

Belarusian Economic Research and
Outreach Center



Working Paper Series

BEROC WP No. 004

**EDUCATION AND SOCIOECONOMIC MOBILITY
IN POST-COMMUNIST COUNTRIES**

Alina Verashchagina

September 2009

**Education and socioeconomic mobility
in post-communist countries**

Alina Verashchagina

University of Siena and BEROC

Kiev, September 2009

Belarusian Economic Research and Outreach Center is created in Kiev as a joint project of the Stockholm Institute of Transition Economics, the Kyiv School of Economics, the Kyiv Economics Institute and the Economics Education and Research Consortium.

It is financed jointly by the Swedish International Development Cooperation Agency (SIDA) and by the United States Agency for International Development (USAID) through the Eurasia Foundation.



USAID
FROM THE AMERICAN PEOPLE



Education and socioeconomic mobility in post-communist countries

Alina Verashchagina

*University of Siena, Dipartimento di Economia Politica, p.zza San Francesco 7,
53100 Siena, Italy*

Abstract

Patterns of intergenerational educational mobility are studied in thirteen post-communist countries of Central Europe and the former Soviet Union. No clear trend in educational inheritance emerges over the recent 50 years, covering both the period of socialism and transition to a market economy. This is contrary to expectations formed by the existing literature that claims considerable weakening of the correlation between parental education and that of their children during the period of socialism. If any, we find the decrease in intergenerational persistence up until the generation of the 1950s. In subsequent years no further decline is observed. On the contrary in a number of states the correlation between parents' and children's schooling got stronger, further increasing over the period of transition.

Key words: educational mobility, post-communist economies

Acknowledgements

I am grateful to Sam Bowles and Tom Hertz firstly for getting me involved into this field of research and then providing guidance. Special thanks goes to Francesca Bettio for careful supervision of my work. I also wish to thank Francesco Pastore and the participants of the IX GDN conference and BEROC seminar for useful comments, in particular Randall Filer, Tom Coupe and Maksim Yemelyanau. All possible imperfections remain my own responsibility.

1 Introduction

Education is considered a strategic resource in a modern knowledge-based economy, as well as the main prerequisite for socioeconomic mobility. With lots of emphasis put on increasing educational attainments, one would expect educational mobility¹ also to be on the rise. The available literature suggests this has not always been the case.

This paper investigates the trends in intergenerational educational mobility in thirteen post-communist economies² in Central and Eastern Europe (CEE) and the former Soviet Union (FSU) for which little empirical evidence has been made available thus far. These countries witnessed a spectacular increase in educational attainments during the socialist era, this being one of the main achievements of those times. The central question we ask is whether such achievement has been accompanied by an increase in educational mobility.

We are going to test three hypotheses, respectively that (i) the relation between education of parents and their children has been weakened during the socialist era; (ii) the current levels of educational mobility in post-communist countries are higher compared to their Western counterparts, despite the fact that (iii) transition to market economy caused an increase in educational persistence.

We first provide an overview of the available studies on intergenerational mobility in post-communist economies followed by a description of the data and methodology used to approach the issue. We then present the results and discuss the main findings. The final section offers the concluding remarks.

2 Pre- and postreform perspective

Before the term knowledge economy was introduced by Peter Drucker back in 1966, the importance of education for economic growth and development had already been fully understood. While this was equally true for capitalist and socialist countries, in the latter case education was also seen as a mean to even out social disparity.

¹ *Educational mobility* is understood as a change in educational status throughout generations. Educational mobility is considered to be high if the top level of education achieved by a child does not closely relate to that of his/her parents. *Educational persistence* on the opposite characterises a situation when educational choices of children are affected by that of their parents.

² These include Belarus, Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia, Romania, Russia, and Ukraine.

Education was offered free of charge in all the socialist countries, and this was expected to eliminate one of the main barriers between the different strata of society with regard to access to knowledge³. The idea was that a much facilitated entry into education would increase social mobility, in particular for the representatives of the working class and their children. The specific expectation that this created among scholars was that intergenerational educational mobility would increase during the socialist era, surpassing the levels achieved in Western economies. It was also expected that, with the launch of market oriented reforms and the concurrent near abolition of free education, the role of the family background increased and educational mobility decreased as a result.

However, these expectations do not take into account a powerful countervailing factor, namely parents' behaviour. Parents who already attained higher education levels may consider it a matter of principle to provide their children with at least the same level of education as their own. Breen & Goldthorpe (1997) modelled this behaviour within the framework of formal rational action theory, despite the fact that parent's decision is often taken irrespectively of the abilities that the offspring shows. This hypothesis finds support in some recent studies including Hertz et al. (2007) and Pfeffer (2008), who do not find considerable change in intergenerational educational mobility over the XXth century in a wide range of both developed and developing countries, as if there are intrinsic forces keeping it relatively stable. Pfeffer (*ibidem*) goes as far as calling educational mobility patterns and rates pervasive characteristics of nations.

It is consistent with this hypothesis that the new elites coming into power in communist regimes might have exercised control over the channels of intergenerational mobility in order to facilitate the desired life course of their children, thus behaving in the same manner as the bourgeois previously did. Parents' involvement in the education careers of children may take different forms depending on the way the education system operates. In contexts where education is free, the number of positions at higher levels is usually rationed. Thus higher status parents in socialist countries might have strived to facilitate entry into higher or higher quality education for their offspring.

Testing this hypothesis is made difficult by the fact that investigation of the communist period affords a long time-perspective but is limited by lack of data. Conversely data are now made available for transition and post-reform periods, but the time span may still be too short to reconstruct a clear trend. Different reserach methods have been proposed to overcome data limitations at least in part, and some empirical evidence on the intergenerational educational

³ Other institutions that sustain the class structure of society, e.g. private property, have also been challenged, but it is beyond the scope of this chapter.

mobility in post-communist economies is already available.

In one of the first studies to appear, Ganzeboom & Nieuwbeerta (1999) considered six Eastern European countries, including Bulgaria, Czech Republic, Hungary, Poland, Slovakia, and Russia. The authors concluded that the effect of parents' education decreased by about half from 1940 to 1985 (years refer to when the school was attended), but remained at the high end of the spectrum in international comparisons⁴. This would suggest that the socialist systems were not able to fully exploit the potential of education to facilitate intergenerational mobility.

Since then a number of country-specific studies appeared (Beblo & Lauer, 2004, for Poland; Gang, 1996 and Varga, 2006, for Hungary; Hazans et al., 2008 for the Baltic States), and practically all of them claim that parent's education exhibits strong positive effect on children's educational attainments in post-communist economies.

Most of the studies nevertheless confirm that some increase in educational mobility took place, especially in the post-war period. However, there is no consensus about the order of magnitude or how long the temporary improvement lasted. Consensus is even lower about the direction of the current trends or about current levels of educational mobility, since both depend on the way country-specific institutions developed during the reforms. Several recent studies claim that intergenerational educational mobility might have declined over transition, this being the case for Bulgaria (Hertz et al., 2009) and Russia (Gerber & Hout, 2004). In general, therefore, the available empirical findings support the theoretical predictions of Fan et al. (1999) and Spagat (2002) about the adverse effect of restructuring on intergenerational mobility.

We are going re-consider these issues for a much larger number of Eastern European countries than any of the existing studies examined, using the same methodology across the countries. Our specific focus is on three hypotheses, respectively that (i) the relation between education of parents and their children has been weakened during the socialist era; (ii) the current levels of education mobility in post-communist countries are higher compared to their Western counterparts, and (iii) transition to market economy caused an increase in educational persistence.

We pay attention to pre- and post-reform periods, for both seem equally important in order to understand recent developments. Of particular interest to us is the precise time at which transition to market economy was launched,

⁴ The reported coefficients obtained by regressing the education of children against that of their parents were at the level of 0.4-0.6 for Bulgaria, the Czech Republic, Hungary, Poland, and Slovakia. Only for Russia they were found to be lower - 0.28 for men and 0.33 for women.

since the timing and pace differed remarkably among countries. The process was more gradual in Central Europe, thus the effect on education too may be less pronounced and distributed in time. As for the FSU countries, we expect to observe a more varied change in intergenerational transmission patterns. This is partly because people in these countries experienced substantial change during the late socialist period with the launch of *perestroika* in 1986. This might have caused change in behavioural models inherent into education choices (Bowles et al., 2005) before the actual transition.

3 Data and measures used for the analysis

We use education as a proxy of status in a society, and in order to trace its transmission through generations, we look at how the education of parents and children relate to each other. We rely on two basic measures for this purpose: the coefficient obtained by regressing the years of education of an individual against that of his(her) parents, and the correlation between the two. As was emphasized in Hertz et al. (2007) these two measures bring different pieces of information. The regression coefficient shows the change in expected education of children in response to the one year change in the education of their parents. The correlation coefficient measures the correspondence between one standard deviation change in parents education and one standard deviation difference in the schooling of their children⁵.

Hertz et al. (2007) document a substantial decline of the regression coefficients for a set of 42 countries considered, which should be taken as the weakening of statistical association between the education of children and that of their parents, not a weaker causal relation. However, the explanatory power of parents education for the education of next generations (R^2 in the bivariate regression) remained fairly stable, which is also reflected in the stability of correlation between the two, at the range of 0.4. The study thus concludes that parental schooling by itself now explains as much of the variance of children’s schooling as ever.

The above mentioned study included several post-communist countries, but it did not focus specifically on the latter. Given the distinctiveness of these countries with regard to education it is worth focusing on a larger number of them and asking more specific research questions. This is what we do in this paper. The 13 countries that we consider are shaded in Figure 1, while Table 1 reports the data source used for each country and the size of the sample.

⁵ The relation between the two measures is as follows: $r_s^c = \beta_s^c(\sigma_0^c/\sigma_1^c)$, where the indexes c and $_s$ stand for cohort and schooling, σ_0^c and σ_1^c - standard deviations of schooling in two consequent generation.

Fig. 1. Countries covered by the study



Table 1
Data used for the analysis

| Country | Year | Dataset† | Number of observations used d (out of total) | Men/Women |
|----------------|------|----------------------|--|-----------------|
| Belarus | 1999 | BPC ^a | 12.203 (98.815‡) | 6,384 / 5,819 |
| Czech Republic | 2005 | EU-SILC ^b | 5.751(8.628) | 2.768 / 2.983 |
| Estonia | 2005 | EU-SILC | 5.570 (9.643) | 2.593 / 2.977 |
| Hungary | 2005 | EU-SILC | 9.611(14.791) | 4.570 / 5.041 |
| Latvia | 2005 | EU-SILC | 4.770 (7.913) | 2.119 / 2.161 |
| Lithuania | 2005 | EU-SILC | 6.251(9.929) | 2.825 / 3.426 |
| Poland | 2005 | EU-SILC | 23.699 (37.671) | 11.223 / 12.476 |
| Slovakia | 2005 | EU-SILC | 8.394 (12.879) | 3.966 / 4.428 |
| Slovenia | 2005 | EU-SILC | 5.356 (23.862) | 2.612 / 2.744 |
| Bulgaria | 2006 | ESS ^c | 965 (1.400) | 356 / 609 |
| Romania | 2006 | ESS | 1.389 (2.139) | 656 / 733 |
| Russia | 2006 | ESS | 1.539 (2.437) | 641 / 898 |
| Ukraine | 2006 | ESS | 1.352 (2.002) | 532 / 826 |

Note: ‡Further in the text explanation is given to how the final sample was obtained in the case of Belarus.

Source: ^aBelarus Population Census: Minnesota Population Center. Integrated Public Use Microdata Series. Version 3.0. Minneapolis: University of Minnesota, 2007. ^bThe European Union Statistics on Income and Living Conditions. ^cEuropean Social Survey. ^dThe size of the samples is restricted by the number of observations with complete information on own and parental education.

The sources of data include the Belarus Population Census (BPC, 1999), the European Social Survey (ESS, 2006) and the EU Statistics on Income and Living Conditions (EU-SILC, 2005). For the countries covered by the EU-SILC we used the years of education reported in the main survey, while drawing information on the education of parents from the special 2005 module on the intergenerational transmission of poverty. The module includes a question about the highest level of education attained by the father and the mother. The ESS provides the same type of information as the EU-SILC, whereas the BPC provides information only on the education level of the respondent. Parents' education was thus reconstructed using the relationship of the respondent with the household head.

The procedure we followed for Belarus using BPC illustrates how an initially large sample had to be reduced in order to ensure complete information on education and preservation of the original age structure. As described in Table A.1 of the Appendix, 365.974 pairs were initially identified for Belarus. They cover several generations, the baseline being household head and his/her partner. Once we considered individuals aged 20-64 with complete information about their own and their parents' education the sample shrunk to 98.815 observations. Moreover, because the subsample thus obtained was unbalanced, with younger generations that clearly outnumbered⁶, resizing the overrepresented age-groups was necessary in order to keep the original age structure. We used random sampling procedure for that purpose. The resulting, final number of observations for Belarus is 12.203. For other countries imposition of age limits and the dropping of observations with missing education also implied a reduction in the size of the sample.

Whenever years of education were readily available (through the direct question "How many years of education have you completed?") we used this information. In other instances, like that of parent education reported in the form of highest levels achieved in ESS and the EU-SILC, we converted levels of educations into years by exploiting observations for which both years and levels are reported individually (see Tables A.2-A.4 of the Appendix). Finally, we used country-specific coding for the level of education in case of ESS, while the classification is standard in case of EU-SILC and BPC (ISCED).

We first carried out the estimation on the year-by-year basis for all the countries. Because the noisy picture that was obtained was not easy to interpret, and because the results might had been influenced by unequal size of age-groups, we decided to mainly rely on by-cohort estimates⁷. The data was

⁶ The reason is that the incidence of non-reporting education is higher for older generations.

⁷ For the matter of comparison we provide an illustration of both for Belarus in Figure 2.

Table 2
Observations by countries and age cohorts

| № | Cohort | Belarus | Czech Republic | Estonia | Hungary | Latvia | Lithuania | Poland | Slovakia | Slovenia | Bulgaria | Romania | Russia | Ukraine |
|-------|----------|---------|----------------|---------|---------|--------|-----------|--------|----------|----------|----------|---------|--------|---------|
| 1 | 1935-'39 | 1161 | - | - | - | - | - | - | - | - | 108 | 98 | 141 | 180 |
| 2 | 1940-'44 | 982 | 777 | 696 | 1284 | 664 | 802 | 2078 | 826 | 598 | 132 | 177 | 116 | 126 |
| 3 | 1945-'49 | 1010 | 792 | 642 | 1087 | 490 | 718 | 2752 | 932 | 575 | 128 | 166 | 177 | 156 |
| 4 | 1950-'54 | 1397 | 803 | 741 | 1342 | 627 | 843 | 3605 | 1238 | 756 | 123 | 188 | 202 | 191 |
| 5 | 1955-'59 | 1659 | 664 | 820 | 1295 | 681 | 1008 | 3698 | 1212 | 741 | 125 | 130 | 193 | 150 |
| 6 | 1960-'64 | 1730 | 606 | 822 | 1019 | 658 | 993 | 3092 | 1190 | 690 | 91 | 131 | 175 | 129 |
| 7 | 1965-'69 | 1444 | 628 | 708 | 1115 | 626 | 749 | 2692 | 904 | 683 | 99 | 191 | 189 | 144 |
| 8 | 1970-'74 | 1405 | 715 | 608 | 1189 | 524 | 588 | 2771 | 935 | 640 | 84 | 182 | 183 | 134 |
| 9 | 1975-'79 | 1415 | 766 | 533 | 1280 | 500 | 550 | 3011 | 1157 | 673 | 75 | 126 | 163 | 142 |
| Total | | 12203 | 5751 | 5570 | 9611 | 4770 | 6251 | 23699 | 8394 | 5356 | 965 | 1389 | 1539 | 1352 |

Source: Own elaboration using using BPC 1999, EU-SILC 2005 and ESS 2006 as specified in Table 1.

divided into nine 5-year birth year cohorts as described in Table 2. As the youngest and the oldest respondents were excluded, the age interval of our observations spans from 20 to 64 years old in the BPC, 26 to 66 years old in EU-SILC, and 25 to 69 years old in ESS⁸.

Table 3 reports the range in years of education for both the parents and their children. Note that for some countries zero values are not allowed. This depends on the classification used in the questionnaire, but should not be a problem in a context where everybody was supposed to obtain at least basic level of education⁹. Parent education is measured by the average value for the mother and the father. When the information is missing for either parents, the remaining value is treated as the average value for the couple in order to maximize the number of observations.

All of the datasets involved in this study lack information on children who live outside the household. Moreover, in the case of Belarus we could only take stock of parents' education if they shared the household with children at the time of the interview. For the remaining countries parent education was reported by children independently of whether they lived in or out of the household, or whether they were still alive or not. Whilst this ensures wider coverage, recollection by children may be problematic.

Table 3 also reports average years of education for the first and the ninth cohorts, with separate records for parents and children. The figures for children are often twice as high as those for parents providing evidence of considerable increase in educational attainments in the countries under consideration in the second half of the XXth century.

⁸ This notwithstanding we need to be cautious about the results obtained for the two extreme cohorts. Some of young people may still be enrolled (about 2-4%) and thus the reported years of education are not always final. Also education for older generations might have been different in quality and content.

⁹ This was probably the motivation behind the coding for education and might give rise to an upward bias for older generations, if any.

Table 3
Years of education

| Country | Range of years of education | | Average years of education | | | |
|----------------|-----------------------------|----------|----------------------------|----------|----------|----------|
| | Parents | Children | Parents | | Children | |
| | | | Cohort 1 | Cohort 9 | Cohort 1 | Cohort 9 |
| Belarus | 2 / 15 | 0 / 15 | 4,7 | 10,4 | 9,4 | 10,2 |
| Czech Republic | 4 / 15 | 4 / 15 | 8,9 | 10,2 | 10,1 | 10,8 |
| Estonia | 2 / 15 | 2 / 15 | 6.0 | 11.5 | 10.5 | 10.9 |
| Hungary | 2 / 15 | 2 / 15 | 6.0 | 10.0 | 9.2 | 10.7 |
| Latvia | 2 / 15 | 2 / 15 | 6.1 | 10.4 | 9.1 | 10.0 |
| Lithuania | 2 / 15 | 4 / 15 | 4.0 | 10.9 | 10.1 | 11.5 |
| Poland | 2 / 15 | 2 / 15 | 4.1 | 8.7 | 7.9 | 11.0 |
| Slovakia | 4 / 15 | 4 / 15 | 7.1 | 10.3 | 10.3 | 11.1 |
| Slovenia | 2 / 15 | 2 / 15 | 5.1 | 8.4 | 8.1 | 10.6 |
| Bulgaria | 3 / 16 | 1 / 22 | 6.8 | 10.4 | 10.6 | 11.9 |
| Romania | 2 / 18 | 0 / 25 | 4.7 | 10.7 | 7.9 | 12.7 |
| Russia | 4 / 18 | 3 / 22 | 6.2 | 12.4 | 10.9 | 13.7 |
| Ukraine | 3 / 17 | 0 / 25 | 5.7 | 12.1 | 10.3 | 12.5 |

Note: Parental education represents the mean between the education of mother and father.

Source: Own elaboration using data as specified in Table 1.

4 Empirical findings

We proceeded by first estimating the two basic measures of educational persistence as described in the previous section. For the six countries that we have in common with Ganzeboom & Nieuwbeerta (1999), the values obtained for the correlation and regression coefficients are broadly comparable, with the only exception of Bulgaria. For this country we find much higher educational persistence as can be seen from Table 4. Our findings are probably driven by the sharp decline in intergenerational mobility in post-socialist Bulgaria that was documented in Hertz et al. (2009)¹⁰.

Overall, no clear pattern emerges for the trend in educational inheritance over the latest 50 years (see Figure 2), which is contrary to the expectations raised by Ganzeboom & Nieuwbeerta (1999). If anything, we find a decrease of intergenerational persistence until the generation of the 1950s. In later years there appears to be no further decline, on the contrary in a number of states the effect of family background got stronger. In all likelihood the earlier decline is the outcome of the policy of massively expanding education implemented

¹⁰ The correlation between the education of parents and that of their children in Bulgaria has almost doubled from 1995 to 2000. Moreover educational attainments declined in absolute terms for children from families with lower levels of parents' education. Hertz et al. (2009) claim it was an economically driven structural change caused by the contraction of public spending on education and the decline in its quality, the increase in out-of-pocket costs, the fall in the number of schools, and the rise in unemployment among those with secondary education.

Table 4
The relation between parents and children’s education

| | All | | Men | | Women | |
|----------------|---------|--------|---------|--------|---------|--------|
| | Correl. | Coeff. | Correl. | Coeff. | Correl. | Coeff. |
| Belarus | 0.367 | 0.362 | 0.341 | 0.324 | 0.369 | 0.368 |
| Czech Republic | 0.380 | 0.519 | 0.386 | 0.532 | 0.383 | 0.523 |
| Estonia | 0.331 | 0.308 | 0.339 | 0.299 | 0.335 | 0.316 |
| Hungary | 0.461 | 0.419 | 0.434 | 0.375 | 0.487 | 0.460 |
| Latvia | 0.389 | 0.448 | 0.395 | 0.448 | 0.390 | 0.444 |
| Lithuania | 0.358 | 0.292 | 0.337 | 0.272 | 0.387 | 0.314 |
| Poland | 0.391 | 0.409 | 0.385 | 0.389 | 0.398 | 0.426 |
| Slovakia | 0.329 | 0.335 | 0.304 | 0.303 | 0.353 | 0.366 |
| Slovenia | 0.402 | 0.458 | 0.335 | 0.355 | 0.463 | 0.554 |
| Bulgaria | 0.626 | 0.665 | 0.614 | 0.618 | 0.629 | 0.689 |
| Romania | 0.508 | 0.557 | 0.466 | 0.538 | 0.562 | 0.605 |
| Russia | 0.402 | 0.336 | 0.368 | 0.313 | 0.438 | 0.369 |
| Ukraine | 0.312 | 0.309 | 0.326 | 0.356 | 0.291 | 0.295 |

Source: own calculation using BPC 1999, EU-SILC 2005 and ESS 2006 as specified in Table 1.

by practically all governments in Eastern Bloc in the first half of the century.

The graphs are also revealing of the between countries differences in levels of educational mobility. The Central European countries oscillate around values of 0.3-0.5 for correlation and regression coefficients, while former members of the FSU tend to record lower values, around 0.2-0.4: this is specifically the case for Lithuania, Russia and Ukraine (see Table 4 for average values of correlation and regression coefficients across cohorts).

The recent trends are of particular interest for testing the effect of transition on intergenerational mobility. The only country for which we cannot perform such test is Belarus, given that the census that we used dates back to 1999 and thus covers at most the first decade of a reform process that is still ongoing. Moreover, since the age of completing higher education in Belarus is about 22 years of age, some members of the youngest cohort we considered (1975-1979) might still be enrolled¹¹. However, the data available for the remaining countries does allow testing for the effect of transition. Both EU-SILC 2005 and ESS 2006 include people born in the 1970s who may be expected to have completed their education career in the mid 2000s, be it at secondary or higher levels. Most importantly, there are people who obtained their degrees during transition, whose educational choices might have been affected by the ongoing changes.

Since the reform was launched at different points in time and at different

¹¹ There is no way to check with the BPS whether the person is still enrolled into education. The dash line on the first part of the Figure 2 for Belarus serves to identify the cut-off point beyond which the trend can be misleading.

paces throughout Eastern Europe, the task of identifying the timing of a possible structural break is not straightforward. Graphical evidence about the time pattern of the estimated coefficients (Figure 2 above) is not particularly suggestive, since no isolated and major breaks clearly emerge over the period considered. We therefore resolved to test for all possible breaks in the data by using first the CUSUM test and then the Chow test.

The CUSUM test is based on the cumulated sum of residuals and verifies the occurrence of structural breaks without prior knowledge of the precise timing of the break (Brown et al., 1975). The test is performed by plotting the cumulated sum of residuals against the time span as in Figure 3. The structural break occurs if cusum goes outside the predefined boundaries. If the cusum plot gets close to the boundaries, it is generally interpreted as a sign of possible model instability around the corresponding period of time. In our case it basically refers to the instability of regression coefficient β_t , which corresponds to parents' education being the main regressor for the years of education of children.

CUSUM squared is a complementary version of the CUSUM recursive residuals. It is based on the cumulated sum of squared residuals. The two tests are complementary in the sense that CUSUM squared is more appropriate to test for haphazard rather than systematic changes in regression coefficients.

We perform the CUSUM test on the whole time series of coupled average years of education of children and their parents, starting from the generation of the late 1930s - early 1940s up until the generation of the late 1970s. The procedure thus followed allows to identify all the possible breaks in the data over the 40-year period considered. Note, this way we test for the presence of any breaks in the data, not only those caused by transition. As exemplified in Figure 3, in Belarus the main change in fact happened around the beginning of the 1960s (the year refers to the year of birth of a child). For other countries see Figure B.1 in the Appendix.

Fig. 2. Intergenerational educational regression coefficients and correlations

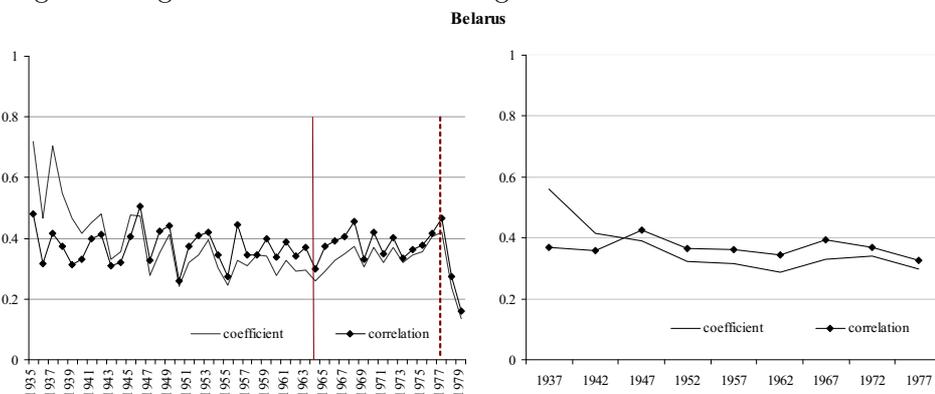
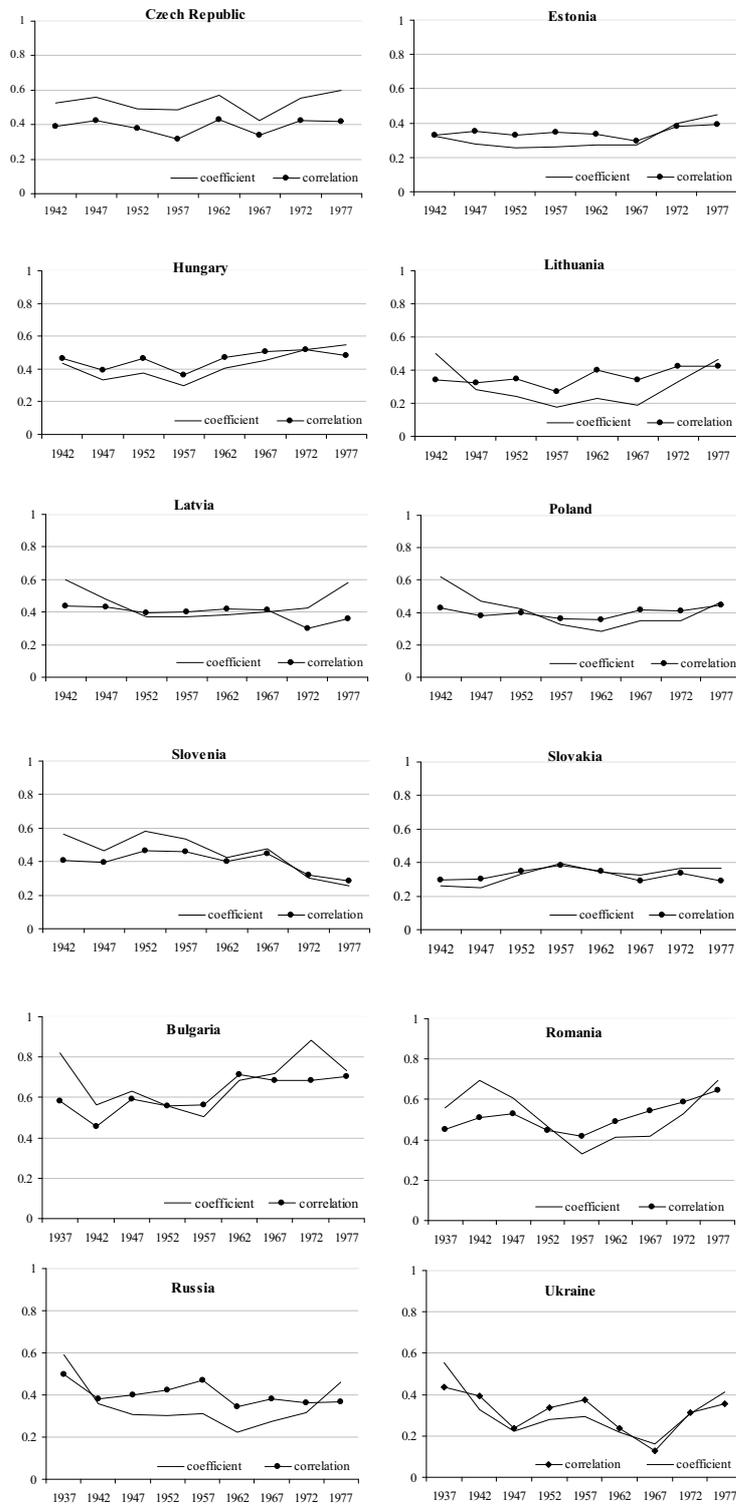


Figure 2 continued



Source: Own calculations using data as specified in Table 1.

Table 5

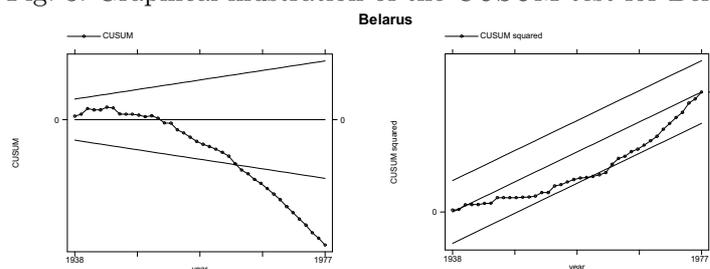
The incidence of structural breaks

| | Structural breaks in the data detected by | | Confirmed by the Chow test |
|----------------|---|----------------------------------|-------------------------------|
| | CUSUM | CUSUM squared | |
| Belarus | 1963 | 1960, instability around 1959-63 | 1960(1%) |
| Czech Republic | no break | instability 1962-1970 | 1967 (1%) |
| Estonia | 1969-1970 | 1960-62, 1968-70 | 1960(1%), 1968(5%) |
| Hungary | 1967 | no break | no break |
| Latvia | 1973 | 1958-59, 1972-73 | 1958 (1%) |
| Lithuania | 1965 | 1954-55, 1962-63 | 1954 (1%), 1963 (1%) |
| Poland | 1967-68 | 1956-57, 1963 | 1956 (1%), 1963 (1%) |
| Slovakia | no break | instability 1958-63 | 1958 (5%) |
| Slovenia | instability 1962-66 | no break | 1962(1%) |
| Bulgaria | instability 1977-82 | 1961, 1977, instability 1960-80 | 1961 (10%), 1977(5%) |
| Romania | 1980 | 1960, instability 1960-68 | 1960 (1%) |
| Russia | instability 1954-1957 | instability 1966-1970 | 1954 (1%) |
| Ukraine | no break | instability around 1945 | 1945 (1%) |

Note: Here we refer to the year of birth of a child.

Source: own calculation.

Fig. 3. Graphical illustration of the CUSUM test for Belarus



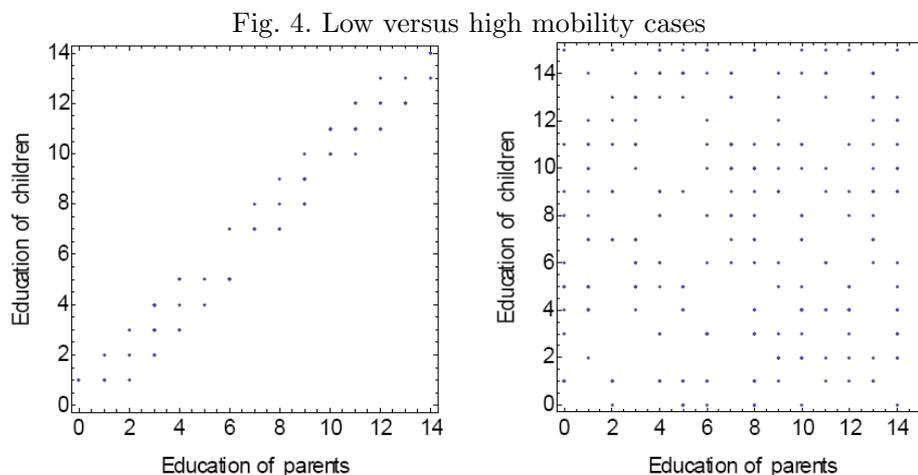
Source: Own calculations using BPC 1999.

The years of instability or of structural break thus detected are listed in Table 5. Once break years have been identified through the CUSUM tests, the statistical significance of the related findings can be ascertained using the Chow test (see column 4 in Table 5). In the majority of cases the Chow test confirms the occurrence of breaks as detected by the CUSUM squared. Note that, sometimes, significance (at the conventional 5% level) is achieved by the CUSUM squared plot, but not by the CUSUM of the recursive residuals. According to Brown et al. (1975), in such cases instability is due to change in residual variance rather than to shifts in the values of the regression coefficients. Moreover, the timing of detected breaks as of Table 5 suggests that, although transition caused some instability in the patterns of intergenerational transmission of education, there should have been prior events that brought about major changes¹².

¹² Remember that most important transformations caused by the economic transition in Eastern Europe took place in the late 1980s - early 1990s (Roland, 2000, Berglöf & Roland, 2007).

In light of the fact that so much effort was spent by communist countries to promote socioeconomic mobility, and that education featured as the main tool in this respect, the overall outcome is modest: only post-war generations were apparently able to take advantage of temporary increases in educational mobility. Overall, the case of post-communist economies clearly raises the question of whether high educational mobility may be sustainable over time.

The issue of sustainability is explored in Figure 4 by means of a scattergram of the paired values of parent and child education in two hypothetical cases of mobility, respectively low (left panel) and high (right panel). High mobility is characterised by greater dispersion of values, with at least two implications. *First*, the very fact that average educational attainments increase may lead to a decrease in educational mobility because of lower dispersion. In simple words when everybody is highly educated there is little room for improvement. *Second*, high mobility also includes cases of downward mobility where highly educated parents fail to ensure transmission of high educational levels to their children. This could result in a loss of aggregate knowledge that slows down future gains in mobility. Given that downward mobility is a necessary outcome of upward mobility, the question in fact arises whether there is an optimal relation between the two. The question is worth pursuing but lies outside the scope of this paper.



Source: Own calculations using EU-SILC 2005.

To summarize our findings thus far, of the three hypotheses that we put to the test, the first two are partially rejected, while the third is weakly confirmed. Specifically, our expectations of a weakening in educational persistence during the communist era do not get full support from the data. The initial decline during the post-war period was followed by a setback some 10 years before transition was launched. We also expected to find higher mobility, i.e. lower regression and correlation coefficients, in post-communist versus mature market economies, but this too is only partly supported by the data. Among

the countries considered only Lithuania, Russia and Ukraine got close to the 0.2 mark at some point (Figure 2). The remaining countries consistently displayed middle range values. This was also found to hold for market economies by who employ the same methodology Hertz et al. (2007). Our final expectation concerned the effect of transition on the educational mobility and the data suggest that it further declined during the economic reforms. How can we make sense of these apparently disparate results? In this final paragraph we will put forward our view of how these findings may fit together.

5 Discussion

The correlation between the socioeconomic status of children and their parents is indicative of whether the society is able to provide everybody with equal opportunities. It is therefore puzzling that the communist regimes based on the idea of equal opportunity for all could not exploit it fully for the increase in educational mobility, or rather could not sustain the relatively high mobility rates that had been achieved in the 1950s and 1960s. Since then, lower equality was accompanied by decreasing mobility.

The available literature illustrates cases when inequality and mobility go in the same direction. Take for example the case of Italy and the US. The education system that is largely based on public schools in the former case was found to generate less inequality, but also less intergenerational educational upward mobility (see Checchi et al., 1999). Instead in the US higher inequality was found to be coupled with higher intergenerational mobility (ibidem). The study claims that the way the public education system is designed in Italy reduces it's capacity to generate intergenerational mobility. In particular, when individual effort is relatively more important than the quality of education for the successful accumulation of human capital, the return to education will be lower thus making it less attractive for children from poorer background.

Private returns to education (*PRE*) are considered to be one of the main determinants of mobility. There is a lot of evidence on *PRE* for developed countries, less so for developing and transition countries. In the latter case, moreover, empirical evidence is often contradictory. There is an on-going debate in the literature about how returns to education might have responded to the transition (for an overview see Flabbi et al., 2007). The available empirical evidence endorses a scenario where returns to education would increase with market entering into play, mainly due to the decentralization of wage setting mechanisms. The latter would cause an increase in wage inequality in general and returns to education in particular. Yet, we need to be cautious, since the standard approach adopted by many papers does not allow to account for non-

monetary returns to education¹³. There are reasons to think that the latter accounted for a non-negligible part of earnings under the central-planning. Moreover, the cost of education has increased with the introduction of fees. All that means *PRE* on the eve of transition might have been underestimated, and the whole story of a dramatically increasing *PRE* would then be questioned. In fact, the results that we obtained on educational persistence which grew almost universally during the recent decades in the countries under consideration, may be taken as an additional evidence against increasing returns to education.

Which are the factors that might have slowed down educational mobility - as well as *PRE*- and started to do so before transition was launched?

Countries with very high average education levels, such as in Eastern European region before transition, almost naturally raise the question: "How does the overall increase in educational attainments affect the intergenerational educational mobility?" The answer is not straightforward¹⁴. An expansion of education that favours low class entrants will immediately be reflected in the decreasing educational persistence. However, once the percentage of graduates becomes overall high, how would mobility further behave?

On the labour supply side, when education is freely available, it becomes less of a distinguishing feature of socioeconomic status, and this in itself might affect the motivation to invest into education. In other words, such investment is perceived as a necessary, but not longer as a sufficient condition to gain status. With an ever increasing competition among graduates, other channels of socioeconomic mobility may thus become more effective. In addition, the more freely available education is, the longer the investment period may become to reap conspicuous returns, which implies long postponement of one's working life. This amounts to an increase in the opportunity cost of education, especially for children from disadvantaged families and may therefore further contribute to slow down educational mobility.

On the labour demand side, providing everybody with equal opportunity to get education and/or raising the average educational levels is a necessary but not sufficient condition to guarantee effective returns to education to all those

¹³ Here by non-monetary returns we mean e.g. access to services and goods that were not otherwise available. With the demolition of the system of redistribution elites were deprived of many privileges, including high-quality health service and recreation facilities, free housing etc. This would effect the level of private returns to education expected by the generations to come.

¹⁴ Think of an extreme situation when everybody has the highest degree, in this case mobility would get close to 0. This is unrealistic, but helps to grasp the inevitable effect of the overall increase in education levels and the contraction of the gap between the education of children and their parents evidenced in Table 3.

who invest. In order for investment in education not to be discouraged it is equally important that the educated labour force finds suitable jobs where the acquired skills are adequately exploited and remunerated ¹⁵. In previous socialist countries, by contrast, the combination of inefficient use of educated labour and persistent efforts to keep labour income inequality has probably reduced *PRE* to rather low levels.

Thus a decrease in educational mobility initiated on the supply side might have been reinforced by the reduction in *PRE* on the demand side of the labour market, and the latter was probably accentuated by the deterioration of the economic situation which prompted the economic reforms. Unfortunately, direct evidence on pre-transition *PRE* is scanty. One exception is the study for Romania of Andren et al. (2004) providing an estimate of returns to education during the 50-year period that spans from 1950 to 2000. According to this study an initial increase in *PRE* (see Table 3 ibidem), lasted until the 1960s and was followed by a decline until the early 1990s. This is consistent with the pattern of educational mobility that characterizes Romania (see Figure 2); for this country education mobility closely follows *PRE*. Romania may not be an isolated example of how low *PRE* adversely affect educational mobility.

Note that *PRE* are expected to affect differently the intergenerational income mobility (*IIM*) and educational mobility (*IEM*):

$$PRE \downarrow \implies IIM \uparrow \quad PRE \downarrow \implies IEM \downarrow$$

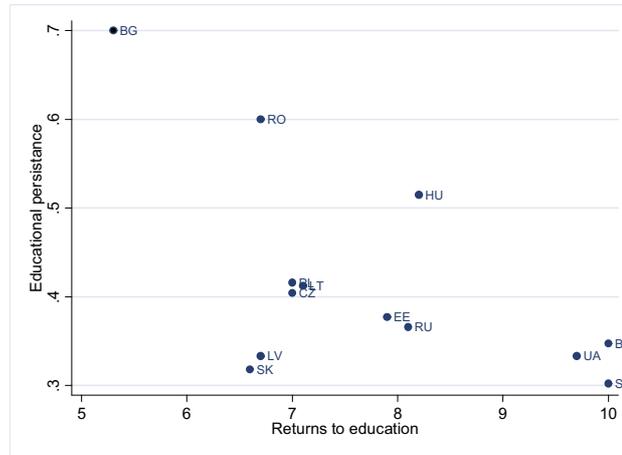
The first expectation is widely supported by estimated earnings functions ¹⁶, while Figure 5 provides evidence that the second expectation also holds for transition countries. The Figure illustrates how increasing *PRE* are generally expected to push mobility up, and conversely ¹⁷. The latter case is often referred to as an incentive trap, the logic behind it being that low returns to education create little incentive for children with poor background to spend their effort on schooling.

¹⁵ Educated labour force is a luxury that not every country may afford in big numbers. In an opened economy there is always possibility to migrate in case people do not find ways to realized their human capital within the country. Unless a state pursues clever education and migration policy, increasing human capital may turn into a loss. In the context of closed economies, like the FSU was, outside migration was limied. Thus the overall effect of enhancing education levels was concentrated within the country.

¹⁶ Intergenerational income mobility will be higher in a given generation if there are lower returns to human capital for children or if children's human capital is less sensitive to parental earnings (see e.g. Solon, 2004; Blanden et al., 2005).

¹⁷ However, the relation between returns to education and educational mobility is often found to be weak (see e.g. Chevalier et al., 2003)

Fig. 5. Returns to education and mobility



Note: ¹We use returns to education as reported in Table 6. They were deliberately selected for the mid 1990s and are expected to affect the education choices of the youngest cohorts. Mobility in turn is measured as an average of the correlation coefficients between the education of children born in the 1970s and the education of their parents.

²For a set of countries considered, returns to education explain about one third of the variation in educational persistence.

Source: own elaboration

Because of this incentive trap, there might have been a substitution effect following the decrease in *PRE* (that we have hypothesized to occur before the transition), whereby people attributed more importance to income rather than to education as a way to obtain higher societal status. Education is in fact one of the main determinants of earnings, but it explains only about one third of the variation in the latter (Bowles et al., 2001).

A very important message in this story is that education in post-communist economies is increasingly becoming an investment good while in the past it has partly been treated as a consumption good ¹⁸. Change in this respect especially affects the new generations, those exposed to market culture for which schooling is increasingly driven by economic calculus ¹⁹. This may further reinforce the relation between *PRE* and educational mobility. If the state does not manage to sustain *PRE* at reasonably high levels, the potential of education as a channel of socioeconomic mobility will further be weakened.

Table 6 reports *PRE* that have been used to construct Figure 5. They come

¹⁸ *Studying, studying and studying*, the famous slogan by V.Lenin was a form of life guidance imputed into the minds of people from the very childhood. First of all they perceived education as a tool to achieve the comprehensively developed personality (Pastuovic, 1993).

¹⁹ This explains a shift in interest to specialties that were not particularly on demand under the central planning, with finance and economics leading the list.

Table 6
Selected findings on returns to education in transition countries

| Country | Author | Data Source | Year | Return to education |
|----------------|--------------------------------|-------------|------|---------------------|
| Belarus | Pastore & Verashchagina (2006) | BHSIE | 1996 | 10 |
| Czech Republic | Flabbi et al. (2007) | ISSP | 1996 | 7 |
| Estonia | Hazans (2003) | LFS | 2000 | 7.9 |
| Hungary | Flabbi et al. (2007) | ISSP | 1996 | 8.2 |
| Latvia | Hazans (2003) | LFS | 2000 | 6.7 |
| Lithuania | Hazans (2003) | LFS | 2000 | 7.1 |
| Poland | Flabbi et al. (2007) | ISSP | 1996 | 7 |
| Slovakia | Flabbi et al. (2007) | ISSP | 1998 | 6.6 |
| Slovenia | Flabbi et al. (2007) | ISSP | 1997 | 10 |
| Bulgaria | Flabbi et al. (2007) | ISSP | 1997 | 5.3 |
| Romania | Andren et al. (2004) | IHS | 1996 | 6.7 |
| Russia | Flabbi et al. (2007) | ISSP | 1997 | 7 |
| Ukraine | Brainerd (2000) | HS | 1994 | 9.7 |

Note: BHSIE - Belarusian Household Survey of Incomes and Expenditures, ISSP - International Social Survey Programme, LFS - Labour Force Survey, IHS - Integrated household Survey, HS- Household Survey.

from different studies, but apparently are high and comparable in size to *PRE* in mature market economies. We take it with due caution, keeping in mind the difficulties in estimating *PRE* in a context of transition countries, discussed more in detail earlier in this section. In addition to that, the simple procedure that we used to obtain the standard measures of educational mobility raised another methodological problem, namely: there is no way to fully capture the variance of education. Many datasets, including those used for this study, allow only standardized levels of education with higher and lower levels suppressed altogether. In addition to that, the respondents tend to approximate the values of years of education. This is potentially a problem and requires high quality data to be involved.

If one abstracts from these methodological difficulties, an interesting picture comes out. Despite cross-country comparisons reveal that countries with higher returns to educations are generally able to sustain higher educational mobility (see Figure 5), at the level of a single state high and increasing returns to education in late transition period are often coupled with middle-to-high and yet decreasing educational mobility (see Figure 2 and Table 6).

6 Conclusion

The expectations raised by the existing literature that educational persistence decreased to a substantially lower levels in post-communist countries are not entirely supported by the data. We find that an increase in educational mobility up until the generation of the 1950-60s was followed by a subsequent setback. We also find that economic transition cannot be held responsible for the mobility decline since much of it generally took place some 10 years before

the reform was launched. More than one reason can be offered as to why this might have happened.

The first reason, which we may call ‘intrinsic’, is that high levels of intergenerational educational mobility are inherently difficult to sustain. High mobility necessarily entails some downward mobility, whereas parents generally tend to oppose the latter, as they do not accept the prospects of having children with lower education than their own.

Other reasons are specific to socialist countries which were initially able to substantially increase educational levels for all at low cost. This meant that education became less of a distinguishing feature of socioeconomic status in the central years of socialism, which in turn discouraged investment into education. This was particularly true among children from disadvantaged families, for whom the opportunity cost of working at earlier ages is a crucial factor. The higher the average educational level is, the longer it is necessary to invest in schooling in order to gain a comparative advantage. Thus further improvement on educational grounds increasingly became the privilege of children from richer families.

In addition, soviet systems pursued egalitarian policies featuring compressed earnings scales, thus lowering returns to education. As a result, the idealistic pursuit of education as a consumption good lost its attraction and people started reasoning in economic terms. If education does not pay enough, why invest in it? This way, widespread disincentives started rolling back educational mobility.

The deterioration of the economic situation that preceded the transition to market economy was the result of persistent inefficiencies. Human capital, alongside other factors of production, was not used efficiently, leading to actual overeducation. This reinforced the downward pressure on wages exercised by the egalitarian ideology and is likely to have further reduced private returns to education. In the pre-reform period, in fact, overeducation, further lowering of *PRE* and the contraction of mobility rates may have sustained one another.

The challenge is to explain what happened after the demise of socialism, during transition to a market economy. According to available studies, private returns to education generally went up while our own findings are that intergenerational mobility declined. The combined suggestion is that the relationship between private returns and educational mobility might have reversed during the transition and the question would be why this happened. However, there are reasons to doubt that such reversal took place. This is because the estimated increase in *PRE* in transition countries might have been exaggerated on two counts, respectively because much of the benefits were in kind under socialism and were not counted for, and because estimated *PRE* ignore the

rise in the costs of schooling after transition. Further research is thus needed to fully account for educational mobility during transition.

Regarding future prospects of intergenerational educational mobility, we believe that a key factor is each country's ability to ensure adequate, actual returns to education. Sustaining high returns to education is bound, in turn, to the efficiency of the whole economic system.

References

- Andren, D., Earle, J., & Sapatoru, D. (2004). The wage effects of schooling under socialism and in transition: Evidence from Romania, 1950-2000. W.E. Upjohn Institute Staff Working Paper No. 04-108.
- Beblo, M. & Lauer, C. (2004). Do family resources matter? Educational attainment during transition in Poland. *Economics of Transition*, 12(3), 537–558.
- Berglöf, E. & Roland, G., Eds. (2007). *The Economics of Transition*. Palgrave Macmillan.
- Blanden, J., Gregg, P., & Machin, S. (2005). *What is the Good of Education? The Economics of Education in the UK*, chapter Educational Inequality and Intergenerational Mobility, (pp. 122–146). Princeton University Press.
- Bowles, S., Gintis, H., & Osborne, M. (2001). The determinants of earnings: A behavioural approach. *Journal of Economic Literature*, XXXIX, 1137–1176.
- Bowles, S., Gintis, H., & Osborne Groves, M., Eds. (2005). *Unequal Chances. Family Background and Economic Success*. Russel Sage Foundation, New York, and Princeton University Press, Princeton and Oxford.
- Brainerd, E. (2000). Women in transition: Change in gender wage differentials in Eastern Europe and FSU. *Industrial and Labor Relations Review*, 54(1), 139–162.
- Breen, R. & Goldthorpe, J. (1997). Explaining educational differentials. Towards a formal rational action theory. *Rationality and Society*, 9, 275–305.
- Brown, B., Durbin, J., & Evans, J. (1975). Techniques for Testing the Constancy of Regression Relationship Over Time. *Journal of the Royal Statistical Society, Series B*, 37, 149–172.
- Checchi, D., Ichino, A., & Rustichini, A. (1999). More equal but less mobile? Education financing and intergenerational mobility in Italy and the US. *Journal of Public Economics*, 74, 351–393.
- Chevalier, A., Denny, K., & McMahon, D. (2003). A multi-country study of inter-generational educational mobility. Centre for Economic Research WP03/14.
- Fan, C., Spagat, M., & Overland, J. (1999). Human capital, growth, and inequality in Russia. *Journal of Comparative Economics*, 27(4), 618–643.
- Flabbi, L., Paternostro, S., & Tiongson, E. (2007). Returns to education in

- the economic transition: A systematic assessment using comparable data. World Bank Policy Research Working Paper 4225.
- Gang, I. (1996). Who matters most? The effect of parent's schooling on children's schooling. Rutgers University, Department of Economics, Working Paper no. 199613.
- Ganzeboom, H. & Nieuwbeerta, P. (1999). Access to education in six Eastern European countries between 1940 and 1985. Results of a cross-national survey. *Communist and Post-Communist Studies*, 32, 339–357.
- Gerber, T. & Hout, M. (2004). Tightening up: Declining class mobility during Russia's market transition. *American Sociological Review*, 69(5), 677–703.
- Hazans, M. (2003). Returns to education in the Baltic countries. GDN Knowledge Base Working Paper No. DOC16801.
- Hazans, M., Trapeznikova, I., & Rastrigina, O. (2008). Ethnic and parental effects on schooling outcomes before and during the transition: evidence from the Baltic countries. *Journal of Population Economics*, 21(3), 719–749.
- Hertz, T., Jayasundera, T., Piraino, P., Selcuk, S., Smith, N., & Verashchagina, A. (2007). The inheritance of educational inequality in developing countries: International comparisons and fifty-year trends. *The B.E. Journal of Economic Analysis and Policy*, 7(2). Article 10.
- Hertz, T., Meurs, M., & Selcuk, S. (2009). The decline in intergenerational mobility in post-socialism: Evidence from the Bulgarian case. *World Development*, 37(3), 739–752.
- Pastore, F. & Verashchagina, A. (2006). Private returns to human capital over transition. A case study of Belarus. *Economics of Education Review*, 25(1), 91–107.
- Pastuovic, N. (1993). Problems of reforming educational systems in post-communist countries. *International Review of Education*, 39(5), 405–418.
- Pfeffer, F. (2008). Persistent inequality in educational attainment and its institutional context. *European Sociological Review*, 24(5), 543–565.
- Roland, G. (2000). *Transition and Economics: Politics, Markets and Firms*. The MIT Press, Cambridge.
- Solon, G. (2004). *Generational income mobility in North America and Europe*, chapter 2. A model of intergenerational mobility variation over time and place, (pp. 38–57). Cambridge University Press.
- Spagat, M. (2002). Human capital, growth and inequality in transition economies. CEPR discussion paper no. 3556.
- Varga, J. (2006). The role of labour market expectations and admission probabilities in students' application decisions on higher education: The case of Hungary. *Education Economics*, 14(3), 309–327.

A Tables

Table A.1

Belarus population survey, intergenerational links

| <i>Constructing pairs:</i> |
|--|
| Parents-children: 326225 |
| Grandparents-parents: 8185(HH head and parents) +3485(HH partner and parents in law) |
| Grandgrandparents-grandparents: 8 |
| Son/daughter of the HH head and their children: 28071 |
| Total: 365974 |

Source: own elaboration on the basis of BPC, 1999.

Table A.2

Belarus population survey, education coding

| <i>Educational attainment</i> | Frequency | Years of education |
|--|-----------|--------------------|
| None (illiterate) | 482 | 0 |
| Unknown(includes literate with no primary) | 85 | 2 |
| Primary general | 1753 | 4 |
| Primary vocational (vocational) | 14.722 | 6 |
| Basic general (incomplete secondary) | 7.593 | 8 |
| Secondary general | 33.051 | 10 |
| Secondary vocational (secondary special | 25.542 | 12 |
| Higher vocational (higher) | 15.587 | 15 |
| Total | 98.815 | |

Source: own elaboration on the basis of BPC, 1999.

Table A.3
EU-SILC 2005, education coding

| <i>Highest education level achieved</i> | Czech Republic | | Estonia | | Hungary | | Latvia | | Lithuania | | Poland | | Slovakia | | Slovenia | |
|---|-----------------------|-------|----------------|-------|----------------|-------|---------------|-------|------------------|-------|---------------|-------|-----------------|-------|-----------------|-------|
| | Nobs | Years | Nobs | Years | Nobs | Years | Nobs | Years | Nobs | Years | Nobs | Years | Nobs | Years | Nobs | Years |
| Pre-primary education | - | - | 18 | 2 | 61 | 2 | 35 | 2 | - | - | 139 | 2 | - | - | 21 | 2 |
| Primary education or first stage of basic education | 16 | 4 | 67 | 4 | 185 | 4 | 629 | 4 | 142 | 4 | 3954 | 4 | 9 | 4 | 1077 | 4 |
| Lower secondary or second stage of basic education | 579 | 8 | 661 | 8 | 2429 | 8 | 176 | 8 | 645 | 8 | 1 | 8 | 658 | 8 | 163 | 8 |
| (Upper) secondary education | 4317 | 10 | 2745 | 10 | 5462 | 10 | 2426 | 10 | 2117 | 10 | 15175 | 10 | 6244 | 10 | 3061 | 10 |
| Post-secondary non-tertiary education | 90 | 12 | 579 | 12 | 34 | 12 | 565 | 12 | 1847 | 12 | 875 | 12 | - | - | 348 | 12 |
| First and second stage of tertiary education* | 749 | 15 | 1500 | 15 | 1436 | 15 | 929 | 15 | 1480 | 15 | 3520 | 15 | 1471 | 15 | 652 | 15 |
| Missing | - | | - | | 4 | | 10 | | 20 | | 35 | | 12 | | 34 | |
| Total | 5751 | | 5570 | | 9611 | | 4770 | | 6251 | | 23699 | | 8394 | | 5356 | |

Note: *corresponds to ISCED values 5(not leading directly to an advanced research qualification) and 6 (leading to an advanced research qualification).

Source: own elaboration on the basis of EU-SILC 2005.

Table A.4
ESS 2006, education coding

| <i>Highest education level achieved</i> | Bulgaria | |
|---|-----------------|--------------|
| | Nobs | Years |
| Not completed primary education | 10 | 3 |
| Primary education | 29 | 4 |
| Lower secondary education | 199 | 8 |
| Upper secondary | 478 | 11 |
| Post secondary, non-tertiary educ. | 66 | 14 |
| Tertiary education | 182 | 16 |
| Total | 965 | |

| <i>Highest education level achieved</i> | Romania | |
|---|----------------|--------------|
| | Nobs | Years |
| No school | 21 | 0 |
| Primary school | 106 | 4 |
| General school, lower secondary | 221 | 8 |
| Vocational and apprenticeship | 341 | 11 |
| High school (upper secondary) | 372 | 12 |
| Post-high school | 131 | 15 |
| University degree | 161 | 17 |
| Post-graduate degree | 8 | 18 |
| Total | 1389 | |

| <i>Highest education level achieved</i> | Russia | |
|---|---------------|--------------|
| | Nobs | Years |
| Primary or first stage of basic education | 40 | 4 |
| Lower secondary, second stage of basic | 132 | 8 |
| Upper secondary | 401 | 11 |
| Post secondary, non-tertiary | 515 | 13 |
| First stage of tertiary | 427 | 15 |
| Second stage of tertiary | 24 | 18 |
| Total | 1539 | |

| <i>Highest education level achieved</i> | Ukraine | |
|--|----------------|--------------|
| | Nobs | Years |
| Not completed primary education | 5 | 3 |
| Primary education | 51 | 7 |
| Not completed secondary education | 70 | 8 |
| Completed secondary education | 370 | 10 |
| Secondary technical education | 515 | 13 |
| First stage of high education | 41 | 15 |
| Completed high education (specialist, master, post-graduate, scientific degree) | 306 | 17 |
| Total | 1358 | |

Source: own elaboration on the basis of ESS 2006.

B Figures

Fig. B.1. Graphical illustration of the CUSUM test

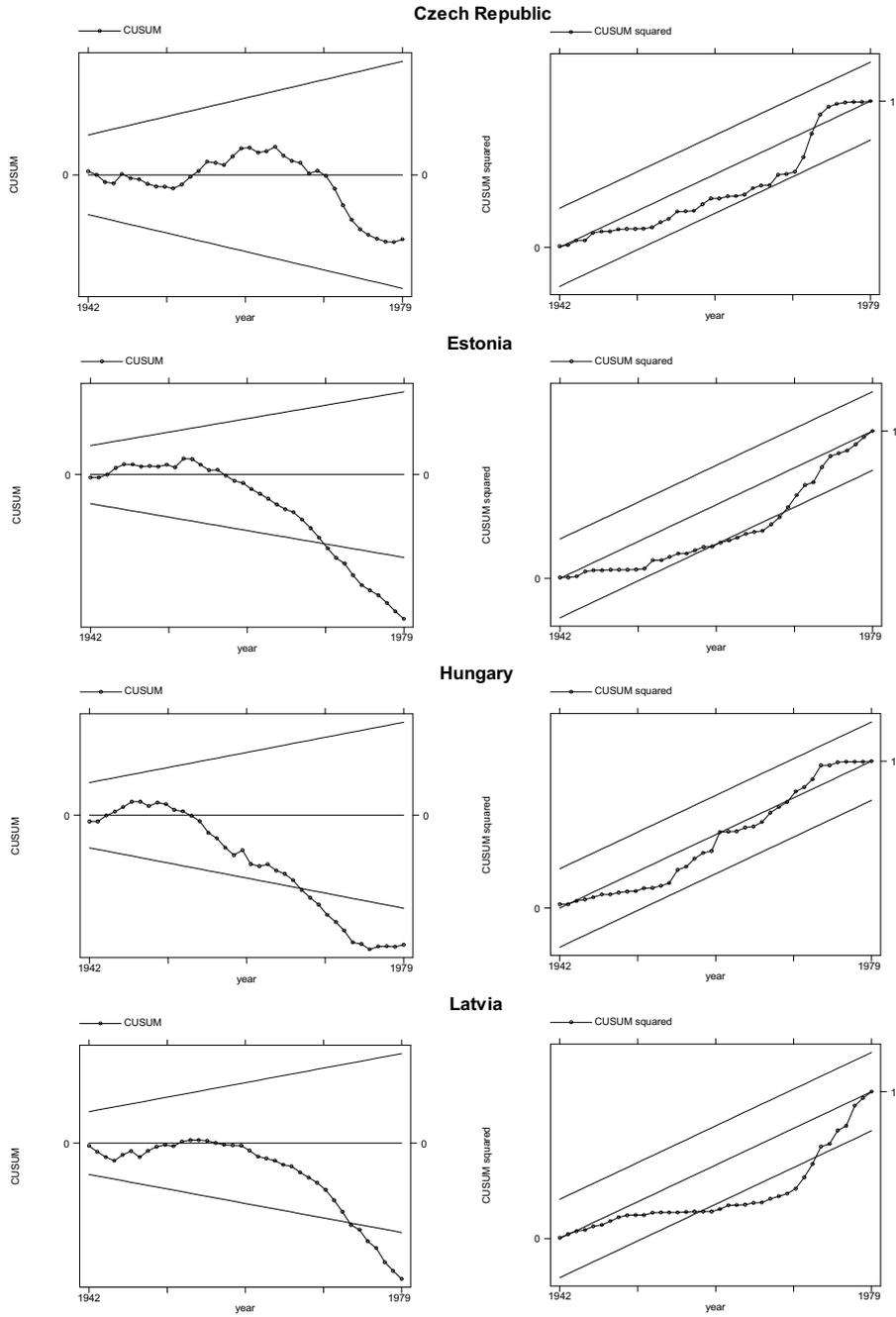


Figure B.1 continued

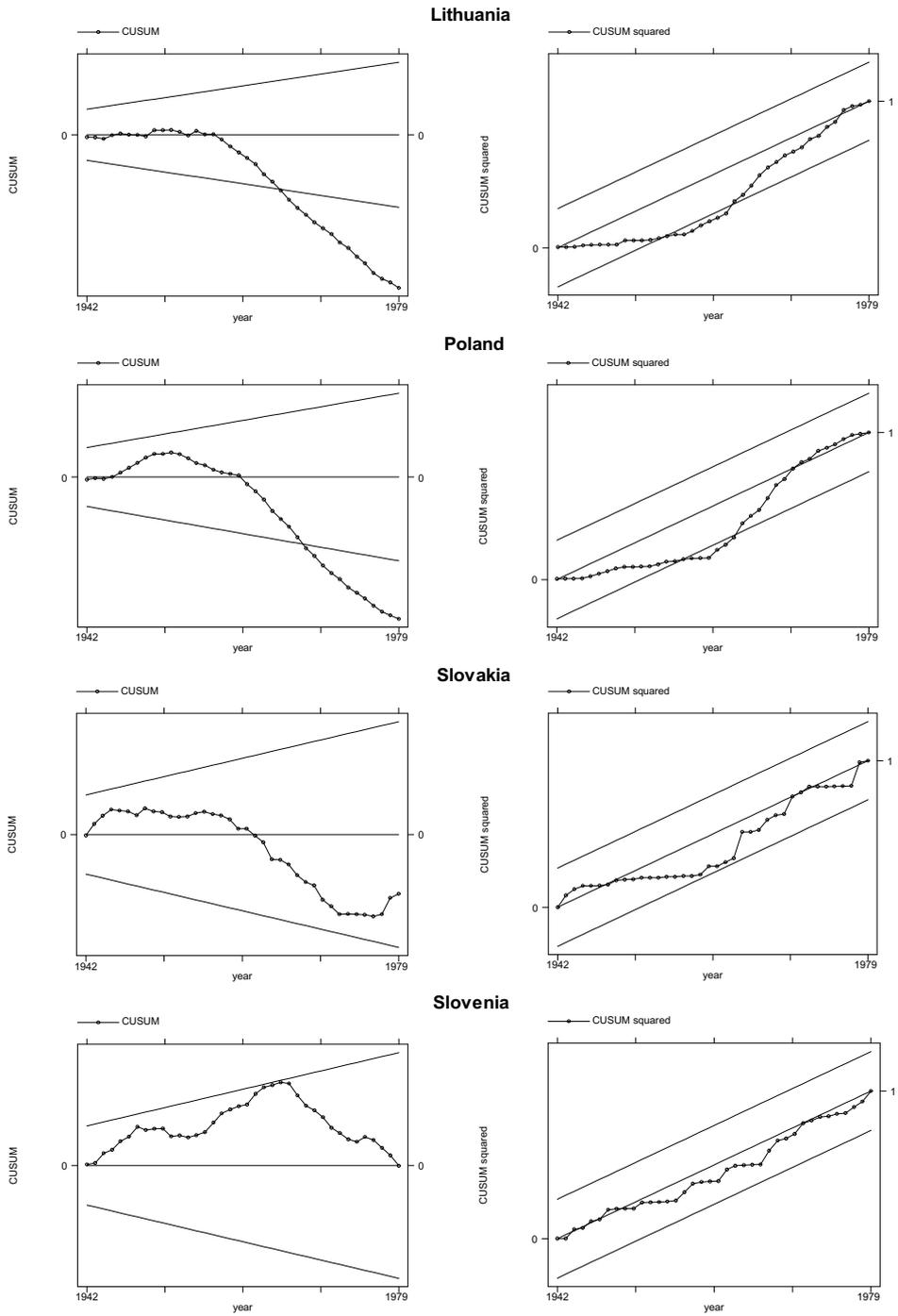
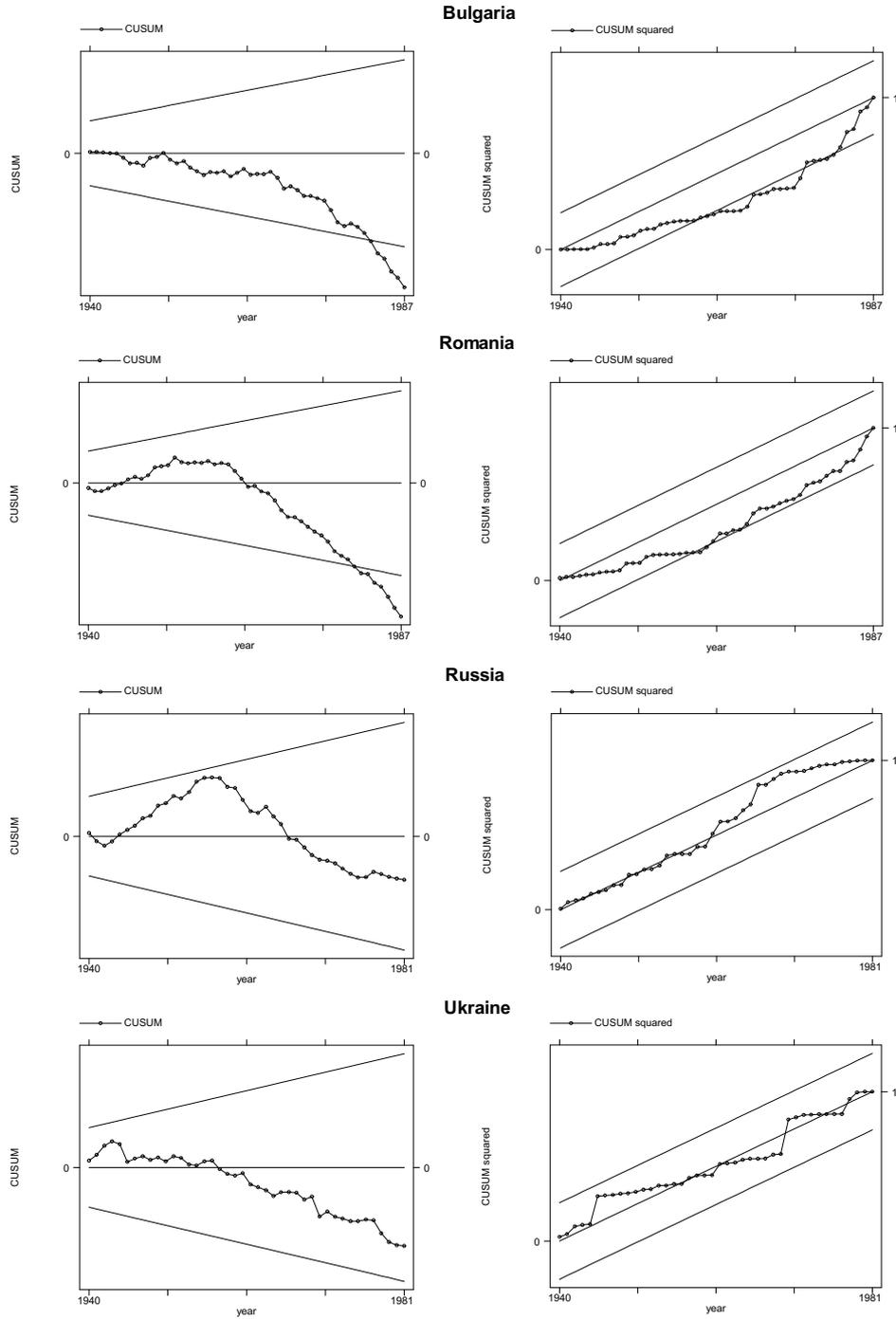


Figure B.1 continued



Source: Own calculations using EU-SILC 2005 and ESS 2006.