mainly on the shape shift.

The decomposition into location and shape effect can be formalized as follows (Jann, 2008):

$$\frac{f_{t+1}(y)}{f_t(y)} = \frac{f_{t+1}(y)}{f_A(y)} \times \frac{f_A(y)}{f_t(y)}$$

overall = shape  $\times$  location. (1)

where  $f_t(y)$  and  $f_{t+1}(y)$  are the density functions in periods  $t$  and  $t+1$ , respectively.  $f_A(y)$  is the location adjusted density function, where  $F_A(y) = F_t(y+\rho)$ , and  $\rho = \text{median}(Y_{t+1}) - \text{median}(Y_t)$ .

The same method can be applied in comparing distributions of two subgroups of the sample in the same time period; e.g. the relative income distribution can be compared according to sex. In addition, the relative distribution method is more informative than commonly used measures or applied techniques.

Traditional techniques of research provide us with only a basic insight into gender earnings differences: official statistics provide us with only mean or median values of earnings for men and women; standard regression analysis shows conditional mean difference; other techniques, such as Oaxaca-Blinder decomposition (Oaxaca, 1973; Blinder, 1973) dividing the total gender earnings gap into a part caused by differences in covariates and an unexplained part, are more informative but do not describe the situation along the whole income distribution. So far, several techniques of distributional analysis of differences between groups have been developed. Buchinsky (1998) analyzed distributions using quantile regression, Machado and Mata (2005) adjusted the Oaxaca-Blinder decomposition method to quantile regression.<sup>4</sup> This is why I decided to follow the methodology of relative distributions developed by Handcock and Morris (1999). Its powerful clearness of description and illustrative simplicity can be applied for comparisons in time, as well as between groups.<sup>5</sup>

#### **4. Earnings inequality in the Czech Republic**

The most substantial increase of earnings inequality in the Czech Republic in terms of the Gini coefficient was apparent between 1988 and 1996, with only moderate changes later, as shown by Table 1. The Gini coefficient for the whole sample grew from 0.18 to 0.28 between 1988 and 1996 and remained unchanged ever since.

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<sup>4</sup> Other similar techniques were applied e.g. by Juhn, Murphy and Pierce (1993); Lemieux (2002).

<sup>5</sup> This approach is closely related to that by DiNardo, Fortin and Lemieux (1996) who examined differences in density functions.

The Gini coefficient is presented separately for several subgroups created according to their sex and education. These subgroups' earnings inequality remained stable since 1996, with the exception of female inequality that reached its peak (0.28) in 2002 and has been declining since then. However, certain differences in inequality between the subgroups are apparent. Therefore, it is rather beneficial to examine the earnings distributions in more detail and to apply the relative distribution method to analyze the changes in time and between subgroups.

**Table 1** Gini coefficient of earnings in the Czech Republic

	<i>sample</i>	<b>total</b>	<b>female</b>	<b>male</b>	<b>low education</b>	<b>medium education</b>	<b>high education</b>
MC 1988	16336	0.18	0.16	0.15	0.18	0.17	0.15
MC 1992	19590	0.25	0.23	0.23	0.22	0.24	0.22
MC 1996	32939	0.28	0.27	0.26	0.25	0.26	0.26
MC 2002	8403	0.28	0.28	0.27	0.25	0.26	0.27
LC 2006	7506	0.28	0.27	0.27	0.25	0.26	0.27
LC 2008	11212	0.28	0.26	0.27	0.25	0.26	0.27

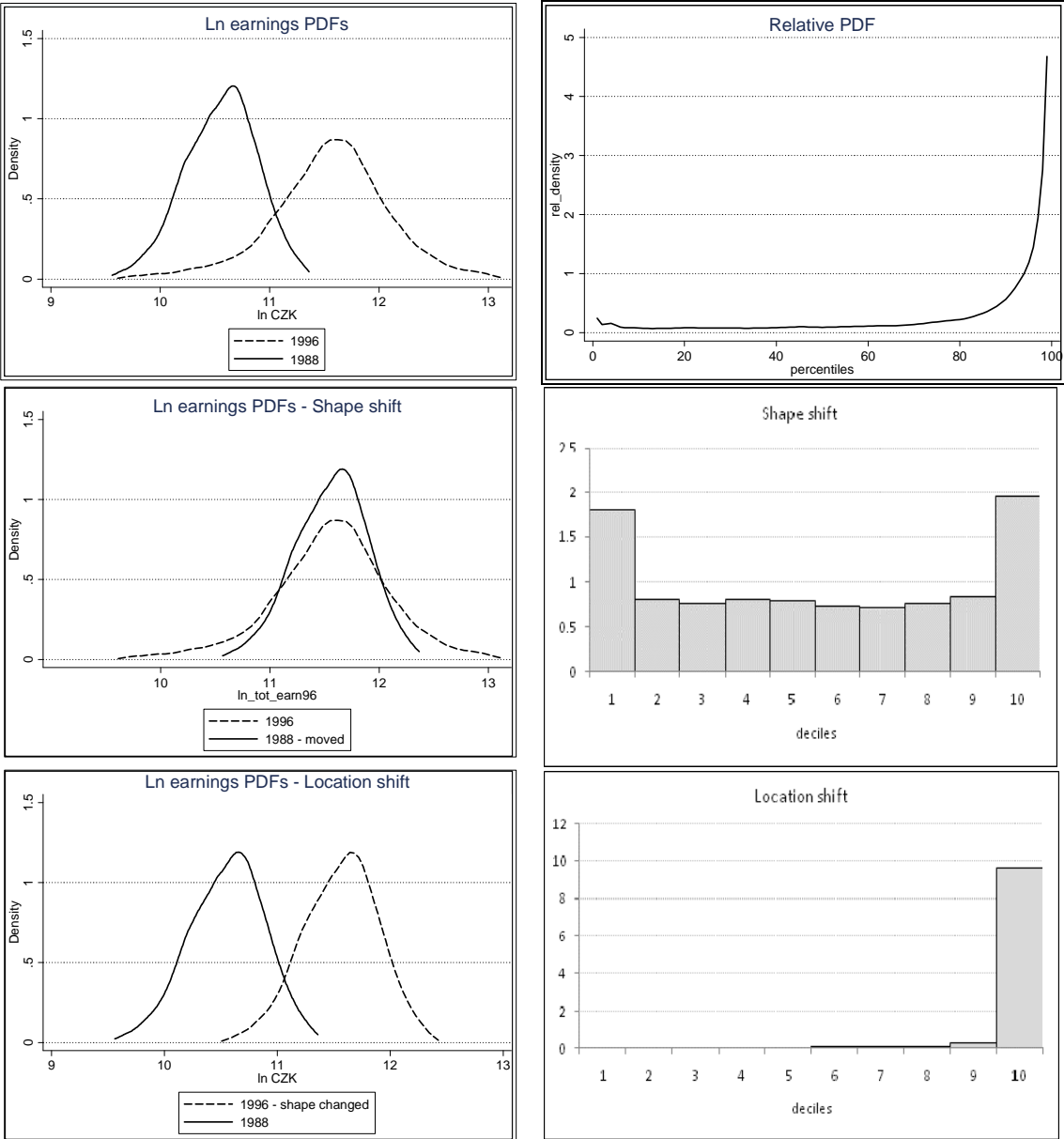
Source: Microcensus 1988, 1992, 1996, 2002, Living Conditions 2006, 2008. Author's computations.

Note: Low education ("basic") – ISCED levels 0, 1 and 2; medium education (upper secondary) – ISCED levels 3 and 4; high education (tertiary) – ISCED levels 5 and 6.

I shall start with the analysis of the earnings distribution functions and their relative change in the period 1988 to 1996. According to Rutkowski (2001) and others, the deepest changes in income distribution occurred as early as in the first half of the 1990s. Alderson and Doran (2010) demonstrated that a 5-Gini-point increase of household income inequality between 1992 and 1996 in the Czech Republic was accompanied by "hollowing of the middle". They found out that about 40% more households joined the ranks of those whose median-adjusted income put them in the 1<sup>st</sup> decile in 1992, with even a stronger movement to the top decile (about 60% more households). However, the most substantive changes might have occurred earlier in the transition period.

For these reasons, it is beneficial to start the analysis of the distributional changes in 1988 and separate two periods. We know that personal earnings inequality rose by 10 Gini points in 1988–1996, while it remained stable in the later period 1996–2008. The relative distribution method will show what exactly happened to the “middle” in these two periods.

**Graph 1** Earnings distribution functions and decomposition, CZ 1988–1996



Source: Microcensus 1988, 1996. Author’s computations.  
 Note: PDF – probability density function.

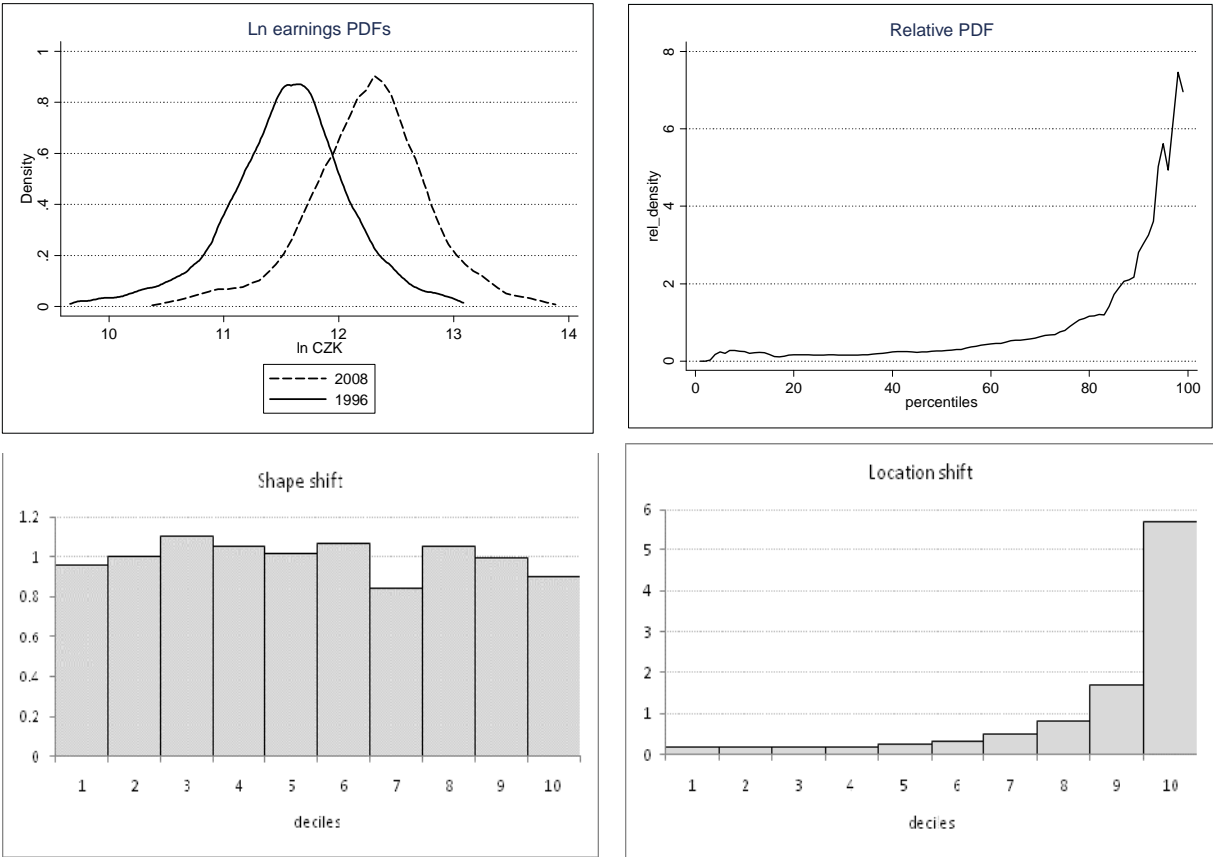
Graph 1 shows the distribution of earnings in 1988 and 1996 (upper left panel), relative distribution (upper right panel) and its decomposition into shape and location effects. Cancelling out the differences in location (which is self-evident when comparing two time periods) reveals the shape shift. The middle left panel indicates a polarization trend. Fewer individuals were concentrated at the middle of the distribution compared to the past. The same tendency is even more apparent in the middle-right panel. Fitting the 1996 data to the 1988 median-adjusted decile cut points shows that deciles ranging from 2<sup>nd</sup> to 9<sup>th</sup> were “hollowing out”. As a consequence, individuals in 1996 were 1.8 times more likely to be at the bottom decile of the 1988 median-adjusted distribution and even nearly twice more likely at the top decile. With my analysis starting in 1988, the aforementioned pattern of “hollowing of the middle” proved more profound compared to the same pattern previously demonstrated for household disposable income by Alderson and Doran (2010) whose analyses started only in 1992.

As far as location shift is concerned, if the change in the distributional shape is cancelled out, the relative distribution (bottom right panel) increases. Individuals in 1996 were about 9.5 times more likely to be at the top decile of the 1988 distribution.

The change in distribution of earnings between 1996 and 2008 is shown in Graph 2. The bottom left panel indicates a slight convergence trend. More individuals joined the ranks of those in the 3<sup>rd</sup> to the 6<sup>th</sup> and 8<sup>th</sup> deciles, however, the increase was rather moderate. Concerning the location shift, individuals in 2008 were nearly 6 times more likely to be located in the top decile of the 1996 distribution.

The shape shifts indicate individual earnings polarization in the initial period of transition, however, this trend later wore off. Between 1996 and 2008, the distribution became rather more homogeneous, with the exception of the 7<sup>th</sup> decile.<sup>6</sup>

**Graph 2** Earnings distribution functions and decomposition, CZ 1996–2008



Source: Microcensus 1996, Living Conditions 2008. Author’s computations.  
 Note: PDF – probability density function.

Table 1 shows that female earnings experienced an 11-Gini-point increase in inequality between the years 1988 and 1996 and women were the only subgroup later experiencing some inequality changes; Graph 3 illustrates the shape shift of female earnings distributions in more detail. The middle part of the distribution was hollowing out in the period 1988–1996 with an

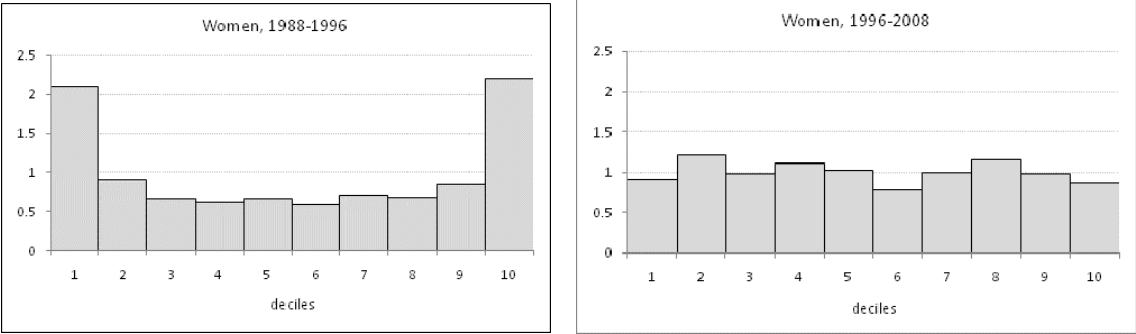
<sup>6</sup> A similar process has prevailed for household income in the Czech Republic in this period (not stated here).



even slightly stronger polarization than recorded for the total sample. This trend did not persist and the relative density function was rather flat in the later period.

Education was an important factor that contributed to the female earnings polarization between the years 1992 and 1996. While in 1992 about 64% of women with high education were concentrated in the two top deciles, in 1996 as many as 74% of these women joined the top two (median-adjusted) 1992 deciles. At the lower tail, 29% of women with low education fell in the two bottom deciles in 1992, while as many as 52% of women with low education occupied these ranks in 1996. This proves that while women with higher education were moving to the top, their low-education counterparts were moving downwards.

**Graph 3** Shape shifts of earnings distributions, women, CZ



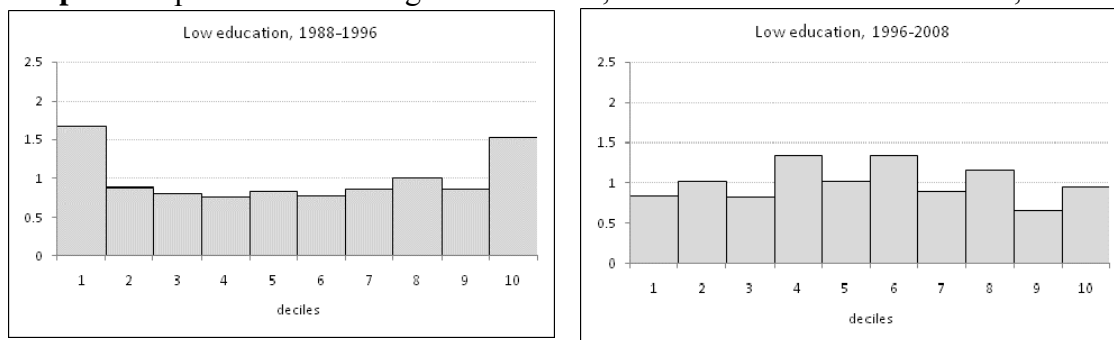
Source: Microcensus 1988, 1996; Living Conditions 2008. Author’s computations.

Table 1 proves that the least profound Gini coefficient increase of individual earnings (by 7 points) between the years 1988 and 1996 occurred within the group of individuals with low education. Graph 4 shows the shape shift of earnings distribution for the subgroup of individuals with low education.

The earnings distribution of low-education subgroup became more polarized over the period 1988–1996. In 1996 there were 50% more individuals whose earnings put them within the cut points of the top decile of the median-adjusted earnings distribution in 1988. Additionally, in

1996 there were also 70% more individuals who came under the 1988 median-adjusted 1<sup>st</sup> decile. Low education is the only subgroup which experienced a stronger movement to the bottom than to the top. After this period, between 1996 and 2008, the shape shift demonstrated that earnings became rather more homogenous, as indicated by increases in 4<sup>th</sup>, 6<sup>th</sup>, and 8<sup>th</sup> deciles.

**Graph 4** Shape shifts of earnings distributions, individuals with low education, CZ



Source: Microcensus 1988, 1996; Living Conditions 2008. Author’s computations.  
 Note: Low education (“basic”) – ISCED levels 0, 1 and 2.

Recent empirics dealing with transition period in post-communist countries stress the existence of the phenomenon “hollowing of the middle” (e.g., Milanovic, 1999; Alderson and Doran, 2010). It seems that this phenomenon was associated with personal earnings in the Czech Republic only in the early stage of transition, while it ceased later.

## 5. Earnings inequality in Europe

So far, the analysis looked at personal earnings distributions in the Czech Republic. The next object of my attention shall be whether the structure of personal earnings in the Czech Republic is specific or rather comparable to other European countries. In order to provide a first insight into the personal earnings inequality across Europe, Table 2 shall present the Gini coefficient in 22 EU countries. After that, I shall focus on several countries in more detail.

The Gini coefficient in European countries amounts to 0.35 on average. The lowest inequality is in Slovakia, followed by the Czech Republic, Belgium, Denmark and Sweden. Comparing the Gini coefficient between gender subgroups, the highest difference is seen in Germany, where also the total Gini coefficient is one of the highest. The Gini coefficient for female subgroups stands at 0.41; the inequality is much lower for male subgroup – 0.33. Nevertheless, earnings inequality is the same for men and women in some countries, e.g. Austria and Hungary.

**Table 2** The Gini coefficient of earnings in some European countries (2008)

	<i>sample</i>	<i>total</i>	<i>female</i>	<i>male</i>	<i>low &amp; medium education</i>	<i>high education</i>
AT	6316	0.36	0.32	0.32	0.36	0.33
BE	6296	0.29	0.30	0.27	0.29	0.27
CZ	11212	0.28	0.26	0.27	0.26	0.27
DE	12790	0.39	0.41	0.33	0.40	0.33
DK	7124	0.29	0.25	0.26	0.27	0.24
EE	6087	0.35	0.33	0.34	0.36	0.33
ES	15680	0.34	0.38	0.31	0.33	0.31
FI	13146	0.33	0.34	0.34	0.36	0.30
GR	6713	0.39	0.41	0.37	0.39	0.34
HU	9356	0.36	0.36	0.36	0.33	0.32
IE	4644	0.40	0.42	0.38	0.40	0.36
IT	22120	0.34	0.35	0.33	0.33	0.36
LT	5300	0.35	0.35	0.34	0.34	0.31
LU	4680	0.37	0.41	0.37	0.36	0.34
LV	6027	0.40	0.40	0.40	0.39	0.34
NL	11910	0.36	0.35	0.28	0.34	0.31
PL	14799	0.38	0.39	0.37	0.37	0.33
PT	4828	0.40	0.41	0.38	0.35	0.33
SE	8988	0.30	0.31	0.28	0.30	0.29
SI	12409	0.31	0.31	0.31	0.27	0.28
SK	7712	0.27	0.26	0.26	0.26	0.25
UK	9030	0.39	0.40	0.35	0.38	0.35

Source: EUSILC UDB 2008 – version 1 of March 2010; Living Conditions 2008 for CZ. Author’s computation.

Note: Low education (“basic”) – ISCED levels 0, 1 and 2; medium education (upper secondary) – ISCED levels 3 and 4; high education (tertiary) – ISCED levels 5 and 6.

Earnings inequality in different education subgroups is listed in the last two columns of Table 2. Once again, the biggest difference in Gini coefficient for subgroups of individuals with and without tertiary education is in Germany – 0.33 and 0.40, respectively. In Hungary, Slovakia and in the Czech Republic such difference is only one Gini point.

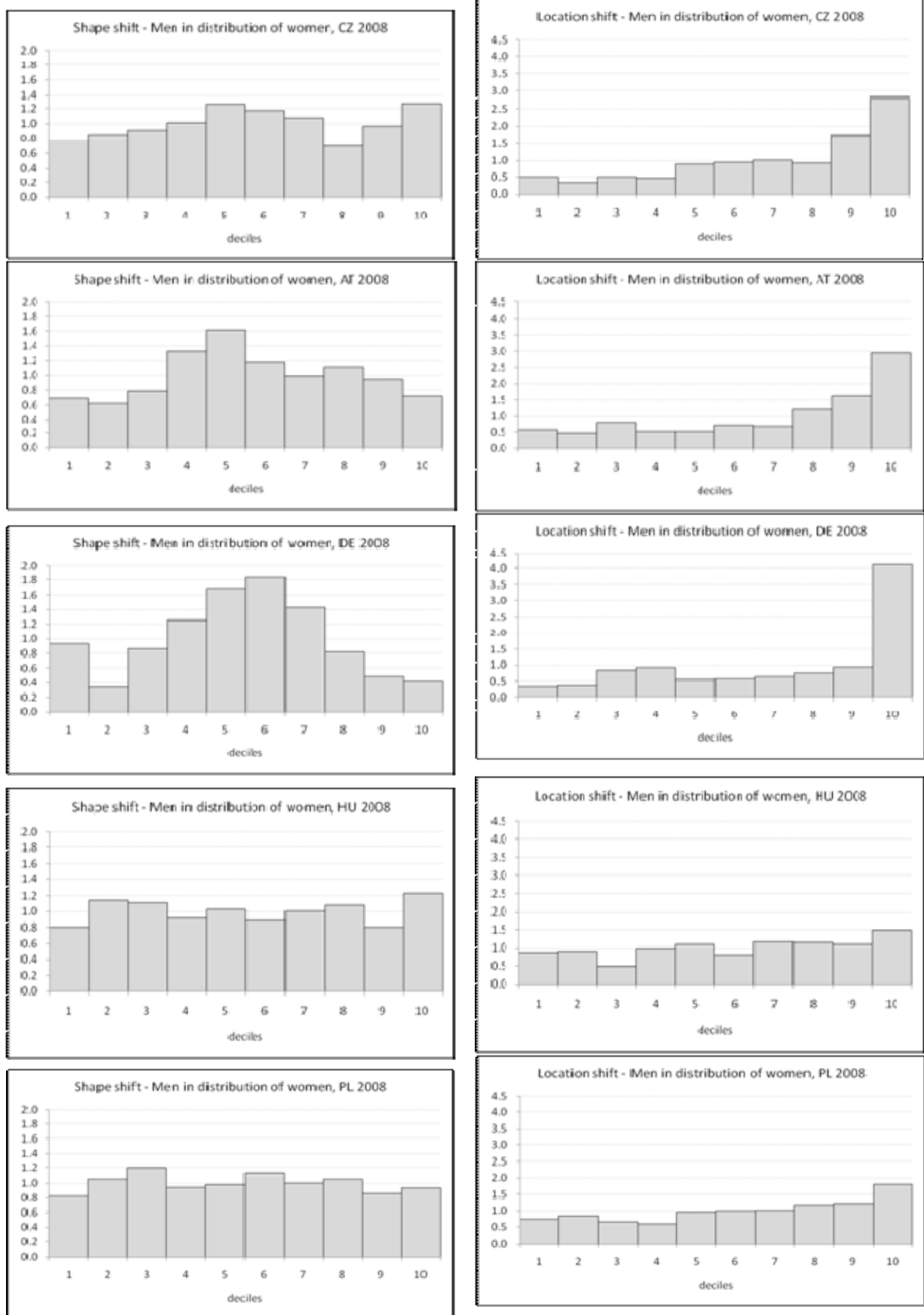
The relative distribution method and the decomposition into shape and location shifts help to reveal the differences in earnings inequality between subgroups more precisely. Graph 5 illustrates the shape and location shifts in the Czech Republic and its neighbours (Austria, Germany, Hungary, and Poland).

In the Czech Republic female earnings inequality was one Gini point lower than male in 2008. Men's earnings distribution is rather more homogenous than women's, as more men come under the 4<sup>th</sup> to 7<sup>th</sup> deciles of female (median-adjusted) distribution (see upper left panel of Graph 5). However, there are 30% fewer men in the 8<sup>th</sup> women's decile and 25% more men in women's top decile, which makes the male overall inequality higher. In simple terms, the male distribution has sharper peak and longer upper tail than female distribution.

In Austria, the Gini coefficients were the same (0.32) for both men and women, but the male earnings distribution is rather more concentrated in the middle (4<sup>th</sup> to 6<sup>th</sup> and 8<sup>th</sup> deciles). There were above 30% more men in the 4<sup>th</sup> and even 60% more men in the 5<sup>th</sup> decile of female earnings distribution. Male distribution has a sharper peak.

Germany is a country with a higher difference in male and female earnings inequality; female inequality is higher by 8 Gini points. Male earnings distribution is considerably more homogenous, as apparent from the middle-left panel in Graph 5. There were 25% more men in the 4<sup>th</sup> decile, 70% in the 5<sup>th</sup>, almost 85% in the 6<sup>th</sup>, and 40% more men in the 7<sup>th</sup> decile than women in the respective deciles of median-adjusted female earnings distribution. Men's earnings distribution is more concentrated in the middle compared to women's, which makes the inequality in the male subgroup substantially lower.

**Graph 5** Shape and location shifts of earnings distributions: Men versus women, 2008



Source: EUSILC UDB 2008 – version 1 of March 2010; Living Conditions 2008 for CZ. Author's computation.

The differences in female and male earnings inequality are highly related to the level of education. German women with high level of education are concentrated in the top deciles – more than 40% of them belong to the top two deciles. Contrary to women, German men with high level of education are spread more equally in the upper part of distribution than women with a similar level of education. Nearly 40% of men with high education are located within the cut points of the 7<sup>th</sup> and 8<sup>th</sup> decile of female (median-adjusted) earnings distribution, thus confirming that men's earnings are more homogenous than women's.

The shape shift, i.e. comparison of female and male earnings distribution without the differences in location, does not show any consistent trend in Hungary. Yet the Gini coefficients for men and women are equal. Although almost 25% more men are located in the top decile compared to women in their median-adjusted distribution, this higher concentration is overbalanced by other deciles along the distribution and results in the same overall earnings inequality.

In Poland, the shape shift exhibits only moderate differences in the shape of women's and men's earnings distributions. To point out one clear trend, the male earnings are more concentrated in the middle than female. This is in accordance with a two-point higher Gini coefficient for women.

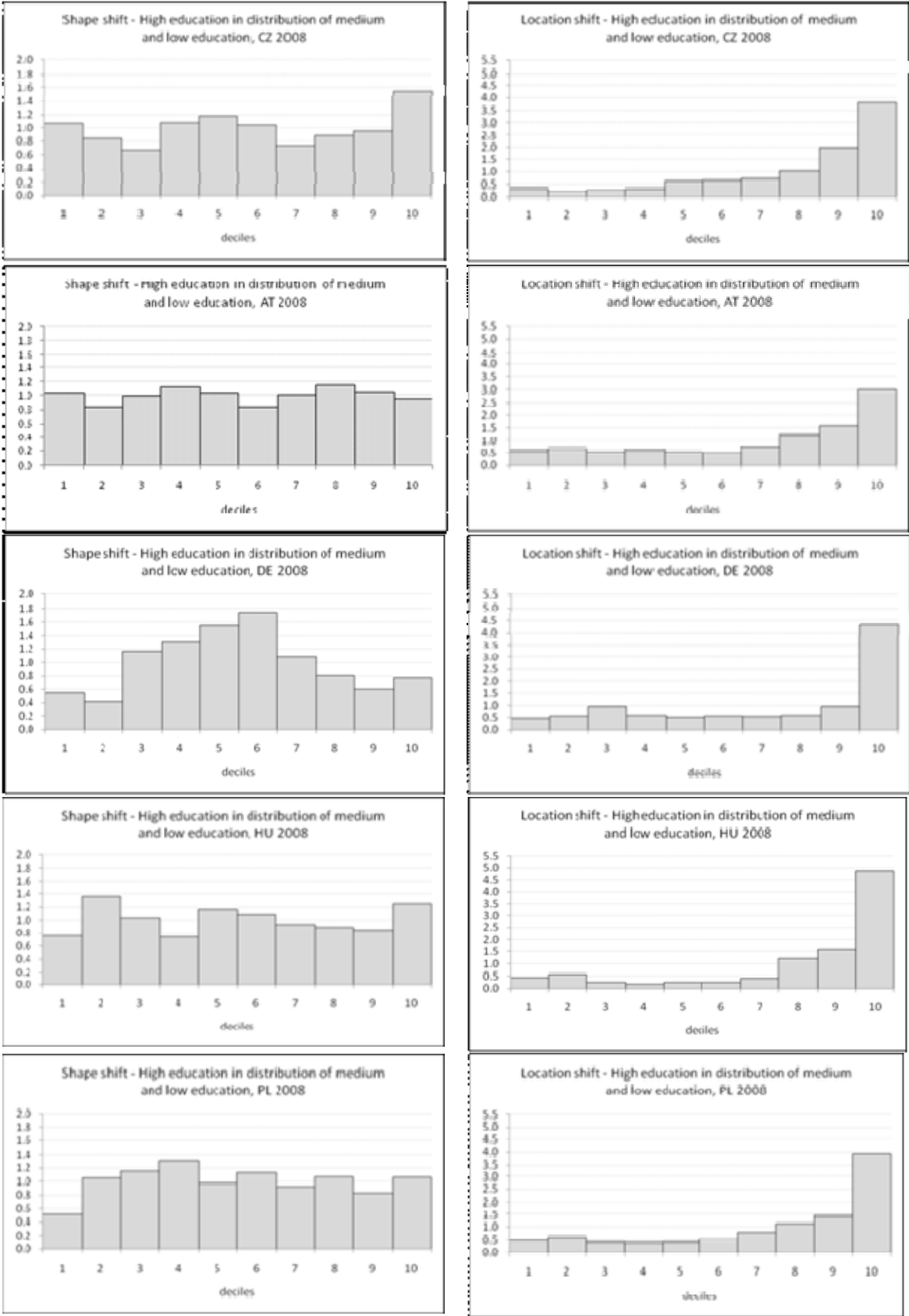
The right panels of Graph 5 show location shifts in these five countries. The difference in location of female and male earnings distributions is most obvious in Germany. There are more than four times more men in the top defined by female 10<sup>th</sup> decile cut point. The situation in Hungary and Poland is also interesting, as it differs substantially from other countries. A higher share of men in the top decile, which otherwise suggest commonly observed gender differences in earnings, usually prevails, but the results for Hungary and Poland indicate relatively low gender earnings inequalities.

In terms of the Gini coefficient, low and medium education subgroups exhibit higher earnings inequality than their highly educated counterparts (see Table 2), with the exception of those in the Czech Republic, Slovenia and Italy. The earnings inequality is one Gini point higher for people with high education in the Czech Republic. Graph 6 (upper left panel) clearly shows the reason. Although individuals with high education are more concentrated in the middle (4<sup>th</sup> to 6<sup>th</sup> deciles) of the less educated median-adjusted distribution than less educated in that distribution, there are also 55% more of highly educated at the very top of that distribution, which makes the overall earnings inequality higher for highly educated individuals.

The most obvious differences between earnings inequality determined by education level occurred in Germany: the highly educated exhibited the Gini coefficient of 0.33 while less educated 0.40. Earnings distribution of highly educated is more homogenous, as apparent from the shape shift in Graph 6 (middle left panel). Highly educated are 16% more likely to have earnings in the 3<sup>rd</sup> decile of the less educated median-adjusted distribution than less educated in the same decile of that distribution, 31% in 4<sup>th</sup> decile, 55% in 5<sup>th</sup> decile, 75% in 6<sup>th</sup> decile, and 9% in 7<sup>th</sup> decile. There are less of them at both tails of female earnings distribution.

Disregarding the differences in shape and focusing on location shift (right column in Graph 6) we see that earnings distributions of the highly educated are located higher, compared to the less educated in all five countries. This tendency is very strong in Germany: the highly educated are 4.3 times more likely to fall into the very top decile of less educated. This phenomenon is apparent also in Hungary and Poland, i.e. countries where the location shift by gender was relatively moderate. There were 3.9 times more individuals with high education whose earnings placed them in the top decile of less educated in Poland and even 4.9 times more in Hungary.

**Graph 6** Shape and location shifts of earnings distributions: High education versus medium and low education, 2008



Source: EUSILC UDB 2008 – version 1 of March 2010; Living Conditions 2008 for CZ. Author’s computation.



Education is a very important factor contributing to income differences well described by human capital theory, as well as by empirics. However, the differences in earnings distributions between education subgroups are not quite typical. Germany is an example where the earnings distribution of highly educated is markedly more homogenous than earnings distribution of the less educated. However, such a clear tendency is not obvious in all examined countries.

## **6. Conclusion**

This paper analyzes personal earnings inequality and earnings distributions in the Czech Republic since 1988 using the relative distribution method. The most substantial changes in earnings distribution were expected to occur already in the early stage of transition. Indeed, the Gini coefficient experienced the most substantial increase in the early transition period 1988–1996, while it remained unchanged between the years 1996 and 2008.

In the early transition period, the distribution of individual earnings became more polarized. These results are in accordance with Alderson and Doran's findings (2010) concerning the phenomenon of "hollowing of the middle" for household disposable income in the Czech Republic in 1992–1996. Their analysis, applying the relative distribution method and decomposing the distributional changes into shape and location shifts, contributed considerably to the explanation of the process of growing income inequality. However, the period covered by their analysis missed the most substantial changes in income distribution that occurred before 1992. Therefore, additionally to their study, this study concentrates on longer period in the Czech Republic, starting from 1988. Hollowing of the middle took place in the Czech Republic but only for a limited period of time. My findings indicate that after

that, in 1996–2008, this trend gradually faded away and personal earnings turned slightly more concentrated in the middle.

The trend of “hollowing of the middle” showed clearly for all gender and education subgroups in the early transition period; however, this trend did not last even for the subgroups. Education was an important factor that contributed to the earnings polarization between the years 1988 and 1996. Individuals with high education were making their way to the top, while people with low education were moving in the opposite direction. The earnings distribution of low-education subgroup experienced a similar pattern but was the only group to undergo a more profound movement to the bottom than to the top in this period.

To reveal the specifics of Czech earnings inequality, the international comparison focused on four neighbours of the Czech Republic – Austria, Germany, Poland, and Hungary. The Czech Republic exhibited the lowest overall earnings disparity in terms of the Gini coefficient in 2008. Also when comparing the earnings inequality by sex and education, the Czech Republic deviates from the other countries. While the earnings inequality is higher for men and highly educated in the Czech Republic, the Gini coefficient is higher (or equal) for women and less educated in other countries. The differences in earnings inequality between these subgroups were the highest in Germany.

The shape shift in Germany showed results expected based on the Gini coefficients – a strong concentration of male and highly educated earnings in the middle compared to women’s and less educated earnings distributions, respectively. However, in the Czech Republic, the relative distribution method and its decomposition into shape and location shifts revealed that the differences in distributions between subgroups were not as straightforward. The Gini coefficient of male earnings was one point higher than for women. More men would likely be placed in the top decile of women’s median-adjusted distribution than women in that decile, which makes the overall male inequality higher. In addition, male earnings were more

concentrated in the middle, which would otherwise indicate lower male inequality. Similar results were observed in Austria: male earnings are more concentrated in the middle than female although the Gini coefficients for these subgroups equal.

Regarding the education subgroups, once again, the Gini coefficient does not fully describe the distributional differences in the Czech Republic. The highly educated are more concentrated in the middle of the less educated median-adjusted distribution than low educated in that distribution. Nevertheless, many of the highly educated are also located at the very top decile, which makes the overall earnings inequality of Czechs with high education higher than the inequality of the less educated.

These findings support the fact that a single overall indicator of earnings inequality does not sufficiently describe the inequality. The relative distribution method reveals changes that occurred along the distribution, brings supplementary results and provides additional possibilities to analyse earnings distributions. Decomposing relative distribution, especially for different subgroups, might bring results with interesting implications for understanding income inequality. In the light of these results, the finding for the Czech Republic differ less from the other countries than it would seem from the first look at the Gini coefficients.

## References

- Alderson, A. S., and Doran, K. (2010): "How Has Income Inequality Grown? The Reshaping of the Income Distribution in LIS Countries." Paper prepared for presentation at the conference on "Inequality and The Status of The Middle Class: Lessons from the Luxembourg Income Study" Luxembourg, July 28–30 2010. <http://www.lisproject.org/conference/papers/alderson-doran.pdf>
- Beach, C. M., and Chaykowski, R. P. (1997): "Inequality and Polarization of Male Earnings in the United States, 1968–1990." *North American Journal of Economics and Finance*, Vol. 8, No. 2, pp. 135–151.
- Blinder, A. S. (1973): "Wage Discrimination: Reduced Form and Structural Estimates." *Journal of Human Resources*, Vol. 8, No. 4, pp. 436–455.
- Buchinsky, M. (1998): "The Dynamics of Changes in the Female Wage Distribution in the USA: A Quantile Regression Approach." *Journal of Applied Econometrics*, Vol. 13, No. 1, pp. 1–30.
- Chase, R. (1998): "Markets for Communist Human Capital: Return to Education and Experience in Post-Communist Czech Republic and Slovakia." *Industrial and Labour Relations Review*, Vol. 51, No. 3, pp. 401–423.
- DiNardo, J. E., Fortin, N., and Lemieux, T. (1996): "Labour Market Institutions and the Distribution of Wages, 1973–1992: A Semiparametric Approach." *Econometrica*, Vol. 64, No. 5, pp. 1001–1046.
- Filer, R., Jurajda, Š. and Plánovský, J. (1999): "Education and Wages in the Czech and Slovak Republics during Transition." *Labour Economics*, Vol. 6, No. 4, pp. 581–593.
- Gasparini, L., Horenstein, M., Molina, E., and Olivieri, S. (2008): "Income Polarization in Latin America: Patterns and Links with Institutions and Conflict." *Oxford Development Studies*, Vol. 36, No. 4, pp. 461–484.
- Handcock, M. S. and Morris, M. (1999): *Relative Distribution Methods in the Social Sciences*. New York: Springer-Verlag.
- Hussain, M. A. (2009): "The sensitivity of income polarization." *Journal of Economic Inequality*, Vol. 7, No. 3, pp. 207–223.
- Jann, B. (2008): "Relative Distribution Methods in Stata." Presentation at 6th German Stata Users Group Meeting, Berlin, June 27, 2008. [http://www.stata.com/meeting/germany08/jann\\_reldist\\_berlin08.pdf](http://www.stata.com/meeting/germany08/jann_reldist_berlin08.pdf)
- Juhn, C., Murphy K. M., and Pierce, B. (1993): "Wage Inequality and the Rise in Returns to Skill." *Journal of Political Economy*, Vol. 101, No. 3, pp. 410–442.
- Lemieux, T. (2002): "Decomposing Changes in Wage Distributions: A Unified Approach." *Canadian Journal of Economics*, Vol. 35, No. 4, pp. 646–688.
- Machado, J. A. F., and Mata, J. (2005): "Counterfactual Decomposition of Changes in Wage Distributions Using Quantile Regression." *Journal of Applied Econometrics*, Vol. 20, No. 4, pp. 445–465.
- Massari, R., Pittau, M. G., and Zelli, R. (2009): "A Dwindling Middle Class? Italian Evidence in the 2000s." *Journal of Economic Inequality*, Vol. 7, No. 4, pp. 333–350.

- Milanovic, B. (1999): "Explaining the Increase in Inequality during Transition." *Economics of Transition*, Vol. 7, No. 2, pp. 299–341.
- Oaxaca, R. (1973): "Male-Female Wage Differentials in Urban Labor Markets." *International Economic Review*, Vol. 14, No. 3, pp. 693–709.
- Rutkowski, J. (2001): "Earnings Inequality in Transition Economies of Central Europe. Trends and Patterns During the 1990s." Social Protection Discussion Papers No. 0117. Washington: The World Bank.
- Švejnar, J. (1999): "Labor markets in the transitional central and east European economies." In: O. Ashenfelter, and D. Card (ed.): "Handbook of Labor Economics", Vol. 3, Chapter 42, pp. 2809-2857. Amsterdam: Elsevier Science B.V.
- Večerník, J. (2009): *Czech Society in the 2000s: A Report on Socio-Economic Policies and Structures*. Prague: Academia.
- Večerník, J. (2010): *Individuals and Households in the Czech Republic and CEE countries*. Prague: Institute of Sociology, Academy of Sciences of the Czech Republic.

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