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The Intergenerational Transmission of Educational Attainment In East and West Germany

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In East and West Germany

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Socialist societies often emphasized the abolition of traditional social classes. To achieve this objective educational opportunities were at times "actively managed" and allocated to children of less educated parents. What happened to these patterns after the demise of socialist rule in Eastern Europe? We study the development of educational mobility after the fall of the iron curtain in East Germany and compare the relevance of parental educational background for secondary schooling outcomes in East and West Germany. Using German *Mikrozensus* data we also compare East and West German education outcomes for boys and girls, for youths in small and large families, as well as in urban vs. rural regions. The results suggest that educational mobility is much lower in East than in West Germany and that it fell in East Germany after unification. While the educational advantage of girls declined over time, having many siblings presents a more substantially disadvantage in East than in West Germany.

Keywords: education transmission, intergenerational mobility, schooling, human capital, transition economy

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1. Introduction

Intuitively, one might have expected that the liberation of former Eastern European socialist countries after 1990 contributed to enhanced opportunities and a richer set of individual career options. However, evidence shows that concomitant with the ensuing economic crises and substantial drops in national GDPs also educational opportunities dwindled. For the case of Bulgaria, Hertz et al. (2009) discuss the closure of public schools, rising out-of-pocket expenditures for and falling returns to education in times of high unemployment as the main causes of falling educational attainment and a doubling of intergenerational immobility. Mateju et al. (2003) discuss the case of the Czech Republic. Here, similarly, social origin increasingly determines educational outcomes in the post-socialist period. These authors see funding problems of the education system on the one hand and increasing income inequality across social classes on the other hand at the origin of the increasingly elitist character of Czech higher education.

Overall, the evidence seems to suggest that after a general increase in intergenerational educational mobility in Eastern European countries up through the 1980s (Ganzeboom and Nieuwbeerta 1999) the years of post-socialist transformation may be connected to a return to educational immobility (for a discussion of Poland see Beblo and Lauer 2004, on the Baltic countries see Hazans et al. 2008, and for Hungary Varga 2006).

This paper studies the development of educational mobility in East Germany after unification. The East German case is of special interest for at least two reasons: first, even though the East German economy experienced a substantial crisis after unification and unemployment was high, funding for the East German education system was provided by transfers from West Germany. Thus, budget cuts as a main cause of reduced educational opportunities should not be central here. Also, East Germans could migrate to West Germany where returns to education were high and unemployment comparatively low.

This differentiates the East German case from that of other Eastern European countries. Second, after unification the East German education system was modeled after its West German counterpart. This provides a natural benchmark in the evaluation of intergenerational educational mobility in East Germany. We study whether the patterns of intergenerational educational mobility differ between East and West Germany and how they have developed since the early years of unified Germany. The situation right after unification is informative for the educational opportunity in an East-West comparison. The development over time indicates the relevance of German educational institutions as determinants of intergenerational education transmission.

While the issue of intergenerational education transmission, its determinants, patterns, and developments has been discussed frequently in empirical studies of the German education system, we found no study which separately looked at the situation in East Germany. Couch and Dunn (1997), Dustmann (2004), Heineck and Riphahn (2009), Henz and Maas (1995), Lauer (2003), Müller and Haun (1994), Riphahn and Schieferdecker (2008), and Tamm (2008) all exclusively use evidence from West Germany. Schnepf (2002) and Woessmann (2004) appear to consider East German observations in their PISA and TIMSS test data but do not evaluate East-West differences.

Following the international literature on intergenerational mobility in educational attainment we chose a descriptive approach to compare educational outcomes, mobility, and further correlates of educational attainment in East and West Germany since unification. Typically three factors are cited to explain educational mobility: genetics, parental behavior and educational institutions. We do not attempt to identify causal effects of "nature" (i.e. genetic effects) or "nurture" (i.e. behavioral effects) in the relationship

between parent and child educational outcomes.¹ Also, our focus is not on the relevance of institutional aspects in the secondary education system.²

Our analysis is based on large cross-sectional datasets of the German *Mikrozensus* gathered in 1991, 1993, 1995, 2000, and 2004. This allows us to follow developments in educational attainment and intergenerational education transmission over time and to distinguish regional and other subsamples.

This study contributes to the literature in three ways: first, we are the first to draw attention to differences in educational attainment and mobility patterns between East and West Germany and to relate East German developments to those in other transition economies. Second, we provide evidence on changes in educational mobility in East and West Germany over time. Finally, we approach the issue of equality of educational opportunity from a variety of perspectives in addition to intergenerational effects and describe, e.g., the correlation between child educational outcomes and the number of siblings, gender, and rural vs. urban residence over time and in East and West Germany.

This extends the analysis of Heineck and Riphahn (2009), which studies the correlation patterns between parental and child educational outcomes for the birth cohorts 1940-1978 for West Germany. They apply data from the 2003 cross-section of the German Socioeconomic Panel and find substantial improvements in the level of secondary school educational attainment over time. However, the relative opportunities of children of parents with low educational background did not improve compared to those of children of parents with high education. Apparently, no group benefited more from educational expansion than children from advantaged backgrounds, i.e. those with few siblings, in urban areas, and with highly educated parents. This seems to be the only study which

¹ For studies pursuing this avenue see e.g. see e.g. Black et al. 2005, Sacerdote 2002, or Plug and Vijverberg 2003.

² For studies on such school design issues see e.g. Hanushek and Wössmann (2006) on the relevance of tracking regimes, or Currie (2001) on the age at school entry or Deming and Dynarski (2008) on pre-school education.

explicitly focused on *changes* in intergenerational educational mobility in West Germany over time, so far.

In the international literature the analyses of changes in educational mobility over time has rarely been addressed. Among sociological contributions Shavit and Blossfeld (1993) describe educational mobility and intergenerational status transmission in 13 countries. Blossfeld (1993) looks at German birth cohorts 1916-1965. He finds no change in the impact of parental background over time. Müller and Haun (1994) analyze educational outcomes and transitions for the birth cohorts 1910 through 1969 and arrive at the opposite conclusion: the relevance of parental social class for child educational outcomes declined over time. Their findings are corroborated by Henz and Maas (1995). Economic analyses of intergenerational education mobility mostly neglect the perspective of changes over time. Typically, these studies determine an average overall indicator of the correlation between child and parent educational attainment. Conclusions with respect to changes in correlation patterns are not provided (see e.g. Couch and Dunn 1997, Lauer 2003, or Dustmann 2004). The studies confirm that parental background affects child educational outcomes but do not determine the variation in this relationship over time.

Our main findings are summarized as follows: the cohort share of East German youth attending Advanced School, has increased substantially after unification and - starting from much lower initial participation rates - has almost reached West German levels. The increase in the East has not been accompanied by a development towards higher intergenerational educational mobility. To the contrary, intergenerational mobility declined by absolute and relative measures: the relevance of parental background for child educational success is higher in East than in West Germany since unification. At the same time gender differences became more balanced in the East where males started to catch up to females over time. When comparing children from differently sized families those with

few siblings advanced further than those with many and the heterogeneity is more intense in East than in West Germany. There are hardly any differences in educational attainment by urban or rural residence.

2. Institutional Background

2.1 Secondary Education in Former East and West Germany

The literature on educational mobility in Germany focuses on track choice in the secondary schooling system as the key outcome of interest. Germany generally uses a threefold track system of secondary schools with a clear hierarchical order in terms of academic reputation, financial returns to educational degrees and subsequent educational opportunities (for analyses of educational mobility outcomes in the similarly structured Swiss secondary school system see e.g. Bauer and Riphahn 2006 and 2007).

West German pupils start primary school at the age of 6. After four years in primary school they chose one out of three alternative secondary school tracks: Basic Schools (*Volksschule / Hauptschule*) last another 6 years and prepare for apprenticeships or vocational schools. Middle Schools (*Realschule / Mittelschule*) also provide 6 years of instruction and typically prepare pupils for training in white collar jobs. Only at Advanced School (upper secondary school, *Gymnasium*) education continues for an additional 8 or 9 years. The Advanced School degree (*Abitur*) is required for admission to university studies. Thus educational choices taken at the end of primary school at the age of 10 are of crucial importance, even though the educational system increasingly offers ways to correct past tracking choices. The regulations which govern the transition from primary to secondary schools vary by federal state. Some states are more restrictive and allow only

pupils with the best grades to enter Advanced School. Other states are more flexible and give parents more say in the choice of the secondary school track for their child.³

The educational system in East Germany prior to unification differed in a number of respects. First, children entered primary school typically at the age of 6 or 7 years. In most cases they had already attended Kindergarten for about three years which conferred some first elements of instruction. As a second difference relative to the West German secondary school system there was no ability-based tracking in East Germany, everybody attended a *Polytechnische Oberschule* (POS). Those who dropped out after grade 8 or 9 are considered to have an education that is equivalent to the West German Basic School. Finishing POS after grade 10 is considered to be equivalent to the West German Middle School. The third important difference is that in the East German schooling system a well defined small share of around 15 percent of each birth cohort was admitted to *Erweiterte Oberschule* (EOS), where pupils could attain the *Abitur*. As in the West only the *Abitur* degree granted eligibility to tertiary education. For some birth cohorts EOS pupils were separated already after grade 8 from POS, for other birth cohorts that happened only after grade 10. East German pupils regularly attained their *Abitur* degree after 12 years in school compared to 13 years in West Germany. After since unification the required number of school years until the *Abitur* exam was adjusted in most states and now varies generally between 12 and 13 years.

Figure 1 depicts the distribution of completed secondary school degrees for the birth cohorts since 1935 in East and West Germany. The data are taken from the *Mikrozensus* surveys and reflect the distribution in the resident native population in East and West Germany as of the survey year. In order to depict the distribution of educational degrees in East Germany at the time of unification and prior to migration between East

³ For a detailed discussion of the German secondary education system see Schnepf (2002).

and West Germany we present the evidence as gathered in the earliest available *Mikrozensus* survey as of spring 1991. Because east-west migration has a smaller impact for West Germany we consider the most recent developments, i.e. the survey of 2007 in this case. Three differences between East and West German degree distributions stand out: (a) as expected, the cohort share attaining the Abitur (Advanced School degree, labeled EOS for East Germany) is much higher in the West than in the East. (b) The socialist education system generated very little heterogeneity as the vast majority of the population leaves school with the POS degree.⁴ (c) In East Germany the number of individuals leaving school merely with a basic school certificate dropped to below twenty percent already for the birth cohort of 1950.

2.2 The Transition Process

Historically, the East German school system took over West German institutions after unification. Already prior to the formal unification on Oct. 3, 1990 numerous meetings between official East and West German educational policy bodies had taken place to prepare the re-organization of the East German institutional framework.⁵ Not only the secondary school system was to be reformed, but also the fields of pre-school, vocational, and academic education. Since conservative parties won the first free East German election of March 18, 1990 and conservative parties ruled in West Germany at the time, the unification treaty and preparatory measures were shaped by their ideas. The treaty copied the West German educational governance rules to the East and assigned the responsibility for education policies to the level of federal states which were to be established in East Germany. Meanwhile East German policies had to solve problems related e.g. to ideology-based instruction, teaching materials, local school governance and

⁴ Unfortunately, the data do not provide details on the number grades after which the POS degree was conferred. Thus we cannot measure the population share leaving after grade 8 vs. grade 10.

⁵ Most of this section is based on Fuchs (1997).

choice of headmasters, language instruction (English vs. Russian), or cooperation of schools with politically oriented youth organizations. After the unification treaty of August 31, 1990 between East and West Germany the federal states took over responsibility in educational policies. The first state elections in East Germany took place October 14, 1990. The subsequently defined secondary schooling system depended on the outcome of the election. In most regions the conservatives won and established the tracked West German secondary education system. Only in the state of Brandenburg social democrats with a preference for a more comprehensive school system dominated.

Even after the states and their governments were established, the discussion about the structure of the secondary education system continued for a few years. Most school laws were passed in the mid 1990s. In all five new states Advanced Schools (*Gymnasien*) were established, which prepared for the *Abitur* degree. In three states (Thuringia, Saxony, Saxony-Anhalt) basic and middle schools were combined in one. The state of Mecklenburg-Vorpommern merged these two tracks in recent years. Saxony is the only state which never established comprehensive schools. Independent of the details of secondary school system, all states copied the dominant "hierarchical" position of Advanced Schools in the secondary school system. Therefore it is meaningful to conduct an analysis which investigates the correlates of Advanced School attendance in the East and West German federal states.

2.3 Aggregate Statistics

Before we study survey based evidence this section briefly describes the development of the East and West German secondary education from an aggregate perspective. It is of interest how educational attainment developed in East Germany after unification. To compare the East and West developments **Figure 2** presents the

development of cohort shares for birth cohorts 1970-1986, with basic school, middle school and Advanced school degrees after unification through the last available cohort which completed their secondary education by the time of the survey. The graph clearly shows the change of the middle school institutions in East Germany from POS relevant for the birth cohorts through 1974 and to the West German type Middle School (labeled Middle School East) for later birth cohorts. The orange lines (straight for West and dashed for East Germany) show a fast increase in Advanced School degrees among the East German birth cohorts after 1970. Only a small East-West difference in cohort shares remains. Finally, the East German cohort share of Basic School degrees increased by a few percentage points after the abolition of POS.

add: - number of Advanced Schools per area (reflects average travel cost)
- number of teachers per Advanced School student (reflects quality)

We observed rising numbers and shares of Advanced School pupils in East Germany over time. Since one might be worried about declining quality of instruction as student numbers go up, it is of interest to consider expenditures per pupil. Figure XXX presents the development of nominal expenditures by state and year for all public schools by pupil. We averaged the nominal figures for West German non-city states and for East German non-city states. The graph shows that at least on average expenditures on schooling per pupil are now even higher in east than in West Germany.

(to be completed)

3. Data and Descriptive Evidence

3.1 Data Issues

Our empirical analysis is based on data from the German *Mikrozensus*, an about annually administered cross-sectional survey, which collects representative data on one percent of the German resident population.⁶ Participation is mandatory. The *Mikrozensus* has been conducted since 1957 in West Germany and since 1991 in East Germany. It covers topics such as household characteristics, labor market participation, health, and education. A typical survey contains information on about 390,000 households and 830,000 individuals.

There are several reasons why it is useful to consider the *Mikrozensus* data to investigate the development of regional educational mobility over time: first, we need information on both, the educational success of parents and their children. Both outcomes can be measured reliably with the *Mikrozensus* when focusing on secondary school attendance of 17 years old youths. These youths typically and in their vast majority still live in the parental household.⁷ Also, at age 17 we can determine whether they attend Advanced School.⁸ As the *Mikrozensus* surveys all individuals in a given household and asks everybody about their education we can match information of children and parents to describe the intergenerational transmission of education. A second advantage of the *Mikrozensus* is its size. Given that we look at 17 years olds only and split the sample again e.g. by region and gender, most surveys would not provide sufficiently large samples to generate reliable results. Third, the *Mikrozensus* has been using the identical questionnaire

⁶ The survey is executed as a rotating panel of dwelling units. For a description of the panel character of the data see e.g. Heidenreich (2002) or Methodenverbund (2006). For the analysis of secondary school attendance at age 17 the panel nature of the data is not relevant. Up through 2004 the data was gathered in in a given week in spring. Since 2005 it is collected throughout the calendar year.

⁷ Rübenach and Weinmann (2008) show that as of 2007 about 98 percent of male and 95 percent of female 17 years olds still live with their parents.

⁸ For a discussion of data quality in the *Mikrozensus* education data see Schimpl-Neimanns (2006).

over a long period of time. Therefore the information gathered is comparable across long periods and allows for reliable comparisons.

Lengerer et al. (2007) harmonized central parts of the *Mikrozensus* data for the survey years 1962 to 2004, rendering variables comparable over time and eliminating inconsistencies. The harmonization was undertaken as part of the project "*Sozialer und ökonomischer Wandel in (West-) Deutschland*" and we take advantage of these data. We use harmonized data from five years of the *Mikrozensus*, i.e. the surveys of 1991, 1993, 1995, 2000, and 2004.⁹ Since East Germany is covered only since 1991 this is the first year we can use for East-West comparisons. Generally, we inspect the situation about every four to five years. However, as the adjustment process in East Germany might have been concentrated in the first years after unification we add the survey of 1993 to our sample. We consider the evidence based on the population residing in East versus West Germany. In the first years after unification substantial migration occurred in both directions with a net outflow of the better educated from East Germany (for discussion see e.g. Brücker and Trübswetter 2007 or Hunt 2006). Our analysis describes the situation in East and West German regions without accounting for potentially selective migration processes.

Out of all 17 years olds we can consider only those with information on at least one parent. Parents are linked to their children within a given household based on a family id variable. A *Mikrozensus* household contains all persons living in a given flat or house. A household may consist of several families. Married parents with their children are one family and can be identified via the family id and a variable that defines the parent- and child-status. This definition of a family does not consider non-married parents. In the case of non-married parents one parent is coded to live in a family with the children while the

⁹ The 2004 survey is the last one available in harmonized format and which is collected during one single survey week. If we were to use more recent data the education outcome might be affected by the modifications in data collection.

other parent lives in a second but separate family in the same household. Only in recent years (e.g. in 2004), also non-married partners can be identified as such. We consistently consider only married partners of an identified parent over the period of our data. By not including non-married partners of one parent our single parent indicator also describes non-married parents living in the same household. We only consider German citizens to avoid measurement problems with foreign schooling degrees¹⁰ and drop 75 observations of youths with missing information on current education. Based on these selection criteria our sample contains a total of 17,439 observations of 17 years old youths for West and 5,794 observations for East Germany. **Table 1** shows the distribution of male and female observations by year and region.

Our dependent variable describes whether an individual attends Advanced School, i.e. that secondary school track, which confers the highest social status. **Figure 2** describes the share of the two regional subsamples attending Advanced School over time. The cohort share attending Advanced School in East Germany is initially much below that observed in West Germany and then catches up. In order to better understand the activities of the 17 years olds **Figure 3** plots the distribution of their activities separately by year, region, and sex. In all four region-sex subsamples the share of individuals who at age 17 still attend grades 1-10 and thus cannot be grouped in the Advanced School category increased over time. Generally, the share attending Advanced School is much higher among females than males. The large East-West difference in Advanced School attendance rates in 1991, both, matches **Figure 2** and the general characteristics of the East German secondary school system: if only about 15 percent of each birth cohort were admitted to Advanced School, this is exactly the pattern we would have expected shortly after the end of the East German schooling system. **Figure 2** indicates a rapid adjustment

¹⁰ Citizenship may not be the most appropriate indicator of migration background. However, it is consistently available across all annual surveys of the *Mikrozensus* data.

to West German standards, as the cohort share attending Advanced School increased within the two year period from 1991 to 1993 from 21 to 36 percent. **Figure 3** shows declines in the cohort shares attending vocational school between 1991 and 2004 for all subsamples. Over time attendance of tertiary education at age 17 has diminished to an invisibly small share of the sample.

Our most important explanatory variables are indicators of parental education. If the education of two parents is available we use the higher of the two available schooling degrees. Parental education is coded using four indicators of either missing information (which includes no degree), low, middle, or high. Low education characterizes parents with a Basic School degree. Middle education is coded for parents with Middle School degree or a *Polytechnische Oberschule* (POS) degree from East Germany, and high education describes parents with Advanced School degrees (*Abitur*). **Figure 4** characterizes the distribution of parental educational background over time in East and West. It confirms the educational expansion of the last decades in that the educational attainment of parents shifted to higher categories in both regions. Not surprisingly, the share of East German parents with an Advanced School degree is below that of West German parents.

As additional control variables we consider gender, age of the older parent, assuming, that older parents are more settled and can afford to invest more time and money in their children. We control for whether there is a single father or a single mother, the number of siblings living in the household (zero being the reference). Federal state fixed effects are included to account for different schooling systems. The indicator for urban (vs. rural) residence describes whether an individual lives in a towns with more than

20,000 inhabitants.¹¹ Descriptive statistics on the explanatory variables for our analyses are summarized in Appendix **Table A.1**.

3.2 Descriptive Evidence on Education Mobility

As we are interested in intergenerational educational mobility **Figure 5** presents first descriptive evidence on the developments over time. It describes for each year and both regions the share of 17 years olds which exceeded ("upward"), matched ("immobile") or remained below ("downward") parental educational attainment.¹² The two graphs appear to be surprisingly similar, with about 10 percent of youth remaining below their parents' degrees and about 20 percent exceeding parental attainment.

More interesting than transgenerational upward or downward mobility are transition matrices: **Table 2** presents an average transition matrix for East and West Germany pooled for all five survey years. The figures confirm the strong intergenerational educational correlation in East and West Germany: the probability for a 17 years old to attend Advanced School in West Germany increases by 200 percent and reaches factor 3 if at least one parent holds an Advanced School degree rather than a basic school degree (see bottom row). This amounts to even 243 percent in East Germany. In terms of absolute differences in the probability of attending Advanced School differences by parental background in East and West are similar: the probability for children of highly educated parents is more than 40 percentage point higher compared to that of children of parents with basic school education.

Next, we investigate how these conditional probabilities of Advanced School attendance developed in the two regions over time. **Table 3** summarizes the development

¹¹ The limit of 20,000 inhabitants is the only limit that can be used consistently over the survey years.

¹² For this depiction children of parents with missing education information were omitted. Upward mobility was coded for children of parents with basic or middle school degrees, who attended Advanced School. Downward mobility was coded for children of parents with Advanced School degrees, who did not themselves attend Advanced School. The others are considered to be in the immobile category.

of absolute and relative educational attainment ratios over time for both regions. Ratio 1 and Difference 1 compare children of parents with high vs. middle education and Ratio 2 and Difference 2 compare children of parents with high vs. basic secondary school education. For West German 17 years olds we see that Ratio 1 and Difference 1 did not show important changes over time (see Panel A), while Ratio 2 and Difference 2 declined somewhat between 1991 and 2004 (see Panel B): the relative advantage in the probability of attending Advanced School for children of highly educated parents compared to children of parents with a middle school degree increased slightly from a factor 1.55 in 1991 to 1.62 in 2004. At the same time the advantage of children with highly educated vs. with lowly educated parents, declined from 3.41 in 1991 to 3.06 in 2004 in West Germany (see Ratio 2). The development is paralleled by the decline in absolute differences (see difference 2). Thus, the disadvantage of children of parents with basic school education declined over time. However, they are still only one third as likely to attend Advanced School compared to children of highly educated parents.

The evidence for East Germany (see Panels C and D) does not indicate a trend towards higher mobility: Difference 1, Ratio 2, and Difference 2 increased over time, at times even substantially. This suggests that relative and absolute educational attainment probabilities now depend more on parental background than they did immediately after unification, and the distribution of educational opportunity has indeed become more unequal. The bottom rows in **Table 3** show that the share of parents of 17 years old youths with Advanced School degrees in East Germany slightly increased over time but did not yet catch up with West German shares. The same holds for East German youths.

4. Multivariate Analysis

Descriptive statistics yield similar patterns for the correlation between parent and child educational attainment in East and West Germany in 1991 and declining mobility in East Germany since then. However, these descriptions do not account for potential composition effects that might affect average statistics. In multivariate Probit regression analyses we estimate the correlation between parental characteristics and child Advanced School participation, conditioning on a variety of potentially relevant covariates.

As a first step of our analyses we investigate the average correlation between parental education (PE), individual and household characteristics (X) and child Advanced School attainment (AS) for East and West Germans. As we are interested in differences between East and West Germany we estimated a model with interaction terms for East German observations (East):

$$\Pr (AS_i = 1) = \Phi (\beta_0 + \beta_1 PE_i + \beta_2 X_i + \gamma_1 PE_i \text{ East}_i + \gamma_2 X_i \text{ East}_i + \beta_3 FE_i)$$

Here i indicates the individual youth, Φ represents the cumulative standard normal distribution function, β and γ are parameters to be estimated, and FE stands for a vector of state and year fixed effects. This specification allows us to test whether correlation patterns differ significantly between East and West Germany.

Results of the probit estimation are presented in **Table 4**. The coefficient estimates in column 1 describe West German patterns, those in column 2 indicate deviations for East German 17 years olds from their West German counterparts. The marginal effects for both subsamples are presented in columns 3 and 4. The estimation results suggest that a number of correlations are significantly different for East and West Germany. In particular, the coefficient vector γ_1 for the East German interaction of parental education is jointly significant at the one percent level: the disadvantage of children of parents with only middle school education appears to be substantially larger in East compared to West Germany. Surprisingly, men differ more strongly from women in the East, urban residence

seems to be less helpful for educational attainment in the East than in the West. Since the interpretation of marginal effects of interaction terms in nonlinear models is somewhat involved (Ai and Norton 2003), we calculated predicted probabilities of Advanced School attendance at the observed sample characteristics. These probabilities are presented for both regions and across all survey years by parental education at the bottom of **Table 4**. The predictions are close to the aggregate figures in **Table 2**. Overall, the probability to attend Advanced School declines in a more stepwise fashion with parental schooling in the West whereas in the East there does not seem to be a large difference for children of parents with middle or basic school degrees.¹³ In both regions children with one sibling have the highest probability of attending Advanced School with slightly larger disadvantages for children from larger families in the East than in the West.

Besides investigating average differences we are interested in changes over time. To measure such developments in the most flexible way we split our two regional samples by observation year and re-estimate the probit model separately by region and for each survey year. This allows for heterogeneity in all covariate effects over time and by subsample. We do not depict estimated coefficients or marginal effects but instead generated average predicted probabilities for child Advanced School participation at the observed characteristics of the sample.

Table 5 shows the predicted annual probabilities by parent education for the 17 years olds between 1991 and 2004 in East and West. While general Advanced School participation remained about constant in West Germany we see an increase in the East. The children of highly educated parents residing in the East appear to have caught up with counterparts in West Germany. However, the predicted average Advanced School participation rates of children of parents with basic and middle schooling in the East are

¹³ Given that institutional differences between Basic Schools and POS are not clearly defined, this is not a surprising result.

still significantly below those in West Germany: in 2004 14 and 27 percent attended Advanced School in East Germany compared to 21 and 39 percent in West Germany, for parents with basic and middle school education, respectively. Similar to the descriptive statistics in **Table 3**, the relative and absolute differences (see bottom rows of Table 5) indicate that educational mobility has increased over time in the West and decreased in the East. The multivariate results thus confirm that overall educational mobility and equality of opportunity declined in East Germany and is now clearly lower than in West Germany.

In **Table 6** we evaluate the correlation of gender (Table 6.1), the number of siblings (Table 6.2) and urban vs. rural residence (Table 6.3) with child Advanced School participation status in East and West Germany over time. Again, all predictions were generated based on separate estimations by region (East vs. West) and survey year. Generally, women are more likely to attend Advanced School than men. This difference has increased in relative and absolute terms over time in West Germany, while it declined in the East (see bottom rows of the table). Whereas boys caught up more than girls in the East over time, the increase in participation rates over time in the West is observable for females only (see rightmost columns).

A comparison of the association of the number of siblings with child educational attainment indicates that family time and budget constraints may still be binding. Generally, the literature does not focus on the educational success of single children. Instead the relevance of constraints is typically identified by comparing the impact of one versus more siblings (e.g. Heineck and Riphahn 2009). This is why in our relative and absolute evaluation at the bottom of **Table 6.2** we compare predicted outcomes for families with at least two ("One sibling") versus families with more children ("More than one sibling"). Overall, having just one sibling appears to be correlated with a slightly higher probability of attending Advanced School compared to having more than one

sibling. While the relative disadvantage of children from large families decreased in West Germany since 1991, it has increased strongly in the East from no difference in 1991 to a 32 percent higher probability of Advanced School participation in small families in 2004. In absolute terms we now observe an eight percentage points lower probability of attending Advanced School for those with more than one sibling (see bottom rows of Table 6.2). Interestingly, the probability of attending Advanced School in West Germany increased most for those with many siblings and in the East it increased most and substantially by 64 percent for single children. These opposite regional developments support the notion that intergenerational mobility did improve somewhat over time in the West while it clearly worsened in East Germany.

In **Table 6.3** we inspect whether children growing up in the countryside are disadvantaged in their Advanced School attendance compared to those being raised in urban areas.¹⁴ The rationale for such a disadvantage is connected to the higher cost of transport for these youths. Riphahn and Heineck (2009) found clear indications for such differences in opportunities. Average predicted probabilities in **Table 6.3** show slight disadvantages for rural children. This difference stayed about constant in West Germany and disappeared in the East by 2004.

5. Conclusions

This is the first study to investigate the educational mobility of youth in East and West Germany after unification. Our empirical analysis is based on five annual surveys of the German *Mikrozensus*, which allow us to measure the correlation between child secondary school choice at age 17 and parental educational attainment. We compare

¹⁴ The only definition of rural origin that could be used in all *Mikrozensus* surveys refers to communities with fewer than 20,000 inhabitants.

schooling outcomes and educational mobility in East and West and evaluate developments over time.

Historically and prior to unification the East German secondary school system provided restrictive access to Advanced School for about 15 percent of any birth cohort compared to almost 30 percent in the West. In consequence, the East German secondary school system faced significant adjustments after unification when West German norms regarding the distribution of educational degrees were accepted. As of 1991, indeed, the probability of holding an Advanced School degree and of attending Advanced School were much lower in East than in West Germany. However, adjustments occurred rapidly. Already in 1993 the cohort share of East German 17 years old pupils attending Advanced School had almost reached West German levels. With respect to the development of parent-child educational correlation patterns since unification descriptive evidence from annual transition matrices indicate that intergenerational mobility slightly increased in West Germany and declined substantially in the East.

We apply multivariate probit analyses to determine the correlation of parental education and the probability that a 17 years old attends Advanced School. Parental education is significantly correlated with child educational outcomes and the correlation patterns differ significantly between East and West. While the probability of attending Advanced School increased for West German children with every additional schooling degree their parents attained we observe a more bimodal distribution for children in East Germany: here it matters mostly whether the parents hold an Advanced School degree, while the sorting between middle and basic school graduates appears to be less relevant.

We re-estimated our model separately for each survey year and region to study the development of the association between parent on child education over time. The results confirm that similar to other post-socialist countries (see Hertz et al. 2009 and Mateju et

al. 2003) intergenerational mobility clearly declined in East Germany since 1991. However, in contrast to the Bulgarian case the absolute level of educational attainment in East Germany increased over time.

In separate estimations we evaluated the correlation of youth educational attainment with gender, family size and rural vs. urban origin to evaluate the extent of equal opportunities in East and West and the development over time. A comparison of educational opportunities for females versus males yields that already in 1991 women had higher Advanced School participation rates than men in both parts of the country. However, while women advanced even further over time in West Germany, men were able to somewhat reduce their disadvantage in East Germany. Most recently gender-related patterns converged to an almost identical advantage for females in both regions.

A comparison of the correlation of family size with educational outcomes yields that children with one sibling enjoy advantages compared to those with more than one sibling in both regions of the country and at all times. Whereas the heterogeneity in educational opportunity by sibship size declined in West Germany it clearly increased in the East. In East Germany, children with at most one sibling benefited most from broadened access to Advanced School. Finally, we study differences with respect to growing up in rural vs. urban regions. Here, inequality is larger in West than in East Germany, however even in the West it declined over time. In the most recent data the differences by region of origin are small.

We compare the resident population in different regions without consideration to the fact that demographic developments (e.g. outmigration and fertility) have differed in East and West Germany. It is for further research to decompose the observed shifts and to study their potential determinants.

Overall, the conversion to the West German secondary school system did not improve equality of access to Advanced School education in East Germany, when evaluated based on the correlation with parental education. This confirms the patterns observed in other transition economies. However, while shifts to greater inequality in other transition economies might be due to economic crises and thus may be transitory, this explanation appears irrelevant for the German case as budget cuts were not a driving force of development. Instead the results call for further research into the institutional determinants of intergenerational mobility and deserve the attention of educational policy.

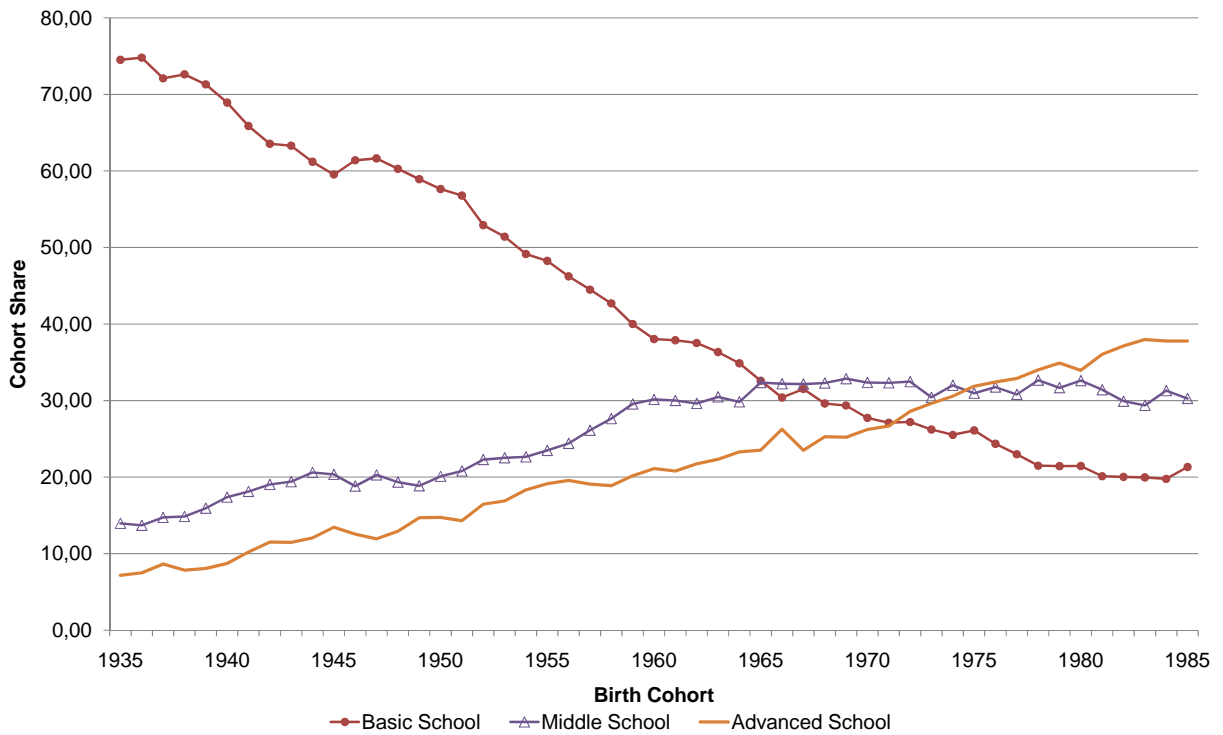
References

- Ai, Chunrong and Edward C. Norton, 2003, Interaction terms in logit and probit models, *Economics Letters* 80, 123-129.
- Autorengruppe Bildungsberichterstattung, 2008, *Bildung in Deutschland 2008*, Bertelsmann Verlag, Bielefeld.
- Bauer, Philipp and Regina T. Riphahn, 2006, Timing of school tracking as a determinant of intergenerational transmission of education, *Economics Letters* 91, 90-97.
- Bauer, Philipp and Regina T. Riphahn, 2007, Heterogeneity in the Intergenerational Transmission of Educational Attainment: Evidence from Switzerland on Natives and Second Generation Immigrants, *Journal of Population Economics* 20(1), 121-148.
- Beblo, Miriam and Charlotte Lauer, 2004, Do family resources matter? Educational attainment during transition in Poland, *Economics of Transition* 12(3), 537-558.
- Black, Sandra E., Paul J. Devereux, and Kjell G. Salvanes, 2005, Why the Apple Doesn't Fall Far: Understanding Intergenerational Transmission of Human Capital, *American Economic Review* 95(1), 437-449.
- Blossfeld, Hans-Peter, 1993, Changes in Educational Opportunities in the Federal Republic of Germany. A Longitudinal Study of Cohorts Born Between 1916 and 1965, in: Shavit, Yossi and Hans-Peter Blossfeld (eds.), 1993, *Persistent Inequality. Changing Educational Attainment in Thirteen Countries*, Westview Press: Boulder et al., 51-74.
- Brücker, Herbert and Parvati Trübswetter, 2007, Do the best go west? An analysis of the self-selection of East-West migrants in Germany, *Empirica* 34, 371-395.
- Couch, Kenneth A. and Thomas A. Dunn, 1997, Intergenerational Correlations in Labor Market Status. A Comparison of the United States and Germany, *Journal of Human Resources* 32(1), 210-232.
- Currie, Janet, 2001, Early Childhood Education Programs, *Journal of Economic Perspectives* 15, 213-238.
- Deming, D. and S. Dynarski, 2008, The Lengthening of Childhood, *Journal of Economic Perspectives* 22, 71-92.
- Dustmann, Christian, 2004, Parental background, secondary school track choice, and wages, *Oxford Economic Papers* 56, 209-230.
- Fuchs, Hans-Werner, 1997, *Bildung und Wissenschaft seit der Wende. Zur Transformation des ostdeutschen Bildungssystems*, Leske+Budrich, Opladen.

- Ganzeboom, Harry B.G. and Paul Nieuwbeerta, 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.
- Hanushek, Eric. A. and Ludger Wößmann, 2006, Does Educational Tracking Affect Performance and Inequality? Differences-in-Differences Evidence Across Countries, *Economic Journal* 116, C63-C76.
- Hazans, Mihails, Ija Trapeznikova, and Olga Rastrigina, 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.
- Heidenreich, H.-J., 2002, Längsschnittdaten aus dem Mikrozensus. Basis für neue Analysemöglichkeiten, *Allgemeines Statistisches Archiv* 86, 213-231
- Heineck, Guido and Regina T. Riphahn, 2009, Intergenerational Transmission of Educational Attainment in Germany – The Last Five Decades, *Jahrbücher für Nationalökonomik und Statistik (Journal of Economics and Statistics)* 229(1), 36-60.
- Henz, Ursula and Ineke Maas, 1995, Chancengleichheit durch die Bildungsexpansion?, *Kölner Zeitschrift für Soziologie und Sozialpsychologie* 47(4), 605-633.
- Hertz, Tom, Mieke Meurs, and Sibel Selcuk, 2009, The decline in intergenerational mobility in Post-Socialism: Evidence from the Bulgarian Case, *World Development* 37(3), 739-752.
- Hunt, Jennifer, 2006, Staunching Emigration from East Germany: Age and the Determinants of Migration, *Journal of the European Economic Association* 4(5), 1014-1037.
- Lauer, Charlotte, 2003, Family background, cohort and education: A French-German comparison based on a multivariate ordered probit model of educational attainment, *Labour Economics* 10(2), 231-251.
- Lengerer, Andrea, Julia Schroedter, Tobias Hubert and Christof Wolf (eds.), 2007, Harmonisierung der Mikrozensus 1962 - 2004. ZUMA-Methodenbericht 2007/06, http://www.gesis.org/Publikationen/Berichte/ZUMA_Methodenberichte/document_s/pdfs/2007/07_06_lengerer.pdf (29.6.2008)
- Mateju, Petr, Blanka Rehakova, and Natalie Simonova, 2003, Transition to University under Communism and after Its Demise. The Role of Socio-Economic Background in the Transition between Secondary and Tertiary Education in the Czech Republic 1948-1998, *Czech Sociological Review* 39(2), 301-324.
- Methodenverbund, 2006, *Handbuch Mikrozensus-Panel 1996-1999*, Herausgegeben vom Statistischen Bundesamt Wiesbaden, Zweigstelle Bonn.
- Müller, Walter and Dietmar Haun, 1994, Bildungsungleichheit im sozialen Wandel?, *Kölner Zeitschrift für Soziologie und Sozialpsychologie* 46(1), 1-42.

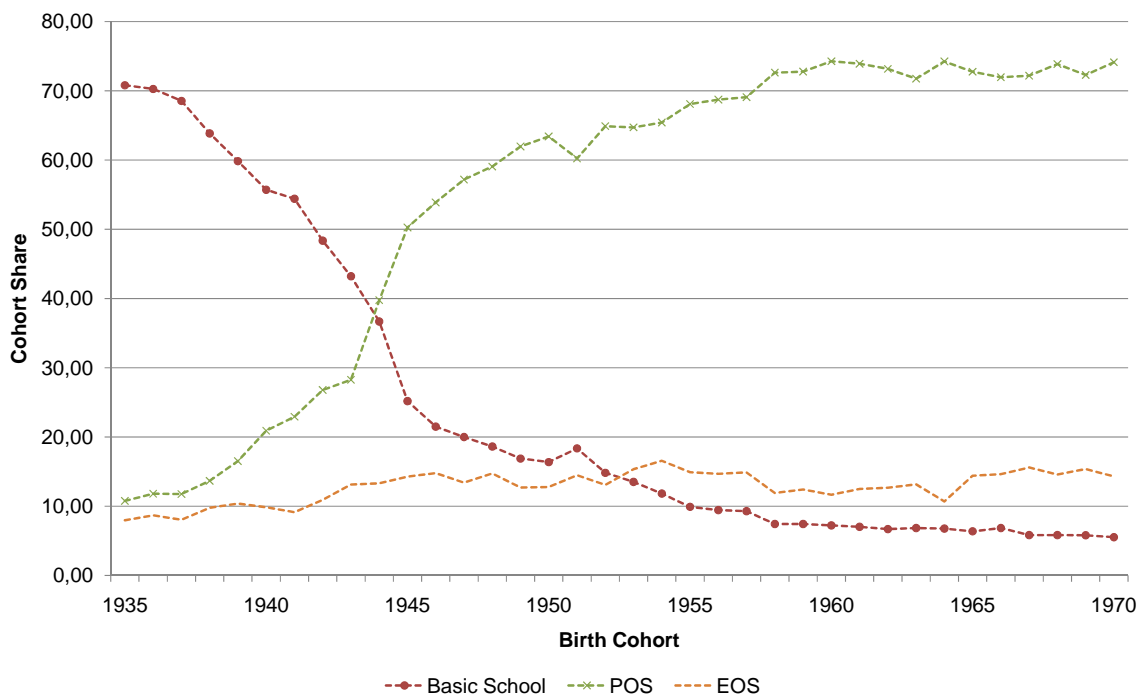
- OECD (Organization for Economic Cooperation and Development), 2007, *Education at a Glance*, Paris.
- Plug, Erik and Wim Vijverberg, 2003, Schooling, Family Background, and Adoption: Is It Nature or Is It Nurture, *Journal of Political Economy* 111(3), 611-641.
- Riphahn, Regina T. and Florian Schieferdecker, 2008, The Transition to Tertiary Education and Parental Background over Time, *BGPE Discussion Paper* No. 63, Univ. of Erlangen-Nuremberg.
- Rübenach, Stefan P. and Julia Weinmann, 2008, Haushalte und Lebensformen der Bevölkerung. Ergebnisse des Mikrozensus 2007, *Wirtschaft und Statistik* 9/2008, 772-783.
- Sacerdote, Bruce, 2002, The Nature and Nurture of Economic Outcomes, *American Economic Review* 92(2), 344-348.
- Schimpl-Neimanns, Bernhard, 2006, Zur Datenqualität der Bildungsangaben im Mikrozensus, *ZUMA Arbeitsbericht* Nr. 2006/03, ZUMA, Mannheim.
- Schnepf, Sylke Viola, 2002, A Sorting Hat that Fails? The Transition from Primary to Secondary School in Germany, *Innocenti Working Paper* No. 92, UNICEF Innocenti Research Center, Florence.
- Shavit, Yossi and Hans-Peter Blossfeld (eds.), 1993, *Persistent Inequality. Changing Educational Attainment in Thirteen Countries*, Westview Press: Boulder et al.
- Tamm, Marcus, 2008, Does Money Buy Higher Schooling? Evidence from Secondary School Track Choice in Germany, *Economics of Education Review* 27, 536-545.
- Varga, Julia, 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.
- Weber, Andreas and Reiner Klingholz, 2009, *Demografischer Wandel. Ein Politikvorschlag unter besonderer Berücksichtigung der Neuen Länder*, Berlin-Institut, Berlin (http://www.bmvbs.de/Anlage/original_1082377/Demografischer-Wandel-Ein-Politikvorschlag-unter-besonderer-Beruecksichtigung-der-neuen-Laender.pdf, Zugriff 24.6.2009)
- Woessmann, Ludger, 2004, How equal are educational opportunities? Family background and student achievement in Europe and the United States, *CESifo Working Paper* No. 1162, Munich.

Figure 1 Cohort Shares of Secondary School Degrees in East- and West Germany
 1.1 West Germany based on Mikrozensus 2007 Survey (Cohorts 1935-1985)



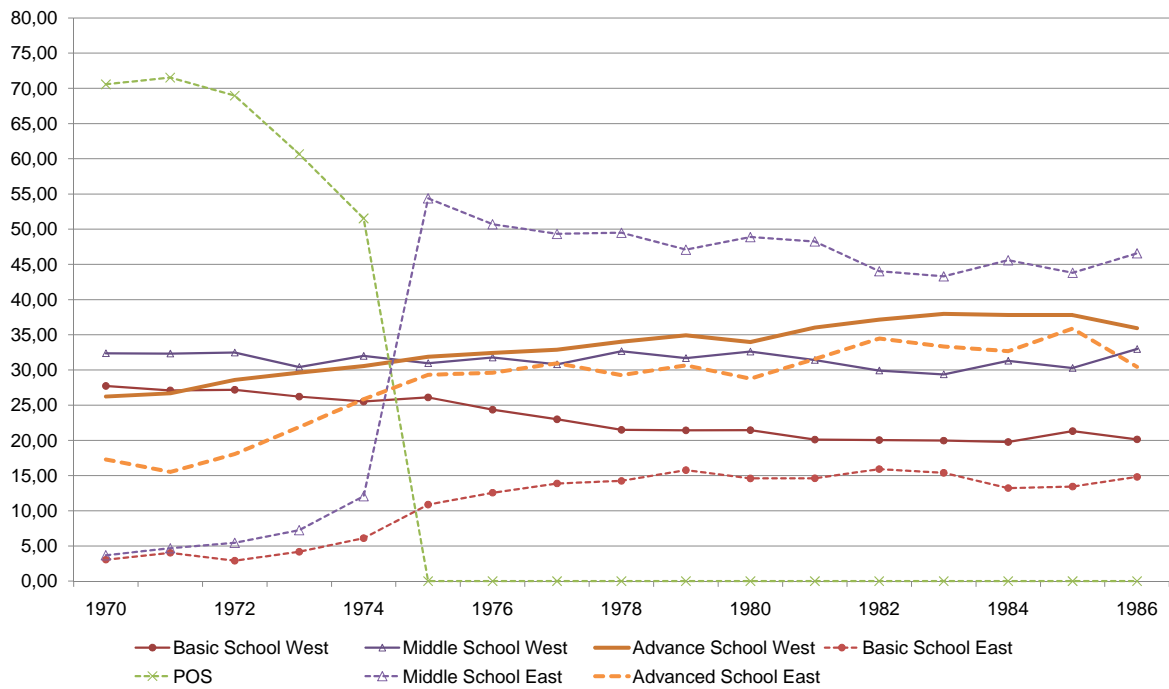
Note: The shares do not add up to 100 percent per cohort as those without degrees (less than 5 percent), those with POS-East degrees living in the West (less than 5 percent) and those with polytechnic-eligibility (mostly less than 10 percent) were omitted to enhance clarity.

1.2 East Germany based on Mikrozensus 1991 Survey (Cohorts 1935-1970)



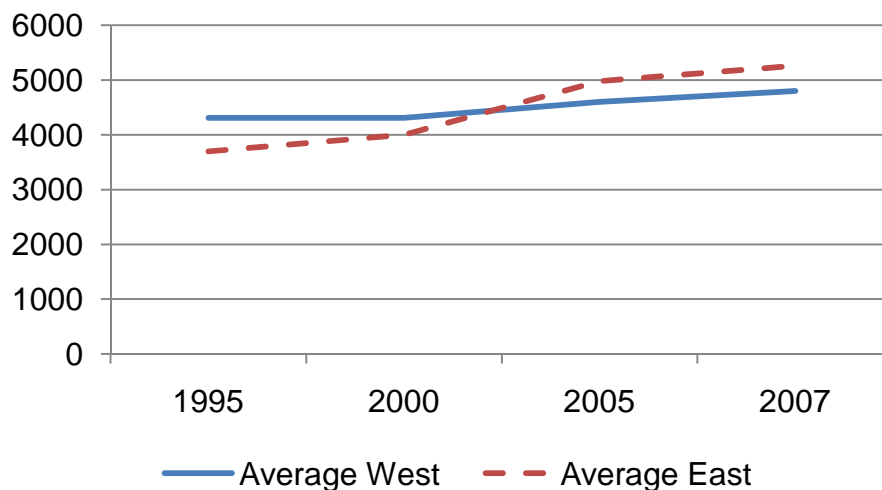
Note: The shares do not add up to 100 percent per cohort as those without degrees (less than 5 percent), those with Middle School degrees (mostly than 5 percent) and those with polytechnic-eligibility (less than 5percent) were omitted to enhance clarity.

Figure 2 Cohort Shares of Secondary School Degrees in East- and West Germany based on Mikrozensus 2007 Survey (Cohorts 1970-1986)



Source: *Mikrozensus* samples 2007.

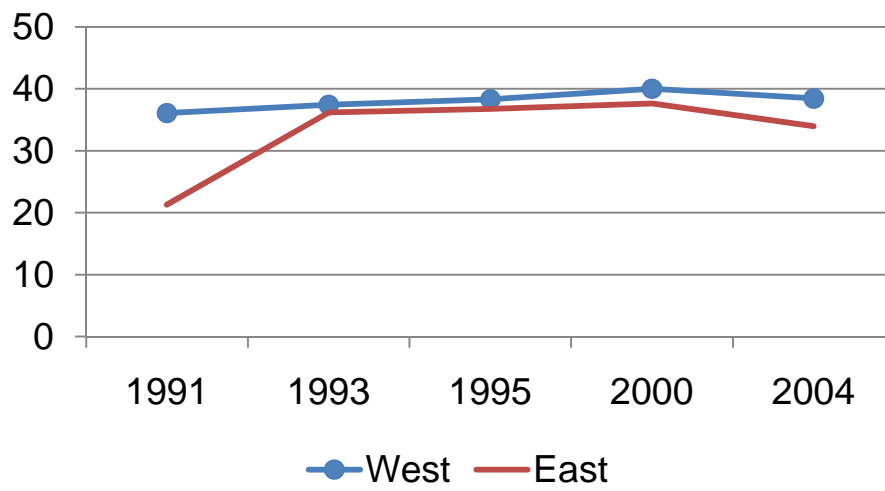
Figure XXX Development of nominal annual expenditures per pupil for East vs. West German non-city states (in nominal Euro)



Note: Not considered in the calculation of averages are the city states of Berlin, Hamburg and Bremen, because they differ structurally from larger federal states.

Source: Statistisches Bundesamt, 2010, *Bildungsausgaben. Ausgaben je Schüler/-in 2007*, Wiesbaden, p. 10 and own calculations.

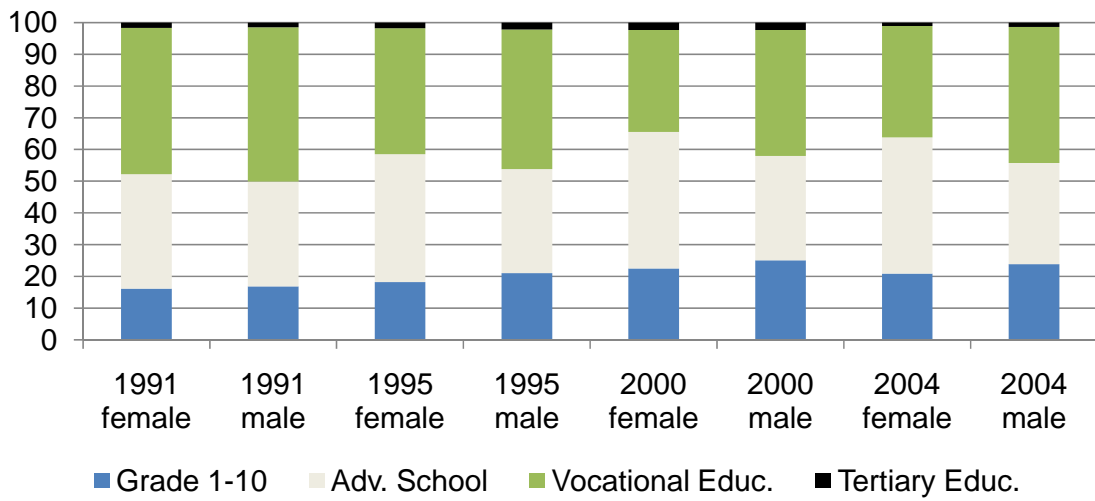
Figure 2A Share of 17 Years Olds in Advance School by Region and Year



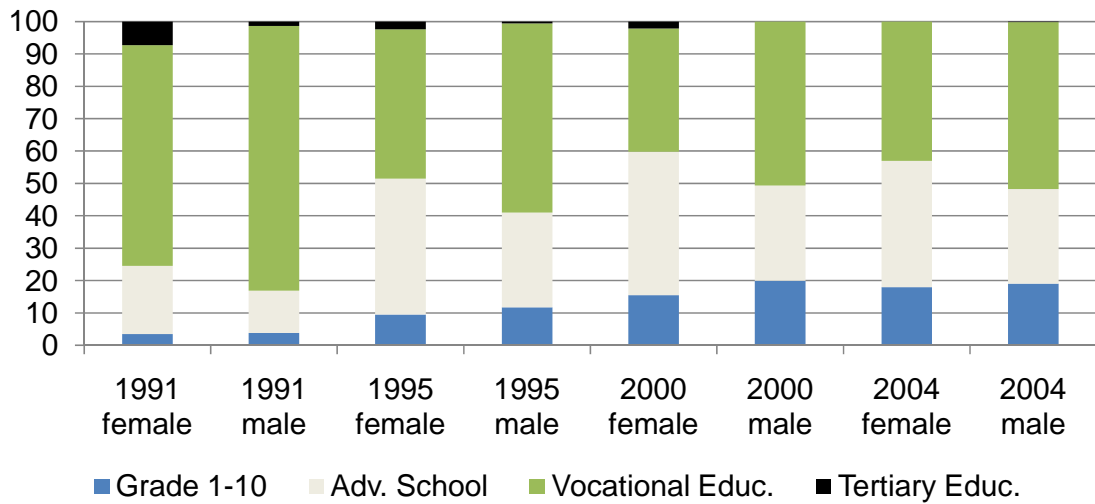
Source: *Mikrozensus* samples 1991, 1993, 1995, 2000, and 2004 and own calculations.

Figure 3 Distribution of Activities of 17 Years Olds by Year, Region and Sex

(a) West Germany



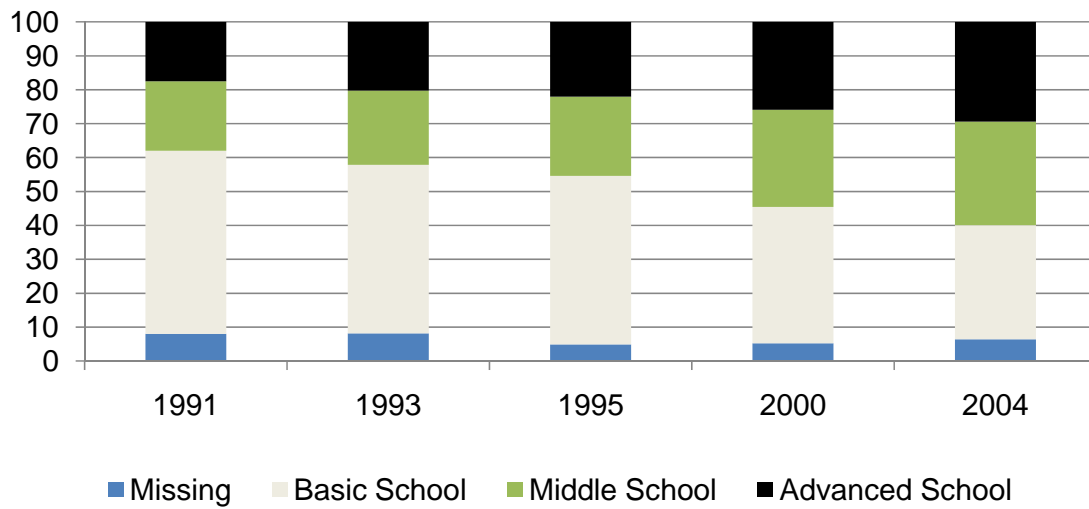
(b) East Germany



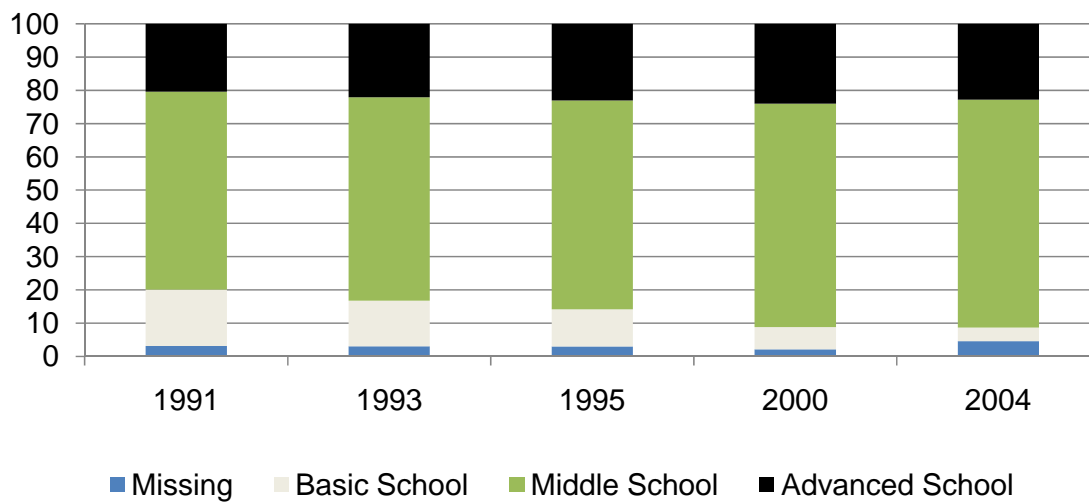
Source: *Mikrozensus* samples 1991, 1995, 2000, and 2004 and own calculations.

Figure 4 Parental Educational Attainment over Time in East and West Germany

(a) West Germany



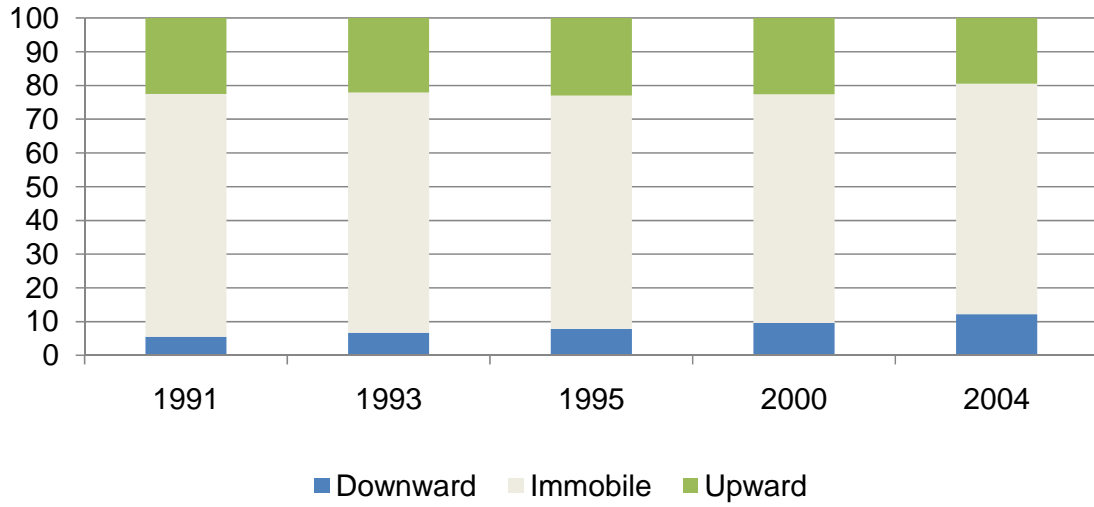
(b) East Germany



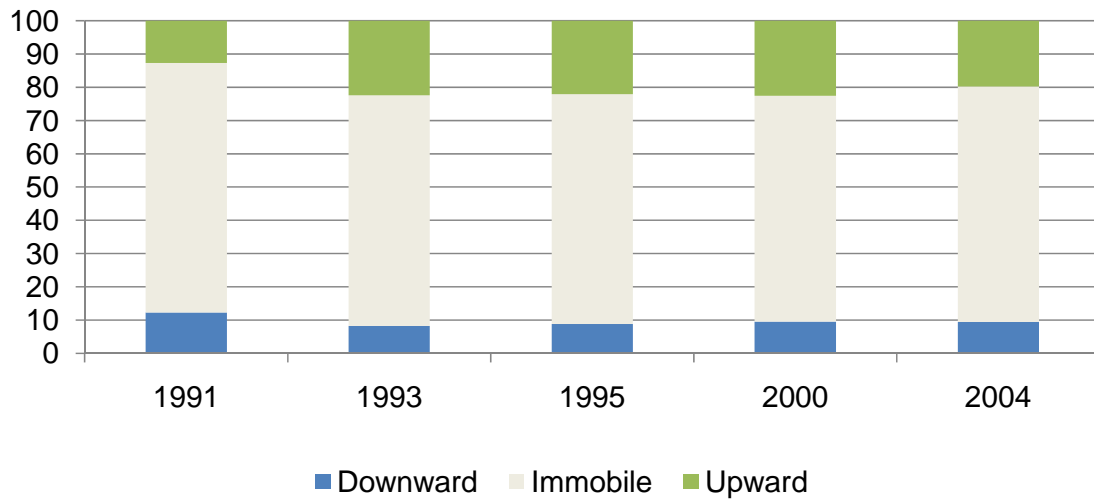
Source: *Mikrozensus* samples 1991, 1993, 1995, 2000, and 2004 and own calculations.

Figure 5 Educational Mobility by Region and Survey Year

(a) West Germany



(b) East Germany



Note: Upward mobility is coded if the child attends a higher level school type than parents had completed, immobility is coded if child and parent education matched and downward mobility is coded if parents held a higher educational degree than their child was pursuing at age 17. Observations with missing information on parental educational degrees were omitted here.

Source: *Mikrozensus* samples 1991, 1993, 1995, 2000, and 2004 and own calculations.

Table 1 Sample Sizes of 17 Years Olds in East and West Germany over Time

	West			East		
	All	Men	Women	All	Men	Women
1991	3,399	1,764	1,635	1,051	529	522
1993	3,287	1,706	1,581	1,019	528	491
1995	3,336	1,749	1,587	1,314	693	621
2000	3,598	1,882	1,716	1,235	636	599
2004	3,819	1,965	1,854	1,175	613	562
Total	17,439	9,066	8,373	5,794	2,999	2,795

Source: *Mikrozensus* samples 1991, 1993, 1995, 2000, and 2004 and own calculations.

Table 2 Average Transition Matrix by Region Across All Survey Years

	Child Advanced School Attendance	
	West	East
Parental Education		
1 Missing	36.0	25.7
2 Basic School	22.0	17.1
3 Middle School	41.9	27.6
4 Advanced School	65.8	58.7
All Parents:	38.2	33.7
Ratio: row 4 / row 2	3.00	3.43

Source: *Mikrozensus* samples 1991, 1993, 1995, 2000, and 2004 and own calculations.

Table 3 Observed Advanced School Enrollment Ratios – By Region and Over Time

		1991	1993	1995	2000	2004
A	West 1 P(child advanced parent advanced)	0.71	0.69	0.66	0.65	0.61
	West 2 P(child advanced parent middle)	0.46	0.46	0.44	0.39	0.38
	Ratio 1: 1 / 2	1.55	1.50	1.49	1.66	1.62
	Difference 1: 1 - 2	0.25	0.23	0.22	0.26	0.24
B	West 1 P(child advanced parent advanced)	0.71	0.69	0.66	0.65	0.61
	West 3 P(child advanced parent basic)	0.21	0.20	0.23	0.26	0.20
	Ratio 2: 1 / 3	3.41	3.41	2.87	2.53	3.06
	Difference 2: 1 - 3	0.50	0.49	0.43	0.39	0.41
C	East 1 P(child advanced parent advanced)	0.42	0.64	0.63	0.61	0.60
	East 2 P(child advanced parent middle)	0.17	0.31	0.31	0.30	0.27
	Ratio 1: 1 / 2	2.43	2.03	2.00	2.04	2.26
	Difference 1: 1 - 2	0.24	0.33	0.31	0.31	0.34
D	East 1 P(child advanced parent advanced)	0.42	0.64	0.63	0.61	0.60
	East 3 P(child advanced parent basic)	0.12	0.18	0.16	0.29	0.15
	Ratio 2: 1 / 3	3.36	3.58	3.83	2.12	4.14
	Difference 2: 1 - 3	0.29	0.46	0.46	0.32	0.46
West	Share parents advanced school	0.18	0.20	0.22	0.26	0.29
East	Share parents advanced school	0.20	0.22	0.23	0.24	0.23
West	Share children advanced school	0.36	0.37	0.38	0.40	0.38
East	Share children advanced school	0.21	0.36	0.37	0.38	0.34

Source: *Mikrozensus* samples 1991, 1993, 1995, 2000, and 2004 and own calculations.

Table 4 Probit Estimation Results – Fully Interacted Model for East and West

	Coefficients		Marginal Effects	
	West (Std.Err.) 1	East (Std.Err.) 2	West (Std.Err.) 3	East (Std.Err.) 4
Parental Education				
missing	-0.750** (17.14)	-0.103 (0.89)	-0.239** (17.26)	-0.233** (7.99)
basic school	-1.159** (43.72)	-0.078 (1.00)	-0.410** (43.59)	-0.301** (15.95)
middle school	-0.566** (20.02)	-0.206** (4.16)	-0.199** (19.77)	-0.289** (18.41)
advanced school	reference	reference	reference	reference
Individual and Household Characteristics				
male	-0.226** (11.09)	-0.167** (4.09)	-0.085** (11.03)	-0.144** (11.30)
urban residence	0.071** (3.07)	-0.043 (0.99)	0.028** (3.21)	0.014 (1.05)
age of oldest parent	0.021** (12.18)	-0.004* (2.14)	0.008** (11.65)	0.004** (3.05)
single father household	-0.059 (1.23)	0.067 (0.63)	-0.019 (1.08)	-0.006 (0.18)
single mother household	-0.060* (2.06)	0.052 (0.96)	-0.019+ (1.71)	-0.016 (0.95)
no siblings	reference	reference	reference	reference
one sibling	0.045+ (1.93)	0.012 (0.27)	0.020* (2.22)	0.018 (1.26)
two or more siblings	-0.033 (1.07)	-0.025 (0.37)	-0.008 (0.70)	-0.024 (1.09)
Year fixed effects	yes	yes	yes	yes
Federal state fixed effects	yes	yes	yes	yes
Predicted Probability of Youth Advanced School Participation				
Parent basic school	0.22	0.17		
Parent middle school	0.43	0.28		
Parent advanced school	0.64	0.57		

Note: The estimation was performed on 23,233 observations. +, * and ** indicate statistical significance at the 10, 5 and 1 percent level. We present heteroskedasticity robust standard errors.

Table 5 Development of Predicted Advanced School Participation Probabilities over Time

	Average	1991	1995	2004	Rel. Diff. 2004 / 1991	Abs. Diff. 2004 - 1991
West						
Average	0.38	0.36	0.38	0.38	1.06	0.02
1 Parent basic school	0.22	0.21	0.24	0.21	0.97	-0.01
2 Parent middle school	0.43	0.46	0.45	0.39	0.83	-0.08
3 Parent advanced school	0.64	0.69	0.64	0.60	0.87	-0.09
Relative Difference 3 / 1	2.91	3.24	2.67	2.90		
Absolute Difference 3 - 2	0.42	0.48	0.40	0.39		
East						
Average	0.33	0.21	0.37	0.34	1.62	0.13
1 Parent basic school	0.17	0.10	0.14	0.14	1.38	0.04
2 Parent middle school	0.28	0.18	0.33	0.27	1.48	0.09
3 Parent advanced school	0.57	0.41	0.60	0.61	1.49	0.20
Relative Difference 3 / 1	3.35	3.94	4.33	4.28		
Absolute Difference 3 - 2	0.40	0.30	0.46	0.47		

Note: The predicted probabilities are generated in separate estimations of the specification as presented in Table 4 by year and region (east vs. west). The predicted values in the column labeled average were generated in the joint estimation over all four years of data. *The standard errors for relative and absolute differences in the bottom rows are still to be bootstrapped.*

Table 6 Development of Predicted Advanced School Participation Probabilities by Gender, Number of Siblings, and Urban vs. Rural Residence

6.1 Gender Differences

	Average	1991	1995	2004	Rel. Diff. 2004 / 1991	Abs. Diff. 2004 - 1991
West						
1 Female	0.42	0.38	0.42	0.44	1.16	0.06
2 Male	0.35	0.34	0.35	0.33	0.97	-0.01
Relative Difference 1 / 2	1.20	1.12	1.20	1.33		
Absolute Difference 1 - 2	0.07	0.04	0.07	0.11		
East						
1 Female	0.40	0.28	0.44	0.39	1.39	0.11
2 Male	0.27	0.14	0.30	0.30	2.14	0.16
Relative Difference 1 / 2	1.48	2.00	1.47	1.30		
Absolute Difference 1 - 2	0.13	0.14	0.14	0.09		

6.2 Difference by Number of Siblings

	Average	1991	1995	2004	Rel. Diff. 2004 / 1991	Abs. Diff. 2004 - 1991
West						
1 No siblings	0.38	0.35	0.36	0.38	1.09	0.03
2 One sibling	0.39	0.38	0.42	0.40	1.05	0.02
3 More than one sibling	0.37	0.34	0.36	0.38	1.12	0.04
Relative Difference 2 / 3	1.05	1.12	1.17	1.05		
Absolute Difference 2 - 3	0.02	0.04	0.06	0.02		
East						
1 No siblings	0.33	0.22	0.35	0.36	1.64	0.14
2 One sibling	0.35	0.21	0.40	0.33	1.57	0.12
3 More than one sibling	0.31	0.21	0.35	0.25	1.19	0.04
Relative Difference 2 / 3	1.13	1.00	1.14	1.32		
Absolute Difference 2 - 3	0.04	0.00	0.05	0.08		

6.3 Difference by Urban vs. Rural Residence

	Average	1991	1995	2004	Rel. Diff. 2004 / 1991	Abs. Diff. 2004 - 1991
West						
1 Rural	0.37	0.33	0.38	0.37	1.12	0.04
2 Urban	0.39	0.39	0.39	0.40	1.03	0.01
Relative Difference 1 / 2	0.95	0.85	0.97	0.93		
Absolute Difference 1 - 2	-0.02	-0.06	-0.01	-0.03		
East						
1 Rural	0.33	0.21	0.35	0.34	1.62	0.13
2 Urban	0.34	0.22	0.38	0.34	1.55	0.12
Relative Difference 1 / 2	0.97	0.95	0.92	1.00		
Absolute Difference 1 - 2	-0.01	-0.01	-0.03	0.00		

Note: see Table 5.

Appendix
Table A.1

Descriptive Statistics

	West	East
	Mean (Std. Dev.)	Mean (Std. Dev.)
Dependent Variable:		
Advanced School Attendance	0.38	0.33
Highest parental education		
Missing	0.07	0.03
Basic School	0.45	0.10
Middle School	0.25	0.64
Advanced School	0.23	0.23
Additional explanatory variables		
Male	0.52	0.52
Urban	0.53	0.45
Age of older parent	47.04 (5.86)	43.89 (5.30)
No mother in family	0.05	0.04
No father in family	0.16	0.20
No sibling	0.50	0.51
One sibling	0.35	0.38
Two and more siblings	0.15	0.11
Calendar Year		
1991	0.19	0.18
1993	0.19	0.18
1995	0.19	0.23
2000	0.21	0.21
2004	0.22	0.20
Federal State		
Schleswig-Holstein	0.04	
Hamburg	0.02	
Niedersachsen	0.12	
Bremen	0.01	
Nordrhein-Westfalen	0.26	
Hessen	0.09	
Rheinland-Pfalz	0.06	
Baden-Württemberg	0.16	
Bayern	0.20	
Saarland	0.02	
Berlin	0.02	0.07
Brandenburg		0.17
Mecklenburg-Vorpommern		0.13
Sachsen		0.29
Sachsen-Anhalt		0.16
Thüringen		0.17
Number of observations	17439	5794

Note: Data taken from Mikrozensus samples 1991, 1993, 1995, 2000, and 2004.