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ABSTRACT

Immigrant Concentration in Schools: Consequences for Native and Migrant Students*

In this paper, I study the impact of immigrant concentration in primary schools on educational outcomes of native and migrant students in a major Austrian city between 1980-2001. The outcome measures of interest are track attendance after primary education and grade repetition. Using variation in the fraction of students with migration background among adjacent cohorts within schools and drawing special attention to time trends, the analysis shows that migrant students suffer from school-grades with a higher share of migrant students, while natives are not affected on average. These negative spill-over effects are particularly strong between students from the same area of origin, indicating that peer groups in schools form along ethnic dimensions.

JEL Classification: I21, J15, J24

Keywords: education, ethnic minorities, migrants, segregation, school choice

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1 Introduction

The economic assimilation of migrants and ethnic minorities poses a major challenge to societies and policy makers all over the world. In Austria, like in many other European countries, the fraction of individuals with migration background increased considerably during the last decades. While only 1.4% of the population were of foreign nationality in the early 1960s, the share increased to around 4% in the 1970s and 1980s and more than 10% in 2009 (Statistik Austria, 1961-2009). This sharp increase in the non-native population – attended by the fact that most migrants in Austria are relatively low skilled – has led to concerns about their economic and cultural integration.

One important way to boost the economic success of migrants and ethnic minorities is education. However, the results of the international student assessment studies PISA (Programme for International Student Assessment) and TIMSS (Trends in International Mathematics and Science Study) show that students with migration background perform poorly in the achievement tests. In the OECD countries, the mean test score gaps in math and science between students with and without migration background average out to 25% of the standard deviations in test scores. These achievement gaps are larger in Central and Northern Europe and amount to 33-45% in Austria (Schneeweis, 2011).

The segregation of migrant students or ethnic minorities in schools is one important and widely discussed topic in the debate about educational integration. The major question is, whether migrant students suffer or gain from schools and classrooms with a higher share of migrant students. And of course, whether native students are influenced by the ethnic composition in schools. Academic achievement may be negatively or positively influenced by class composition. A high fraction of students with foreign background may hamper class room learning and reduce teacher attention, adversely affecting native and migrant students alike. On the other hand, ethnic and cultural diversity and the need to explain, defend and reflect cultural traits may be positive for learning outcomes. Minority students may also profit from being grouped with other minorities because it may be easier for school authorities and teachers to recognize specific needs and respond to them if the group size exceeds a certain level. For example, if more students from a specific country attend the same school, it may be easier to organize bilingual teaching or other remedial activities. However, this could be a mixed blessing, since the exposure to many students from the own ethnic group may hamper social interaction with native students, passing up the chance of improving language skills and other traits that are important in the host country.

In this paper, I study the consequences of the migrant concentration in schools on student learning outcomes. Using Austrian school register data covering the universe of 22 school cohorts of compulsory school students in a major Austrian city, I estimate the impact of the fraction of students with a migration background on educational achievement of different groups of students, i.e. natives, students with migration background and migrant students from specific countries. To identify the respective causal impact, I use variation in the share of migrants between adjacent cohorts within schools. Since the Austrian education system is characterized by early tracking, the outcomes of interest are track choice after primary education (in grades 5-8) and grade repetition in primary and secondary school.

The paper is organized as follows. Section 2 reviews the existing literature and outlines the contribution of this paper. Section 3 describes the population with migration background in Austria. Section 4 explains the institutional characteristics of the Austrian education system and presents the data. Section 5 discusses the estimation strategy, section 6 gives the results and section 7 contains a sensitivity analysis. Section 8 concludes.

2 Previous studies and my contribution

Most of the literature on ethnic segregation originates from the United States, where the integration of black and recently also hispanic students is of major political and scientific interest. Since the *Brown v. Board of Education* case of 1954, school desegregation of black and white students led to major changes in American schools, in particular increased educational opportunities of black students. Guryan (2004) shows that the desegregation of American school districts in the 1970s-80s reduced the high school drop-out rate of black students by 2-3 percentage-points. Angrist and Lang (2004) study the school desegregation program in Boston (Metco) and find no adverse effects of an increase in minority students for white students and some negative effects for other minority students.

The empirical literature on school segregation that is closely related to this paper focuses not directly on desegregation but on the effects of the ethnic composition in schools on student outcomes. To establish the causal impact of school composition, an identification approach is needed that takes into account that students and their parents endogenously choose their school and neighborhood. Hoxby (2000) uses variation in the ethnic composition of adjacent cohorts within schools in Texas, so called population variation, and pays special attention to time trends. Her results indicate that the share of black students in class has a negative impact on test scores, in particular for other black students. The adverse effect is about 4 times larger for black students than for white students. Similar results are obtained by Hanushek et al. (2009), who also use data from Texas. Black students are negatively affected by other black students and the estimated coefficients for white students are smaller and mostly not significant.

Card and Rothstein (2007) investigate the effects of segregation in US schools and neighborhoods on the black-white test score gap. In their paper, segregation is directly measured by racial differences in the exposure to black students. The identification strategy relies on aggregation to the city level to eliminate within-city school sorting and differencing by race to eliminate unobservables at the city level that are common to all students. The results indicate that more segregation at the school level and at the neighborhood level increase the black-white test score gap. Furthermore, the authors suggest that neighborhood segregation is more important than school segregation and the effects operate mainly through neighbors' incomes.

Outside the United States, the literature on school segregation is small and relatively new. Burgess et al. (2005) and Schindler-Rangvid (2006) examine the extent of school and neighborhood segregation in England and Denmark, respectively. Both document a higher level of ethnic segregation in schools than in neighborhoods. Schindler-Rangvid (2010) and Gerdes (2010) study the native flight phenomenon out of public schools in

Denmark. Both authors find that native students are more likely to opt out from local public schools, the higher the share of immigrants in school.[1]

The impact of immigrant concentration on the academic achievement of native pupils is studied by Gould et al. (2009), Brunello and Rocco (2011) and Geay et al. (2012). The results of these studies are mixed. While Gould et al. (2009) find adverse consequences of immigrant concentration for native students in Israeli elementary schools and Brunello and Rocco (2011) find small negative spill-over effects from immigrants to natives in a multi-country set-up, Geay et al. (2012) find no spill-over effects of non-native English speakers on native students in English schools.

Two studies focus not only on the effects on native students but also on students with migration background. Ohinata and VanOurs (2012) use data on primary school students in the Netherlands from the international student assessments PIRLS (Progress in International Reading Literacy Study) and TIMSS (Trends in International Mathematics and Science Study) and find no adverse effects for native students and some negative effects on immigrant students' test scores in reading. In this study, variation among classes within schools is exploited. Jensen and Würtz-Rasmussen (2011) study secondary education students in Denmark using data from PISA (Programme for International Student Assessment) and find negative effects of a higher immigrant concentration for both, native and immigrant students. The authors apply an IV-strategy using the immigrant concentration at the county level as an instrument for the school level.

With this study, I add to the relatively small literature on immigrant school concentration in a European country. I focus not only on educational consequences for native students but also for students with migration background and distinguish between different groups of migrants and potential gender-specific mechanisms. The outcome of interest in this study is not a score in an achievement test but grade repetition in primary and secondary school and track choice after primary education. These are educational outcomes of high stakes that have not been studied before. Like in Germany and Switzerland, the Austrian education system is characterized by the early selection of students into low and

[1] See Fairlie and Resch (2002) and Betts and Fairlie (2003) for examples from the United States.

high track school types. This study is the first one investigating immigrant concentration in a system of early tracking.

Track choice is important for the entire educational and occupational career of Austrian students and is strongly correlated with academic achievement. Results from national questionnaires of the Austrian PISA studies 2000, 2003 and 2006 show that there are huge test score gaps between students coming from low and high track schools. The gaps amount to 94 test scores in reading, 79 in mathematics and 82 in science (test scores have an international mean of 500 and a standard deviation of 100). Furthermore, while about 96% of all PISA students from high track schools attend a school concluding with a university entrance exam at age 15/16, only 39% of low track students do so. These educational differences most likely generate differences in the labor market. Individuals who attended a higher school during secondary education earn 30% higher wages and are less likely unemployed (Schneeweis and Zweimüller, 2013, forthcoming).[2]

3 Migrants in Austria

Despite the multicultural history of the Austro-Hungarian monarchy and large migration flows to Vienna at the turn of the 20th century, the share of foreigners after World War II was relatively small and decreased further to about 1.4% in 1961.

Figure 1 illustrates the share of the population with foreign nationality in Austria between 1961 and 2009. The country experienced two major waves of immigration, the first in the 1960s and early 1970s and the second in the early 1990s. As in Germany, the economic boom in the 1950s and 60s led to an excess demand for labor. So called guest-workers from other countries were actively recruited and invited to work in Austria. Politicians and firms focused on mainly low-skilled workers who were meant to work temporarily in Austrian industries. Most guest-workers came from former Yugoslavia and Turkey. Following the oil crisis, the recruitment of foreign workers was stopped in 1974. Although meant to work temporarily in Austria, many guest-workers stayed in the country

[2] I use administrative data covering the school careers of the students, i.e. school- and track-choice as well as grade repetition during the 9 years of compulsory education. The data-set does not include test scores or school marks of the students.

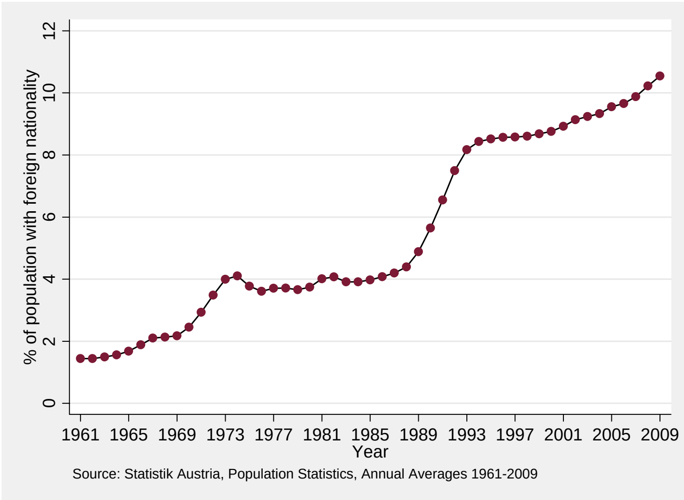

Figure 1: Share of population with foreign nationality in Austria

and subsequent immigration of family members occurred. The first peak in the share of migrants occurred in 1974. Afterwards the share of migrants remained relatively stable up until 1989. The second large wave of migration to Austria arose from the collapse of the Soviet Union and the political and economic changes in Eastern Europe. Moreover, the wars in former Yugoslavia (1991 in Slovenia, 1991-1995 in Croatia, 1992-1995 in Bosnia and Herzegovina and 1999 in Kosovo) resulted in large inflows of refugees.[3]

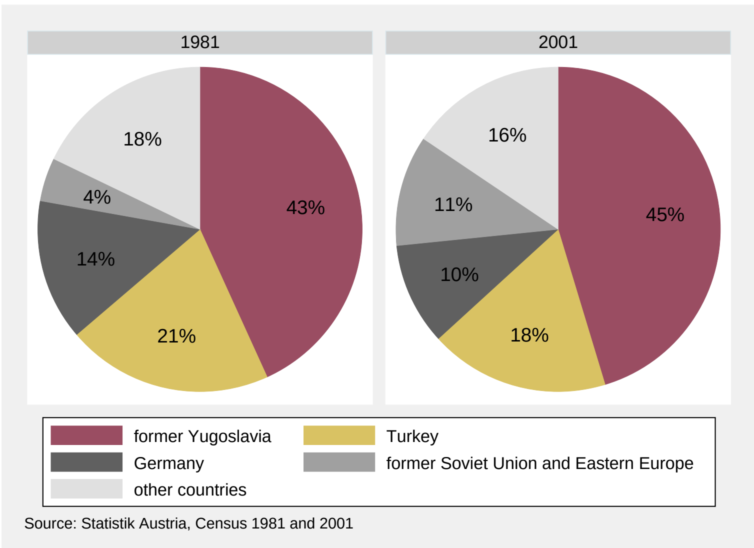

Figure 2: Foreign population by nationality

Figure 2 shows the composition of the population with foreign nationality. Despite the large increase in the number of migrants from 291,448 to 710,926 between 1981 and 2001,

[3]For more details on migration in Austria, see Lebhart and Marik-Lebeck (2007).

the ethnic composition remained almost stable (Statistik Austria, 1951-2001). The largest group of migrants comes from former Yugoslavia, followed by migrants from Turkey, Germany and the former Soviet Union and Eastern Europe (consisting of Poland, the Czech Republic, Slovakia, Hungary, Romania and Bulgaria).

The demographic and socioeconomic characteristics of migrants differ significantly from those of natives. Migrants are generally younger, more likely to be married, less well educated, more likely to be blue collar workers and to be hit by unemployment or poverty. In 2001, more than 50% of foreigners who were employed had no more than compulsory education, for natives the share was about 20%. Migrants from Germany have the most favorable characteristics and migrants from Turkey are the poorest ethnic group in Austria. While around 20% of Germans have university education, only 1% of Turkish migrants and around 2% of migrants from former Yugoslavia have a university degree (see Fassmann and Reeger (2007) for further details and Herzog-Punzenberger (2003) for a special focus on Turkish migrants in Austria).

4 Data and institutional background

In this paper, I study the effects of migrant segregation within an education system that is characterized by early tracking and a high degree of vocational orientation. The structure of the Austrian schooling system is shown graphically in Figure 3. Compulsory schooling starts at the age of 6 and is comprehensive, the students attend the primary school in their neighborhood based on catchment areas. After the successful completion of primary school, students and their parents can choose between two types of secondary education, a *low track* and a *high track* school. While low track schools provide basic general education and prepare students for further vocational education, high track schools offer an academically oriented curriculum. Next to differences in the curriculum, high track schools employ teachers with higher education, pay higher teacher salaries and admit only students with proper academic records.[4] During the four years in the low or

[4] The admission to high track schools is based on the marks of the students in the last grade of primary school. Students who achieve the marks ‘very good’ and ‘good’ in the core subjects (German writing, reading and mathematics) are admitted to a high track school in any case. Students with worse marks

high track school, students can change between school tracks. However, while upward mobility from the low to the high track school is very unusual, some downward mobility occurs between grade 5 and grade 8.

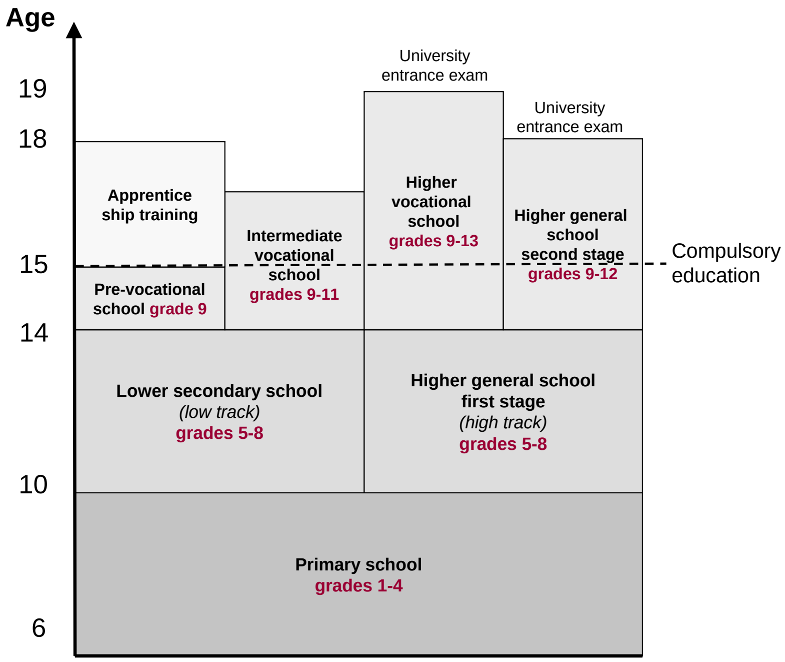

Figure 3: The Austrian education system

At the age of 14, students again have to choose between different types of schools: a pre-vocational school, a range of intermediate and higher vocational schools with different orientations and a higher general school. Only the higher vocational and general schools complete with university entrance qualifications. In principal, each student can choose between all these different types of schools. If, for example, students from low track schools aspire university education, they can apply for a higher vocational or higher general school. Depending on their marks in grade 8, they are either admitted to a higher school in grade 9 or they have to take an admission exam.

Although track revision is possible after grade 8, most students from low track schools choose a pre-vocational or intermediate vocational school, suggesting that the quality differences between low and high track schools during grades 5-8 hamper the transition of low track students to higher schools. For example, in the school year 2007/08 around two-thirds of all Austrian students attended a low track school in grade 8. Of these students,

('satisfactory', 'sufficient' and 'insufficient') have to sit in an admission exam if they apply for a high track school.

only 35% attended a higher vocational or general school in grade 9, while this number amounts to 95% among students from high track schools (Statistik Austria, 2008).

In the Austrian education system, students have to repeat grades if their achievement is insufficient in at least one school subject. More specifically, if a students' achievement is insufficient in more than two subjects, the student has to repeat the grade in any case. If the student is marked insufficient in one or two subjects, the student can avoid repeating the grade by passing an exam in each of the respective subjects.

I use register data covering the universe of 22 school cohorts of compulsory school students in Linz, the third largest city in Austria with about 190,000 inhabitants. I observe some basic individual characteristics of the students (age, sex, native language or citizenship) and the nine compulsory years of their school career (school types, schools and classes), usually grades 1 to 8 or 9.[5]

The explanatory variable of interest is the share of migrant students or students from a specific nationality, measured at the grade-level in the first year of primary school. This measure of ethnic composition is observed for 22 cohorts between 1980 and 2001. In this time period 48 public and 4 private primary schools were in operation. Students who attended a private, mostly catholic, school were dropped from the analysis because student enrollment in private schools is not based on catchment areas of the students' residency. Only about 6% of native students and 0.6% of students with migration background attended a private school in Linz. I further had to drop one public primary school that was in operation between 1980 and 1988 only and had no students with foreign background. Moreover, students in special schools (2.6%) and students with missing data on individual characteristics such as age, sex or migration background (0.8%) were dropped, resulting in a sample of 33,848 students in 47 primary schools.

The main outcome variable is track choice in grade 5, i.e. after primary education, which is observed for all 22 cohorts. Since downgrading or upgrading (to a lesser extent) between grades 5-8 is possible in the Austrian education system, I also study the effects

[5]The municipality of Linz documents nine years of compulsory schooling for each resident. Thus, school choice in grade 9 is only observed for students who did not repeat a grade or attend a pre-school class. Note that in Austria pre-school differs from kindergarten, which is attended by the majority of 3-5 year-old-children.

of class composition in grade 1 on track attendance in grades 6/7/8, which is observed for 21/20/19 cohorts who enrolled in primary school between 1980 and 2000/1999/1998. I furthermore investigate grade repetition in primary school (for 22 cohorts) and secondary school (for 19 cohorts).

I do not observe the full educational career of all students, if families move to other countries or other places in Austria during the compulsory school career of their children (most likely between primary and lower secondary school or lower secondary and upper secondary school). Even if families move to neighboring municipalities of Linz, the outcome variables of interest are not observed. From the full sample of all students attending grade 1, I observe the school track for 89% in grade 5, for 87% in grade 6, for 86% in grade 7 and for 84% in grade 8. Grade repetition in primary school is observed for 98% and in secondary school for around 90%.[6]

Table 1 gives summary statistics for the sample of all students, for male and female students, for students with and without migration background and for different groups of migrant students. The migration background of the students is mainly based on information on their native tongue, which was collected from 1980 to the mid 1990s. Then the municipality of Linz gradually started to report citizenship instead of native language. From 1993 to 1999, both variables are available in some cases, however, because in many cases (especially if students have migration background) only either language or citizenship is available, the definition of foreign background in this study is based on both variables and equals 1 if native language is not German and/or citizenship is not Austrian, German, Swiss or Luxembourg.[7] Section 7.1 provides a discussion of this issue and a robustness test based on a comparison of regression results obtained from alternative definitions of migration background.

Table 1 shows that around 44% of all students attend a high track school in grade 5 and around 41% are still in a high track school in grade 8. 4% repeated a grade in primary school and 6% repeated a class during grades 5-8.[8] About 10% of all students

[6]See Appendix A for a detailed discussion of the missing data.

[7]Students from other German speaking countries, such as Germany, Switzerland and Luxembourg are counted as native students.

[8]There is no grade repetition in the first grade of primary school. If students are not able to follow the instructions, they are either placed in a pre-primary class or they get pre-primary instructions.

have migration background, 48% are female and the students are 6.7 years old when they attend the first grade of primary education. Females do better in school than males, they are more likely to attend high track schools and less likely to repeat grades.

Students with foreign background attend high track schools around half as frequently as German-speaking children and repeat grades more often. More than half of all students with migration background comes from former Yugoslavia (including Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Montenegro, Kosovo and Macedonia), followed by Turkey and Eastern Europe (consisting of Poland, the Czech Republic, Slovakia, Hungary, Romania and Bulgaria).[9] Around 20% of students from former Yugoslavia attend a high track school in grade 5 and around 15% in grade 8, suggesting that around a quarter of these students downgrade between grades 5 and 8.[10] Among students with Turkish background, 10% attend a high track school and almost a third repeat a grade between grades 2 and 8. Students from Eastern Europe are the most successful group of migrants.

Students in Linz are highly segregated among schools. While native students attend primary schools with a migrant share (Fshare) of 8%, students with migration background attend schools with 26% migrants. The most segregated group are students from Turkey, they attend schools with an average migrant share of 29%. Furthermore, while natives are in classes with a share of 1.4% of Turkish children, the Turkish children themselves are surrounded by 9% of peers from their own country.

Figure 4 depicts the development of the total share of migrants in all primary schools. While migrant students constituted a share below 5% in the 1980s, the share increased dramatically during the 1990s and amounted to around 22% in 2001. This development was significantly influenced by migration from former Yugoslavia, but also migration from Turkey and the Eastern European countries grew during the 1990s.

As will be discussed in more detailed in the next chapter, I use the variation in the share of migrants between adjacent cohorts within schools to identify the effects of ethnic grade composition. Around 63% of the overall variation in the migrant share can be attributed to the time dimension. In all schools operating from the early 1980s to 2001, the share

[9]Note that this group of migrant students also comprises 25 students from the former Soviet Union. For the sake of brevity, this group is called 'Eastern Europe'.

[10]Since the sample varies with the grade considered, comparisons among grades are only suggestive.

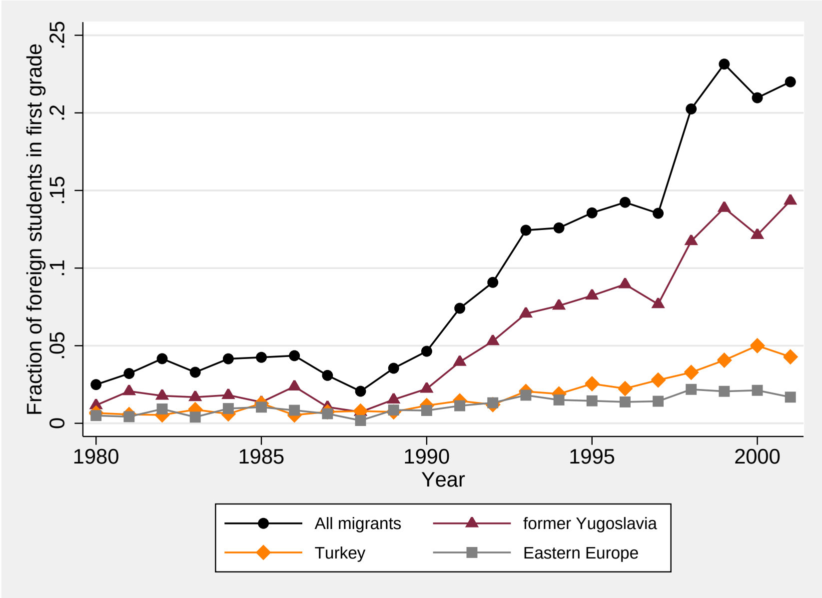

Figure 4: Migrant share in primary schools over time

of migrant students increased steadily, with a mean rise of 18 percentage-points.[11] One third of the schools experienced an increase in the share of migrants by below 8 percentage points, one third by 8-20 percentage points and one third by more than 20 percentage-points. The development in the share of migrants over time in three representative schools is presented in Figure 5.

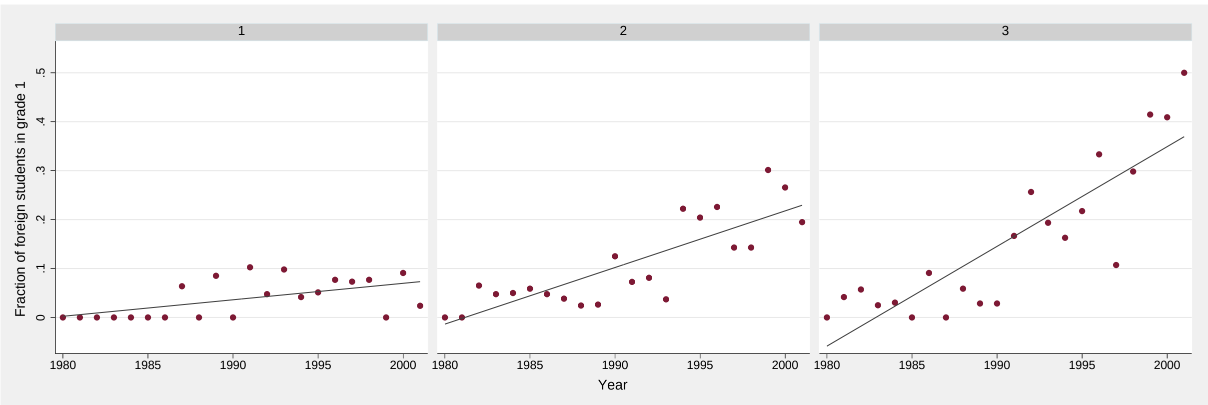

Figure 5: Development of the migrant share in representative schools

[11] 18 percentage points is the mean difference between the 5-year average migrant share of 1980-1984 and 1997-2001.

5 Estimation strategy

I focus on the following research question: What is the effect of the fraction of migrant students in first grade of primary school on track choice for native and migrant students? The baseline econometric model can be written as:

$$Htrack^*_{imcs} = \beta_0 X_{imcs} + \beta_1 M_{imcs} + \beta_2 Fshare_{imcs} \cdot N_{imcs} + \beta_3 Fshare_{imcs} \cdot M_{imcs} + \epsilon_{imcs} \quad (1)$$

$$Htrack_{imcs} = \begin{cases} 1 & \text{if } Htrack^*_{imcs} > 0 \\ 0 & \text{otherwise} \end{cases} \quad (2)$$

where $Htrack^*_{imcs}$ is the latent probability of choosing a high track school type after primary education (in grades 5-8) of student i belonging to (migrant or ethnic) group m of school cohort c coming from primary school s.[12] X_{imcs} captures basic observable characteristics of the students and school cohorts. M_{imcs} is an indicator variable equal to 1 if a student has migration background, $Fshare_{imcs}$ gives the fraction of foreign students in grade 1 of primary education and N_{imcs} is an indicator variable for native students. The coefficients of the two interaction terms give the effect of migrant school composition for native students (β_2) and the equivalent effect for migrant students (β_3).

In a first step, I distinguish between natives and migrants, $m = \{N, M\}$. Different groups of students, such as natives, students from former Yugoslavia, Turkey, Eastern Europe as well as other countries will be considered later on, $m = \{N, Y, T, E, O\}$.

The fraction of migrant students in primary school might be endogenous and correlated with unobserved student, school and neighborhood characteristics. The error term in equation 1 can be decomposed into several components:

$$\epsilon_{imcs} = \mu_c + \nu_s + \tau_{cs} + \eta_{mc} + \theta_{ms} + \phi_{mcs} + \omega_{imcs} \quad (3)$$

μ_c are cohort fixed effects and ν_s are school fixed effects. Cohort fixed effects contain unobservable student characteristics that are shared by all students of a given cohort. The school fixed effects capture unobservable characteristics of schools and neighborhoods (or catchment areas) that are constant over time, such as the school building, school and

[12] Equivalent models can be formulated for grade repetition in primary and secondary school.

neighborhood facilities and other conditions that are likely to be correlated with both, the ethnic composition and academic achievement. τ_{cs} are cohort-by-school effects and capture all unobserved characteristics that are shared by all students who enroll in a given school at the same time. Furthermore, η_{mc} and θ_{ms} are group specific cohort and school effects, capturing all unobservables that are shared by ethnic groups of the same cohorts (e.g. migration or ethnic history) and ethnic or migrant groups in the same schools and neighborhoods. Finally, ϕ_{mcs} captures cohort-by-school fixed effects that are group specific and ω_{imcs} is an idiosyncratic error component.

All estimations include cohort and school fixed effects (μ_c, ν_s). Cohort-by-school fixed effects (τ_{cs}) can not be included in most estimations because the explanatory variable of interest, the share of migrant students in school, only varies by cohort and school. Instead of controlling for τ_{cs}, school-specific linear, quadratic or cubic time trends are included in the regressions, capturing all unobservables within schools that change over time.[13] Due to efficiency reasons and the small sample size, I abstain from including cohort and school effects that are migrant specific. Instead, I show some sensitivity checks by gradually adapting the fixed effects to the migrant level in section 7.3.

As common in this literature, I define the relevant peer group for the students at the grade-level, not at the class-level. The identification strategy is based on variation in ethnic grade-composition of adjacent cohorts within schools. Although I observe classes in the data, I can not be sure, whether students are randomly allocated to different classes or whether classes are formed on the basis of migration background or other unobservable characteristics.[14]

[13] The effects of the own ethnic group (e.g. the effect of Turkish peers on the performance of students from Turkey) can be estimated with cohort-by-school fixed effects. See section 7.2 for this kind of specification and a comparison to the inclusion of school-specific time trends.

[14] The share of foreign students at the class-level and the grade-level are strongly correlated with a correlation coefficient of around 0.92.

6 Results

This section presents the regression results. Section 6.1 shows baseline estimates of the impact of migrant grade composition on track attendance and grade repetition of students with and without migration background. In section 6.2, I focus on the different groups of migrants in Austria and contrast the impact of the share of migrants in school to the impact of the share of migrants from the same country of origin, thereby investigating whether peer groups in schools form along ethnic dimensions. Section 6.3 investigates non-linear effects of grade composition and section 6.4 focuses on heterogeneities between boys and girls.

6.1 Baseline results for native and migrant students

Descriptive evidence on the relationship between the share of migrant students in the first grade of primary school and high track attendance of migrant and native students in grade 5 is given in Figure 6. While the regression line is almost flat for native students, for migrant students a negative slope can be detected.[15]

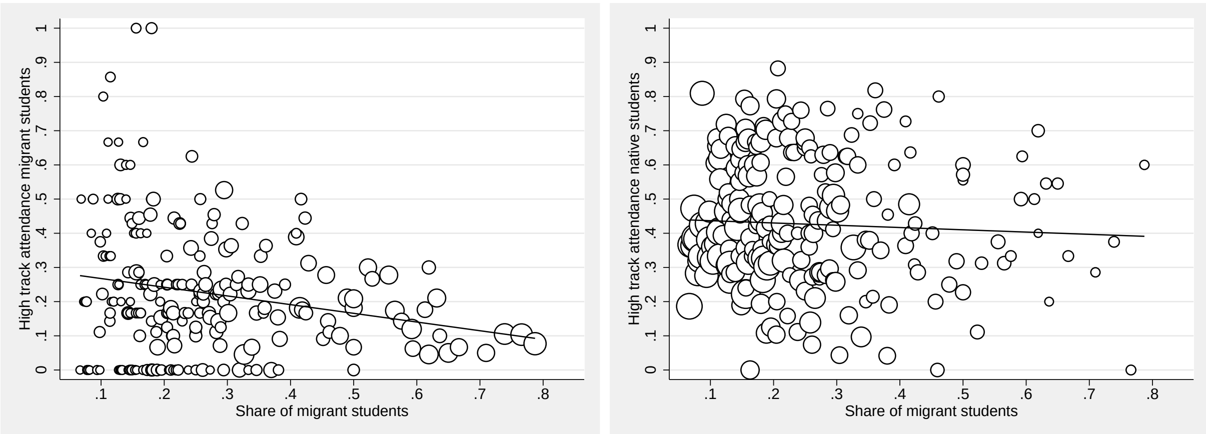

Figure 6: High track attendance in grade 5 and share of migrant students

Table 2 presents the regression results of the effects of grade composition on track attendance of native and migrant students. Panel A shows estimates for track choice in

[15] Figure 6 is based on school*cohort cells. The sample is restricted to school-years with a minimum cohort size of 20 students and a minimum number of 5 migrant and 5 native students. The circle areas are proportional to the number of migrant students/native students in the cell.

grade 5, i.e. directly after primary education. The first three columns give the coefficients of the migrant dummy and the share of foreign students with school-specific linear, quadratic and cubic time trends. On average, students with migration background are 16 percentage-points less likely to choose a high track school in grade 5. The fraction of migrant students in grade has no significant effect on average. The second three columns include an interaction term of the migrant share in grade with the dummy variable for migrant students. While there is no significant effect for native students, migrant students suffer from a higher share of foreign students in the grade. The effect can be seen at a glance in the last three columns of Panel A. This specification includes two interaction terms and shows the estimates for migrant and native students separately (as defined in equation 1). The coefficients range from -0.16 to -0.20, indicating that an increase in the share of foreign students by around 10 percentage-points reduces the probability of choosing a high track school type for migrant students in grade 5 by 1.6-2 percentage-points. Given that around 22% of migrants attend a high track school, the effect is sizeable in magnitude and amounts to 7-9%.

Since track revision in grades 6-8 is possible in the Austrian education system, Panel B of Table 2 presents baseline estimates for track attendance in these grades. The results are very similar to grade 5, migrant students are negatively affected by a higher share of migrant students in the grade and native students are not influenced. Consider grade 8. The coefficient is around -0.3. If migrant students were surrounded by a migrant share of 8% (as native students are) instead of 26%, their probability of attending a high track school would increase by 5.4 percentage points. This would decrease the raw attendance gap between native and migrant students in grade 8 by 23%.[16]

Table 3 gives baseline estimates for grade repetition in primary and secondary school. The net differences in grade repetition between native and migrant students amount to around 5 percentage-points in primary school and 3 percentage-points in secondary school. The share of migrant students in grade 1 of primary school has no significant influence on grade repetition, neither for natives nor for foreign students.

[16]Note that the sample differs for the different outcome variables. When estimating the model using the same sample of students for all grades, the coefficients do not differ between grades.

All baseline estimates are similar when the models are estimated with Probit regressions. The marginal effects are statistically significant for migrant students' track attendance in all grades. For native students, no significant effects are obtained. The magnitudes of the marginal effects are similar in size to the coefficients of the linear probability models.

6.2 Results for groups of migrants

It might be the case that it is not the share of foreign students per se that affects learning outcomes, but the share of students from the own country of origin. If peer groups in schools form along ethnic dimensions, the share of the own group may be the more important variable. Results on the impact of the share of the own group are given in Panel A of Table 4. In these regressions, I distinguish between five groups of students: natives, students from former Yugoslavia, Turkey, Eastern Europe and other countries. The first four columns show estimates of the effects of the own group share on track attendance in grades 5 and 8 as well as grade repetition in primary and secondary school.[17]

The results are similar to the baseline estimates; significant coefficients are obtained for track attendance of migrant students in both grades but not for grade repetition. The magnitudes of the coefficients are similar to the baseline estimates, although somewhat larger when the own group is considered. The second four columns of Panel A include an additional variable, namely the share of other migrants in grade (not counting the own ethnic group). The absolute values of the coefficients for the share of the own migrant group increase somewhat and the share of other migrants in grade exert an additional small and marginally (in)significant influence on track attendance for students with migration background. Again, grade repetition is not influenced.

Furthermore, I investigated whether the impact of the own group share in grade differs between migrant groups and interacted the explanatory variable with binary indicators for native students as well as students from former Yugoslavia, Turkey, Eastern Europe and other countries.[18] For track attendance, negative coefficients are obtained for most groups of migrants. However, the coefficients are statistically significant only for students

[17] All regressions control for school-specific quadratic time trends. The results are similar when linear or cubic trends are used.

[18] Results available upon request.

from Turkey. When grade repetition is investigated, I find statistically significant effects only for students from Eastern European countries. The higher the fraction of this group, the more likely these students are repeating grades in primary and secondary school.

Students from Turkey are the most homogenous group of migrants in Austria, since these students share the same ethnicity, religion and language. Students from former Yugoslavia and Eastern Europe only share the region of birth and a history of communism. Especially after the wars in former Yugoslavia, the students from this area might identify themselves as Croats, Serbs or Bosnians. Social ties among these groups of migrant students should therefore be less intense.

Overall, the analysis by migrant groups suggests that the influence of the own group is larger than the impact of the share of foreign students. These results indicate that some of the mechanisms discussed in section 1 might be more important when the students share the same ethnic background. Limited teacher attention and class room learning, seem to be a minor argument, especially when the estimates for native students are taken into account who should also suffer from a lower level of class room learning. The main mechanism probably has to do with peer groups that form along ethnic dimensions and hamper educational performance. If students from the same country of origin are more likely to form friendships, a higher share of the own group reduces social interactions with and social learning from native students, including the learning of social traits and language skills.

6.3 Non-linear effects

The relationship between migrant concentration in school and academic outcomes might be non-linear. The disadvantages of attending a school with a high share of migrant students might be a lower level of class-room learning and teacher attention ("less learning") as well as less social exposure to native students ("less inter-ethnic interactions"). On the other hand, the advantage of attending a school with a higher share of migrant students or students from the same region might be that specific needs or learning difficulties are more likely to become apparent, the higher the migrant concentration in school. Accordingly, teachers and school authorities might be more likely to recognize these needs and react to them ("salience"). The results presented above indicate that the net effect of these opposing mechanisms is negative.

The magnitudes of the positive and negative channels might depend on the level of ethnic concentration. Two alternative hypotheses can be formulated. First, "salience" is achieved at relatively low levels of ethnic concentration and at higher levels the negative effects ("less learning and inter-ethnic interactions") get stronger and outweigh the positive ones. Or second, "salience" is reached in groups with a rather high fraction of migrant students, thus reducing the negative effects at higher levels. Both hypotheses are plausible.

Panel B of Table 4 gives regression results allowing for a quadratic relationship between grade composition and academic outcomes. While the first four columns refer to the total share of foreign students, in the second four columns the share of the own group of students is considered. Linear probability models are estimated and school-specific quadratic time trends are included in all regressions. Marginal effects evaluated at mean values of the migrant concentration are reported below the coefficients. There is no evidence of a quadratic relationship between the fraction of migrants in grade and academic outcomes. The coefficients are not statistically significant and the marginal effects are similar to the baseline results.

Considering the share of students from the own region of origin, the quadratic specifications are appropriate for track attendance. Track attendance is influenced by the share of students from the own group of origin in a quadratic way with decreasing marginal effects. The higher the share of the own migrant group the lower the magnitudes of the marginal effects. Linear predictions of migrant students' track attendance at various values of immigrant concentration are plotted in Figure 7.

In between the 25^{th} and 75^{th} percentiles of ethnic concentration (an own share of 4.4% and 19.2%), the relationship approximates a linear course. The marginal effects are negative and decreasing until the own group constitutes about 30% (the 88^{th} percentile) and get slightly positive thereafter.

Overall, the analysis of non-linear functional forms yields interesting conclusions. When the share of migrants is considered, the linear specification seems to be the most appro-

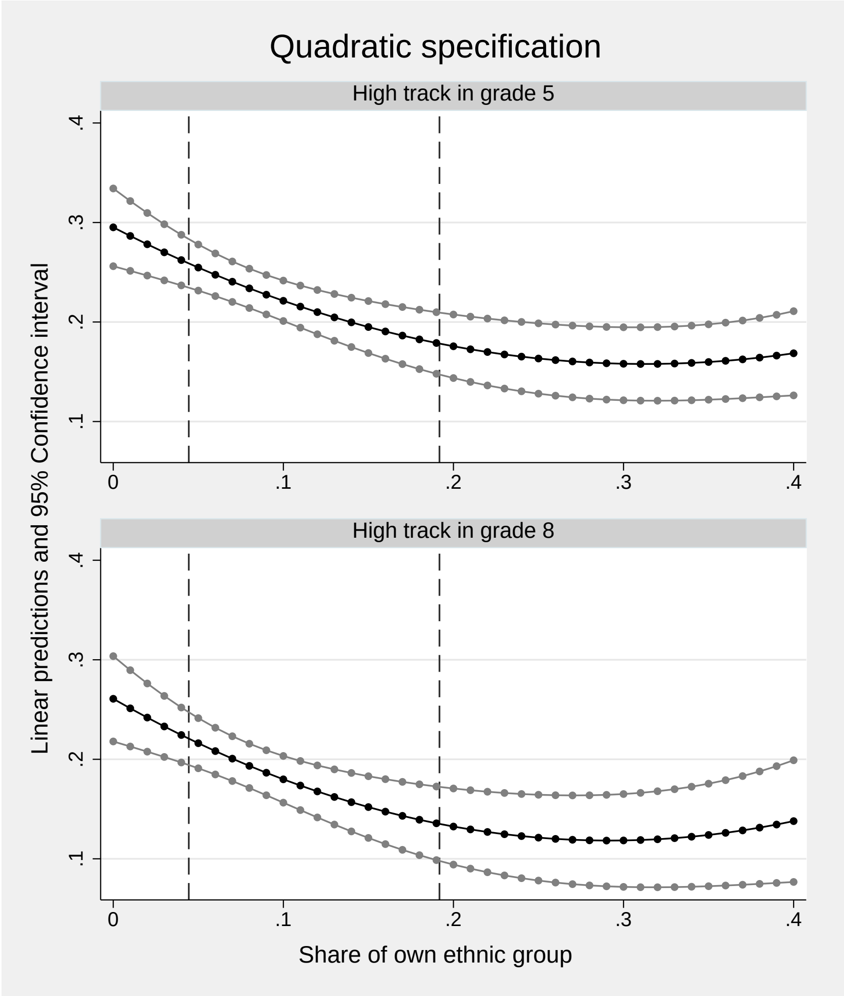

Figure 7: Linear predictions of migrant students' high track attendance, evaluated at migrants' means. The vertical dashed lines give the 25^{th} and 75^{th} percentiles of the distribution.

priate one. When ethnic groups are differentiated, decreasing magnitudes in the marginal effects are observed. This supports the second hypothesis formulated above. The negative effects of ethnic concentration decline the larger the ethnic group gets. This indicates that specific needs of ethnic groups become salient at higher levels of immigrant concentration, and teachers and school authorities adapt their learning strategies to those needs, thus reducing the negative effects. The fact that marginal effects decrease only when the share of the own group is investigated supports this hypothesis, since students from the same origin are more homogeneous than students with migration background in general. They might share individual characteristics and needs that can be recognized when the group exceeds a certain size. In contrast, migrant students might be more heterogenous as a group and it might be more difficult for teachers to adapt learning strategies. This argument can also be applied to other students in class, since students do not only learn from teachers but also from their class mates.

6.4 Results for boys and girls

Female students do better in school than male students and the achievement gap between students with and without migration background is somewhat smaller among females than males. Considering high track attendance in grade 8, the raw achievement gap amounts to around 24 percentage-points among males and 21 percentage-points among females.

In Table 5, I investigate whether the impact of ethnic grade composition differs for males and females. Panel A shows regressions allowing for heterogeneous effects of the share of foreign students/students from the own group for native and migrant students by gender. Neither for native males nor for native females, the share of foreign students has significant effects on track attendance. For native females a small positive coefficient, significant at the 10-percent level, is obtained for repetition in primary school.

For students with migration background, as above, negative effects are obtained for track choice. The coefficients are somewhat larger in magnitude for males than females and statistically more significant. However, equality tests show that the coefficients are not significantly different from each other. When the share of the own group is considered, similar results are obtained. A significant difference is found for migrant boys' and girls' repetition in primary school, suggesting that males repeat less likely when their own ethnic share in grade is higher. However, this coefficient is significant at the 10 percent-level only.

In Panel B of Table 5, I investigate whether peer groups form along gender lines. Instead of considering the share of (groups of) migrants in the whole grade, these estimates refer to the shares among gender groups. The underlying assumption is that for boys mainly the fraction of migrant students among boys is relevant, and the same argument applies to girls. For native students, I obtain a positive coefficient of gender specific migrant concentration on high track attendance in grade 8 for boys and a positive coefficient on repetition in primary school for girls. Native male students seem to profit from migrant boys in terms of track attendance, while native female students seem to lose from migrant girls in terms of grade repetition.[19] Equality tests show that these gender differences are statistically significant at the 10-percent level.

The results for foreign students are similar to those presented above. Male migrants are somewhat more influenced by their foreign male peer group than female migrants are. However, most of the obtained coefficients are not statistically different between boys and girls. Compared to the estimates in Panel A, Panel B coefficients are smaller in magnitude and less precise, indicating that migrant peer groups in primary school form cross gender.

The analysis by gender shows that native females are negatively affected by a higher share of foreign students with respect to grade repetition in primary school. An increase in the share of students with migration background by 0.1 (one standard deviation) increases the probability of repeating a grade by around 0.5 percentage-points for them. Interestingly, native females are stronger affected when the share of migrants among females is considered. This seems to be the relevant peer group for native females. The equivalent effect amounts to 0.75 percentage-points. Among native boys, a positive effect of a more foreign male peer group on high track attendance in grade 8 is observed. Again, the gender specific peer group seems to be important for native males. For migrant students, the effects are somewhat stronger for males than for females and stronger when the total share of migrants is considered compared to the gender specific shares. This indicates that the gender dimension in primary schools is less important for migrant students than the ethnic dimension. These differences might have to do with group size. Migrant students are in a minority position in the class, which might hamper the formation of peer groups by gender. There might be simply not enough students for gender-specific and ethnic peer groups. Among native students, the gender dimension is more important.

7 Sensitivity analysis

This section investigates the robustness of the baseline results. Section 7.1 shows regressions for certain time periods in which the information on either native language or citizenship is used to define the migration background of the students. In section 7.2, the

[19]The same results with reversed signs are obtained for native students when the own group shares are considered, since the own group share for native students is simply the share of natives in the grade.

robustness of the results to more flexible school-specific time trends and school-by-cohort fixed effects is investigated and "unexpected shocks" in the ethnic school composition (deviations from linear and quadratic trends) are used in an Instrumental Variables approach. In section 7.3, I allow the various fixed effects and the school-specific time trends to vary for students with and without migration background.

7.1 Definition of migrants

The definition of migration background in this study is based on two variables, native language and citizenship.[20] Information about the native language of the students was fully collected from 1980-1992 and then gradually replaced with the information on the students' citizenship. From 1993-1999 both variables are available in some cases. For native students both variables are available most of the time, while for students with migration background either language or citizenship or both are documented. Thus, the definition of migration status in this paper is based on both variables and equals 1 if either language or citizenship indicates migration background.

Table 6 provides a robustness test and shows the estimated effects of the share of foreign students/students from the own ethnic group when the variable of interest is based on native language only (Panel A) and citizenship only (Panel B). Because of missing data, the regressions are restricted to a time period in which at least 95% of language-information (1980-1994) and 80% of citizenship-information (1993-1998/2001) is available. Since the time spans are shorter in this exercise, school-specific linear time trends are used instead of quadratic ones. The results for native language are robust to the inclusion of quadratic time trends.

I find significant negative effects of immigrant concentration on migrant students' track attendance in grades 5 and 8 with both definitions of migration background and for both

[20] The conditions for acquiring the Austrian citizenship are regulated in the Austrian Nationality Act ('Staatsbuergerschaftsgesetz'). Foreign citizens are allowed to apply for the Austrian nationality if they have been in Austria for at least 10 years and have had a permanent residency for 5 years. Legal integrity and proof of regular earnings are additional requirements. After acquiring the Austrian nationality, individuals lose the previous one(s), as dual citizenship is not allowed. Furthermore, the Austrian law is based on nationality by descent not birth, i.e. children who are born in the country do not get the Austrian citizenship automatically. If one parent is an Austrian citizen and the other parent is not, the child can have the Austrian nationality, the nationality of the other parent or both, depending on the other country (dual citizenship is allowed in this case).

time periods. The coefficients are somewhat larger in the first, longer, period and a positive significant coefficient of the own group on primary school repetition is obtained. While the analysis is imperfect because the different measures of migration background are observed for different time periods, the main conclusions are corroborated.

In general, for measuring migration background, the country of birth of the student and his/her parents would be the preferred information. While these variables are not available in the school data, I can compare the distribution of the different migrant groups in the school data to another data source where the information on birth countries is available. The Austrian PISA-data (Programme for International Student Assessment) of 2003 and 2006 include detailed information on countries of birth and contains a representative sample of all Austrian students born in 1987 and 1990. Thus, I restrict the PISA data to students who go to school in urban areas similar to Linz[21] and restrict the school data to the birth cohorts 1987-1990 (starting primary education in 1993-1997). The distribution of first and second generation migrants in the PISA data is very similar to the distribution of foreign students in the school data. While the school data include 7.7% of students from former Yugoslavia, 2.3% from Turkey and 1.4% from Eastern Europe, the corresponding numbers in PISA are 7.0%, 2.1% and 1.5%.

7.2 Time trends

All estimations presented above control for unobservables that are common to all students who belong to the same cohort (cohort fixed effects, μ_c) and attend the same school or live in the same neighborhood (school fixed effects, ν_s). Moreover, school-specific linear, quadratic or cubic time trends are included in the regressions. However, since the time period under investigation is relatively long, there might be worries that unobservable characteristics of schools and students change from cohort to cohort and are correlated with changes in the share of foreign students.

Consider the following example. The municipality of Linz builds a new apartment building that provides cheap housing in a relatively affluent neighborhood. Due to this

[21] I choose cities with 100.000 to 1 million inhabitants including all big cities except Vienna: Graz (∼270.000), Linz (∼190.000), Salzburg (∼150.000) and Innsbruck (∼120.000).

housing policy, the share of students with migration background who enroll in the local primary school rises suddenly. Moreover, the native and migrant students who live in the new apartment building and who enter primary school are negatively selected with respect to socio-economic characteristics. Thus, the negative academic outcomes of the school cohort might be spuriously attributed to the rise in the share of students with migration background and the absolute values of the coefficients β_2 and β_3 are biased upwards.

Flexible school-specific time trends should capture this variation and reduce these kinds of biases. One strategy to get rid of unobservable characteristics of schools and students that change over time is to control for school-by-cohort effects (τ_{cs} in equation 3). Since the share of foreign students is equal to all students in a given school-cohort, the impact of the share of foreign students can not be separated from school-by-cohort effects. However, the impact of the own ethnic group can be estimated with school-by-cohort effects. Panel A in Table 7 compares regressions and F-Statistics of different trend specifications (linear, cubic and quartic trends) and the school-by-cohort fixed-effects approach for each outcome. I do not find any significant effects for native students. For foreign students' track choice in grade 5, all specifications yield similar coefficients. For track attendance in grade 8, the coefficient loses statistical significance if school-by-cohort effects are used. For grade repetition in primary school, I find significant negative coefficients with the cubic, quartic and fixed-effects approach. Repetition in secondary education is not affected in all specifications. Overall, the F-Statistics decline when school-by-cohort effects are estimated, in particular when track attendance is considered. Overall, the results for track attendance are quite robust, while the results for grade repetition in primary school are mixed.

To provide a sensitivity check with respect to unobserved time trends for the analysis of the impact of the share of migrant students in grade, I follow Hoxby (2000) and apply an IV-strategy. The idea is to use unexpected shocks in the share of foreign students (deviations from a trend) in each school as an Instrumental Variable for the main explanatory and possibly endogenous variable. For each single school, I regress the share of foreign students on a linear time trend. I then calculate the deviations from these trends, the residuals, and use these to instrument for the share of foreign students in equation 1. The identifying assumption is that the trend in the enrollment of students with migration background can adequately be summarized by a linear trend. This assumption might be too restrictive. I therefore repeat the same procedure with quadratic trends. Here, the deviation in the share of foreign students from a quadratic trend within each school is used as an Instrumental Variable. Panel B of Table 7 shows results form the 2SLS estimations. The conclusion does not change: native students are not affected and students with migration background are less likely to attend a high track school if the share of foreign students increases randomly. The magnitudes of the coefficients are equal to the estimated magnitudes of the baseline results.

7.3 Migrant-specific fixed effects

As described in section 5, the results presented so far are based on regressions that control for school-fixed effects, cohort-fixed effects as well as school-specific time trends. One might argue that cohort-fixed effects are not enough because cohorts of native student and migrant students might differ in their unobservable characteristics. In the same way, school-fixed effects, capturing school- or neighborhood characteristics that are constant over time, might differ for students with and without migration background and the school-specific time trends as well. In Table 8, I present regressions in which I control for school-by-migrant effects (θ_{ms}), cohort-by-migrant effects (η_{mc}), and school-specific quadratic trends (Panel A) or school-by-migrant specific quadratic trends (Panel B). The school-by-migrant specific quadratic time trends are a proxy for ϕ_{mcs} in equation 3.

All coefficients for track attendance range between -0.20 and -0.27, similar magnitudes as reported above. All estimates for track attendance in grade 5 are statistically significant. For track attendance in grade 8, only one statistically significant coefficient is obtained. For grade repetition, no significant effects are found. Overall, the migrant-specific fixed effects seem to be less efficient than the baseline model, however, the main results are corroborated.

8 Conclusions

I study educational careers of 22 cohorts of compulsory school students in a major Austrian city. Using within-school variation in the share of foreign students in the grade between adjacent cohorts, I identify the effects of ethnic grade composition on track choice after primary education, track attendance in higher grades and grade repetition in primary and secondary school, educational outcomes of high stakes. To my knowledge, this paper is the first one investigating the effects of immigrant concentration on school choice in a system of early tracking.

The ethnic composition in primary schools has significant effects on educational outcomes of students with migration background. A higher share of foreign students in the grade decreases high track attendance for migrant students. For native students, no significant effects are found on average. Furthermore, the estimated coefficients for migrant students are larger in magnitude when the share of the own migrant group is considered.

Segregation of migrant students among primary schools is high. While native students attend schools with around 8% of migrants, students with migration background are in primary schools with around 26% of migrants. Migrant students are also segregated with respect to their region of origin. Students from Turkey, for example, while constituting only 1.8% of all students are in school-grades with 9% of Turkish students. The results of this study indicate that a reallocation of students with migration background to schools with no or very few students from their own region of origin would decrease the native-migrant achievement gaps.

A lower level of classroom learning and reduced teacher attention due to a higher share of foreign students in class seem to play a minor role, since native students are not affected by the share of foreign students. The larger coefficients when considering the share of the own migrant group suggest that peer groups in schools form along ethnic dimensions. When more students from the same migrant group are in the same school, they form ethnic peer groups and engage in less social interactions with native students. Furthermore, when considering the impact of the share of the own migrant group, the effects are non-linear with decreasing marginal effects, indicating that the negative impact of ethnic peer groups is reduced the larger the group becomes. One explanation is that the larger the group of students from a specific region or ethnicity, the easier it becomes for teachers and school authorities to recognize specific needs of certain groups and adapt their teaching strategies, thus reducing the negative effects.

The analysis by gender shows that boys with migration background are somewhat more influenced by the ethnic composition in school than girls, however, most coefficients do not differ statistically between genders. When the share of migrant (groups) among boys is considered for males and among girls for females, the coefficients are smaller in magnitudes and statistically less significant, suggesting that primary school peer groups among foreign students do not form by gender. For native students, I found some evidence that peer groups in primary school form along gender-lines.

Overall, the results of this study are in line with the results from the previous literature. The share of migrant students in class has negative effects on high track attendance for migrant students and no effects for native students on average. The probability of grade repetition is not affected by the share of students with migration background. The effects might differ by the socio-economic background of the students or their ability. However, these kinds of heterogeneities can not be studied with the data at hand.

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Table 1: Summary statistics

	All Students		Means		Means		Migrants from . . .			
	Mean	St.Dev	Males	Females	Natives	Migrants	Yugoslavia	Turkey	EE	Other
Dependent Variables										
High track (grade 5)	0.437		0.423	0.451	0.460	0.221	0.200	0.109	0.420	0.317
High track (grade 6)	0.424		0.421	0.452	0.446	0.207	0.178	0.115	0.391	0.298
High track (grade 7)	0.416		0.412	0.441	0.436	0.190	0.158	0.100	0.365	0.290
High track (grade 8)	0.407		0.404	0.436	0.424	0.190	0.153	0.104	0.359	0.302
Repetition (grades 2-4)	0.043		0.045	0.036	0.037	0.097	0.087	0.157	0.061	0.089
Repetition (grades 5-8)	0.064		0.072	0.048	0.061	0.105	0.084	0.178	0.102	0.100
Student Characteristics										
Migrant (lang/cit)	0.097		0.096	0.098	0	1	1	1	1	1
Female	0.476		0	1	0.476	0.481	0.480	0.477	0.519	0.451
Age in grade 1	6.735	0.430	6.773	6.693	6.715	6.921	6.876	7.080	6.895	6.931
School-grade Characteristics										
Share of migrant students (Fshare)	0.096	0.126	0.098	0.095	0.079	0.263	0.279	0.291	0.183	0.213
Share of students from . . .										
German-speaking countries	0.904	0.126	0.902	0.905	0.921	0.737	0.721	0.709	0.817	0.787
former Yugoslavia	0.055	0.084	0.055	0.054	0.043	0.161	0.185	0.161	0.088	0.107
Turkey	0.018	0.036	0.019	0.018	0.014	0.054	0.052	0.091	0.026	0.034
Eastern Europe	0.012	0.020	0.012	0.012	0.011	0.022	0.019	0.017	0.047	0.022
Other countries	0.017	0.021	0.012	0.012	0.010	0.026	0.023	0.022	0.022	0.049
Share of own ethnic group (Own share)	0.846	0.254	0.845	0.846	0.921	0.137	0.185	0.091	0.047	0.049
Share of females	0.472	0.087	0.458	0.488	0.473	0.463	0.461	0.458	0.473	0.466
Number of students in grade	46.155	19.05	45.831	46.511	46.085	46.810	46.716	41.754	51.732	50.584
Number of schools	47		47	47	47	47	47	47	47	47
Number of students	29,979		15,708	14,271	27,082	2,897	1,714	532	343	308

NOTES: The number of observations (N=29,979) refers to the number of students with non-missing information on track choice in grade 5, which is observed for 21 cohorts in 47 schools. The number of cohorts is smaller when outcomes of higher grades are considered. Track attendance in grades 6/7/8 is observed for 21/20/19 cohorts or 28,198/26,455/24,427 students. Repetition in primary school (grades 2-4)/secondary school (grades 5-8)/both schools (grades 2-8) is observed for 21/19/19 cohorts or 33,211/26,080/26,067 students.

Table 2: Baseline results - Track attendance

	High track g5			High track g5			High track g5		
A: Track choice g5	lin-trend	qu-trend	cub-trend	lin-trend	qu-trend	cub-trend	lin-trend	qu-trend	cub-trend
Migrant	-0.164	-0.164	-0.164	-0.134	-0.130	-0.131	-0.134	-0.130	-0.131
	(0.012)***	(0.012)***	(0.012)***	(0.017)***	(0.017)***	(0.017)***	(0.017)***	(0.017)***	(0.017)***
Fshare	-0.059	-0.086	-0.067	-0.018	-0.045	-0.030			
	(0.051)	(0.055)	(0.058)	(0.058)	(0.060)	(0.062)			
Native*Fshare							-0.018	-0.045	-0.030
							(0.058)	(0.060)	(0.062)
Migrant*Fshare				-0.139	-0.158	-0.154	-0.157	-0.203	-0.184
				(0.063)**	(0.063)**	(0.065)**	(0.061)**	(0.064)***	(0.068)***
Observations	29979	29979	29979	29979	29979	29979	29979	29979	29979
F-Statistics	44.62	44.20	46.00	44.22	43.72	46.05	44.22	43.72	46.05
Adj R-squared	0.106	0.107	0.107	0.106	0.107	0.107	0.106	0.107	0.107
	High track g6			High track g7			High track g8		
B: Higher grades	lin-trend	qu-trend	cub-trend	lin-trend	qu-trend	cub-trend	lin-trend	qu-trend	cub-trend
Migrant	-0.139	-0.134	-0.136	-0.137	-0.132	-0.133	-0.128	-0.123	-0.125
	(0.017)***	(0.017)***	(0.018)***	(0.018)***	(0.018)***	(0.018)***	(0.019)***	(0.020)***	(0.020)***
Native*Fshare	-0.003	-0.042	-0.014	0.014	-0.053	-0.017	0.038	-0.043	-0.039
	(0.059)	(0.062)	(0.063)	(0.063)	(0.065)	(0.067)	(0.070)	(0.071)	(0.073)
Migrant*Fshare	-0.130	-0.195	-0.155	-0.191	-0.289	-0.247	-0.200	-0.315	-0.302
	(0.066)**	(0.073)***	(0.074)**	(0.072)***	(0.084)***	(0.084)***	(0.084)**	(0.096)***	(0.095)***
Observations	28198	28198	28198	26455	26455	26455	24427	24427	24427
F-Statistics	49.38	53.37	51.18	48.14	49.77	52.80	40.84	44.88	59.53
Adj R-squared	0.106	0.107	0.108	0.107	0.108	0.109	0.102	0.103	0.103

NOTES: Each panel and column refers to a separate linear probability regression. Fshare is the share of students with migration background in the first grade of primary school. Student (age, female) and school-grade characteristics (number of students in grade, share of females), cohort fixed effects and school fixed effects included in each regression. School-specific linear trends, quadratic trends and cubic trends included as indicated above. Heteroscedasticity and cluster robust standard errors in parentheses (cluster=school*cohort). ***, ** and * indicate a statical significance at the 1, 5 and 10 percent-level.

Table 3: Baseline results - Grade repetition

	Primary school (g2-4)			Secondary school (g5-8)		
Grade repetition	lin-trend	qu-trend	cub-trend	lin-trend	qu-trend	cub-trend
Migrant	0.053	0.050	0.051	0.033	0.032	0.030
	(0.010)***	(0.010)***	(0.010)***	(0.013)***	(0.013)**	(0.013)**
Native*Fshare	0.020	0.026	0.011	0.007	0.009	0.011
	(0.024)	(0.026)	(0.026)	(0.036)	(0.039)	(0.041)
Migrant*Fshare	-0.006	0.015	-0.005	0.006	0.013	0.028
	(0.036)	(0.038)	(0.039)	(0.065)	(0.073)	(0.074)
Observations	33211	33211	33211	26080	26080	26080
F-Statistics	6.654	6.996	9.371	4.332	6.018	6.954
Adj R-squared	0.017	0.019	0.021	0.011	0.011	0.011

NOTES: Each panel and column refers to a separate linear probability regression. Fshare is the share of students with migration background in the first grade of primary school. Student (age, female) and school-grade characteristics (number of students in grade, share of females), cohort fixed effects and school fixed effects included in each regression. School-specific linear trends, quadratic trends and cubic trends included as indicated above. Heteroscedasticity and cluster robust standard errors in parentheses (cluster=school*cohort). ***, ** and * indicate a statical significance at the 1, 5 and 10 percent-level.

Table 4: Migrant groups & Non-linearities

	Impact of own share				Impact of own share & share of other migrants			
A: By migrant groups	High track g5	High track g8	Repeat g24	Repeat g58	High track g5	High track g8	Repeat g24	Repeat g58
Native*Own share	0.018	-0.007	-0.008	0.005	0.051	0.044	-0.026	-0.008
	(0.055)	(0.069)	(0.027)	(0.037)	(0.060)	(0.071)	(0.026)	(0.039)
Migrant*Own share	-0.303	-0.345	-0.045	-0.044	-0.328	-0.383	-0.030	-0.032
	(0.079)***	(0.111)***	(0.059)	(0.098)	(0.081)***	(0.112)***	(0.056)	(0.100)
Migrant*Share other					-0.112	-0.242	0.060	0.059
					(0.084)	(0.130)*	(0.056)	(0.092)
Observations	29979	24427	33211	26080	29979	24427	33211	26080
F-Statistics	42.63	44.25	7.411	5.995	43.12	45.08	6.977	5.985
Adj R-squared	0.107	0.103	0.019	0.011	0.107	0.103	0.019	0.011
	Impact of foreign share				Impact of own share			
B: Non-linearities	High track g5	High track g8	Repeat g24	Repeat g58	High track g5	High track g8	Repeat g24	Repeat g58
N*Fshare/Own share	-0.068	-0.059	-0.010	-0.047	-0.244	-0.325	-0.065	-0.145
	(0.108)	(0.128)	(0.043)	(0.058)	(0.358)	(0.554)	(0.164)	(0.196)
N*Fshare^2/Own share^2	0.067	0.046	0.086	0.161	0.175	0.199	0.034	0.096
	(0.221)	(0.312)	(0.098)	(0.132)	(0.223)	(0.331)	(0.098)	(0.118)
M*Fshare/Own share	-0.094	-0.394	-0.003	-0.117	-0.879	-0.976	0.153	-0.462
	(0.181)	(0.224)*	(0.100)	(0.130)	(0.250)***	(0.287)***	(0.179)	(0.251)*
M*Fshare^2/Own share^2	-0.149	0.144	0.040	0.251	1.406	1.672	-0.465	1.067
	(0.209)	(0.334)	(0.132)	(0.216)	(0.510)***	(0.611)***	(0.420)	(0.651)
ME Migrants	-0.172	-0.333	0.018	-0.008	-0.494	-0.588	0.026	-0.150
	(0.084)**	(0.110)***	(0.045)	(0.074)	(0.124)***	(0.163)***	(0.082)	(0.080)*
Mean	[0.263]	[0.212]	[0.264]	[0.217]	[0.137]	[0.116]	[0.136]	[0.117]
Observations	29979	24427	33211	26080	29979	24427	33211	26080
F-Statistics	44.98	44.86	7.524	5.852	43.45	43.92	7.306	5.947
Adj R-squared	0.107	0.103	0.019	0.011	0.107	0.103	0.019	0.011

NOTES: Each panel and column refers to a separate linear probability regression. Fshare/Own share is the share of students with migration background/from the same country of origin in the first grade of primary school. Student (age, female) and school-grade characteristics (number of students in grade, share of females), cohort fixed effects and school fixed effects included in each regression. School-specific linear trends, quadratic trends and cubic trends included as indicated above. Heteroscedasticity and cluster robust standard errors in parentheses (cluster=school*cohort). ***, ** and * indicate a statical significance at the 1, 5 and 10 percent-level.

Table 5: Results by gender

	Impact of foreign share				Impact of share of own group			
A: By gender	High track g5	High track g8	Repeat g24	Repeat g58	High track g5	High track g8	Repeat g24	Repeat g58
N*Male*Fshare/Own Share	-0.041	0.035	0.006	0.002	0.014	-0.085	0.011	0.012
	(0.067)	(0.079)	(0.029)	(0.044)	(0.062)	(0.077)	(0.028)	(0.042)
N*Female*Fshare/Own Share	-0.048	-0.134	0.048	0.016	0.021	0.086	-0.031	-0.003
	(0.067)	(0.083)	(0.029)*	(0.043)	(0.063)	(0.081)	(0.030)	(0.041)
M*Male*Fshare/Own Share	-0.239	-0.352	-0.008	0.016	-0.336	-0.424	-0.116	-0.120
	(0.072)***	(0.091)***	(0.051)	(0.082)	(0.094)***	(0.120)***	(0.069)*	(0.096)
M*Female*Fshare/Own Share	-0.164	-0.259	0.038	0.005	-0.261	-0.232	0.037	0.041
	(0.075)**	(0.126)**	(0.043)	(0.075)	(0.107)**	(0.165)	(0.079)	(0.126)
M*Male=M*Female?								
F-Statistics	1.08	0.71	0.69	0.03	0.36	1.16	3.00	2.44
P-Value	0.299	0.399	0.407	0.864	0.549	0.281	0.084	0.119
	Fshare(g)				Own Share(g)			
B: Gender specific shares	High track g5	High track g8	Repeat g24	Repeat g58	High track g5	High track g8	Repeat g24	Repeat g58
N*Male*Fshare(g)/Own Share(g)	0.019	0.124	0.031	0.009	-0.024	-0.132	-0.016	-0.002
	(0.057)	(0.067)*	(0.025)	(0.036)	(0.055)	(0.066)**	(0.024)	(0.036)
N*Female*Fshare(g)/Own Share(g)	0.022	-0.012	0.075	0.033	-0.026	0.004	-0.061	-0.027
	(0.054)	(0.066)	(0.024)***	(0.034)	(0.052)	(0.064)	(0.024)**	(0.033)
M*Male*Fshare(g)/Own Share(g)	-0.146	-0.203	0.040	0.065	-0.270	-0.310	-0.036	0.002
	(0.064)**	(0.084)**	(0.047)	(0.071)	(0.078)***	(0.113)***	(0.068)	(0.077)
M*Female*Fshare(g)/Own Share(g)	-0.106	-0.058	0.053	0.015	-0.182	-0.037	0.050	0.046
	(0.070)	(0.103)	(0.043)	(0.049)	(0.097)*	(0.130)	(0.068)	(0.072)
N*Male=N*Female?								
F-Statistics	0.00	3.57	3.44	0.41	0.00	3.63	3.60	0.45
P-Value	0.966	0.059	0.064	0.520	0.975	0.057	0.058	0.505
M*Male=M*Female?								
F-Statistics	0.32	2.03	0.06	0.60	0.57	2.95	0.92	0.30
P-Value	0.573	0.155	0.813	0.439	0.449	0.086	0.338	0.582

NOTES: Each panel and column refers to a separate linear probability regression. Fshare/Own share is the share of students with migration background/from the same country of origin in the first grade of primary school. (g) indicates gender-specific shares. Student (age, female, foreign*female) and school-grade characteristics (number of students in grade, share of females), cohort fixed effects, school fixed effects and school-specific quadratic trends included. Heteroscedasticity and cluster robust standard errors in parentheses (cluster=school*cohort). ***, ** and * indicate a statical significance at the 1, 5 and 10 percent-level.

Table 6: Sensitivity to the definition of migration background

	Impact of foreign share				Impact of share own group			
A: Language (1980-1994)	High track g5	High track g8	Repeat g24	Repeat g58	High track g5	High track g8	Repeat g24	Repeat g58
Migrant	-0.119	-0.107	0.040	0.032	-0.168	-0.173	0.080	0.036
	(0.024)***	(0.026)***	(0.015)***	(0.021)	(0.088)*	(0.089)*	(0.039)**	(0.051)
Native*Fshare/Own share	0.025	0.030	-0.039	-0.018	-0.040	-0.052	0.040	0.010
	(0.094)	(0.094)	(0.039)	(0.050)	(0.093)	(0.094)	(0.039)	(0.050)
Migrant*Fshare/Own share	-0.330	-0.363	0.155	0.028	-0.436	-0.408	0.277	0.146
	(0.126)***	(0.151)**	(0.097)	(0.144)	(0.188)**	(0.228)*	(0.138)**	(0.224)
Observations	20105	19083	21656	20133	20105	19083	21656	20133
F-Statistics	30.99	31.45	7.987	5.121	31.11	31.46	7.833	5.132
Adj R-squared	0.089	0.094	0.024	0.011	0.089	0.093	0.024	0.011
	Impact of foreign share				Impact of share own group			
B: Citizenship (1993-98/2001)	High track g5	High track g8	Repeat g24	Repeat g58	High track g5	High track g8	Repeat g24	Repeat g58
Migrant	-0.138	-0.137	0.039	0.015	-0.107	-0.209	0.052	0.048
	(0.025)***	(0.028)***	(0.013)***	(0.012)	(0.065)*	(0.085)**	(0.035)	(0.033)
Native*Fshare/Own share	-0.091	-0.027	0.063	0.025	0.040	-0.056	-0.000	0.022
	(0.082)	(0.102)	(0.041)	(0.041)	(0.073)	(0.093)	(0.038)	(0.035)
Migrant*Fshare/Own share	-0.220	-0.236	0.060	0.035	-0.238	-0.151	-0.083	-0.079
	(0.080)***	(0.105)**	(0.054)	(0.052)	(0.089)***	(0.120)	(0.059)	(0.067)
Observations	12181	8263	13069	12202	12181	8263	13069	12202
F-Statistics	51.35	70.32	5.470	8.059	50.26	66.38	5.495	8.054
Adj R-squared	0.134	0.190	0.017	0.019	0.134	0.190	0.018	0.019

NOTES: Each panel and column refers to a separate linear probability regression. Fshare/Own share is the share of students with migration background/from the same country of origin in the first grade of primary school. Student (age, female) and school-grade characteristics (number of students in grade, share of females), cohort fixed effects, school fixed effects and school-specific linear trends included. In Panel B track attendance in grade 5 and grade repetition in primary school are based on data 1993-2001, while track attendance in grade 8 and repetition in secondary school refer to the years 1993-1998. Heteroscedasticity and cluster robust standard errors in parentheses (cluster=school*cohort). ***, ** and * indicate a statical significance at the 1, 5 and 10 percent-level.

Table 7: School-by-cohort fixed-effects and IV-regressions

	High track g5				High track g8			
A: School-cohort effects	lin-trend	cub-trend	quartic-trend	s*cohort-fe	lin-trend	cub-trend	quartic-trend	s*cohort-fe
Migrant	-0.125	-0.129	-0.099	-0.148	-0.198	-0.154	-0.148	-0.322
	(0.047)***	(0.050)***	(0.052)*	(0.081)*	(0.061)***	(0.066)**	(0.069)**	(0.124)***
Native*Own share	0.009	0.005	0.035	-0.018	-0.062	-0.015	-0.011	-0.201
	(0.050)	(0.053)	(0.055)	(0.089)	(0.064)	(0.069)	(0.073)	(0.134)
Migrant*Own share	-0.280	-0.280	-0.344	-0.275	-0.255	-0.326	-0.355	-0.156
	(0.088)***	(0.093)***	(0.096)***	(0.122)**	(0.122)**	(0.130)**	(0.134)***	(0.180)
Observations	29979	29979	29979	29979	24427	24427	24427	24427
F-Statistics	31.03	18.18	15.11	5.047	24.99	14.60	12.18	4.565
	Repetition g24				Repetition g58			
	lin-trend	cub-trend	quartic-trend	s*cohort-fe	lin-trend	cub-trend	quartic-trend	s*cohort-fe
Migrant	0.045	0.057	0.057	0.085	0.041	0.042	0.053	0.089
	(0.019)**	(0.020)***	(0.021)***	(0.032)***	(0.030)	(0.032)	(0.034)	(0.059)
Native*Own share	-0.012	0.002	0.000	0.033	0.003	0.007	0.017	0.053
	(0.020)	(0.021)	(0.022)	(0.035)	(0.032)	(0.034)	(0.036)	(0.064)
Migrant*Own share	-0.055	-0.066	-0.071	-0.104	-0.050	-0.034	-0.053	-0.139
	(0.036)	(0.037)*	(0.039)*	(0.048)**	(0.059)	(0.063)	(0.064)	(0.085)
Observations	33211	33211	33211	33211	26080	26080	26080	26080
F-Statistics	5.973	4.359	3.768	2.029	3.425	2.392	2.135	1.436
	IV = deviation of Fshare from linear trend				IV = deviation of Fshare from quadratic trend			
B: 2SLS estimations	High track g5	High track g8	Repeat g24	Repeat g58	High track g5	High track g8	Repeat g24	Repeat g58
Migrant	-0.124	-0.123	0.034	0.007	-0.104	-0.123	0.029	0.009
	(0.026)***	(0.031)***	(0.016)**	(0.026)	(0.032)***	(0.029)***	(0.018)	(0.024)
Native*Fshare	-0.037	-0.043	0.007	-0.018	-0.041	-0.043	0.008	-0.019
	(0.065)	(0.077)	(0.026)	(0.039)	(0.065)	(0.077)	(0.027)	(0.039)
Migrant*Fshare	-0.226	-0.315	0.071	0.124	-0.318	-0.313	0.094	0.115
	(0.096)**	(0.150)**	(0.062)	(0.129)	(0.120)***	(0.138)**	(0.078)	(0.120)
Observations	29979	24427	33211	26080	29979	24427	33211	26080
Wald-Statistics	7283	7282	1280	971.4	7360	7282	1284	971.2
SHEA's adj part R-sq (first stage)								
Native*Fshare	0.848	0.861	0.857	0.861	0.854	0.855	0.864	0.853
Migrant*Fshare	0.506	0.370	0.506	0.397	0.334	0.446	0.329	0.463

NOTES: Each panel and column refers to a separate linear probability regression. Fshare/Own share is the share of students with migration background/from the same country of origin in the first grade of primary school. Student characteristics (age, female), cohort and school fixed effects as well as school-specific trends included in all regressions. School-specific quadratic trends and school-grade characteristics included in Panel B. Standard errors are clustered at school*cohort in Panel B. ***, ** and * indicate a statical significance at the 1, 5 and 10 percent-level.

Table 8: Sensitivity to migrant-specific fixed effects

A: School-by-migrant & cohort-by-migrant effects	Impact of foreign share				Impact of share own group			
	High track g5	High track g8	Repeat g24	Repeat g58	High track g5	High track g8	Repeat g24	Repeat g58
Migrant	-0.390	-0.349	0.041	-0.011	-0.414	-0.347	0.067	0.052
	(0.109)***	(0.117)***	(0.045)	(0.059)	(0.115)***	(0.129)***	(0.048)	(0.065)
Native*Fshare/Own share	-0.006	-0.034	-0.000	-0.030	-0.006	0.022	0.008	0.041
	(0.062)	(0.075)	(0.025)	(0.038)	(0.061)	(0.074)	(0.024)	(0.037)
Migrant*Fshare/Own share	-0.230	-0.253	0.048	0.083	-0.274	-0.245	-0.036	-0.026
	(0.101)**	(0.143)*	(0.041)	(0.070)	(0.103)***	(0.150)	(0.041)	(0.072)
Observations	29979	24427	33211	26080	29979	24427	33211	26080
F-Statistics	16.97	13.69	4.189	2.555	16.98	13.69	4.187	2.549
Adj R-squared	0.110	0.106	0.022	0.013	0.110	0.106	0.022	0.013
B: + school-by-migrant-specific quadratic trends	Impact of foreign share				Impact of share own group			
	High track g5	High track g8	Repeat g24	Repeat g58	High track g5	High track g8	Repeat g24	Repeat g58
Migrant	-0.892	-0.832	0.342	-0.283	-0.899	-0.810	0.328	-0.215
	(0.321)***	(0.384)**	(0.133)**	(0.195)	(0.326)***	(0.389)**	(0.135)**	(0.197)
Native*Fshare/Own share	-0.015	-0.042	0.008	-0.032	0.015	0.042	-0.008	0.033
	(0.064)	(0.077)	(0.026)	(0.039)	(0.064)	(0.077)	(0.026)	(0.039)
Migrant*Fshare/Own share	-0.216	-0.216	-0.014	0.146	-0.233	-0.196	-0.069	-0.039
	(0.129)*	(0.193)	(0.052)	(0.094)	(0.111)**	(0.168)	(0.044)	(0.079)
Observations	29979	24427	33211	26080	29979	24427	33211	26080
F-Statistics	12.53	10.12	3.581	2.358	12.54	10.12	3.588	2.351
Adj R-squared	0.111	0.106	0.025	0.016	0.111	0.106	0.025	0.016

NOTES: Each panel and column refers to a separate linear probability regression. Fshare/Own share is the share of students with migration background/from the same country of origin in the first grade of primary school. Student and school-grade characteristics included in all regressions. Panel A controls for cohort-by-migrant fixed-effects, school-by-migrant fixed effects and school-specific quadratic trends. Panel B controls for cohort-by-migrant fixed-effects, school-by-migrant fixed effects and school-by-migrant-specific quadratic trends. Standard errors in parentheses. ***, ** and * indicate a statical significance at the 1, 5 and 10 percent-level.

A Missing data

As discussed above, the register data for Linz do not include all records for all students who enrolled in one of the 47 public primary schools in Linz between 1980 and 2001. If families move to other countries or other municipalities within Austria during the compulsory school career of their children, the full record of the student is not observed. I observe 89-84% when studying track attendance in grades 5-8 and 98-90% when grade repetition in primary and secondary school is investigated.

Table A-1: Missing regressions

	Track attendance in . . . missing				Repetition in . . . missing	
	grade 5	grade 6	grade 7	grade 8	grades 2-4	grades 5-8
Migrant	-0.004	-0.003	0.005	0.022	0.002	0.010
	(0.011)	(0.012)	(0.014)	(0.016)	(0.008)	(0.012)
Native*Fshare	-0.011	-0.039	-0.034	-0.036	0.020	0.019
	(0.041)	(0.044)	(0.049)	(0.050)	(0.017)	(0.043)
Migrant*Fshare	-0.039	-0.055	-0.044	-0.080	0.037	-0.091
	(0.053)	(0.056)	(0.069)	(0.078)	(0.039)	(0.057)
Mean of outcome	0.114	0.127	0.142	0.158	0.019	0.101
Observations	33848	32307	30848	29003	33848	29003
F-Statistics	44.58	55.75	61.50	56.16	7.160	49.46
Adj R-squared	0.070	0.074	0.082	0.083	0.027	0.073

NOTES: The dependent variables are indicator variables equal to 1 if the respective outcomes are missing for the student. Each column refers to a separate linear probability regression. Fshare is the share of students with migration background in the first grade of primary school. Student (age, female) and school-grade characteristics (number of students in grade, share of females), cohort fixed effects, school fixed effects and school-specific quadratic trends included in each regression. Heteroscedasticity and cluster robust standard errors in parentheses (cluster=school*cohort). ***, ** and * indicate a statical significance at the 1, 5 and 10 percent-level.

As presented in Table A-1, the students with missing records seem to be random, i.e. the missing status is not related to migration background or the share of foreign students in first grade of primary school.