Cohort Effects in the Educational Attainment of Second Generation Immigrants in Germany: An Analysis of Census Data

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Even though second generation immigrants make up ever increasing population shares in industrialized countries we know little about their social integration and wellbeing. This study focuses on the educational attainment of German born children of immigrants. Their schooling success still lags behind that of natives. This paper investigates school attendance and completed degrees of second generation immigrants and finds that even after controlling for characteristics the educational gap remains large and significant. The available evidence suggests that this group as a whole does not assimilate to native educational standards and instead increasingly falls behind.

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1. Introduction

Although they make up increasing shares of Western European populations, up to now second generation immigrants have not received much attention in economic research. Their role is instead discussed in public debates on issues such as youth unemployment, wage and employment discrimination, or crime. Formal analyses of this population suffer from a scarcity of data. The literature typically solves this problem by avoiding clear distinctions between first and second generation immigrants. Yet this may produce biased results and begs the issue of looking at second generation immigrants as an increasingly important group.

In a society where formal educational degrees are entry requirements at all levels of the vocational and academic training system as in Germany, key factors for lifetime labor market success are determined early in life. If second generation immigrants as an increasing share of the population pass the educational system being systematically disadvantaged, this may justify the consideration of policy interventions. So far few studies measure this group's educational success and its development over time.[1] In a recent study for the United States Hirschman (2001, p.334) concludes "... some foreign-born adolescents (and probably some second-generation national-origin groups) are falling behind educationally." That is the issue which this paper investigates for the case of Germany.

Given the importance of parental input in the child education process one would expect immigrant children to start in the educational system with a disadvantage deriving from their parents' lack of familiarity with the schooling system. Several reasons suggest that the extent of this disadvantage might have declined over time in a country like Germany, which since the 1960s has become accustomed to the presence of guestworker families: First, the school and educational system may have adapted to the needs of the growing shares of immigrant children.

[1] Existing studies typically focus on differences in the educational attainment of immigrants in general as compared to natives, without paying attention to first vs. second generation and cohort effects. Chiswick's (1988) analysis concentrates on testing a child investment model of family decision making, Borjas (1992) tests for the persistence of ethnicity effects across generations, and Leslie and Drinkwater (1999) evaluate the incentives to invest in education for natives and immigrants. German studies investigate the factors correlated with the level of schooling attained, see e.g. Gang and Zimmermann (2000), Haisken-DeNew et al. (1997) or Alba et al. (1994).

Second, ethnic capital theory suggests that the educational attainment of immigrant youth is higher, the more individuals of their ethnicity are around and the better they do in the destination country (Borjas 1992). The number of immigrants in Germany has been rising over the last decades, suggesting overall positive cohort effects. Third, since immigration to Germany was concentrated in the 1960s and 1970s, the later born children of immigrants, are likely to have parents who are better assimilated to host country circumstances than parents of earlier born cohorts. Thus, more assimilated parents of recently born children might better be able to guide their offspring during their formative years in Germany. Finally, if German society over time improved its capacity to integrate first generation immigrants in its educational and labor market systems, the second generation may have benefitted as well.

In view of these arguments the questions addressed in this study are first, whether German born children of immigrants achieve degrees as high as their native counterparts. After showing that this is not the case we focus second on whether the gap in educational achievement declines and the two groups' schooling attainments converge over time. The strategy of the paper is to compare the schooling achievement of second generation immigrants to that of natives and to investigate cohort effects in educational attainment differences.

These issues are addressed using data from annual German censuses (*Mikrozensus*), which have not been applied to this question before. The main advantage of this data is the large number of observations and their representative nature. Two measures of educational attainment are analyzed: First, the level of secondary school currently attended by teenagers, which is explored for cohorts born 1970 through 1980, and second the highest educational degree completed by cohorts born between 1956 and 1974. The analysis of the two different educational outcome measures allows one to test different hypotheses.

The policy relevance of these issues results from several considerations: First, the human capital endowment of a population is a crucial input for individual and aggregate economic success, and therefore deserves attention and monitoring. Second, sufficient education is a precondition for the social integration of foreign workers, which has important consequences

not only for economic efficiency but also for social, political, and cultural participation. Third, given the fertility differences between natives and immigrants (Mayer and Riphahn 2000) and demographic projections, the already high population share of second generation immigrants will continue to grow.[2] If a growing share of the population is poorly educated this endangers the funding of the pay-as-you-go social security system beyond the demographic ageing problem. Fourth, European societies will open up to immigration from the east in the foreseeable future. It is important to learn the lessons from past immigration to improve education and integration policies for the migrants yet to come.

The paper proceeds as follows. Section 2 briefly discusses the data, the German educational system, and recent immigration history. Section 3 then carefully lays out the empirical strategy and describes samples and variables used in the analysis of school attendance and completed degrees. The results are presented in section 4 before section 5 concludes.

2. Dataset and Institutions

2.1 The German *Mikrozensus*

Historically, German legislation required a population census every decade, and a representative one percent random sample of the population every year in between. The latter surveys are called "*Mikrozensus*" and have been administered since 1956. The statistical office provides public use files with information on 70 percent random samples of the *Mikrozensus* data which contain up to half a million observations.

The *Mikrozensuses* cover demographic issues, and are an important source of labor market information. Whereas the entire questionnaire used to be mandatory, recently respondents were given the choice not to answer a number of questions (Emmerling and Riede 1997). The *Mikrozensus* uses a rotation scheme, where inhabitants of a given house or flat are reinterviewed for up to four years in sequence, during which time the actual inhabitants of the

[2] Based on the Mikrozensus data it can be shown that second generation immigrants made up cohort shares of more than 10 percent among children already in 1995.

house or flat may leave or change. Unfortunately the 70 percent public use random sample does not allow the identification of survey households over time.

2.2 Secondary Education in Germany

Before we can fruitfully discuss the issues involved in defining samples and variables it is important to provide background information on the German system of secondary education. In contrast to many countries it is defined by a differentiated track system. Already after four grades of primary education (at about age 10) parents and teachers jointly choose the track that seems appropriate for each pupil. These tracks differ in academic orientation and requirements. The basic school (*Hauptschule*) graduates individuals after six years of secondary education and is traditionally a preparation for blue collar occupations. The middle school (*Realschule*) also lasts six years and trains for white collar employment. The highest track (*Gymnasium*) offers nine years of schooling and a degree (*Abitur*), which is a precondition for academic studies. Depending on the track, pupils typically finish school aged 16 or 19.[3]

2.3 Immigration to Germany since 1945

The West German immigration experience can be divided into several phases (Schmidt and Zimmermann 1992): In the first years after World War II West Germany had to absorb about eight million German refugees from former German territories in the East. In the next phase about 2.6 million individuals migrated from East to West Germany until the construction of the Berlin Wall in 1961. Since the early 1960s through 1973 West Germany recruited workers mostly from Italy, Spain, Greece, Turkey, Portugal, and Yugoslavia, who are referred to as *guestworkers*. They were predominantly employed in manufacturing and construction, typically in low-skill, blue-collar jobs. By the time the recruitment policy was stopped, the foreign-born population in West Germany had grown from 0.7 in 1961 to 4.1 million in 1973. In the seventies and eighties many guestworkers brought their families to Germany and only few

[3] See Riphahn (2000) for more detailed information.

returned to their home countries. Since 1989 immigration patterns have been dominated by inflows of ethnic Germans, asylum seekers, and refugees. The foreign population in West Germany, which does not count ethnic German immigrants, increased from 4.5 million at the end of 1988 to 6.6 million at the end of 1999 with a population share up from 7.3 to 9.9 percent. In contrast foreigners make up only about 0.5 percent of the population in East Germany.

3. Empirical Strategy and Data Description

3.1 Overall Empirical Strategy

The questions addressed in this research are first, whether second generation immigrants and natives differ in their educational attainment and second whether there is a time trend in this gap. Two educational outcome measures are used: The first describes the type of school currently attended by teenagers. It can be used to evaluate a pupil's level of education due to the quality ranking among German secondary schools (see section 2.2). The second measure describes the highest educational degree completed by individuals aged 22 and above.

We look at two educational outcome measures because this allows us to test different hypotheses. On the one hand we want to consider all relevant determinants of school choice including parental background. This is possible only when using the first outcome measure because typically pupils only reside with their parents as long as they are attending school. In the *Mikrozensus* data this living arrangement is a precondition for being able to measure parental characteristics. On the other hand we can only measure cohort effects if our sample covers a sufficiently wide range of birth cohorts. The disadvantage of looking at those attending school (here ages 16 through 19) is that we capture only a limited range of birth cohorts. Given the available survey years 1989 through 1996, only the birth cohorts 1970 through 1980 can be observed. In contrast, completed degrees can be evaluated long after leaving school and thus we can study completed degrees also for those born before 1970, in fact we can go back through 1956. For this group we do not observe parental characteristics because these individuals have left their parents' home.

To address the first research question, i.e. whether there is an educational gap for the two populations, we regress educational attainment (EA) on an indicator of second generation immigrant status (Sec.Gen.). Next we control for socio-demographic characteristics such as age, region of residence, or year of the survey (X) in order to test whether lower educational attainment among second generation immigrants can be explained by these factors. Then a set of parent characteristics (P) is added and finally immigrant-specific assimilation and country-of-origin indicators (I) are controlled for. If i indexes individual observations and ϵ indicates a random disturbance term, the general model is:

(1) $$EA_i = \alpha + \beta_0 \text{ Sec.Gen.}_i + \beta_1 X_i + \beta_2 P_i + \beta_3 I_i + \epsilon_i \, .$$

If second generation immigrants lag behind natives in their educational attainment, β_0 yields a significant, negative coefficient estimate. If this difference is due to compositional effects of socio-demographic characteristics, region, or survey year, the effect should disappear once the control variables (X) are introduced. If differential parental characteristics drive the education gap, β_0 should lose significance when parental variables (P) are controlled for. Similarly, if the country-of-origin composition among second generation immigrants explains the β_0 outcome, controlling for immigrant-specific variables (I) including country of origin as well as possibly assimilation measures will affect the β_0 measure of the average group effect. To refine the analysis additional interaction effects are considered:

(2) $$EA_i = \alpha + \beta_0 \text{ Sec.Gen.}_i + \beta_1 X_i + \beta_2 P_i + \beta_3 I_i + \gamma_1 (X_i * \text{Sec.Gen}_i) + \gamma_2 (P_i * \text{Sec.Gen}_i) + \epsilon_i.$$

The coefficients γ_1 and γ_2 yield whether the correlation of given characteristics (X or P) with educational attainment differs significantly for natives and second generation immigrants.

Once the correlates of educational attainment are described and investigated we proceed to the second question of interest, i.e. whether there are changes over time in the difference in

educational attainment between natives and second generation immigrants. The gap in educational attainment may have declined for the more recent second generation immigrant cohorts if the German educational system improved in integrating this group, if the enhanced educational and labor market integration of the first generation benefitted the next generation as well, or if the rising number of immigrants in Germany over the last decades increased the level of support that immigrant pupils receive from their ethnic group. To investigate whether the immigrant disadvantage has indeed declined in the recent past we introduce controls for differential cohort effects between natives and second generation immigrants in the model:

(3) $$EA_i = \alpha + \beta_0 \, Sec.Gen._i + \delta_0 \, Cohort_i + \delta_1 \, (Cohort_i * Sec.Gen_i) + \epsilon_i.$$

If δ_1 is statistically significant then its sign indicates whether immigrants' education converges to or diverges from natives'. If significant differences in developments over cohorts can be detected it is then of interest to examine whether they are robust. This implies first a test of different parameterizations of the cohort effect such as a model with quadratic cohort effects or categorical cohort indicators and their interaction terms, and second controls for additional explanatory variables such as X, P, and I. Therefore the extended model to be estimated is:

(4) $EA_i = \alpha + \beta_0 \, Sec.Gen._i + \delta_0 \, Cohort_i + \delta_1 \, (Cohort_i * Sec.Gen_i) + \beta_1 \, X_i + \beta_2 \, P_i + \beta_3 \, I_i + \epsilon_i$.[4]

The estimation procedures differ for the two outcome measures and are discussed below.

3.2 General Sampling Issues

The analysis compares the educational attainment for representative samples of natives and second generation immigrants. The data are taken from five pooled *Mikrozensus* surveys

[4] For simplicity the coefficient and disturbance term indicators are left identical across the four model descriptions. Formal correctness would require different labels in each equation.

conducted in 1989, 1991, 1993, 1995, and 1996. Since the variable describing current school attendance was not provided in the available 1995 data, our analysis of school attendance relies on the other four surveys. The analysis of completed degrees combines all five survey years.

Individuals were coded as natives if they indicated German citizenship. A weakness of the survey instrument is that it does not allow one to distinguish between persons who have *only* the German citizenship and those that hold the German citizenship as one out of two or more citizenships.[5] Those individuals who indicated that they are not German nationals were asked about the year they had entered Germany, with one possible answer "born in Germany." Foreign nationals who checked the latter are coded as second generation immigrants. This measure bears three disadvantages: First, we overlook those immigrants who took on the German nationality. However, up through the early 1990s only very small fractions of immigrants residing in Germany actually naturalized as regulations were highly restrictive.[6] Thus it is unlikely that selective naturalization biases our estimates. Second, it is possible that those coded as second generation immigrants are already third generation immigrants. Third, the question on year of entry was answered voluntarily. Therefore we miss those who preferred not to answer this

[5] An exception is the 1996 *Mikrozensus* where individuals with double citizenship were explicitly asked about their second nationality. However, only 107 individuals in our final sample provided information on their second nationality, a number too small to permit separate analyses. Also, to avoid nonrandom selection when analysing these cases, it would be important to distinguish between those individuals who hold a second citizenship "by accident" such as place of birth, as opposed to a conscious decision. These groups cannot be distinguished in the 1996 data.

[6] Germany does not consider itself an immigration country. Naturalization rules follow the *ius sanguinis,* which grants citizenship to ethnic Germans only. Thus until 1993 when the rules where changed, no foreigner could *claim* German citizenship. Instead, German citizenship *could be granted* by the administration to individuals who were married to a native, or who had spent at least 10 years in Germany and met a number of conditions (e.g. no criminal record, stable income, knowledge of German language). Since July 1, 1993 individuals *have the right* to be naturalized if (i) foreign citizens aged 16-23 give up their other citizenship (exceptions possible), lived in Germany for at least eight years, went to school in Germany for at least 6 years, and committed no crime. (ii) Also the right to become German is granted to those who have legally spent at least 15 years in Germany and meet a large number of conditions. Their spouses and children may then *apply for* citizenship but have no claim to it. In 2001 regulations became more generous, which however does not affect our data. The restrictive naturalization practice is reflected in aggregate naturalization rates which remain below 0.6 percent through 1993 and do not exceed 1.2 percent of all foreigners in Germany through 1996. – Unfortunately the Federal Statistical Office does not provide naturalization figures by place of birth. Therefore we cannot cross-check for the magnitude of the potential problem.

question, overall 9.2 percent of the non German sample.[7] Those foreign nationals who did provide a year of entry were coded as first generation immigrants. To keep the sample at a manageable size, a ten percent random sample of the native observations was drawn.

3.3 Data Preparation for Analysis of Current School Type

3.3.1 Dependent Variable, Sample, and Estimator

The survey asks whether a respondent is currently in school or training, and if so in what kind. Possible answers are kindergarten, primary school, school grades 5-10, advanced school grades 11-13, vocational, and academic training. The question does not allow one to distinguish the type of school that pupils attend up to grade ten. However, for individuals age 16 and above we can determine whether they attend an advanced school (*Gymnasium*) or pursue other avenues. Since the advanced school degree (*Abitur*) is a precondition for university studies and is ranked highest among secondary school degrees, it is meaningful to investigate the determinants of advanced school enrollment. The dependent variable describes whether an individual is enrolled in an advanced school in contrast to either other forms of education or employment.

The sample consists of those 10,839 individuals aged 16 through 19, who might

[7] The share varies between 5.8 percent of the non German individuals in 1989, and a maximum of 18.2 percent in 1993. The author is unaware of reasons for the variation in answering behavior, as e.g. the question was posed in an identical manner. A comparison of sample sizes across years suggests that the missing information is most likely to go back to first rather than second generation immigrants. While second generation immigrants simply had to check "born in Germany", first generation immigrants had to provide the immigration year. There are several reasons why such an answer may be difficult, among them problems of recall, of clear definition which of possibly several years of commuting between countries should be set as the immigration year, or the problem of possible illegal immigration. – For the first time the German Federal Statistical Office provided information on the overall share of second generation immigrants in all foreigners for December 31, 1996. The aggregate figure of 20.8 percent then compares very well to the 21.7 percent we find in the 1996 data, supporting the representative nature of our sample.

participate in advanced schooling.[8,9] Table 1 first describes the sample composition by group, age, and survey year, and then shows the enrollment rates in advanced school (*Gymnasium*) for the two subsamples. With an average *Gymnasium* enrollment rate of 25.38 percent among natives and 16.09 percent among second generation immigrants the latter seem to lag behind in their educational attainment already during school age. Given that the outcome measure is bivariate, a probit estimator is applied to the pooled cross-sectional data.

3.3.2 Independent Variables

Unfortunately the available information on individual characteristics is rather limited in the *Mikrozensus* data. As our set of socio-demographic control variables we consider a person's year of birth, sex, whether the individual lives in East Germany (relevant after 1989), and the size of the person's city of residence. Since this measure is not available in the 1996 survey, indicators are coded zero for that year. To control for overall regional and survey year differences we consider vectors of the state of residence and survey year fixed effects. Further explanatory variables are chosen based on theoretical models explaining individual schooling outcomes. Three theoretical approaches can be distinguished in the literature: The child quantity vs. child quality model as developed by Becker (1981), the ethnic capital model as presented by Borjas (1992, 1994), and the optimal schooling model, which Chiswick (1988) explains. These models suggest that parent characteristics, assimilation, and ethnicity are key determinants of educational attainment.

Since the surveys gather household information, parent information can be matched using the characteristics of the heads of households and their partners. This information is available for about 95 percent of all cases. For those youth, who are already heads of households

[8] Here it is important to point out that in principle pupils from any type of secondary school can enter the advanced school after grade 10, where the specific regulations vary across federal states.

[9] The older the sample, the higher the fraction of missing values for the school attendance variable. For those aged 16 and 17 it is less than 1 percent, at age 18 it increases to just under 5 percent and at age 19 it already exceeds 25 percent. Therefore, even though some individuals may still attend advanced school at age 20, they are not considered in the analysis.

or partners of household heads the indicator "independent" was coded and parent variables were set to zero as such information was not available. For the majority of the sample we have detailed information on parental school attainment and vocational training.[10] As an indicator of household level assimilation we use years since parents' migration. When this information is not available, the variable is coded zero and an indicator for missing values is introduced instead.[11] Finally we control for country of origin indicators to measure ethnicity effects.

The independent variables are described in Table 2 separately for natives and second generation immigrants. Two general differences are notable between the samples. One concerns the region of residence: The share of immigrants living in East Germany is much below that of natives reflecting the overall small number of foreigners residing there. Also, in comparison to natives immigrants seem to live more frequently in bigger cities. The second important distinction lies in the subsamples' average parental education. A simple comparison of the shares' of highly educated parents yields that natives generally have much better educated parents.[12] The multivariate analysis tests whether differences in characteristics explain the gap in educational attainment between natives and immigrants observed in Table 1. The results of the probit estimations are discussed in section 4.1 below.

3.4 Data Preparation for Analysis of Completed Degrees

3.4.1 Dependent Variable, Sample, and Estimator

[10] If those who at age 19 have left the parental home differ in their (unobservable) characteristics from those still living at home, and if these differences are correlated with the dependent variable we would suffer a problem of endogenous sample selection when the independently living individuals were dropped from the sample. To consider them in the estimation we can either replace parental characteristics by the sample means or explicitly control for their missing nature. The latter is preferred here as it imposes weaker assumptions on the data. Section 4.1. reports estimation results obtained including and excluding those living independently.

[11] In a few cases the years since migration indicator is coded for a parent of a native child. In these situations possibly one parent is a first generation immigrant or the child is an offspring of ethnic Germans who migrated to Germany from Eastern Europe and were naturalized upon arrival.

[12] Given the sampling rule of using only those aged 16 through 19 the average age for the two samples is merely identical at 17.52 for natives and 17.41 for second generation immigrants.

The second measure of educational attainment describes individuals' highest completed degree of schooling. The degrees are categorized in three levels: A low degree is coded if individuals completed no degree or the basic school (*Hauptschule*) degree. The medium category is reserved for those who graduated from either middle school (*Realschule*), its east German equivalent (*Polytechnische Schule*), or achieved the *Fachhochschulreife*, a degree granted to those who partially completed the highest track.[13] The advanced degree is coded for those who completed the "Abitur" degree at the advanced school (*Gymnasium*). Those observations for which the degree indicator was missing, were dropped from the sample.[14]

For the analysis of completed degrees it is important how old individuals are at the time of the survey, because the fraction of those with uncompleted degrees increases for the younger ones. Even though the typical age to complete basic and middle school is 16 and that of leaving the highest track is 19, we conservatively consider only those who were at least 22 years of age at the time of the survey, to reduce the number of cases with not yet completed degrees.[15] Since we are interested in the education of recent cohorts, and because the number of second generation immigrants per birth year declines as we go back in time, we consider only individuals born after 1955. The last observed cohort is born in 1974, 22 years prior to the 1996 survey. Our sample consists of 52,351 natives and 3,427 second generation immigrants, and is described by survey year in Table 3.

Table 4 presents the distribution of the dependent variable, across sample groups. The figures show clear differences between the samples: The share of native individuals holding advanced degrees exceeds that of second generation immigrants, who have a much higher chance of ending up with low or no degrees. So Table 4 already answers the question whether

[13] The regulations on degrees vary somewhat across federal states.

[14] This affected 5.8 and 5.5 percent of native and second generation immigrant observations, respectively.

[15] This procedure might present a problem if natives and immigrants differ in the time they need to attain a given degree. However, first, the lack of a degree at age 22 is indicative of low educational attainment as well. Second in our data the probability to attain a (higher) degree does not increases noticably for either of the two subsamples if the age cutoff is raised from 22 to say 25 years.

second generation immigrants keep up with the schooling attainment of natives, they do not.

The second question then asks whether there is a cohort trend in this attainment gap. Does the schooling success of the children of immigrants show signs of convergence to that of natives? A first step to answering this question is the description of schooling developments over time, i.e. across birth cohorts. Figure 1 presents the share of natives and second generation immigrants completing advanced, and low degrees across cohorts. These figures show no signs of convergence. While the share of natives with low degrees has been steadily declining, that of second generation immigrant cohorts went up, and vice versa for advanced schooling degrees suggesting increasing divergence. The multivariate analysis tests whether these developments are statistically significant, and whether they can be explained by composition effects captured by controls for covariates. Since the highest completed degree is an ordered discrete dependent variable, an ordered probit estimator is applied for the multivariate analysis.

3.4.2 Independent Variables

In order to investigate the difference in the educational attainment for natives and second generation immigrants, completed degrees are first regressed on a set of explanatory variables. Here the main limitation of the *Mikrozensus* becomes relevant, its restrictive set of variables. We can control for demographics, measures of assimilation, and vectors of regional, survey year, and country of origin fixed effects.

The demographic variables control for the same set of indicators as described in section 3.3.2, i.e. sex, whether the individual lives in East Germany (relevant after 1989), and the size of the city of residence, which was not measured in the 1996 survey. The only immigrant assimilation indicators available here are whether the person has a partner or children in the home country. These variables were not applied in the analysis of current school attendance above since for teenagers they do not seem to be relevant. The most important omission among the explanatory variables concerns the parent indicators, which are not observed in the data. Table 5 describes the explanatory variables separately for the two subsamples. A comparison

across the two groups confirms that the share of individuals living in East Germany is much larger among natives than among second generation immigrants and that the latter tend to live in larger cities. Also the investigated immigrants are on average about born four years after the natives. Calculating the actual age distribution, we obtain for natives an average age of 29.8 and for second generation immigrants of 26.2 years. The relevance of these covariates for educational attainment is investigated using ordered probit estimations. The results are described in section 4.2 below.

In a second analysis step we investigate whether cohort effects play a role in the development of the educational attainment gap between natives and second generation immigrants. To test this possibility various parameterizations of cohort effects are considered in estimations. The age distribution of the two samples is described by the birth year indicators presented in Table 5. They confirm that while the native sample is more evenly spread over the range of birth years from 1956 through the mid 1970s only few second generation immigrants were born before 1962, which is a result of the overall migration patterns discussed in section 2.3. The results of the estimations are discussed in section 4.3 below.

4. Discussion of Results

4.1 Analysis of Current School Type

The description of the dependent variable at the bottom of Table 1 yielded that the share of natives attending advanced school exceeds that of second generation immigrants by about one third or 9 percentage points. If this gap narrows when controlling for the observable characteristics of the two samples, the education gap is at least in part a result of the subsamples' compositions. The probit estimations presented in Table 6 test this hypothesis.

Model 1 in Table 6 regresses the dependent variable on an indicator of second generation immigrant status, a set of regional i.e. federal state fixed effect indicators, and a set of controls for the survey year. Both sets of fixed effects are generally highly statistically significant. Model 1 confirms that the average second generation immigrant has a significantly lower probability of

attending advanced school than a native youth.[16] After controlling for fixed effects the difference in probabilities between the subsamples amounts to about 10 percentage points.

A first extension is to consider demographic characteristics ("X" variables from equation 1). They yield that older birth cohorts, males, East Germans, and those living in small cities have significantly lower probabilities of attending an advanced school. The coefficient of the second generation indicator remains statistically significant and almost unchanged. It yields a predicted conditional difference between the two subsamples' probability of advanced school enrollment of 11 percentage points. So the demographic characteristics are unlikely to be the determinants of the gap in advanced school enrollment rates for the two subsamples.

Model 3 adds immigrant specific variables ("I" variables from equation 1) such as parental assimilation indicators and country of origin fixed effects. The assimilation indicators generate the expected result that a longer paternal duration of stay in Germany significantly increases the child's probability of advanced school attendance. The country of origin fixed effects are also highly statistically significant. In comparison to youth of Turkish origin all but the Italians and the Polish have significantly higher enrollment rates in advanced schools. The highest enrollment rates are observed for those from Austria, France, Great Britain, and Greece in that order. Interestingly it is not a country of origin effect that drives the negative coefficient of the second generation indicator: The coefficient is still significant and has become even more pronounced in Model 3.

Finally, Model 4 adds detailed controls for parental human capital. Four separate sets of indicators are considered for fathers' and mothers' schooling degrees and vocational training. The estimated coefficients confirm expectations and the predictions of the theoretical literature: Each of the four indicator groups is significantly positively correlated with a child's advanced school attendance. Interestingly, the coefficients for maternal schooling are almost twice as large as those for fathers. However, even with these powerful predictors of youth educational

[16] The coefficient in Model 1 at -0.387 even exceeds that obtained in an estimation without fixed effect controls. The coefficient there was -0.328. The result is not presented to save space.

attainment added to the model, the coefficient for the second generation immigrant indicator remains statistically significant and negative. Thus also after controlling for the effect of parental human capital the average second generation immigrant has a significantly lower probability of attending advanced schools than natives. A prediction based on Model 4 yields an average probability difference of 7 percentage points between the subsamples. Thus the explanatory variables, in particular parental characteristics, explain only a small part of the difference in school attendance between natives and second generation immigrants. Potential additional factors are the language ability of immigrant youth, which we cannot consider because it is not measured in the *Mikrozensus*. Given the limited range of birth cohorts in this sample it is not useful to analyze cohort effects here. They will be investigated in section 4.3 below.[17]

An interesting question is whether the correlation of the covariates with advanced school enrollment differs for natives and second generation immigrants. This can be inspected in Table 7 which presents the results of an estimation with interaction effects of demographic and parental schooling indicators with second generation immigrant status. Only few coefficients are individually significant while both the group of demographic and of parental variables are jointly significant at the one percent level. Thus overall demographics and parental human capital seem to affect natives and immigrants differently. Among the demographic variables only the indicator for living in East Germany is statistically significant, but it only applies to about six percent of the immigrants. The direction of the parental interaction effects does not follow clear patterns. However, the effect of parental vocational degrees appears to be less pronounced for immigrants than for natives.

[17] For a robustness test the estimations in Table 6 were repeated after dropping observations who no longer reside with their parents; clearly this represents a potentially endogenous selection. The estimated coefficients for the second generation indicator in Models 1-3 exceeded those presented in Table 6 in absolute magnitude. Only the estimate in Model 4 was smaller at -0.16 and no longer statistically significant (p=0.177). If these results were not biased by endogenous selection this would suggests that (a) the gap in advanced school enrollment is robust to the treatment of those living independently and (b) that it can in part be explained by parental characteristics. However, it is plausible that the decision to move out from the parental home is correlated with parental characteristics. Thus the results obtained when using the selected sample are problematic.

4.2 Analysis of Completed Degrees

The next step of our analysis investigates the difference in the highest completed educational degrees for natives and second generation immigrants. Table 4 presented evidence that on average immigrants' completed degrees are lower than natives'. When regressing completed degrees on an indicator of second generation immigrant status this yielded a statistically significant coefficient of -0.429, which we do not present to save space. The result holds up to controls for regional and survey year fixed effects in Model 1 of Table 8, where the coefficient declines only slightly.

In Model 2 we additionally consider demographic indicators. They yield highly significant coefficient estimates, confirming the findings from the analysis in section 4.1 that males and those living in smaller cities have lower educational degrees. In contrast to prior results we now find positive effects of younger birth cohorts and for living in Eastern Germany. One possible explanation for this divergence is that we are now looking at a sample which was born earlier (1956-1974) than those whom we observed while attending school (1970-1980). Even though much explanatory power was added to the model by considering demographic indicators, the second generation immigrant coefficient stayed negative, highly statistically significant, and even increased in absolute magnitude.

The available immigrant specific indicators country of origin and whether a partner or child lives in the home country were added to the specification in Model 3. The effects of the latter are insignificant, yet the negative coefficients weakly indicate that those with stronger ties to the home country and thus weaker assimilation on average have lower degrees in Germany, a plausible correlation. Note these home country ties indicators are relevant only for a minute fraction of immigrants. The coefficients on the country of origin indicators are jointly as well as individually highly significant. Immigrants from Austria, Great Britain, Poland, France, and the "other" category have the highest degrees (in that order). Nations with the least successful pupils in Germany seem to be Turkey at the bottom and then Spain, former Yugoslavia, Portugal, and Greece. After controlling for these strong effects, the second generation immigrant coefficient

still statistically significant and even larger. This suggests that the overall educational gap is not due to the nationality composition in the second generation immigrant sample.

The model in Table 8 adds interaction terms to the specification, as suggested in equation (2) in section 3.1. Here all prior effects remain basically unchanged, and we find evidence for some differences in the correlation between demographic variables and educational outcomes across the two samples. As shown in Table 7 the relative educational outcomes of immigrants living in East Germany is better than for natives. The negative correlations between education and male sex or living in a big city are more pronounced for the immigrant sample. The interaction between immigrant status and cohort is not significant in this specification. However, the relevance of cohort effects is investigated in greater detail in section 4.3 below.

4.3 Cohort Effects

4.3.1 The Evidence

The question addressed in this section is whether the divergence in schooling degree developments for the two groups as observed in Figure 1 is statistically significant and robust. Table 9 presents the results of ordered probit estimations which consider separate cohort effects for natives and immigrants. The results in the row labeled "test" indicate that in all but the last specification the estimated cohort effects jointly differ significantly for the two samples. The very first model is an exact representation of equation (3) in section 3.1. Since the signs of the overall second generation effect and the interaction effect differ, it is difficult to interpret the result by inspection.

Therefore Panel B at the bottom of Table 9 presents simulation results: The probability of each schooling degree is calculated for natives and second generation immigrants and the probability differences are presented for cohorts born in 1956 and 1972. The prediction based on model 1 yields that the difference in the probability of a low educational degree for the two groups rose from about ten percentage points for the 1956 cohort to about 24 for those born 16 years later. Similarly, the probabilities of attaining an advanced degree differed by close to six

points for the 1956 cohort and more than 18 percentage points for the cohorts of the early 1970s. This confirms the rising gap in educational attainment described in Figure 1.[18] This simple model was reestimated with quadratic, cubic, and categorically represented cohort effects which corroborated the findings (not presented to save space). Thus the outcome does not seem to be sensitive to the parameterization of the cohort effect.

A separate question concerns whether the outcome is robust to controls for covariates or whether it is possibly driven by composition effects. If for example the share of males in the immigrant sample increased faster than among natives, and males have lower degrees than females then the cohort effect could be explained by shifts in the sample composition. In a first step survey year and regional fixed effects are added to a model with quadratic cohort effects (see Model 2 in Table 9). The quadratic second generation-cohort interactions are jointly significant and the predictions in Panel B are similar to those based on Model 1.

Demographic control variables are added in Model 3 and are highly significant. Again the cohort interaction terms are jointly significant and the predictions in Panel B are nearly unchanged. Only in Model 4 when immigrant specific indicators and in particular the country of origin fixed effects are added does the cohort effect of immigrants cease to differ significantly from that of natives. The eleven indicators describing the immigrants' nationality are jointly as well as individually significant and indicate that those from Turkey, Italy, former Yugoslavia, Spain, and Portugal (in this order) have the lowest degrees, whereas immigrants from Austria, Great Britain, Poland, France, and the "other" category on average attained the highest degrees. Interestingly the predictions still yield an increasing gap in the probability of attaining an advanced degree for the two subsamples.

The result that significant cohort differences are robust to the addition of explanatory variables, regional, and survey year fixed effects, but disappear once nationality indicators are considered, is independent of the parameterization of cohort effects. Therefore the country of

[18] Separate estimations by sex confirmed these results with significantly different cohort effects by subsample for both sexes.

origin composition of immigrants to Germany may be a determinant of the relative decline of second generation schooling attainment. Figure 2 depicts the distribution of second generation immigrants by nationalities across the cohorts in our sample. The nationality composition changed strongly, where the share of Turkish and Ex-Yugoslavian second generation immigrants increased from under ten and five percent in the late 1950s to more than 50 and 20 percent in the 1974 cohort, respectively.

4.3.2 Looking for an Explanation

The challenge now is to explain this finding. An important point to keep in mind is that parental background indicators are missing, since they are not observed for this sample. So one possible explanation of the results could be that parental background (or in fact any other unobserved characteristic[19]) is correlated with nationality among immigrants, and that through this transmission mechanism the changing nationality composition somewhat spuriously affected the results. Unfortunately this hypothesis cannot be tested with the available data.

Additionally one may ask whether certain nationality groups are behind the relative decline in immigrants' educational attainment. To address this question and to describe the immigrant sample more carefully we estimated cohort effects for each national group separately. Those countries, for which significant changes across cohorts could be measured at all, showed significant improvements in educational attainment over time.[20] However, as our argument centers not on absolute changes among immigrants over time, but on the educational gap relative to natives, a more appropriate experiment is to pool each nationality group separately with the native sample and to estimate linear main and interacted cohort effects for each nation

[19] Alternative examples are linguistic distance from German, or nationality specific changes in parental human capital over time. Also, supply side effects might play a role. If advanced schools were constructed in rural areas with low foreigner shares, this might explain natives' educational advancement. If certain immigrant groups are more strongly represented in rural regions than others, this might be another unobservable transmission mechanism behind the observed changes.

[20] The improvements in educational attainment were significant at the one percent level for Greece, the Netherlands, Austria, and Turkey, and at the ten percent level for Portugal and Spain.

separately. This exercise yields mixed results. For second generation immigrants from Greece, the Netherlands, Austria, and Turkey we find significantly stronger improvements in school attainment than for natives. For those from Great Britain, Italy, Poland, and the "other" category, improvements lagged significantly behind those of natives. For the remaining nationalities significant differences could not be measured. Interestingly, the share of immigrants form countries with declining relative attainments (i.e. Great Britain, Italy or Poland, cf. Figure 2) fell between 1956 and 1974.

However, the overall second generation cohort effect is not just a simple aggregation of all nationality-specific cohort effects relative to natives. It is also affected by each national group's level of educational attainment combined with its changing weight among the immigrants: Turkish pupils improved over time compared to natives. Yet if their education is the lowest of all and their share in the total increased over time (see Figure 2), the average second generation immigrant's educational attainment may be observed to decline over time simply due to the reweighting of national groups. Table 10 shows that educational attainments differ strongly across national groups with Turkey and Italy at the bottom end. To test the scenario just described, the estimations in Table 9 were repeated after dropping the Turks from the sample. The results (not presented to save space) for the cohort effect among second generation immigrants remain unchanged. The results remained robust even when the Italians or the former Yugoslavs were dropped as well.[21] The observed cohort effect is correlated with the country of origin composition of the sample, but it does not seem to go back to the changing share of one specific country of origin.

5. Conclusion

This study is the first to investigate the educational attainment of German second generation immigrants using representative data of the *Mikrozensus* surveys. The educational

[21] The regressions were also rerun after sequentially dropping each off the nationality groups separately. In all cases the results remained robust thus confirming that it is not one single country of origin, whose changing representation in the sample determines the cohort effect.

success of the children of first generation immigrants is compared to that of natives, with an interest in developments over time.

A first analysis step establishes that the educational attainment of immigrants, measured by current enrollment or highest completed degree, is significantly below that of natives. The educational gap between the two groups is statistically significant and robust to controls for available demographic measures, immigrant assimilation variables, parental human capital indicators, country of origin, regional, and yearly fixed effects. Therefore the factors, which based on theoretical models should determine educational outcomes, do not seem to be behind the second generation's overall educational disadvantage.

In a second step we investigate whether the achievement gap declined over time. This development would seem plausible for several reasons: German society and educational institutions over time may have learned to better serve the needs of the growing number of immigrants in the country. Also, if the integration occurred over time, growing assimilation advantages may have been passed from the first to the second generation of immigrants. For these reasons second generation immigrants' education should improve relative to natives.

A description of completed degrees for subsequent birth cohorts does not confirm this hypothesized development. Multivariate analyses instead show that the overall educational gap between the two groups *increases* significantly over time. Several control variables in the regressions do not affect the estimated cohort effects. Only when the immigrants' country of origin is controlled for does the significant diverging trend between natives and second generation immigrants vanish. The exact mechanism behind this apparent composition effect could not be determined with the available data and remains to be investigated in future studies using richer data and in particular controlling for parental human capital.

Our main findings are that (even conditional) educational outcomes for second generation immigrants lag behind those of natives and that the overall gap in educational attainment between the two groups increases over time. While the attainment of natives has improved strongly over recent decades, second generation immigrants do not obtain higher

degrees now than about two decades earlier. Overall, Hirschman's (2001) finding for the United States must thus be confirmed for the case of Germany as well, where second generation immigrants are falling behind educationally.

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Table 1 Sample Composition and Dependent Variable: Analysis of Current School Type

	1989	1991	1993	1996	All
Sample: Number of Observations					
Natives	*1 628*	*1 928*	*1 887*	*2 039*	*7 482*
age 16	351	459	474	568	1 852
age 17	412	503	466	468	1 849
age 18	385	454	477	520	1 836
age 19	480	512	470	483	1 945
Second Generation Immigrants	*593*	*862*	*926*	*976*	*3 357*
age 16	177	225	242	257	984
age 17	175	262	233	240	1 001
age 18	129	213	244	236	892
age 19	112	162	207	243	809
All	2 221	2 790	2 813	3 015	10 839
Dependent Variable: Mean Share in Advanced School by Subsample (in percent)					
Natives	*31.27*	*21.78*	*23.11*	*26.19*	*25.38*
Second Generation Immigrants	*22.43*	*14.04*	*15.01*	*15.06*	*16.09*
All	28.91	19.39	20.44	22.59	22.50

Source: Own calculations based on *Mikrozensus* surveys 1989, 1991, 1993, and 1996.

Table 2 Explanatory Variables: Analysis of Current School Type

Variable Description	Natives		Second Gen.	
	Mean	S.D.	Mean	S.D.
Dependent Variable				
currently attending advanced school	0.254	0.435	0.161	0.367
Demographic Variables				
cohort: year of birth - 1900	74.91	2.862	75.24	2.690
male sex	0.403	0.491	0.404	0.491
lives in East Germany	0.213	0.409	0.059	0.236
lives in small city: <20 000 inhabitants	0.353	0.478	0.168	0.374
lives in big city: >500 000 inhabitants	0.09	0.286	0.201	0.401
Survey Year Indicator				
survey year is 1989	0.218	0.413	0.177	0.381
survey year is 1991	0.258	0.437	0.257	0.437
survey year is 1993	0.252	0.434	0.276	0.447
survey year is 1996	0.273	0.445	0.291	0.454
Parent Variables				
lives independently, i.e. not in parent household	0.055	0.228	0.043	0.203
father no schooling / information missing	0.225	0.418	0.324	0.468
father lowest schooling degree	0.435	0.496	0.581	0.494
father higher schooling degree	0.340	0.474	0.095	0.294
father vocational information missing	0.227	0.419	0.166	0.372
father no vocational training	0.086	0.281	0.502	0.500
father basic vocational training	0.436	0.496	0.292	0.455
father advanced vocational training	0.251	0.434	0.041	0.197
mother no schooling / information missing	0.135	0.342	0.366	0.482
mother lowest schooling degree	0.487	0.500	0.556	0.497
mother higher schooling degree	0.378	0.485	0.078	0.268
mother vocational information missing	0.142	0.349	0.132	0.339
mother no vocat. training	0.230	0.421	0.720	0.449
mother basic vocational training	0.492	0.500	0.128	0.335
mother advanced vocational training	0.137	0.344	0.019	0.138
Parent Assimilation Variables				
father years since migration	0.183	2.179	20.009	9.189
father years since migration missing	0.937	0.243	0.101	0.302
mother years since migration	0.188	2.087	19.242	7.918
mother years since migration missing	0.936	0.244	0.069	0.254
Country of Origin Indicators				
citizen of Turkey	-	-	0.492	0.500
citizen of former Yugoslavia	-	-	0.179	0.383
citizen of Italy	-	-	0.110	0.313
citizen of Greece	-	-	0.089	0.284
citizen of other countries	-	-	0.052	0.221
citizen of Spain	-	-	0.033	0.179
citizen of Portugal	-	-	0.015	0.124
citizen of Austria	-	-	0.012	0.110
citizen of the Netherlands	-	-	0.006	0.079
citizen of France	-	-	0.006	0.077
citizen of Great Britain	-	-	0.004	0.064
citizen of Poland	-	-	0.001	0.039
Number of Observations	7 482		3 357	

Source: Own calculations based on *Mikrozensus* surveys 1989, 1991, 1993, and 1996.

Table 3 Sample Composition: Analysis of Completed Degrees

Group	1989	1991	1993	1995	1996	Total
Natives	7 038	9 875	10 788	12 006	12 644	52 351
Second Generation Immigrants	294	466	739	902	1 026	3 427
Total	7 332	10 341	11 527	12 908	13 670	55 778

Source: Own calculations based on *Mikrozensus* surveys 1989, 1991, 1993, 1995, and 1996.

Table 4 Dependent Variable by Subsample: Analysis of Completed Degrees

Degree	Natives	Second Generation Immigrants	All	Number of Observations
Low	33.50	55.88	34.87	19 452
Medium	43.50	25.50	42.39	23 646
High	23.00	18.62	22.73	12 680
Total	100	100	100	55 778

Source: Own calculations based on *Mikrozensus* surveys 1989, 1991, 1993, 1995, and 1996.

Table 5 Explanatory Variables: Analysis of Completed Degrees

Variable Description	Natives		Second Gen.	
	Mean	S.D.	Mean	S.D.
Dependent Variable				
level of completed degree (1 = low, 2 = medium, 3 = high)	1.895	0.744	1.627	0.779
Cohort Indicators				
cohort: year of birth - 1900	63.43	4.662	67.60	4.446
cohort^2: cohort * cohort / 100	40.44	5.962	45.89	5.894
born 1956 - 1958	0.183	0.387	0.041	0.199
born 1959 - 1961	0.197	0.398	0.069	0.253
born 1962 - 1964	0.206	0.404	0.121	0.326
born 1965 - 1967	0.200	0.400	0.214	0.411
born 1968 - 1970	0.135	0.342	0.231	0.422
born 1971 - 1973	0.070	0.256	0.273	0.445
born 1974	0.009	0.095	0.050	0.219
Demographic Variables				
male sex	0.503	0.500	0.558	0.497
lives in East Germany	0.205	0.404	0.029	0.169
lives in small city: < 20 000 inhabitants	0.321	0.467	0.156	0.363
lives in big city: > 500 000 inhabitants	0.117	0.322	0.171	0.377
Assimilation Measures				
partner in home country	0.000	0.000	0.007	0.083
children in home country	0.000	0.000	0.005	0.068
Survey Year Indicator				
survey year is 1989	0.134	0.341	0.086	0.280
survey year is 1991	0.189	0.391	0.136	0.343
survey year is 1993	0.206	0.404	0.216	0.411
survey year is 1995	0.229	0.420	0.263	0.440
survey year is 1996	0.242	0.428	0.299	0.458
Country of Origin Indicators				
citizen of Turkey	-	-	0.299	0.458
citizen of former Yugoslavia	-	-	0.102	0.302
citizen of Italy	-	-	0.185	0.388
citizen of Greece	-	-	0.118	0.323
citizen of other countries	-	-	0.079	0.269
citizen of Spain	-	-	0.057	0.232
citizen of Portugal	-	-	0.011	0.106
citizen of Austria	-	-	0.050	0.219
citizen of the Netherlands	-	-	0.064	0.245
citizen of France	-	-	0.014	0.119
citizen of Great Britain	-	-	0.012	0.109
citizen of Poland	-	-	0.008	0.090
Number of Observations	52 351		3 427	

Source: Own calculations based on *Mikrozensus* surveys 1989, 1991, 1993, 1995, and 1996.

Table 6 Estimation Results: Probit on "Current School Type is an Advanced School"

	Model 1		Model 2		Model 3		Model 4	
	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.
constant	-0.411**	0.038	10.501**	0.888	10.556**	0.897	13.181**	0.978
second generation	-0.387**	0.032	-0.403**	0.033	-0.503**	0.091	-0.269**	0.101
Demographic Variables								
cohort	-	-	-0.153**	0.012	-0.163**	0.013	-0.189**	0.013
male	-	-	-0.067*	0.030	-0.076*	0.030	-0.071*	0.031
lives in East Germany	-	-	-0.482**	0.129	-0.513**	0.129	-0.664**	0.107
lives in small city	-	-	-0.065□	0.037	-0.081*	0.038	0.001	0.039
lives in big city	-	-	0.209**	0.052	0.205**	0.053	0.200**	0.054
Immigrant Specific Variables								
father's years since migration	-	-	-	-	0.021**	0.007	0.017*	0.008
father's ysm missing	-	-	-	-	0.746**	0.174	0.453*	0.202
mother's years since migration	-	-	-	-	0.004	0.007	-0.001	0.008
mother's ysm missing	-	-	-	-	-0.046	0.175	-0.202	0.200
country of origin fixed effects	-		-		yes**		yes**	
Parental Schooling Variables								
lives independently	-	-	-	-	-	-	-0.366□	0.214
father no/missing schooling degree	-	-	-	-	-	-	-0.280**	0.092
father lowest schooling degree	-	-	-	-	-	-	-0.285**	0.044
father vocational info. missing	-	-	-	-	-	-	0.175□	0.092
father basic vocational training	-	-	-	-	-	-	-0.024	0.049
father advanced vocational training	-	-	-	-	-	-	0.267**	0.060
mother no/missing schoolg. degree	-	-	-	-	-	-	-0.573**	0.081
mother lowest schooling degree	-	-	-	-	-	-	-0.442**	0.043
mother vocational info. missing	-	-	-	-	-	-	0.301**	0.080
mother basic vocational training	-	-	-	-	-	-	0.148**	0.041
mother advanced vocational traing.	-	-	-	-	-	-	0.367**	0.061
Regional fixed effects	yes**		yes**		yes**		yes**	
Survey year fixed effects	yes**		yes**		yes**		yes**	
Log Likelihood	-5 635.54		-5 543.14		-5 436.42		-5 077.55	

Source: Own calculations based on *Mikrozensus* surveys 1989, 1991, 1993, and 1996.
Note: **,*, and □ indicate statistical significance and the 1,5, and 10 percent level.

Table 7 Estimation Results: Probit on "Current School Type is an Advanced School" - Interacted Model

	Coef.	Std.Err.
constant	13.312**	1.019
second generation	-1.224	1.034
Demographic Variables		
cohort	-0.195**	0.014
male	-0.069▫	0.036
lives in East Germany	-0.703**	0.107
lives in small city	-0.009	0.043
lives in big city	0.166*	0.070
Demographic Variables Interacted for Immigrants		
cohort * second generation	0.016	0.013
male * second generation	-0.020	0.066
lives in East Germany * second generation	0.489**	0.150
lives in small city * second generation	0.043	0.092
lives in big city * second generation	0.108	0.101
Immigrant Specific Variables		
father years since migration	0.016*	0.008
father years since migration missing	0.614**	0.218
mother years since migration	-0.001	0.008
mother years since migration missing	-0.136	0.205
country of Origin fixed effects	yes**	
Parental Schooling Variables		
lives independently	-0.179	0.239
father no / missing schooling degree	-0.092	0.155
father lowest schooling degree	-0.354**	0.049
[reference: father higher schooling degree]	-	-
father vocational information missing	0.096	0.158
[reference: father no vocational training]	-	-
father basic vocational training	0.084	0.070
father advanced vocational training	0.351**	0.077
mother no /missing schooling degree	-0.751**	0.131
mother lowest schooling degree	-0.428**	0.047
[reference mother higher schooling degree]	-	-
mother vocational information missing	0.567**	0.124
[reference: mother no vocational training]	-	-
mother basic vocational training	0.184**	0.047
mother advanced vocational training	0.420**	0.066
Parental Schooling Variables Interacted for Immigrants		
lives independently * second gen.	-0.073	0.248
father no / missing schooling degree * second gen.	-0.126	0.212
father lowest schooling degree* second gen.	0.356**	0.120
father vocational information missing * second gen.	-0.053	0.214
father basic vocational training * second gen.	-0.152	0.100
father advanced vocational training * second gen.	-0.042	0.171
mother no / missing schooling degree* second gen.	0.133	0.190
mother lowest schooling degree * second gen.	-0.155	0.126
mother vocational information missing * second gen.	-0.484**	0.179
mother basic vocational training * second gen.	-0.064	0.100
mother advanced vocational training * second gen.	-0.308	0.218
Regional fixed effects	yes**	
Survey year fixed effects	yes**	
Log Likelihood		-5 049.871

Source: Own calculations based on *Mikrozensus* surveys 1989, 1991, 1993, and 1996.
Note: **,*, and ▫ indicate statistical significance and the 1,5, and 10 percent level, # obs = 10839.

Table 8 Estimation Results: Ordered Probit on Completed Degree

	Model 1		Model 2		Model 3		Model 4	
	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.
second generation	-0.389**	0.021	-0.531**	0.021	-1.057**	0.041	-1.424**	0.368
Demographic Variables								
cohort	-	-	0.025**	0.001	0.026**	0.001	0.026**	0.001
male	-	-	-0.046**	0.010	-0.045**	0.010	-0.041**	0.010
lives in East Germany	-	-	0.470**	0.034	0.468**	0.034	0.461**	0.030
lives in small city	-	-	-0.301**	0.013	-0.303**	0.013	-0.307**	0.013
lives in big city	-	-	0.179**	0.019	0.179**	0.019	0.169**	0.020
Immigrant Specific Variables								
partner in home country	-	-	-	-	-0.273	0.286	-0.257	0.287
children in home country	-	-	-	-	-0.343	0.354	-0.346	0.357
country of origin fixed effects	-	-	-	-	yes**		yes**	
Demographic Variables Interacted for Immigrants								
cohort * second generat.	-	-	-	-	-	-	0.01	0.005
male * second generat.	-	-	-	-	-	-	-0.07¤	0.06
lives in East Germany * second generation	-	-	-	-	-	-	0.282*	0.12
lives in small city * second generation	-	-	-	-	-	-	0.107¤	0.06
lives in big city * second generation	-	-	-	-	-	-	0.112¤	0.058
Regional fixed effects	yes**		yes**		yes**		yes**	
Survey year fixed effects	yes**		yes**		yes**		yes**	
μ_1	-0.33	0.016	1.133	0.067	1.224	0.067	1.209	0.069
μ_2	0.837	0.016	2.316	0.067	2.412	0.068	2.399	0.069
Log Likelihood		-58 437.7		-57 710.9		-57 469.4		-57 463.7

Source: Own calculations based on *Mikrozensus* surveys 1989, 1991, 1993, 1995, and 1996.
Note: **,*, and ¤ indicate statistical significance and the 1,5, and 10 percent level.

Table 9 Estimation Results: Ordered Probit on Completed Degree - Cohort Effects

	Model 1		Model 2		Model 3		Model 4	
	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.
A. Estimation Results								
second generation	1.178**	0.311	1.384	4.051	3.68	4.055	1.665	4.220
Cohort Effects								
cohort	0.026**	0.001	0.011	0.028	0.004	0.028	0.004	0.028
cohort^2	-		0.012	0.022	0.017	0.022	0.017	0.022
cohort * second generation	-0.025**	0.005	-0.029	0.123	-0.100	0.123	-0.087	0.128
cohort^2 * second generation	-	-	0.002	0.093	0.055	0.093	0.068	0.097
Demographic Variables								
male	-	-	-	-	-0.046**	0.010	-0.045**	0.01
lives in East Germany	-	-	-	-	0.465**	0.030	0.462**	0.03
lives in small city	-	-	-	-	-0.301**	0.013	-0.303**	0.01
lives in big city	-	-	-	-	0.181**	0.019	0.179**	0.02
Immigrant Specific Variables								
partner in home country	-	-	-	-	-	-	-0.281	0.286
children in home country	-	-	-	-	-	-	-0.335	0.355
cntry. of origin fixed effects	-	-	-	-	-	-	yes**	
Regional fixed effects	-	-	yes**		yes**		yes**	
Survey year fixed effects	-	-	yes**		yes**		yes**	
μ_1	1.236	0.07	0.815	0.898	0.522	0.9	0.53	0.9
μ_2	2.386	0.07	1.987	0.898	1.706	0.9	1.719	0.9
Log Likelihood	-59 034.33		-58 138.45		-57 694.80		-57 468.42	
Test [2)]	**30.40****		**31.51****		**32.49****		**0.86**	
B. Prediction Results								
Cohort of 1956: Probab. Natives - Probab. Second Gen. Immigrants								
Degree Low	-0.097		-0.071		-0.069		-0.376	
Degree Medium	0.040		0.028		0.027		0.217	
Degree Advanced	0.056		0.043		0.042		0.159	
Cohort of 1972: Probab. Natives - Probab. Second Gen. Immigrants								
Degree Low	-0.243		-0.222		-0.235		-0.382	
Degree Medium	0.060		0.052		0.058		0.136	
Degree Advanced	0.182		0.171		0.177		0.245	

Source: Own calculations based on *Mikrozensus* surveys 1989, 1991, 1993, 1995, and 1996.

Note: 1. **,*, and ▫ indicate statistical significance and the 1,5, and 10 percent level.
2. "Test" provides the Wald test statistic for a joint test of the cohort interactions for second generation immigrants.
3. The prediction results present the excess probability of attaining a given degree for the native over the second generation immigrant sample, evaluated for the birth cohorts of 1956 and 1972. The predictions are obtained using the coefficient estimates and the original data for the covariates.

Table 10 Completed Degrees by Nationality

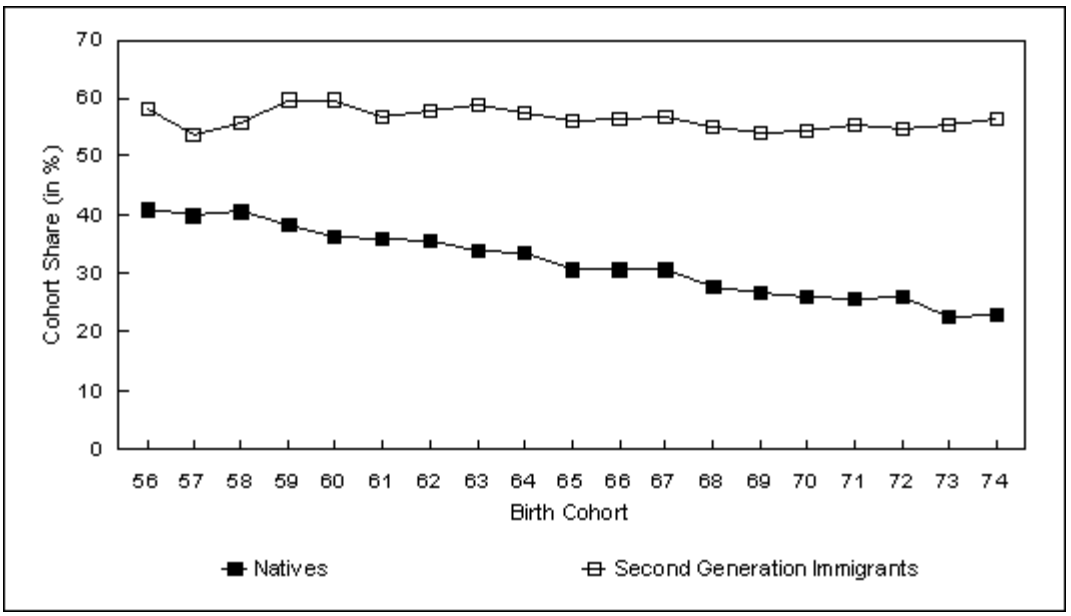
Degree	Natives	Second Generation Immigrants from									
		Turkey	Italy	Other	Greece	Former Jugoslavia	Nether-lands	Spain	Austria	France	All
Low	33.50	72.32	64.77	42.22	47.65	46.42	44.29	47.69	21.97	44.90	55.88
Medium	43.50	17.54	25.12	23.70	24.69	35.53	33.33	34.87	38.15	18.37	25.50
High	23.00	10.14	10.11	34.07	27.65	18.05	22.37	17.44	39.88	36.73	18.62
Average	1.90	1.38	1.45	1.92	1.80	1.72	1.78	1.70	2.18	1.92	1.63
# Obs.	52 351	1 024	633	270	405	349	219	195	173	49	3 427

Source: Own calculations based on *Mikrozensus* surveys 1989, 1991, 1993, 1995, and 1996.

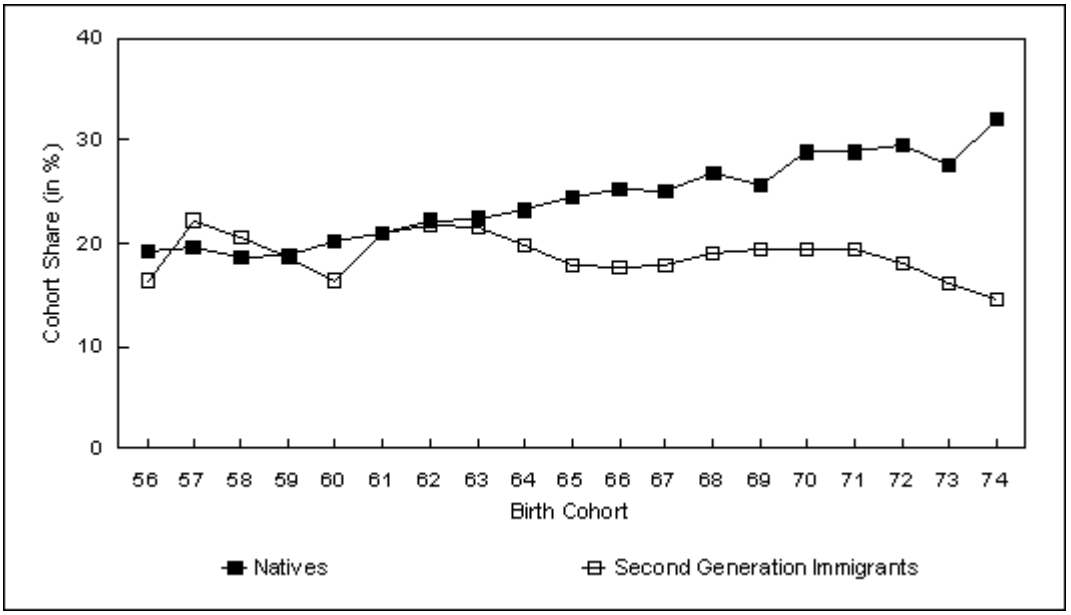
Note: 1. The "average" figure presents the weighted average of the schooling degrees when low, medium and high are assigned to numerical representations 1,2, and 3. It provides a simple metric to facilitate cross national comparisons.

2. To save space the information for the least nationalities with the smallest population shares are not presented. Their average degree values are (numbers of observations in parentheses): Portugal 1.72 (39), Great Britain 2.02 (41), and Poland 1.96 (28).

Figure 1 (a) Cohort Shares with Low or No Completed Educational Degree

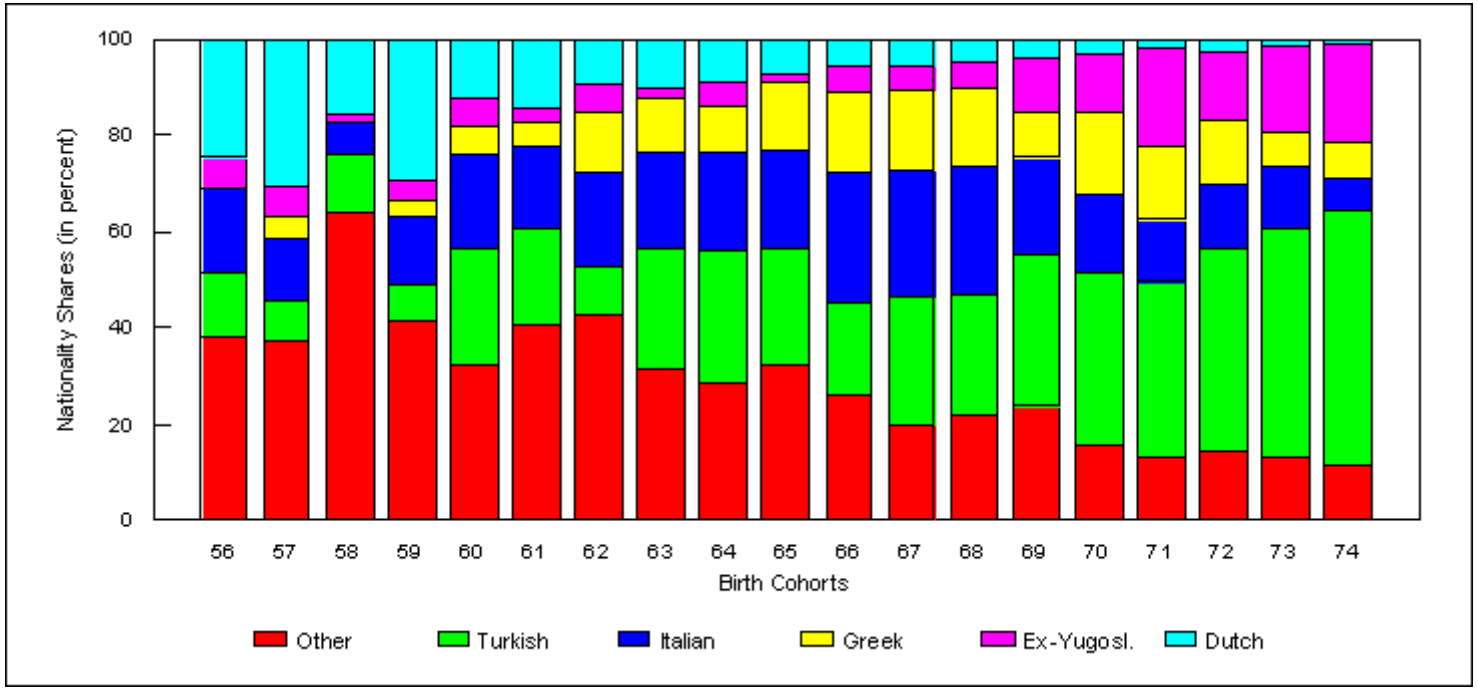


(b) Cohort Shares with Advanced Educational Degree (*Abitur*)



Source: Own calculations based on *Mikrozensus* 1989, 1991, 1993, 1995, and 1996
Note: To reduce fluctuations due to the small number of second generation immigrants for some cohorts, three year moving averages are presented for this group.

Figure 2 Country of Origin of Second Generation Immigrants by Cohort



Source: Own calculations based on *Mikrozensus* 1989, 1991, 1993, 1995, and 1996.