

# Trends in Educational Fluidity after the Fall of Socialism in the Czech Republic<sup>1</sup>

Tomáš Katrňák

Faculty of Social Studies, Masaryk University

Natalie Simonová

Institute of Sociology, Czech Academy of Sciences

**Abstract:** The aim of this paper is to identify the trends in educational fluidity after the fall of socialism in 1989 in the Czech Republic. The data are based on 27 sample surveys carried out from 1990 to 2009, including information on the child's and his father's education. The trends in educational fluidity are analysed both in view of the years and with respect to the birth cohorts, i.e. on the grounds of two effects: unequal educational odds (according to the socio-economic origin) and the "differentiation" effect. Unequal educational odds are related to the expansion of the Czech education system while the differentiation effect is given by social homogeneity of educational groups. The findings show that despite expansion of educational opportunities the fluidity in education has not been increasing in Czech society. The period between 1990 and 2005 saw even a decline in educational odds depending on the respondents' educational origin. Only from 2006, this tendency started to fall. In our view, the development of educational fluidity was caused primarily by socio-political transition of Czech society rather than by cohort replacement.

**Keywords:** educational fluidity, cohort analysis, educational inequality, measures of inequality

So far, intergenerational fluidity in education – a relative educational mobility, i.e. change in the education attained by children as compared to their parents<sup>2</sup> – has been a rather underanalysed topic in social stratification research. It even seems to be neglected compared to intergenerational social fluidity.<sup>3</sup> The concept of educational fluidity is based on the concept of social fluidity as described by Erikson and Goldthorpe (1992) and Breen (2004); but concerns education rather than labour market position (Breen & Jonsson, 2005).

Social stratification researchers see the education attained as a prerequisite for a professional position or the result of the socio-economic position of a family rather than in relation to the parents' education. In the first case, they use education as a variable to control the relationship between the professional position of parents and their children (social fluidity analysis) and show to what extent such a relation is mediated by education – whether it is weakened or not. If this is the case, there is a variable determining and, at the same time, explaining the position on the labour

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<sup>2</sup> The change is relative which means that the (upward or downward) shift between the parents' and their children's education is controlled in terms of changes in the education structure. Relative educational mobility is a synonym for fluidity in education.

<sup>3</sup> Intergenerational social fluidity means the relative difference between the social classes of parents and their children.

50 market (cf. Blau & Duncan, 1967; Erikson & Goldthorpe, 1992; Breen, 2004). In the latter case, they analyse the attained education with respect to social origin. They reflect unequal educational odds with respect to social origin and refer to open and closed education systems of nation states (Mare, 1980, 1981; Hauser et al., 1983; Rafferty & Hout, 1993; Breen & Jonsson, 2000; Lucas, 2001).

Intergenerational fluidity in education indicates whether an education system is closed or open. When analysing its development, we can answer questions concerning the rate of educational reproduction – whether and to what extent the educational status is transmitted from parents to their children and how the parents' education influences the education of their children. These are burning questions for the Czech Republic after 1989 as Czech society has undergone major political, economic and social changes, changing both the importance of education for social processes and the fundamental trends in educational status transmission.

The aim of this paper is to identify the development of fluidity in education in the Czech Republic after the fall of socialism in 1989 and to provide an explanation. Given the continuous nature of historical development whereas each development phase is related to a preceding one, let us have a brief look at the analyses on unequal education odds carried out in Czech sociology in the past few years. First part of this paper shows there is a consensus on the development of educational inequalities before 1989 in Czech sociology: the period of socialism did not significantly weaken the relation between the education of parents and their children (Matějů, 1993; Hanley & McKeever, 1997; Wong, 1998; Hanley, 2001).

Later on, we present analyses on unequal educational odds carried out in the Czech Republic after 1989. The inconsistent conclusions of these analyses have motivated us to try to once again reconstruct the development of fluidity in education after 1989.<sup>4</sup> In the analytical part, we have innovated the approach to this topic. Our innovation is primarily based on the fact that we use all available data sources in which fluidity in education in Czech society can be identified from 1990 to 2009 (27 surveys in total). Another innovation involves the analysis of the development of fluidity in education in view of the cohorts and the respective periods. We believe that the cohort effect must be viewed separately from the time effect. Our data from several moments in time (years) enable such a differentiation, providing a completely new view on the post-1989 development of fluidity in education in the Czech Republic.

As we have come to the conclusion that the impact of cohort differences on the development of fluidity in education is not as significant as the differences in the analysed years from 1990 to 2009 – i.e. Czech society after 1989 has experienced a significant transition influencing changes in fluidity in education – we interpret the development of fluidity in education using two “external” effects: unequal educa-

<sup>4</sup> Previous version of this text was aimed at Czech readership and was published in the *Czech Sociological Review* (Katrňák & Simonová, 2011). The current version is – compared to its predecessor – written in a more accessible fashion, includes the latest research findings concerning the topic in question, and is more closely linked to education policy.

tional odds and the “differentiation effect”. The test of both effects in relation to the development of fluidity in education is the subject of our final analysis.

In the conclusion, we summarise our findings, setting them in the 1990–2009 transition context. We believe that this analysis will explain the so far contradictory conclusions concerning the development of fluidity in education in the Czech Republic in the past 20 years, contributing to the discussion on the development of educational odds.

## 1 Unequal educational odds after the fall of socialism in 1989

To date, analyses focusing on the development of educational odds after 1989 have presented different results, either stability of educational inequalities, increase in unequal educational odds or decrease in inequalities when it comes to the access to higher education.

The first of these analyses showed that after 1989 the unequal odds in terms of access to university education did not see any major changes compared to the previous cohorts. For the cohort entering university after the fall of socialism, the effect of the father's education returned to the level reported for the 1948–1969 period (Simonová, 2003). The second analysis (Matějů et al., 2007) showed that the educational odds of children of unskilled and semi-skilled workers have dropped significantly after 1989 compared to children from other social classes. This means that the influence of the father's socio-economic position on the education of his child increased. However, the effect of the parents' education on their child's education remained unchanged.

According to the analysis by Simonová and Soukup (2009), both the odds of entering university and the odds of passing from an elementary to a secondary school with a school-leaving certificate increased among the 1955–2002 cohorts. For students whose fathers had university education, the odds of attaining university education were almost seven times higher than for students whose fathers had not completed secondary education (without school-leaving certificate) and approximately four times higher than for students whose fathers had completed it (Simonová & Soukup, 2009).

Koucký, Bartušek and Kovařovic (2010)<sup>5</sup> say that the inequality index of access to tertiary education was far below the European average in the 1950s in the Czech lands. In the 1960s inequalities rose and reached a level slightly below the European average. This level dropped significantly again in the 1970s when again children from “blue-collar” classes were given preference in admission to higher education institutions. In the following two decades, i.e. 1980–90 and 1990–2000, the level of

<sup>5</sup> The authors used the Inequality index which has been constructed as a well-known and often used measure of inequality, the Gini inequality index (perfect equality in access to tertiary education is represented by the value 0, perfect inequality by the value 100).

52 inequalities increased again closely above the European average. After 2000, in the context of a quantitative expansion in the number of new graduates, inequalities in access to tertiary education have decreased again in the CR and reached a level below the European average.

Analysing intergenerational mobility and fluidity in education in the Czech Lands during the 20th and 21st centuries, Simonová (2011) showed that during the entire nineteen-hundreds there was a steady increase in the share of persons attaining higher education than their parents. This was mostly due to the expansion of educational systems that occurred after WWII across the developed world. However, the trend slowed down in birth cohort 1969–1989 and did not recover until 2003 (last year in the analysis). The author suggested that this was a result of both slow development of educational opportunities, and weakening of the role education played in life success under state socialism (a trend that likely continued for some time after the regime's fall). The analysis of educational fluidity then showed that the association between parental and offspring education had remained stable since the 1970s, an exception being mothers and their daughters. Among women, in fact, educational reproduction weakened between 1948 and 2003, whereas for men the trend was stagnant since 1969 and continued to be so after 1989.

The newest debates within the sociology of education focus on the possibility that the declining inequality in access to higher education gives rise to qualitative inequalities, i.e., that differences between schools start to appear that are based on quality (meaning the extent into which a school is demanding and academically oriented) and that schools of different quality cater to – or are easier to access by – children from different social strata (with higher-quality schools being easier to access for children from higher strata and vice versa). Therefore, it should be acknowledged that decline in educational inequalities pertaining to a particular level within the system of education might be accompanied by differentiation to better and worse schools at this very level. For more see Lucas (2001); for an application within the Czech context concerning secondary education, see Katrňák, Simonová and Fónadová (2016).

So, why do several analyses on the same topic focusing on the same period produce different results? In our opinion, there are several reasons. First, these analyses were conducted using sets of data collected in different years after 1989. The question is how long it took for the social, political and economic changes after 1989 to affect the educational odds to an identifiable extent. Second, all these analyses examined the development of educational inequalities among cohorts. This means that the differences between the years were identified on the grounds of differences between the cohorts born in different years. This can distort the results because the cohort effect (the influence of the time period when a group of young people passes through the education system) and the effect of years (the influence of the period when the data are collected) on the educational odds may vary. Last but not least, the intervals of years used in these analyses were defined in a different way, which can also distort the results given that the effect of time (years) is not controlled.

## 2 Methodology – two perspectives in one set of data

The representatives of the cohorts born in different years have a different historical experience. They represent different social phenomena as they grew up in different historical eras (Glenn, 1977, 2005). One cohort replaces another one in time. Sociologists describing this phenomenon use the term “cohort replacement”. Where the cohort effect is not separated from the effect of time (years) and the effect of age (biological aging) in the analysis, the effects of all three variables are interrelated and it is not clear whether the years of data collection, cohort replacement or biological aging of people influence the changes in fluidity in education.

In our analysis, we do not take the age into account. This is due to three reasons. First, we assume that most people complete their education by the age of 25 and do not change it later. Second, we believe that where such a change occurs at a later age, it results from other social factors rather than age. And, last but not least, we are convinced that such a change is primarily influenced by the time period – i.e. the overall social changes which enable to attain education at a later age.

The effect of time (years) influences all social groups. Where the society undergoes some economic, social, political or cultural changes, these changes affect the society as a whole rather than selected age, social or economic segments. The effect of time in the analysis of fluidity in education means that the social processes occurring in a society are so significant that they can influence most cohorts rather than only those completing their education at the time in question. Such processes can involve, for example, a massive expansion of education, induced by economic and political incentives, penetrating the society as a whole.

Cohort replacement forms the core of the cohort effect. According to many sociologists, it is the reason for social changes in stable democracies. Western democratic societies keep changing by replacing previously born cohorts with cohorts born at a later time. According to Ryder (1965), cohort (composition) replacement has to be taken into account when explaining the development of most social phenomena unless there is a sudden (revolutionary) social and cultural turn.

Our data include 18 cohorts and 5 periods.<sup>6</sup> We are interested in whether the development of fluidity in education is influenced by the differences between the cohorts or time periods. If the cohort effect influences the development of fluidity in education more significantly than the effect of years, this means that each later-born cohort differs from the previously born cohort in terms of fluidity in education. Cohort replacement – replacement of previously born cohorts by later-born cohorts – leads to changes in fluidity in education in time. If the effect of years influenced educational mobility in our analysis more significantly than the cohort effect, it would mean that the period under consideration (1990 to 2009) was such

<sup>6</sup> To ensure sufficient number of respondents in the individual cells of our mobility tables (i.e., to make the analysis possible) we created five four-year time periods. In our view, this did not alter the description of the development of educational fluidity as a change is expected to occur over longer periods of time, not annually.

- 54 a “turbulent” era that it did not only affect the latest-born cohorts in the education system but the educational odds of a much larger segment of society.

### 3 Data and variables

The data was sourced from all available sample surveys carried out in the Czech Republic from 1990 to 2009, including information on the child’s (respondent’s) and his father’s education. There are 27 field surveys in total. In most cases, random (multilevel, stratified) samples were used, representative of Czech society at the time of data collection. In three cases, quota (quasi-representative) samples were used. Since we are interested in the highest completed level of education, we have limited our analysis to the age of 25–80 years.<sup>7</sup> The overall size of the analysed data amounts to 41,906 respondents. Weighting was applied wherever possible.

The variables we work with are the father’s and the respondent’s education. The father’s education indicates the respondent’s educational origin. The difference between the education attained by a father and a respondent reveals educational reproduction (where the father and his child have the same education), upward educational mobility (where the child has higher education than his/her father) or downward educational mobility (where the child attains lower education than his/her father). In both cases, we use four levels of the highest education attained (elementary education, apprentice training, secondary education and university education).

In terms of years, the data were aggregated into five four-year periods. Each of these periods reflects a different time of the political, economic and cultural transition of Czech society. In each four-year period, 14 age groups were identified on the grounds of the four-year terms. Deducting the age of the age groups from the respective periods, 18 cohorts born between 1910 and 1981 were defined. The oldest cohort were born from 1910 to 1913, the second one from 1914 to 1917 and the youngest cohort were born from 1978 to 1981 (Table 1).

Since our data are limited by the respondents’ age of 25 to 80 years, all birth cohorts are not represented in all periods. For example, cohort 1 (born from 1910 to 1913) is only represented in the 1990–1993 period while cohort 14 (born from 1962 to 1965) is represented in all analysed periods. This means that our data do not have a square form when analysing the relationship between the father’s and the respondent’s education and when separating the cohort effect from the effect of time of data collection. The basic contingency table which we analyse is a  $4 \times 4$  table (father’s education  $\times$  respondent’s education). When analysing the relationship in this table according to 5 periods and 18 cohorts at one time, the number of analysed table fields amounts to 1,440 with 320 fields accounting for a structural zero.<sup>8</sup>

<sup>7</sup> We assume that after the age of 25 most people have finished their education trajectory.

<sup>8</sup> A structural zero means that no case exists for a given combination of variables.

Table 1 Relationship between periods (years), age groups and birth cohorts

Age groups	Years (period)									
	1990–1993		1994–1997		1998–2001		2001–2004		2005–2009	
25–28	<b>14</b>	<i>1962–1965</i>	<b>15</b>	<i>1966–1969</i>	<b>16</b>	<i>1970–1973</i>	<b>17</b>	<i>1974–1977</i>	<b>18</b>	<i>1978–1981</i>
29–32	<b>13</b>	<i>1958–1961</i>	<b>14</b>	<i>1962–1965</i>	<b>15</b>	<i>1966–1969</i>	<b>16</b>	<i>1970–1973</i>	<b>17</b>	<i>1974–1977</i>
33–36	<b>12</b>	<i>1954–1957</i>	<b>13</b>	<i>1958–1961</i>	<b>14</b>	<i>1962–1965</i>	<b>15</b>	<i>1966–1969</i>	<b>16</b>	<i>1970–1973</i>
37–40	<b>11</b>	<i>1950–1953</i>	<b>12</b>	<i>1954–1957</i>	<b>13</b>	<i>1958–1961</i>	<b>14</b>	<i>1962–1965</i>	<b>15</b>	<i>1966–1969</i>
41–44	<b>10</b>	<i>1946–1949</i>	<b>11</b>	<i>1950–1953</i>	<b>12</b>	<i>1954–1957</i>	<b>13</b>	<i>1958–1961</i>	<b>14</b>	<i>1962–1965</i>
45–48	<b>9</b>	<i>1942–1945</i>	<b>10</b>	<i>1946–1949</i>	<b>11</b>	<i>1950–1953</i>	<b>12</b>	<i>1954–1957</i>	<b>13</b>	<i>1958–1961</i>
49–52	<b>8</b>	<i>1938–1941</i>	<b>9</b>	<i>1942–1945</i>	<b>10</b>	<i>1946–1949</i>	<b>11</b>	<i>1950–1953</i>	<b>12</b>	<i>1954–1957</i>
53–56	<b>7</b>	<i>1934–1937</i>	<b>8</b>	<i>1938–1941</i>	<b>9</b>	<i>1942–1945</i>	<b>10</b>	<i>1946–1949</i>	<b>11</b>	<i>1950–1953</i>
57–60	<b>6</b>	<i>1930–1933</i>	<b>7</b>	<i>1934–1937</i>	<b>8</b>	<i>1938–1941</i>	<b>9</b>	<i>1942–1945</i>	<b>10</b>	<i>1946–1949</i>
61–64	<b>5</b>	<i>1926–1929</i>	<b>6</b>	<i>1930–1933</i>	<b>7</b>	<i>1934–1937</i>	<b>8</b>	<i>1938–1941</i>	<b>9</b>	<i>1942–1945</i>
65–68	<b>4</b>	<i>1922–1925</i>	<b>5</b>	<i>1926–1929</i>	<b>6</b>	<i>1930–1933</i>	<b>7</b>	<i>1934–1937</i>	<b>8</b>	<i>1938–1941</i>
69–72	<b>3</b>	<i>1918–1921</i>	<b>4</b>	<i>1922–1925</i>	<b>5</b>	<i>1926–1929</i>	<b>6</b>	<i>1930–1933</i>	<b>7</b>	<i>1934–1937</i>
73–76	<b>2</b>	<i>1914–1917</i>	<b>3</b>	<i>1918–1921</i>	<b>4</b>	<i>1922–1925</i>	<b>5</b>	<i>1926–1929</i>	<b>6</b>	<i>1930–1933</i>
77–80	<b>1</b>	<i>1910–1913</i>	<b>2</b>	<i>1914–1917</i>	<b>3</b>	<i>1918–1921</i>	<b>4</b>	<i>1922–1925</i>	<b>5</b>	<i>1926–1929</i>

Note: Bold numbers in each field designate the cohort, numbers in italics identify when the cohorts for a specific period were born.

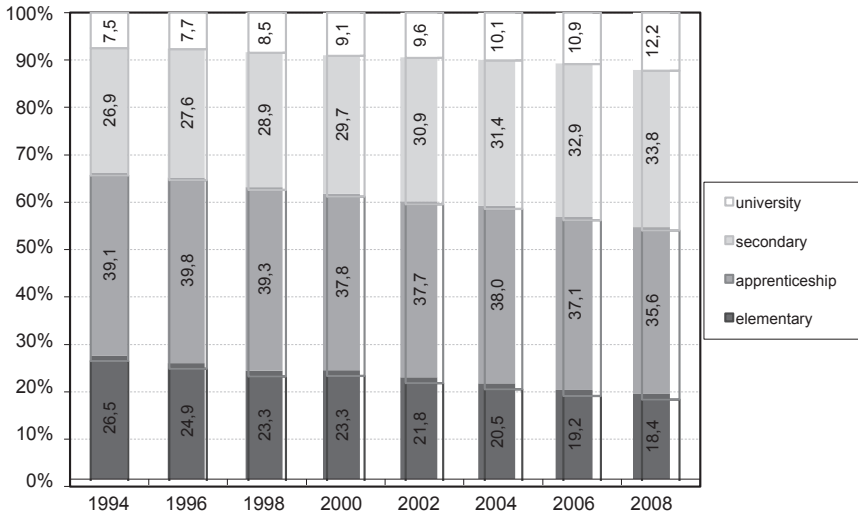
Source: *Czech Statistical Office data* from 1994 to 2008 (weighted data).

#### 4 Starting point of the analysis – educational structure and absolute educational mobility

Since 1989, the educational structure of Czech population has been changing. The number of people attaining the lowest education levels has been falling, while the number of people with secondary and university education has been increasing (Chart 1). This trend has been observed in most European populations where more and more people are attaining higher education levels (OECD 2014).

So do the data on the development of the education structure in the Czech Republic correspond to the development of (absolute) educational mobility? Chart 2 shows that this is not the case. While the share of people on higher education levels increased in the period under consideration, the share of people showing upward educational mobility remained unchanged.<sup>9</sup>

<sup>9</sup> The fact that upward educational mobility did not change despite increased percentage of persons attaining higher educational levels might be attributed to demographical and structural causes – while the ever-growing generation of parents enjoyed increased number of places in schools, thereby attaining more education, the offspring generation witnessed slowly expanding system of education which brought to light the stagnation of upward educational mobility.



Source: Czech Statistical Office data from 1994 to 2008 (weighted data).

Chart 1 Educational structure development in the Czech Republic from 1994 to 2008 (in %)

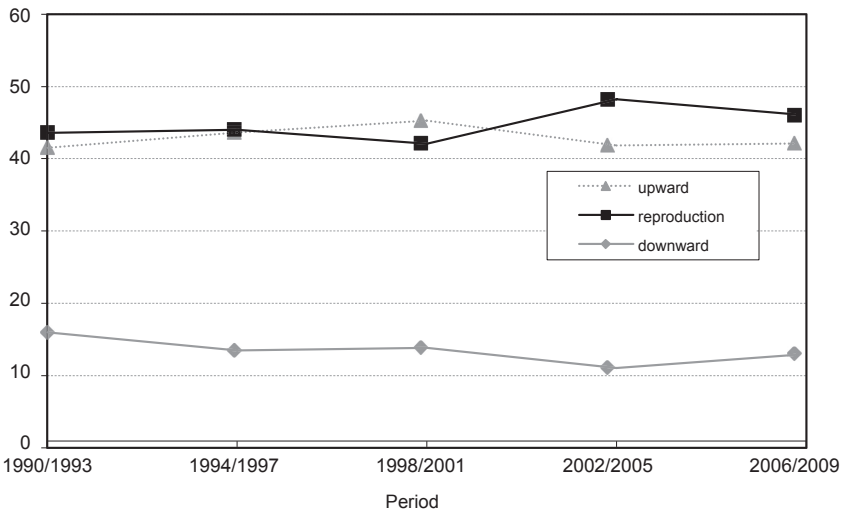


Chart 2 Educational mobility in the Czech Republic from 1990 to 2009 (25-80 years of age)

Chart 3 shows the same data in view of the defined cohorts forming the education structure from 1990 to 2009. In all cohorts, educational reproduction and upward educational mobility outweigh downward educational mobility. The share of respondents who attained the same education as their fathers dropped from the oldest cohorts to the cohorts born by the early 1950s. On the contrary, the share of those respondents who attained higher education than their fathers increased.



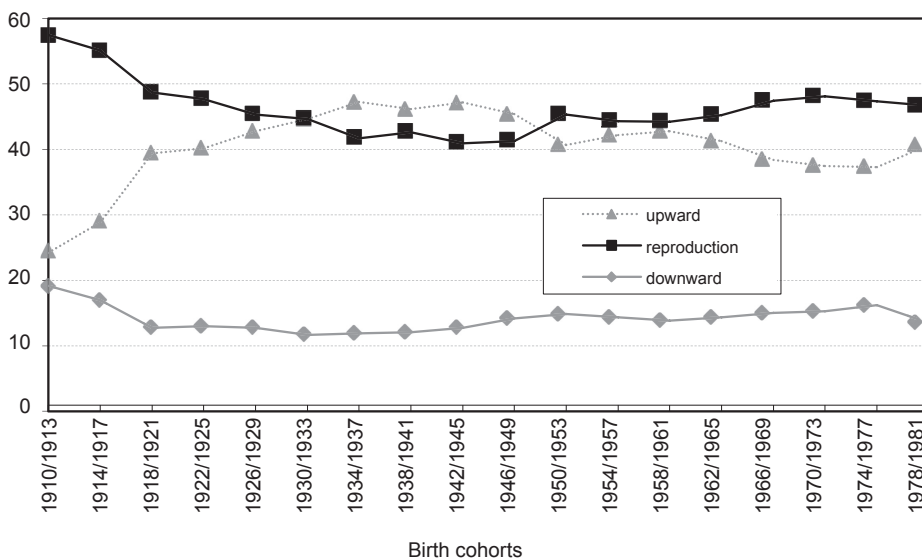


Chart 3 Educational mobility in cohorts born from 1910/1913 to 1978/1981 (in %)

*The youngest cohorts who received education from 1990 to 2009 experience a slight drop in educational reproduction.*

The conclusions of the data analysis in view of cohorts (on the absolute level) go hand in hand with the previous findings concerning the development of educational odds in pre-socialist and socialist Czechoslovakia. In the cohorts passing through the education system in the first two decades of socialist Czechoslovakia (from 1950 to 1970, cohorts born from 1937 to 1949) a lower level of educational reproduction can be expected than in later-born cohorts for which inequalities concerning the access to education grew (Matějů, 1993; Hanley & McKeever, 1997; Simonová 2003).

## 5 Analysis of the fluidity in education from 1990 to 2009

We divided the analysis of fluidity in education into two parts. In the first part, we deal with the development of fluidity in education according to respondents' cohorts born in different years (from 1910/1913 to 1977/1981), controlling this development for the respondents' sex. After that, we analyse the development of fluidity in education in the years which our data come from (from 1990 to 2009), also controlling this development for the respondents' sex.

In the second part of the analysis, we focus on an explanation of the development of fluidity in education using two effects. The first one is the effect of *unequal educational odd*; the second one is the *differentiation effect*. We assume that, provided fluidity in education dropped in the analysed years, unequal educational odds ac-

58 cording to socio-economic origin must have increased too. This means that we test whether the effect of socio-economic origin on the attained education increases in those years when fluidity in education declines.

### 5.1 Analysis part I: Development of fluidity in education – cohort or period effect?

Table 2 shows estimated log-linear models for a four-way table with the following variables: father's education, respondent's education, specific cohort and sex ( $F \times R \times C \times S$ ; table dimensions:  $4 \times 4 \times 18 \times 2$ ). Model 1 assumes no relationship between father's education and respondent's education if the specific cohort and sex variables are controlled. Model 2 is a model of constant fluidity in education: fluidity in education for all cohorts as well as for both sexes is the same. Model 3 presumes that fluidity in education log-multiplies according to cohorts but independently of sex.<sup>10</sup> Model 4 assumes that fluidity in education differs by sex but not by cohort. Finally, model 5 builds on the assumption that fluidity in education changes both according to respondent's cohorts and sex.

**Table 2** Estimated log-linear models according to cohort and sex (25–80 years of age)

Models	Model description	$L^2$	$\Delta$	$df$	$BIC$
1) $CSF\ CSR$	$F$ and $R$ independence model	8691.54	16.25%	324	5236
2) model 1 + $FR$	$FR$ constant association model	491.25	3.15%	315	-2868
3) model 1 + $FR^*\varphi C$	Log-multiplicative development of $FR$ association according to $C$	444.18	2.96%	298	-2734
4) model 1 + $FR^*\varphi S$	Log-multiplicative development of $FR$ association according to $S$	491.25	3.15%	314	-2858
5) model 1 + $FR^*\varphi CS$	Log-multiplicative development of $FR$ association according to $C$ and $S$	427.35	2.88%	280	-2559

Note:  $C$  – cohort,  $S$  – sex,  $F$  – father's education,  $R$  – respondent's education,  $BIC$  is the Bayesian information criterion ( $BIC = L^2 - (df) \ln N$ ) where  $N$  is the total number of cases;  $\Delta$  is the difference index showing the difference of incorrectly classified cases in the estimated model.

According to the  $BIC$  criterion we should interpret our data based on model 2 whereas traditional statistical criteria would suggest model 5 for our data interpretation. Model 2 assumes that fluidity in education undergoes no significant change according to cohorts or according to sex. Chart 4 shows estimated phi parameters of model 5 for fluidity in education of men and women in individual cohorts. Each cohort and sex is given a phi parameter estimate interpreted in relation to the first parameter (men born between 1910 and 1913), which is set on 1. The higher the phi

<sup>10</sup> For a log-multiplicative model and change in the size of association between two variables according to a third variable, cf. Xie (1992) or Powers and Xie (2009).

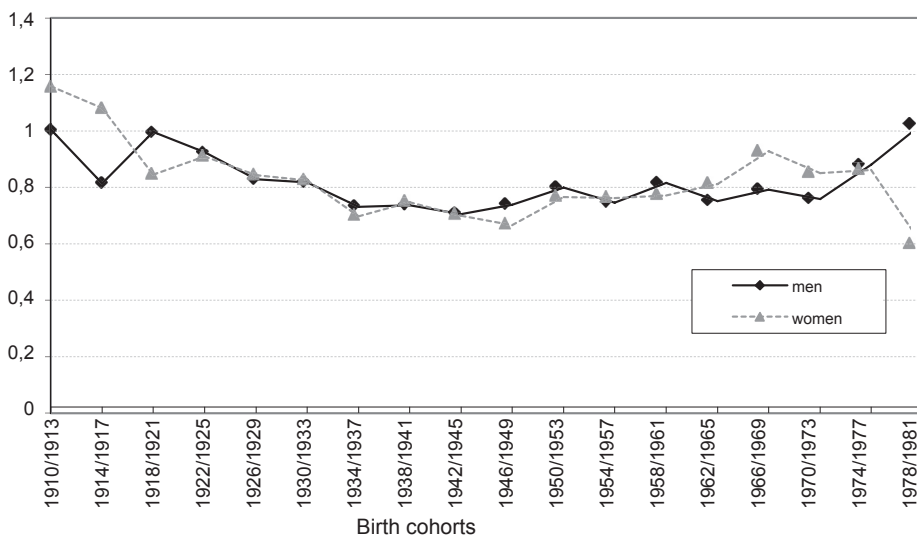


Chart 4 Fluidity in education according to cohort and sex in the Czech Republic (25–80 years of age)

parameter, the lower the fluidity in education, and vice versa. Sex differences in fluidity in education by cohort (with the exception of the three oldest cohorts and the youngest cohort) are insignificant. We can therefore accept model 2 assumption of no difference in fluidity in education between sexes in the view of cohorts. In terms of development, model 2 also predicts no significant differences among cohorts. Thus, we claim that fluidity in education does not change in any significant way among cohorts in the 1990–2009 period.

Table 3 Estimated log-linear models for the development of fluidity in education according to period and sex in the Czech Republic (25–80 years of age)

Models	Model description	$L^2$	$\Delta$	$df$	$BIC$
1) $PSF\ PSR$	$F$ and $R$ independence model	10 308.82	17.93%	90	9348
2) model 1 + $FR$	$FR$ constant association model	307.48	2.81%	81	-557
3) model 1 + $FR^*\varphi P$	Log-multiplicative development of $FR$ association according to $P$	186.70	1.89%	77	-634
4) model 1 + $FR^*\varphi S$	Log-multiplicative development of $FR$ association according to $S$	301.66	2.82%	80	-552
5) model 1 + $FR^*\varphi PS$	Log-multiplicative development of $FR$ association according to $P$ and $S$	175.97	1.96%	72	-592

Note:  $C$  – cohort,  $S$  – sex,  $F$  – father's education,  $R$  – respondent's education,  $BIC$  is the Bayesian information criterion ( $BIC = L^2 - (df) \ln N$ ) where  $N$  is the total number of cases;  $\Delta$  is the difference index showing the difference of incorrectly classified cases in the estimated model.

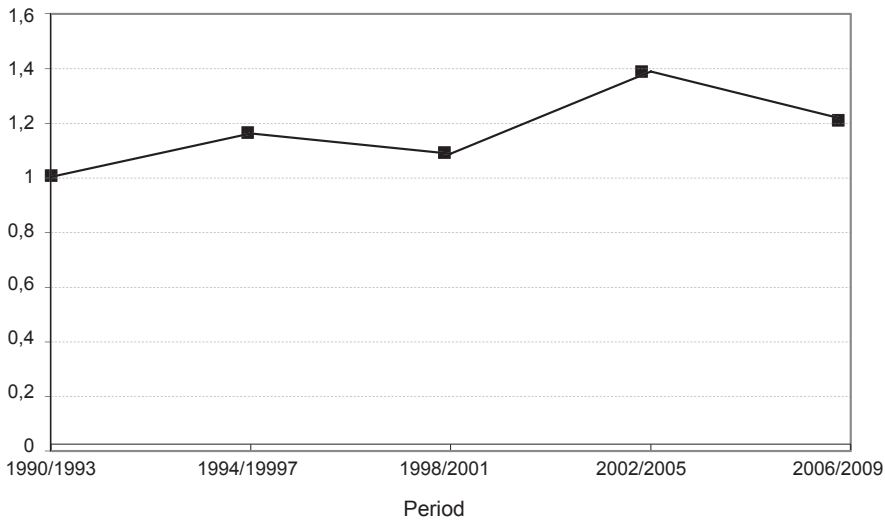


Chart 5 Development of fluidity in education according to period in the Czech Republic (25–80 years of age)

In our next step, we have estimated the same log-linear models, however, instead of a cohort perspective we have chosen a time-period perspective. Table 3 shows the estimated log-linear models for a  $4 \times 4$  table which includes variables of fathers' education, respondent's education, period and sex ( $F \times R \times P \times S$ ; table dimensions:  $4 \times 4 \times 5 \times 2$ ). In this case, we should prefer model 3 for our data interpretation according to the *BIC* statistics, supposing a change in fluidity in education by period, not by sex. The chi-square test based on comparing  $L^2$  and  $df$  of this model with model 5 shows that model 3 is not statistically different from model 5 (chi-square = 10.73,  $df = 5$ ). Nevertheless, model 4 differs statistically in quite a significant way from model 5. Therefore, we prefer model 3 to model 5 for our data interpretation. On the basis of this model, *educational fluidity is the same for both sexes in the 1990–2009*.

Chart 5 shows the developments in fluidity in education in time based on model 3. Similarly to the cohort approach, an estimate of one phi parameter is provided for each period and it is interpreted in relation to the first parameter set to 1 (the 1990–1993 period). Even in this case, the higher the phi parameter the lower fluidity in education. This data allows us to claim that *fluidity in education in the Czech Republic decreased between 1990 and 2005 and went up again only in the post-2005 period. The post-1989 period is not a period of growth in educational odds determined by educational origin*.

The last question we asked in the first part of our analysis is whether the cohort effect on fluidity in education is insignificant even when the period effect is controlled. In other words: which of these effects has a greater impact on fluidity in education? Is it cohort replacement, or rather the change Czech society has been undergoing since 1989? In order to answer this question we need to control the fluidity

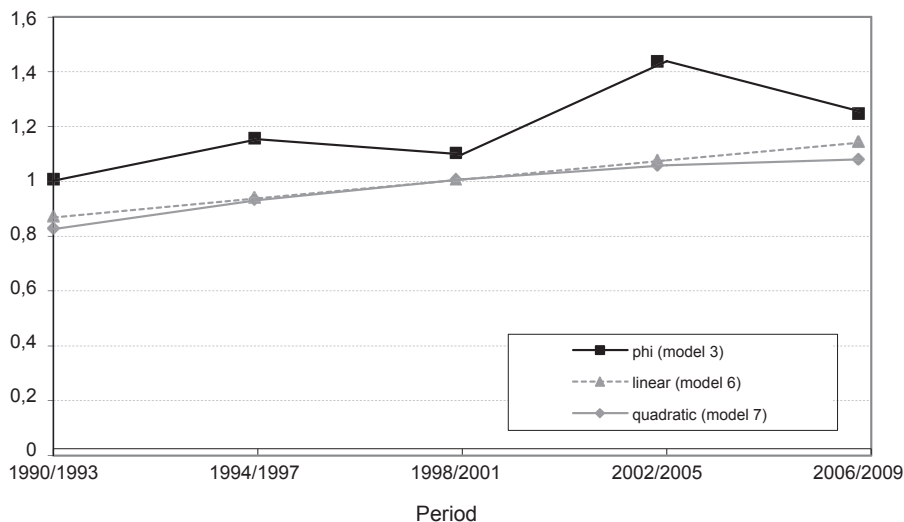
in education developments both for cohorts and periods. We have not included sex in this analysis since the two previous analyses have shown that it is not necessary to account for sex in studying fluidity in education in the Czech Republic. In this case (table 4), we analysed a  $4 \times 4$  table with the following variables: father's education, respondent's education, periods and cohorts ( $F \times R \times P \times C$ ; table dimensions  $4 \times 4 \times 5 \times 18$ ).

**Table 4** Estimated log-linear models for the development of fluidity in education according to cohort and period in the Czech Republic (25–80 years of age)

Models	Model description	$L^2$	$\Delta$	$df$	$BIC$
1) <i>PCF PCR</i>	<i>F</i> and <i>R</i> independence model	8896.88	16.37%	810	256
2) model 1 + <i>FR</i>	<i>FR</i> constant association model	836.34	4.30%	801	-7708
3) model 1 + <i>FR</i> * $\varphi$ <i>P</i>	Log-multiplicative development of <i>FR</i> association according to <i>P</i>	713.18	3.88%	797	-7789
4) model 1 + <i>FR</i> * $\varphi$ <i>C</i>	Log-multiplicative development of <i>FR</i> association according to <i>C</i>	811.77	4.24%	784	-7552
5) model 1 + <i>FR</i> * $\varphi$ <i>PC</i>	Log-multiplicative development of <i>FR</i> association according to <i>P</i> and <i>C</i>	635.89	3.57%	712	-6959
6) model 3 + <i>FR</i> * $\varphi$ <i>P</i> (linear)	Linear development of <i>FR</i> association according to <i>P</i>	760.28	4.00%	800	-7774
7) model 3 + <i>FR</i> * $\varphi$ <i>P</i> (quadratic)	Quadratic development of <i>FR</i> association according to <i>P</i>	756.12	3.99%	799	-7767

Note: *C* – cohort, *S* – sex, *F* – father's education, *R* – respondent's education,  $BIC$  is the Bayesian information criterion ( $BIC = L^2 - (df) \ln N$ ) where  $N$  is the total number of cases;  $\Delta$  is the difference index showing the difference of incorrectly classified cases in the estimated model.

Model 1 builds on the assumption that the association between the education of the father and the respondent disappears when both the cohort and period variables are controlled. Model 2 assumes that this association is constant across all cohorts and periods. According to model 3, *the association between father's and respondent's education changes only with respect to the period, and not in relation to cohorts*. Model 4 suggests that this association changes only in relation to cohorts, and not periods. Finally, model 5 posits that the association between father's and respondent's education changes both in relation to the period and cohort. Again, we prefer model 3 for the interpretation of our data: *cohort differences are not as significant for the fluidity in education development as are temporal differences. The time-period effect related to the post-1989 society transformation has a stronger impact on fluidity in education than the cohort effect referring to cohort replacement*. This conclusion is consistent with the cohort replacement premise: a cohort effect shows only in stable democratic societies which do not undergo significant social, economic or political changes. And that was not the case of Czech society between 1990 and 2009.



**Chart 6** Development of fluidity in education according to period in the Czech Republic (25–80 years of age)

We prepared two more estimated models for fluidity in education developments by period and not by cohort. Our first premise was that of a linear (model 6) and quadratic (model 7) development of fluidity in education over time. Both of these models are based on model 3 but are much more economic than this model and their *BIC* criterion is lower than the *BIC* criterion of models 4 and 5.

The phi parameter estimates for models 3, 6 and 7 are shown in Chart 6. In model 3, an estimate of one phi parameter is made for each period and both are interpreted with respect to their first parameter set on 1 (the 1990–1993 period). In model 6, estimates for only two parameters ( $a$ ,  $b$ ) are made in an equation describing the linear trend ( $Y = a + bX$ , where  $X$  represents years and each  $Y$  demonstrates a linear trend). In model 7, estimates of three parameters ( $a$ ,  $b$ ,  $c$ ) were made for an equation of a quadratic trend ( $Y = a + bX + cX^2$ , where  $X$  represents years and each  $Y$  shows the quadratic trend line). One rule guides all models: the higher the phi parameter, the lower fluidity in education.

All three curves suggest diminishing fluidity in education in the post-1989 period whereas model 3 curves (one phi parameter for each year) and model 7 curves (quadratic development model based on three parameters) suggest the change of the trend post 2005. Hence, we may conclude that in spite of accounting for cohorts in our data the development in fluidity in education remains practically the same as when disregarding the cohorts completely. The cohort effect on the temporal change in fluidity in education is insignificant compared to the period effect. *It is mainly societal transformation – a transformation of society concentrated in a relatively short period of several years, which influences how fluidity in education develops.*

## 5.2 Analysis Part II: Explanation by unequal educational odds and differentiation effect

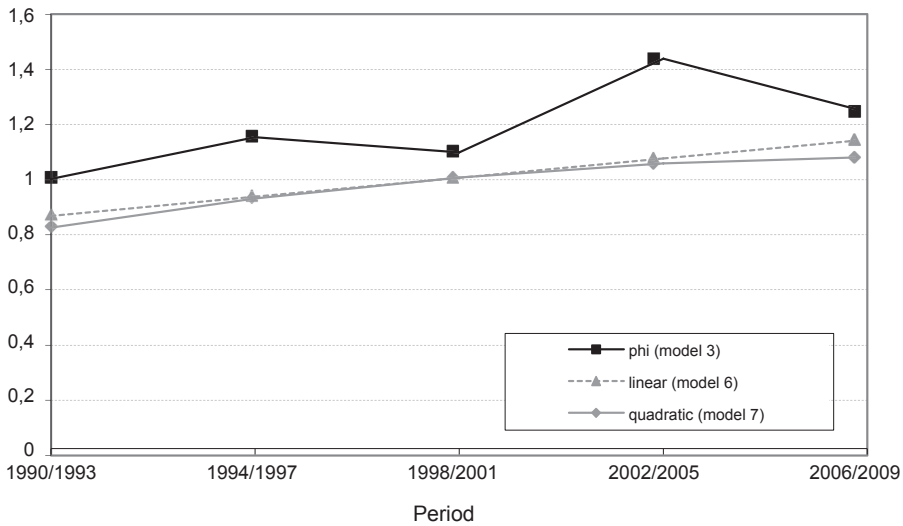
The second part of our analysis focuses on explaining the attenuating fluidity in education between 1990 and 2005 and on changing this trend in the 2006–2009 period. First, we focus on educational odds. When fluidity in education goes down, hereby reinforcing the effect of father's education on his child's education, one of the causes of this phenomenon should be increasingly unequal educational odds dependent on socio-economic origin (Vallet 2004). We presume that a child's socio-economic environment should have an increasingly stronger effect on his/her education. Socio-economic environment of the respondent's origin is indicated by the father's international socio-economic index (ISEI) which we categorised in quintiles. Thus, we analysed a three-dimensional table with the following variables: father's ISEI, respondent's education and period ( $O \times R \times P$ ; table dimensions:  $5 \times 4 \times 5$ ). This analysis was limited to respondents between 25 and 40 years of age only, again regardless their sex.

Table 5 shows estimated log-linear models for the educational odds development according to socio-economic origin. According to model 1, there is no association between the father's ISEI and respondent's education (controlled for all periods). According to model 2, this association is constant in all the three periods and according to model 3 it has been estimated using one parameter for each period (modelled as a multiplicative variable using phi parameters). Models 4 and 5 are based on model 3, nevertheless, they model the association between the father's ISEI and respondent's education in various periods both in a linear (model 4) and in a quadratic way (model 5). Both of these models are more economic than model 3. They include fewer parameters describing the development of the relationship between the father's ISEI and respondent's education. Model 4 describes this relationship using two parameters (the equation for the linear relationship is  $Y = a + bX$ , where  $X$  represents years and  $a$  and  $b$  were estimated from the data). Model 5 describes the relationship using three parameters (equation for the quadratic relationship is  $Y = a + bX + cX^2$ , where  $X$  are years and  $a$ ,  $b$  and  $c$  were estimated from the data).

**Table 5** Estimated log-linear models for the development of educational odds according to socio-economic origin in the Czech Republic between 1990 and 2009 (25–40 years of age)

Models	Model description	$L^2$	$\Delta$	$df$	$BIC$
1) <i>PO PR</i>	<i>O</i> and <i>R</i> independence model	1921.75	15.33%	60	1356
2) model 1 + <i>OR</i>	<i>OR</i> constant association model	69.80	2.33%	48	-361
3) model 1 + <i>OR</i> * $\varphi$ <i>P</i>	Log-multiplicative development of <i>OR</i> association according to <i>P</i>	54.15	2.06%	44	-383
4) model 3 + <i>OR</i> * $\varphi$ <i>P</i> (linear)	Linear development of <i>OR</i> association according to <i>P</i>	68.57	2.34%	47	-375

Note: *P* – period, *O* – father's social class, *R* – respondent's education,  $BIC$  is the Bayesian information criterion ( $BIC = L^2 - (df) \ln N$ ) where  $N$  is the total number of cases;  $\Delta$  is the difference index showing the difference of incorrectly classified cases in the estimated model.



**Chart 7** Development of unequal educational odds according to the father's socio-economic status in the Czech Republic between 1990 and 2009 (25–40 years of age)

Chart 7 shows estimated phi parameters of model 3 and the linear and quadratic development of the relationship between the father's ISEI quintiles and respondent's education based on models 4 and 5. All curves have a very similar progression to the curves illustrating the development of fluidity in education in Analysis I. *The influence of the father's ISEI on the respondent's education gets stronger between 1990 and 2005 while we are witnessing the weakening of this trend nowadays. Unequal educational odds increase as fluidity in education in Czech society diminishes (cf. Chart 6). The reinforcing effect of socio-economic origin "intermediates" the relationship between the father's and child's education, being one of the causes of a decreased fluidity in education in Czech society between 1990 and 2005. In the 2006–2009 period, the association between the father's ISEI and child's education grows weaker. A similar development can be seen in fluidity in education. Unequal educational odds dependent on socio-economic status did not grow in Czech society in that period, translating into a growing fluidity in education (even though it is not clear yet whether this is a beginning of a long-term trend or a mere temporary statistical deviation).*

A second reason we are testing as a potential cause for a diminishing fluidity in education between 1990 and 2005 and its subsequent increase is the "differentiation" effect. We suppose that if the Czech education system in the past 20 years did not offer enough study opportunities, these places were occupied mainly from the highest social levels down. We base this premise of ours on the MMI (*maximally maintained inequality*) theory according to which the limited number of positions in the highest levels of the education system is based on the social origin in a top-down way (Raftery & Hout, 1993).



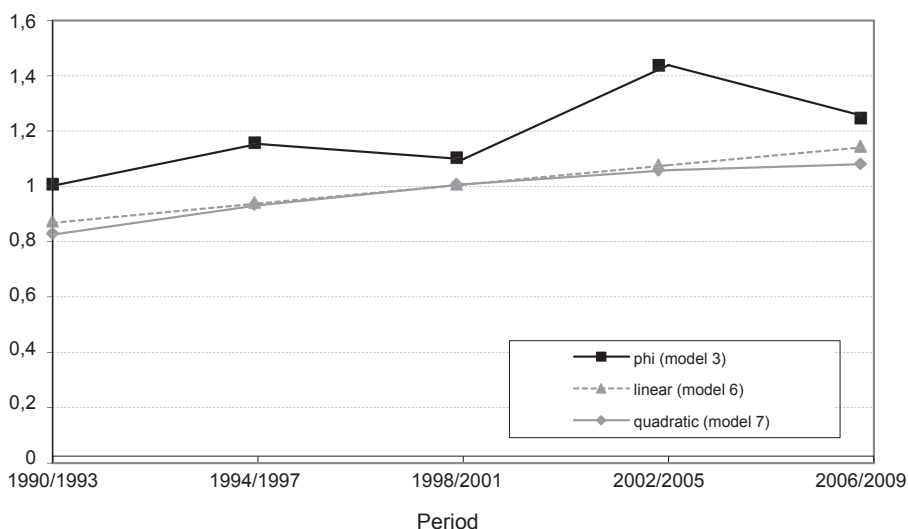
**Table 6** Estimated log-linear models for the development of fluidity in education according to socio-economic origin in the Czech Republic between 1990 and 2009 (25–40 years of age)

Models	Model description	$L^2$	$\Delta$	$df$	$BIC$
1) <i>POF POR</i>	<i>F</i> and <i>R</i> independence model	1115.61	9.93%	225	-999
2) model 1 + <i>FR</i>	<i>FR</i> constant association model	291.34	4.44%	216	-1603
3) model 1 + <i>FR</i> * $\varphi$ <i>PO</i>	Log-multiplicative development of <i>FR</i> association <i>FR</i> according to <i>PO</i>	201.27	3.40%	192	-1739

Note: *P* – period, *O* – father’s social class, *F* – father’s education, *R* – respondent’s education,  $BIC$  is the Bayesian information criterion ( $BIC = L^2 - (df) \ln N$ ) where  $N$  is the total number of cases;  $\Delta$  is the difference index showing the difference of incorrectly classified cases in the estimated model.

We test the *differentiation effect* as a development of social fluidity in time in each category of socio-economic origin. We are interested in which social strata (ISEI father quintiles) social fluidity weakened between 1990 and 2005 or grew stronger between 2006 and 2009. We analyse a  $4 \times 4$  table composed of the following variables: father’s ISEI, father’s education, respondent’s education and period ( $O \times F \times R \times P$ ; table dimensions:  $5 \times 5 \times 4 \times 4$ ). Again, we analyse only respondents between 25 and 40 years of age and pay no attention to sex (Table 6).

Model 1 presumes that by introducing father’s ISEI the relationship between father’s and respondent’s education in time disappears. According to model 2 this relationship is constant in all father’s ISEI quintiles and periods. According to model 3 the relationship in father’s ISEI quintiles and periods differ – for each quintile and

**Chart 8** Development of fluidity in education according to socio-economic origin (ISEI father quintiles) in the Czech Republic between 1990 and 2009 (25–40 years of age)

66 each period the relationship is expressed by a phi estimate (Xie 1992). Our data interpretation is based on model 3.

Chart 8 shows the development of fluidity in education according to socio-economic origin between 1990 and 2009. A lower father's ISEI quintile translates into lower fluidity in education. The same applies to the entire monitored period of 1990–2009. Thus, *the vast majority of children of parents from the lowest social strata are the ones achieving the same low education as their parents*. Educational level differentiation – social homogeneity – grows mainly in lower educational levels. There is no dramatic change of the situation in higher educational levels.

## 6 Conclusion

The objective of this paper was to identify and explain the post-1989 development of fluidity in education in the Czech Republic. Seeking to identify the cause of the described developments we identified two effects corresponding with the development of fluidity in education in a given period. First, we tested the influence of socio-economic origin on respondent's education. We demonstrated that this effect was growing until 2005 and started to decrease between 2006 and 2009. It is the unequal educational odds effect on education dependant on father's social strata. We are inclined to explain this development by the initially slow increase in number of places at higher education following the end of the socialist regime and a subsequent break and rapid increase in educational opportunities at the turn of the new century. As it was shown elsewhere, "between 1990 and 2003 there was an increase in downward mobility which might be attributed to a small number of places at universities. It does not mean that the system did not expand after 1989, but the expansion wasn't as substantial as it could appear" (Simonová 2011, p. 141).

We identified the same trend also in terms of social homogeneity of educational groups (differentiation effect). Social homogeneity of educational groups increased between 1990 and 2005 – the same social layers achieved respective levels of education. On the contrary, social homogeneity of educational groups dwindled between 2006 and 2009 – levels of education were more diverse in terms of socio-economic origin. Our conclusions show that the lower the socio-economic origin of fathers the lower the level of education achieved by respondents and the greater the social homogeneity of this group.

The post-1989 expansion in education in the Czech Republic was not as extensive until 2005 as to decrease the influence of educational origin on the education achieved by respondents. Prior to 1989, the centrally-controlled education system often "forced" children of educated parents to finish their schooling with a certificate of apprenticeship while children of parents with apprentice training who were loyal to the pre-1989 regime were allowed to go on and graduate from university. This helped to maintain a stable level of unequal educational odds dependent on

socio-economic status. Fluidity in education has not changed in any significant way, as showed by cohort perspective.

After 1989, it was only logical that the level of educational inequalities was set to increase while fluidity in education weakened. Children of educated parents were not limited by anyone and children of parents with certificate of apprenticeship were not helped in any special way to earn their university diplomas. Children of blue-collar workers were the majority of children with a certificate of apprenticeship and children of educated parents were the majority of students enrolling in universities. It was only after a restructuring took place between 1990 and 2005 – as evidenced by our analysis – that fluidity in education increased. No sooner than in the 2006–2009 period did the wider offer of education (more secondary schools and universities) and the lower demand for education (due to saturated demand in older cohorts or due to a lower number of young people in the cohorts born after 1989) change the development of fluidity in education.

In the context of this change the effect of time on fluidity in education should be gradually replaced by the cohort effect. Social, political and economic changes between 1990 and 2005 were so radical that the cohort effect proved insignificant in our analysis. Our assumption is that the social structure of Czech society is so consolidated nowadays that any education system expansion will only affect new cohorts respectively. If this expansion continues we should be able to see greater fluidity in education in each new cohort. Socio-economic origin should play an increasingly smaller role in education attainment in young people. We believe that this is going to be the case and that fluidity in education in the Czech Republic will grow due to cohort replacement.

All in all, post-1989 developments in educational mobility, fluidity, and the inequalities in the access to education reflect a *decline in educational reproduction*, although not a particularly stark one. Educational climate existing within the family of origin tends to influence the selection of secondary school which then has an important effect on further educational career, especially tertiary enrolment and graduation. Educational policy should take as a warning the fact *the vast majority of children of parents from the lowest social classes are the ones achieving the same low education as their parents*, resulting in an intergenerational reproduction of social strata with the lowest levels of educational attainment.

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Associate Professor Tomáš Katrňák  
Faculty of Social Studies, Masaryk University  
Joštova 218/10  
602 00 Brno, Czech Republic  
katrnak@fss.muni.cz

PhDr. Natalie Simonová, Ph.D.  
Institute of Sociology, Czech Academy of Sciences  
Jilská 1, 110 00 Praha, Czech Republic  
Natalie.Simonova@soc.cas.cz