Foreign Classmates and Secondary Education Track Choice – Evidence from Germany during the "Refugee Crisis"[*]

Lea Mayer[†]

May 27, 2024

Abstract

This paper studies the effect of refugee and other foreigner share among cohort peers in elementary schools on the secondary school track choices of natives, refugees, and other foreigners in Germany. I exploit the variation of the refugee share among cohorts within schools since the massive inflow of refugees during the *refugee crisis* in 2015/2016. I find positive effects of refugee share among cohort peers in the same school on natives' likelihood to select higher secondary school tracks, negative effects on refugees' likelihood, and no strong effects on non-refugee foreigners' likelihood. Additional evidence points to changes in teachers' reference points or parents' preferences as drivers for the effects on Germans.

Keywords: educational economics; school choice
JEL Codes: I21, I24, J15

1 Introduction

The share of refugees in German elementary schools increased strongly since the beginning of the European *refugee crisis*. In representative surveys among Germans conducted in 2012 and 2019, 64% agreed that immigration leads to problems in schools, while in 2017, shortly after the *refugee crisis*, the share was even higher at 68% (Kober and Kösemen, 2019). The number of refugees younger than 12 years of age, who will most likely still visit an elementary school in Germany, increased from 50,000 to 330,000 between 2011 and 2018, caused by the large refugee influx to Europe in 2015/16.[1] This increase could affect Germans education, as their peers change, and schools may struggle to deliver adequate education for refugees and other foreigners due to the high influx. However, there is no evidence regarding the effects of refugees on educational outcomes in German schools so far.

This paper studies the effect of the share of refugees and other foreigners among cohort peers in elementary schools on natives', refugees', and other foreigners' secondary school track choices. I focus on the years 2015/16-2018/19 after the *refugee crisis*. The dataset includes every Bavarian elementary school graduate and their secondary education track choice after elementary school. Parents choose from three tracks of different academic levels for their children based on the schools' recommendation when their children are on average ten years old. I study the effects on secondary school choices by exploiting the quasi-random within-school variation of refugee shares over time using a school fixed-effect model.

My main results show positive effects of the refugee share among cohort peers on Germans' secondary school choice, negative effects on refugees, and no strong effects on other foreigners in the years 2015-2018. The effects persist in various robustness checks. Studying the effects on non-refugee foreigners in more detail shows that the share of foreigners with the same citizenship has a negative impact on the secondary school choice of non-refugee foreigners. The possibilities to analyze the mechanism behind the positive impact of the refugee share on Germans are limited due to the available data. However, additional analyses and insights from the literature reveal potential mechanisms. The evidence suggests that changes in teachers' reference points could lead to better secondary school recommendations, as suggested by the grading on a curve concept (Calsamiglia and Loviglio, 2019). Additionally parental preferences for their children's peers in secondary schools may serve as contributing factors to the positive effect, similarly to the "white flight" literature in the United States of America (US) (Li, 2009; Baum-Snow and Lutz, 2011).

The literature shows that track choices are decisive for further educational and

---

[1]Data source: Statistisches Bundesamt (Destatis), 2022, *Schutzsuchende: Deutschland, Stichtag, Geschlecht/ Altersjahre/Familienstand - Table 12531-0001*

labor market outcomes, which makes them relevant educational milestones to study. Among others, Hanushek and Wößmann (2006) and Piopiunik (2014) illustrate that early tracking increases educational inequality and reduces performance. Chetty *et al.* (2011) show that students who were randomly assigned to higher quality classmates at a young age have better educational outcomes and higher earnings.[2]

The paper contributes to the literature on peer effects in the classroom. A considerable share of the literature focuses on immigrants and finds mixed effects of their share in grade on the educational outcomes of natives.[3] Several papers find mostly modest negative effects of immigrants on natives, for example in Israel, Denmark, Italy, Sweden, and based on PISA scores (Gould *et al.*, 2009; Jensen and Rasmussen, 2011; Brunello and Rocco, 2013; Tonello, 2016; Ballatore *et al.*, 2018; Brandén *et al.*, 2019). Other studies find no impact of the share of immigrants on natives, for example in England, the Netherlands, and Austria (Geay *et al.*, 2013; Ohinata and Van Ours, 2013; Schneeweis, 2015). Hunt (2017) finds small positive effects of immigrants on natives' education outcomes in the US.

Recently, a few papers study the effects that the share of refugees among fellow students has on natives' educational outcomes. Figlio and Özek (2019) study the effect of Haitian refugees in the US after the earthquake in 2010. They find none or a small positive effect of the refugee share within the same grade on natives' test scores. Morales (2022) analyzes the effect of refugees in the US between 2008 and 2017 and finds a positive effect of a higher refugee share in grades on natives' Math tests, but not on English tests. The recent large refugee inflow to Europe starting in 2015 was only studied by two papers. Green and Iversen (2022) analyze the effect of the share of refugees in the grade in Norway in 2007 and 2015. They find negative effects on natives' Math performance and no effects on their English and Norwegian performance. Tumen (2021) studies the large inflow to Turkey and shows positive effects on natives' PISA scores.

Among the studies only a few analyze the effect that immigrants have on other immigrants. Negative effects are found by Jensen and Rasmussen (2011) and Schneeweis (2015), while Brandén *et al.* (2019) find positive effects. Figlio and Özek (2019) study the effect of refugees on other foreigners and do not find significant effects of the Haitian refugee concentration in the US on the educational outcomes of other immigrants. In contrast, Morales (2022) finds a positive effect of the share of refugees in the US between 2008 and 2017 on Math tests for other immigrants, but not on English tests. The peer effect on refugees themselves is so far not studied.

The literature shows that the effect of refugee or other foreign inflow into schools

---

[2]Biewen and Tapalaga (2017) show that later possibilities in the German school system to make second-chance decisions in a higher secondary track, do not convert previous inequalities.

[3]Most of the listed papers define immigrants as students with two non-native parents.

is highly dependent on the situation in the host country and the nature of the inflow. My data allows studying a particularly interesting setting during the *refugee crisis*. The two previous papers on peer effects during this refugee flow to Europe (Tumen, 2021; Green and Iversen, 2022) find opposite effects on natives, possibly caused by a large difference in the education and labor market situation in the two countries and the number of refugees entering the country. Turkey is the country hosting the most asylum seekers worldwide, is a neighboring country to Syria, where most of the refugees originate from, and has a large low-wage sector. Norway has one of the largest GDPs per capita and traditionally had low levels of immigration, but increased that share in the last years due to a refugee inflow. Germany has a GDP between the two previously studied countries and a longstanding history of immigration. Additionally, Angela Merkel's *welcome culture* in September 2015 allowed for an unregistered influx of refugees, resulting in a large increase in a short time. The unique approach during the *refugee crisis* makes the situation in Germany worth studying.[4]

In addition to studying the effects on natives, I analyze the effects on refugees and other foreigners, which only a small fraction of the literature considered. My large dataset allows for observing a large number of refugees and foreigners. The data shows that the composition of citizenship and secondary school choices of refugees and other foreigners do not change drastically during the years 2015-2018, which allows to study the effects on them over that timeframe.

The remainder of the paper is organized as follows. Section 2 explains the setting of schools and refugees in Bavaria and the large administrative dataset. Section 3 elaborates on the empirical fixed-effects strategy. Section 4 discusses the results and shows their robustness. Section 5 provides some additional evidence to explore the mechanism behind the positive effects on Germans, and Section 6 concludes.

2 Setting and Data

2.1 Setting

Schools   In Bavaria, students enter secondary education after four years of elementary school, choosing mostly from three main tracks: the highest track (Gymnasium), the

---

[4]Although not identical to a peer effect, a recent paper from Höckel and Schilling (2022) studies the effect of separated German learning classes on refugees in a small German federal state. They find that refugee students who visited such a class perform worse in standardized tests and have a lower probability of visiting a higher track. Another paper that uses German data to study an effect related to peer effects is Bredtmann *et al.* (2021). They show for Germany that conditional on the share of immigrants in class linguistic diversity has no significant effects on immigrants' language and math scores.

medium track (Realschule), and the lowest track (Mittelschule).[5] After completing elementary school, which typically ranges from ages six to ten, students' secondary education track choice will determine their degree. The highest track leads to a university entrance certificate (Abitur), the medium track and the lowest track provide a degree that allows vocational training. Certain vocational trainings are only accessible with a degree from the medium track. Changing the track later or receiving Abitur through a qualification after the high school degree is possible. Additional tracks like special need schools exist but play a minor role in terms of size.

The grades that students receive in the first half of the last year (grade 4) of elementary school in the subjects Math, German, and general science studies determine the track which is recommended by the school to the parents.[6] Parents have the option to choose whether they want to enroll their child in the recommended secondary school track, opt for a lower track, or have their children undergo tests for a higher track, for which they did not achieve the required grades. If the children pass the extra tests in Math and German they can attend the higher track (Pädagogisches Institut, 2021). The final school choice is therefore made by the parents but the upper bound of the track choice is determined by their child's performance.

Visiting the public school assigned by a school district is very common in Germany. More than 90% of Bavarian elementary schools are public and I only consider those. School attendance is compulsory for all children in Germany for a minimum of nine years (Standing Conference of the Ministers of Education and Cultural Affairs , 2021). Parents cannot freely select an elementary school for their child, but their place of residence determines which public school the child has to visit.[7] Therefore, parents cannot simply change their children's elementary school as a reaction to, for example, foreigner inflow.

Refugee Settlement and School Visit   The number of refugee applications increased drastically in Germany in the years 2015 and 2016 during the *refugee crisis*. The number of applications was highest in 2015 and 2016, leading to a growth in absolute numbers up to 1.1 million refugees in Germany in 2019, making it the fifth largest host country worldwide in absolute numbers (The UN Refugee Agency, 2019).
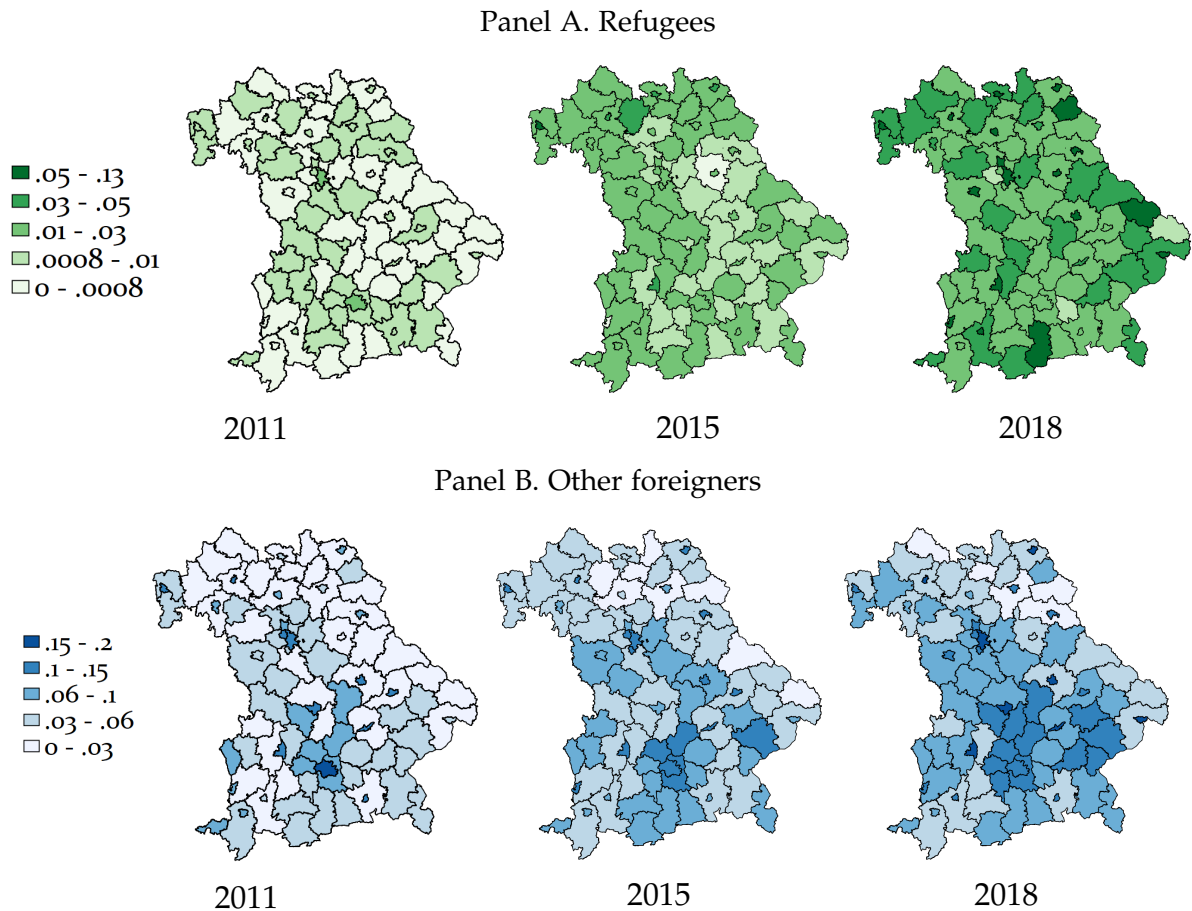
While arriving asylum seekers in Germany are initially distributed by the authorities, refugees can resettle later (Federal Office for Migration and Refugees, 2023).

---

[5]The school systems in the federal states of Germany vary slightly. I focus on the analyzed state Bavaria. Before the year 2011 Mittelschule was named Hauptschule in Bavaria.

[6]The average grade of 2.33 (B-) or better leads to a recommendation for the highest track, 2.66 (C+) for the medium track, and 3.0 (C) for the lowest track. German grade system: 1 very good, 2 good, 3 satisfactory, 4: sufficient, 5: inadequate, 6: insufficient.

[7]Requesting another school is possible for an urgent reason, e.g. afternoon care (Pädagogisches Institut, 2021).

Figure 1: Share of Foreigners and Refugees among Elementary School Graduates

Panel A. Refugees

.05 - .13
.03 - .05
.01 - .03
.0008 - .01
0 - .0008

2011　　　　　　2015　　　　　　2018

Panel B. Other foreigners

.15 - .2
.1 - .15
.06 - .1
.03 - .06
0 - .03

2011　　　　　　2015　　　　　　2018

Notes: The maps display the counties in Bavaria. Panel A shows the county average of the share of refugee among all graduates in an elementary school. Panel B shows the share of other foreigners. The years stand for the beginning of the school years (e.g. 2011 for 2011/2012).

The distribution of refugees can therefore not be seen as random but self-selected. Generally, refugees underlie the same school districts as Germans and their place of residence should determine their elementary school. Exceptions exist in which the authorities assign refugees to other schools due to insufficient space or staff (Bayerisches Staatsministerium für Unterricht und Kultus, 2023b). Therefore, the non-random place of refugees residence or other non-random factors, determine which schools refugees visit.

Figure 1 shows the increase of refugees and other foreigners among all Bavarian elementary school graduates between 2011, 2015, and 2018 for each county. The share of refugees increased in all 96 counties, while the share of foreigners increased in all but four of them. Appendix Figure A.1 shows the increase in share over all years and the strong rise with the *refugee crisis*. For mechanical reasons, the share of refugees and other foreigners is negatively correlated, as shown in the graphs. However, the numbers are in fact positively correlated (see Appendix Table A.2).

For non-German-speaking students, several options to learn German in elementary schools exist. They can visit a separate integration class, exclusively for non-German speaking students, focused on learning German for one to two years until they visit regular classes. Another coexisting concept is to separate the students only in German lessons while teaching them otherwise with the regular classes. Students who cannot attend such classes are taught in regular classes together with German-speaking students and receive extra German lessons additional to their regular curriculum. While there are no exact numbers for elementary schools, they exist for the whole basic track (elementary school and Mittelschule). At the beginning of the school year 2015/16 12% of students, who needed help with German, visited a completely separated class, 10% a partially separated and the large majority of 78% a regular class (Staatsinstitut für Schulqualität und Bildungsforschung München, 2016).

2.2 Data

Dataset I use a large administrative dataset of all elementary school graduates and their secondary track school choices in Bavaria in the school years 2011/2012 - 2018/2019.[8] Additionally, I employ a separate dataset of all elementary school students in the same period. The time frame excludes the school years from 2019/2020 onwards, during which COVID-19 unequally affected natives, refugees, and foreigners, which may influence the effects. I exclude earlier years due to a change in German law in 2000, resulting in fewer German-born children being classified as foreigners, which changes the composition of foreign students. The cutoff assures that only children born after the change are in the age of fourth graders.

Both datasets include students' gender, birth year, and nationality, the school year, and the school's ID. The school ID identifies the exact location of the school and a linkage of both datasets on school levels. Additionally, the dataset of all students includes the grade the student visits, a class ID[9], information about the school visited the year before, and a dummy of whether the class is a segregated integration class. The other dataset includes the main outcome, the final secondary school choice made by the parents and reported to elementary school.[10] I cannot distinguish whether a child repeats grade four, due to not meeting the minimum requirements or transfers to the lowest track. Therefore the variable basic track also includes repetitions. I consider the three main tracks (Gymnasium, Realschule, basic track). I compute a dummy

---

[8]The data was made available by "Landesamt für Statistik, Amtliche Schuldaten". I additionally use the school years 2008/2009 - 2010/2011 to merge previous years' information to the dataset.

[9]The class ID does not remain consistent across years.

[10]These reported choices result in the child appearing in the reported school in the following school year in 97% of the observable cases, see Appendix Table A.4 for more details.

variable to indicate the availability of an integration class across the four grades while the student attends the school.

The dataset includes no information on the legal status of a student. Therefore I use citizenship as an indicator for refugee status. I define a student as a refugee if their citizenship has a refugee-foreigner share in Bavaria in that year larger than 50%, and as another foreigner, if it is any other citizenship Statistisches Bundesamt (Destatis) (2023a,d).[11] Appendix Figure A.1 shows the similarity between the citizenship-based classification and legal-status-defined refugee shares among Bavarians aged 9 to 11, the age of graduating elementary school.

For each individual, the share of refugees and other foreigners among cohort peers excludes the students themselves (leave one out shares). Cohort peers include anyone who graduated from the same school in the same year as the individual, regardless of their class. The age of an individual is determined by subtracting their birth year from the school year's start (e.g. 2015 for the school year 2015/2016). I generate four dummies to approximate a student's years at the elementary school (grade 4 by the present availability, grade 3 by the availability last year, grade 2 by two years prior, and grade 1 by three years prior). The dummies rely on gender, birth year, and citizenship since students are not trackable over the years.

Additionally, I merge the data to administrative data at the municipality and county level based on the school's location and the year. This includes the number of inhabitants and the of the state legislature election results in 2018 in the municipality of the school and the average household income, the unemployment rate, the share of refugees and foreigners in the county of the school (Bayerisches Landesamt für Statistik, 2023b,c,d,a; Statistisches Bundesamt (Destatis), 2023e,b,c). For non-natives the number of cohort peers with the same citizenship and the same language spoken in the country of their citizenship is created (Wikipedia, 2023).

The raw data includes 853,863 graduates in the school years 2011/2012 - 2018/2019. The data cleaning primarily addresses inconsistencies in the student numbers when merging the two datasets (graduates and the whole school) per year and ensures that only schools with at least three graduates per year, that are public and are available for all eight years are considered.[12] This leaves 729,025 graduates in 1,973 schools in the dataset. Of those track choices, 11,410 students do not remain in the analysis, as they left for other schools than the three main tracks. Those individuals remain as cohort peers for the other students when calculating the shares.

---

[11]See Appendix Table A.3 for details on the citizenships that determine the definition of refugees.

[12]When merging the two datasets, schools with an unrealistic large difference between fourth graders (school dataset) and graduates (graduate dataset) are excluded. Schools are removed if the share of the gap is larger than 1 or larger than 0.66 for schools with more than 10 graduates or larger than 0.4 for schools with more than 30 graduates, for all graduates and graduates aged 9, 10, or 11. For other ages, a difference larger than 1 and more than 3 students of that age excludes the school.

Table 1: Descriptives

	Germans		Refugees		Other foreigners	
	2011-14	2015-18	2011-14	2015-18	2011-14	2015-18
Refugees among cohort peers in %	0.4 (1.3)	2.2 (3.2)	2.7 (3.2)	5.5 (5.7)	1.3 (2.3)	3.4 (4.2)
Other foreigners among cohort peers in %	5.7 (6.7)	7.6 (6.8)	15.5 (11.0)	11.6 (9.1)	13.2 (10.7)	13.0 (8.9)
Highest track in %	40.5 (49.1)	41.6 (49.3)	17.4 (37.9)	10.3 (30.4)	26.9 (44.3)	25.9 (43.8)
Medium track in %	29.3 (45.5)	29.5 (45.6)	16.6 (37.2)	11.7 (32.1)	17.3 (37.8)	18.0 (38.4)
Basic track in %	29.0 (45.4)	27.5 (44.6)	60.1 (49.0)	74.3 (43.7)	51.1 (50.0)	51.2 (50.0)
Minor tracks in %	0.8 (9.0)	1.1 (10.4)	4.3 (20.2)	2.2 (14.6)	3.9 (19.3)	4.1 (19.7)
#Graduates in school	60.4 (28.6)	61.1 (30.3)	72.7 (27.1)	66.6 (29.2)	71.9 (27.6)	72.5 (29.9)
4th grade class size	21.5 (3.6)	20.9 (3.7)	20.9 (3.5)	20.4 (3.7)	21.4 (3.3)	21.0 (3.4)
Female in %	49.3 (50.0)	49.1 (50.0)	48.7 (50.0)	47.8 (50.0)	49.6 (50.0)	50.1 (50.0)
Age	9.3 (0.5)	9.4 (0.5)	9.8 (0.8)	10.0 (0.8)	9.6 (0.7)	9.7 (0.7)
Years at current school	3.9 (0.5)	4.0 (0.3)	2.7 (1.5)	1.8 (1.3)	3.0 (1.4)	2.9 (1.4)
Integration class available in %	11.0 (31.2)	8.9 (28.5)	16.7 (37.4)	24.8 (43.2)	14.1 (34.8)	18.9 (39.1)
Own citizenship among cohort peers in %			1.5 (2.2)	2.6 (3.8)	1.5 (3.0)	1.2 (2.2)
Own language among cohort peers in %			1.9 (2.5)	3.9 (4.9)	5.1 (16.7)	4.2 (14.6)
N. of Obs	342,239	324,196	1,851	8,504	22,830	29,405

Notes: The table shows the mean for the graduates separated by Germans, refugees, other foreigners and by two time periods. Standard deviations in parentheses.

Descriptives   Table 1 reports the descriptives of the data separately for Germans, refugees, and other foreigners split by the four years since and before the crisis. The key explanatory variable, the share of refugees among cohort peers, increased since the crisis and has the highest percentage among refugees (5.5%), followed by other foreigners (3.4%) and Germans (2.2%). The share of other foreigners increased less and is 7.6% for Germans, 11.6% for refugees, and 13% for other foreigners in the years since the crisis.[13]   Both the table and Figure 2 show the secondary education track choices, which serve as outcome variables. Germans predominantly choose, over all years, the highest track (over 40%) while refugees rarely choose this track

---

[13]See Appendix Figure A.1 for the development in shares over the years.

(10-17%), with other non-German students falling in between (around 26%). For the basic track, the exact opposite is true. Non-considered tracks include schools abroad and less common tracks and play a minor role. On average a student visited a school with over 60 graduates and around 20 fourth graders per class. While Germans had fewer fellow students in their cohort than non-Germans, refugees visited schools with slightly smaller classes in fourth grade. The average age for natives was 9.4 years[14] with a slightly higher age for non-natives. The German graduates since 2015 spent on average 3.9 of 4 years at that school, foreigners spent 2.8 years, and refugees spent 1.8 years.[15] 8.9% of Germans visited a school that had a separated integration class in at least one grade they visited, the number was slightly higher before the crisis although a lower number of students visited such a class in these years. The share of refugees that visit a school with an integration class increased to 24.8% and the share of other foreigners to 18.9% in 2015-2019. Per school and year in 2015-2018 on average 1.2% of cohort peers have the same citizenship and 4.2% speak the same language as a non-refugee foreigner. For refugees, 2.6% of cohort peers have the same citizenship and 3.9% the same language.

Figure 2 Panel B shows the regional composition of refugees and foreigners among the graduates. The left part presents the composition of refugees. In the years 2011-2014, most refugees came from Iraq, followed by Afghanistan, the share of Syrians increased over the years, while refugees from Africa and other countries and regions played a minor role. In the years 2015-2018, 50% of all refugees who graduated came from Syria, around 20% from Iraq and Afghanistan, and around 10% from Africa and all other countries and regions, respectively. The right part shows the regional composition of other foreigners, which is similar over all eight years. The largest share comes from Eastern Europe followed by Asia, Western Europe, Africa, America and Oceania.[16] Appendix Table A.1 reports descriptives for the schools themselves. It illustrates that the average school in 2015-2018 is in a municipality with 11,700 inhabitants, in a county with an average income per capita of €24,100, 3.1% unemployment, 11.5% foreigners, and 1.3% refugees.

3   Empirical strategy

Challenges to Identification   A naive regression of Germans', refugees', and other foreigners' track choices on the share of refugees and foreigners among graduates

---

[14]This quite low number (expected: 10) results from $age = school\ year\ start - birth\ year$.

[15]The construction of the measure could partly explain the difference in years at school, since a fit in gender, birth year, and citizenship is most likely for Germans. The difference could also reflect the fact that foreigners and refugees could arrive in Germany after starting school in another country.
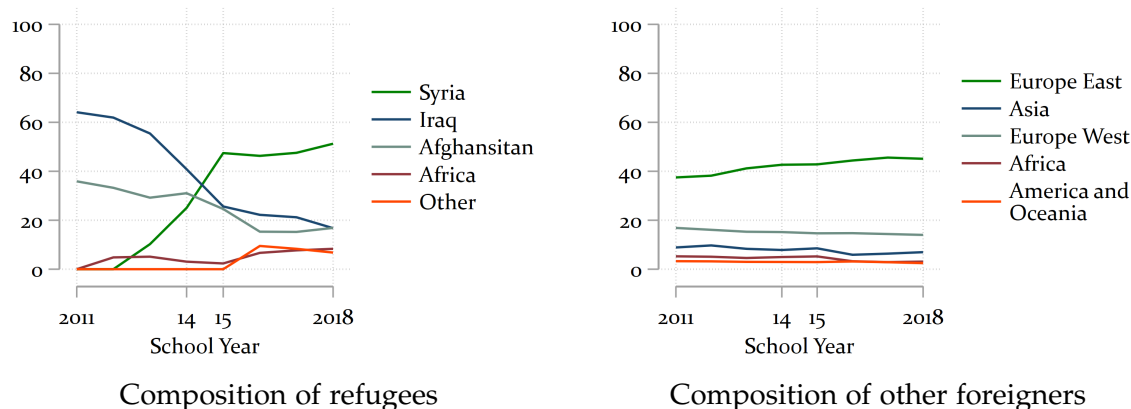
[16]The maps in Appendix Figure A.2 show the countries of citizenship in detail.

Figure 2: Development of Track Choices and Citizenship Compositions

Panel A. Secondary Track Choices

Choice: Highest track
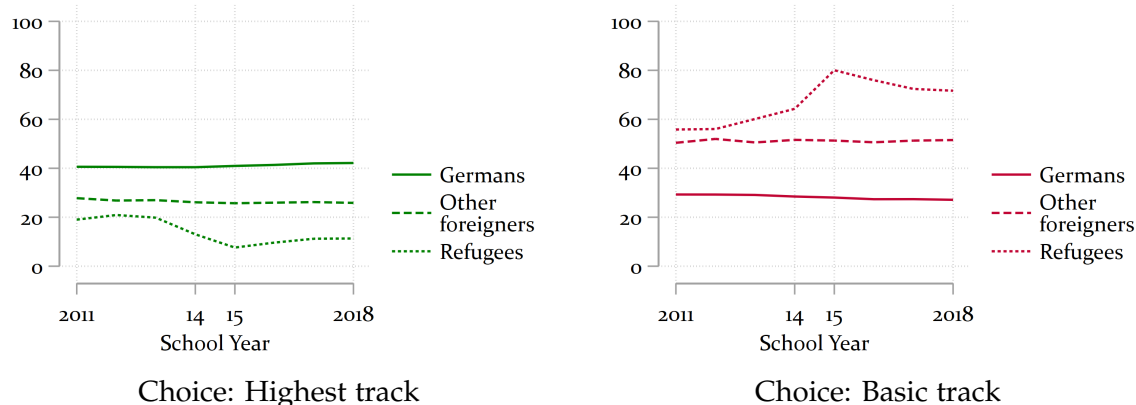
Choice: Basic track

Panel B. Citizenship Composition

Composition of refugees

Composition of other foreigners

Notes: Panel A shows the development over time of the share of Germans, refugees, and other foreigners who chose the highest (Gymnasium) and the basic track (Mittelschule or class repetition)as secondary school choice. The choices for the mudium track (Realschule) and other minor tracks are not displayed. Panel B shows the citizenship or regional composition over time of all refugee and other foreign graduates.

would overlook non-random variation. Self-selection of refugees and other foreigners into school districts would therefore correlate with the conditions of the schools, e.g. socioeconomic background of German students. Appendix Table A.5 shows that schools with at least one refugee student during 2015-2018 and schools without refugees during the same period differ significantly in many characteristics in the years 2011-2014.

To address this, I employ within-school analyses, a method widely used in peer effect studies, firstly by Hoxby (2000) and for immigrant peers by Gould *et al.* (2009). This exploits the quasi-random variation in shares between cohorts. While the sorting between schools is non-random, the ages of the children of refugees and foreigners are quasi-random within a school, as there is arguably no sorting of foreigners with children of a specific age in a particular region. To address the potential issue of time

11

trends in track choice or refugee shares, I analyze the effects conditional on the share of refugees and other foreigners in the other grades in the same school and year and exploit time-fixed effects.

Another crucial assumption is the stability in attributes over time within the studied population, which is separated into Germans, refugees, and other foreigners. This stability is quite likely for Germans since they cannot easily switch schools and it is unlikely that the socioeconomic composition of an area changed in the short period since the *refugee crisis*.[17] For refugee graduates, there is a larger difference in school choices (Figure 2 Panel A) and the countries of origin (Panel B), especially between the years before and since the crisis. Analyzing the years 2015-2018 separately leads to a more stable trend of continuously low visits of the highest track and a high origin from Syria followed by Iraq. For other foreigners, the trends are quite stable over the years.

In the four years before the crisis a school had an average share of refugees of 0.5%. The number of refugees among graduates increased by 4.6 to 2.3% after the crisis. To account for the low number and instability in refugee composition the main results considering refugees will only be reported for the years since the *refugee crisis*.

Fixed Effect Model To adjust for those challenges, I employ a school fixed effect model seperatly for Germans, refugees, and other foreigners in the years 2015-2018. I estimate the following equation:

$$Y_{ist} = \beta_1 ShareRefugees_{ist} + \beta_2 ShareForeigners_{ist} + \gamma X'_{ist} + \lambda_s + \delta_t + u_{ist} \qquad (1)$$

Y_{ist} is a dummy for student i's secondary school choices in school s in year t. The dummy indicates either choosing the highest track ($Y_{ist} = 1$ if Gymnasium, $Y_{ist} = 0$ if Realschule or basic track) or choosing one of the two highest tracks and therefore avoiding the lowest track ($Y_{ist} = 1$ if Gymnasium or Realschule, $Y_{ist} = 0$ if basic track). $ShareRefugees_{ist}$ is the refugee share among individual i's cohort peers in school s in year t. $ShareForeigners_{ist}$ is the other, non-refugee, foreigner share among individual i's cohort peers in school s in year t. X'_{ist} is a vector of covariates on the individual, school, municipality, or county level for the year t. The covariates include the refugee and other foreigners share in the other grades (1-3) in school s in year t, meaning the non-graduating students in each school. Additionally, covariates include a gender dummy, the individuals' age, dummies for the years at school, the number of graduates, the average number of students per class in the fourth grade, a dummy of whether the school had a special integration class for the students' cohorts, the

---

[17]Even the students graduating in 2018/2019 started in the first grade of elementary school in 2015/2016 in which year the first inflow of refugees was experienced.

number of inhabitants in the schools' municipality, the unemployment rate, share of refugees and share of foreigners in the schools' county.[18] For non-German students, dummies for citizenship are added to the control variables. λ_s are school fixed effects and δ_t are year fixed effects.

Variation in Sample   A crucial assumption when analyzing the effect is a substantial within-school variation in the outcome and refugee composition. The within variation of the refugee share among graduates is 4.0 percentage points in 2015-2018 and 0.8 percentage points in 2011-2014, in which the share is 0% for more than 70% of observations. All other variables have reasonable variation in both four-year periods. The average within-school difference in the years 2015-2018 is 7.5 percentage points for the share of other foreigners and 18 percentage points for the likelihood of visiting the highest track (Gymnasium) or the basic track. Appendix Figure A.3 shows kernel-density graphs of the within-school variation in the shares of refugees and other foreigners and the secondary school choice.

Knowing that there is substantial variation within schools, the following discussion explores the quasi-randomness of the variation. Appendix Table A.6 shows that the refugee share in a county explains only 5.9% of the variation in the same categories among graduates between 2015-2018, the inclusion of fixed effects reduces to 3.4%. The refugee share in other grades in the same school, meaning all non-graduating students, explains 35.4% of the variation in the refugee share among cohort peers. The inclusion of fixed effects reduces this variation to 5.6%.[19] The correlation including fixed effects can be expected to remain due to e.g. siblings that visit the same school and have the same citizenship. This shows that there is variation in refugees and other foreigners among graduates that cannot be explained by the trends in shares in that region or school but is varying additionally to that.

Figure 3 shows the variation that deviates from the school-specific refugee share among all non-graduating students. Specifically, it presents the residuals from a within-school regression that includes year-fixed effects as well as the share of refugees in the other grades, related to an approach of Brenøe and Zölitz (2020). The right side variation, positive deviations from the predicted share, follows a normal distribution, as expected for a random variation. Some large outliers exist, which are schools with irregularly high shares of refugees in a specific cohort. The left side variation looks more irregular, which is largely driven by the school cohorts with zero refugees. If those are dropped the left side is still compressed, which is a result attributed to the

---

[18]All selected covariates, but some citizenship dummies, are correlated with the secondary school track choices and the share of refugees among cohort peers. The majority of the correlation persists when adding school and year fixed effects, but for gender, age and years in the school.

[19]Both variables are control variables in the main regressions.

Figure 3: Deviation of Graduates Asylum Share from School Share
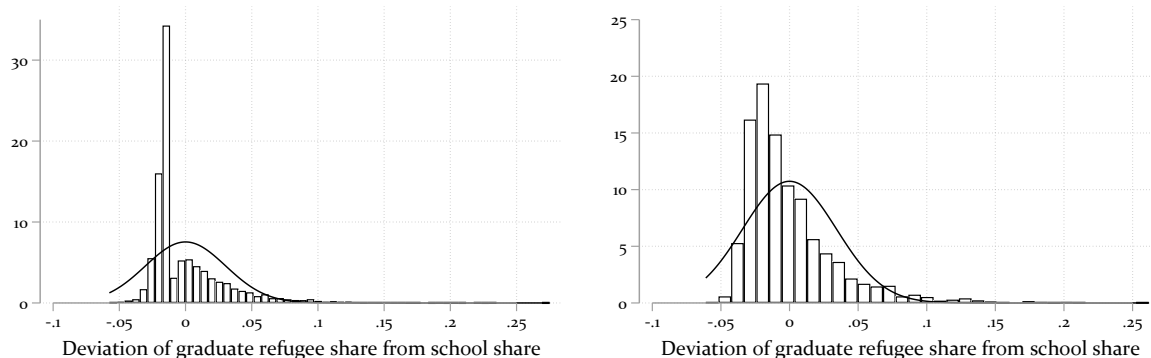
All schools and years	Share of refugees among graduates >0

Notes: The figure displays the distribution of residuals when regressing the share of refugees among graduates on the share of refugees in other grades in the same school including school and year fixed effects for the years 2015-2018. Each school per year is used as one observation.

relatively small shares of refugees and the absence of negative values. Therefore the variation in the main coefficient of interest, the share of refugees, follows a distribution that can be expected under random circumstances.

4   Results

4.1   Effect of foreigners and refugees shares on track choices

Main Results   Table 2 reports my main findings and shows the effects of the shares of refugees and other non-refugee foreigners among cohort peers on Germans', refugees', and other foreigners' secondary school choices in the years 2015-2018.[20]

The share of refugees among cohort peers has a significant positive effect on the secondary school choice of Germans. An increase in the share of refugees among cohort peers by one percentage point leads to a 0.126 percentage point higher likelihood to choose the highest track and a 0.112 percentage point increase to choose one of the two higher tracks. Increasing the share of refugees among cohort peers by one standard deviation (0.032) significantly increases the likelihood of visiting the highest track and the likelihood of avoiding the lowest track by 0.4 percentage points.

The effect on refugees' secondary school choice is negative. Increasing the share of refugees among cohort peers by one standard deviation (0.057) significantly decreases the likelihood of choosing the highest track by 1.2 percentage points and avoiding the lowest track by 2.6 percentage points. The effect on other non-refugee foreigners is

---

[20]For completeness the results for the years before the crisis 2011-2014 are reported in Appendix Table A.7 but all effects are insignificant.

not significant but negative. The share of other foreigners among cohort peers does not have a significant effect on any of the three groups. While the effects on Germans and other foreigners are negative but quite small, the effects on refugees are positive and of a similar size as the positive effects that refugees have on Germans.

Table 2: Effects on Secondary School Choice (2015-2018)

	Germans		Refugees		Other Foreigners	
Track choice:	High (1)	High/Medium (2)	High (3)	High/Medium (4)	High (5)	High/Medium (6)
Refugees/Cohort peers	0.126*** (0.045)	0.112** (0.047)	-0.216* (0.121)	-0.461*** (0.175)	-0.064 (0.114)	-0.172 (0.136)
Other foreigners/Cohort peers	-0.029 (0.028)	-0.008 (0.028)	0.121 (0.093)	0.052 (0.131)	-0.042 (0.062)	-0.095 (0.073)
N. of Obs	319,619	319,619	8,181	8,181	27,972	27,972
Mean dep. var.	0.422	0.721	0.107	0.228	0.273	0.462

Notes: The table shows fixed-effect regressions using as dependent variable dummies of the secondary school choice of elementary school graduates in Bavaria in the years 2015-2018. All regressions include school-, and year-fixed effects, the share of refugees and foreigners among non-graduating students, and individual, school, municipality, and county controls. Columns (1) and (2) cover Germans, (3) and (4) refugees, and (5) and (6) non-refugee foreigners. The outcome variable in columns (1), (3), and (5) is a dummy =1 if a student chooses the highest track (Gymnasium), and in (2), (4), and (6) a dummy =1 if a student chooses one of the two higher tracks (Gymnasium, Realschule) and therefore not the lowest (basic) track. Standard errors (clustered at school level) in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Overall foreigner effect   To provide a context of the effect of refugees Table 3 shows the impact of the share of all foreigners among cohort peers. In this modified version, β_1 and β_2 are consolidated into β, which includes the share of all foreigners among cohort peers, while the fixed effects and covariates remain.[21] The effect of the share of all foreigners is positive on Germans' secondary educational track choice and negative on foreigners' choice in all years. However, these effects are statistically insignificant, apart from the effect on foreigners avoiding the lowest track in 2015-2018, that remains similar to the effect in 2011-2014.

This indicates that the increase in the influx of refugees since 2015 did not drastically change the peer effects of all foreigners for elementary students, as refugees are outnumbered by non-refugee foreigners and therefore do not drive the overall effect. Appendix Figure A.4 Panel A shows the overall foreigner effects separated for each year. The effects are small, mostly insignificant, and not consistent in direction over the years. Panel B reports the effects of refugees, which are studied conditional on the share of other foreigners. The effects of refugees in 2011-2014 have large standard errors and are therefore insignificant due to the low number of refugees in that period.

---

[21]Only change in the covariates: the share of refugees and other foreigners in other grades (1-3) is also cumulated to the share of all foreigners in the other grades.

Table 3: Overall Effect of Foreigners

	Germans		Foreigners	
Track choice:	High	High/Medium	High	High/Medium
	(1)	(2)	(3)	(4)
Panel A. 2011-2014				
Foreigners/Cohort peers	0.039	0.010	-0.095	-0.095
	(0.030)	(0.030)	(0.063)	(0.082)
N. of Obs	338,347	338,347	23,496	23,496
Mean dep. var.	0.410	0.706	0.275	0.456
Panel B. 2015-2018				
Foreigners/Cohort peers	0.014	0.029	-0.044	-0.120**
	(0.024)	(0.024)	(0.045)	(0.060)
N. of Obs	319,619	319,619	36,153	36,153
Mean dep. var.	0.422	0.721	0.235	0.409

Notes: The table shows fixed-effect regressions using as dependent variable dummies of the secondary school choice of elementary school graduates in Bavaria in 2011-2014 (Panel A) and 2015 – 2018 (Panel B). All regressions include school-, and year-fixed effects, the share of refugees and foreigners among non-graduating students, and individual, school, municipality, and county controls. Columns (1) and (2) cover Germans and (3) and (4) foreigners. The outcome variable in columns (1) and (3) is a dummy =1 if a student chooses the highest track (Gymnasium), and in (2) and (4) a dummy =1 if a student chooses one of the two higher tracks (Gymnasium, Realschule) and therefore not the lowest (basic) track. Standard errors (clustered at school level) in parentheses. * p <0.10, ** p <0.05, *** p <0.01

When studying the effects in 2015-2018, the effects on Germans' highest track choices and refugees' track choices become consistent in their direction, and the standard errors are largely reduced.

4.2 Robustness

Robustness Checks Figure 4 shows the robustness of the main results to variations in the method or data specification. Each row presents six results of one specification in 2015-2018: the effect on Germans', refugees', and other foreigners' choice of the highest and the two highest tracks. Specification (1) shows the main results.

Specifications (2) and (3) show the robustness of instrumenting the refugee share to address potential sorting issues. Specification (2) uses a prediction of the share of refugees based on the birth years of all students in the school as an instrument variable (IV) while using the same fixed effects and covariates. This eliminates sorting issues between grades, e.g. assigning refugees to grades not based on their age and previous education but to sort them in a higher-performing cohort. The IV has a strong first stage as reported in Appendix Table A.8. The results indicate that the observed effects are not driven by within-school grade sorting. Although the results for refugees become quite imprecise, the effect on avoiding the lowest track remains similar in size. To extend the argument of sorting to a broader context, one could

Figure 4: Effect of Refugee Share in Various Robustness Checks
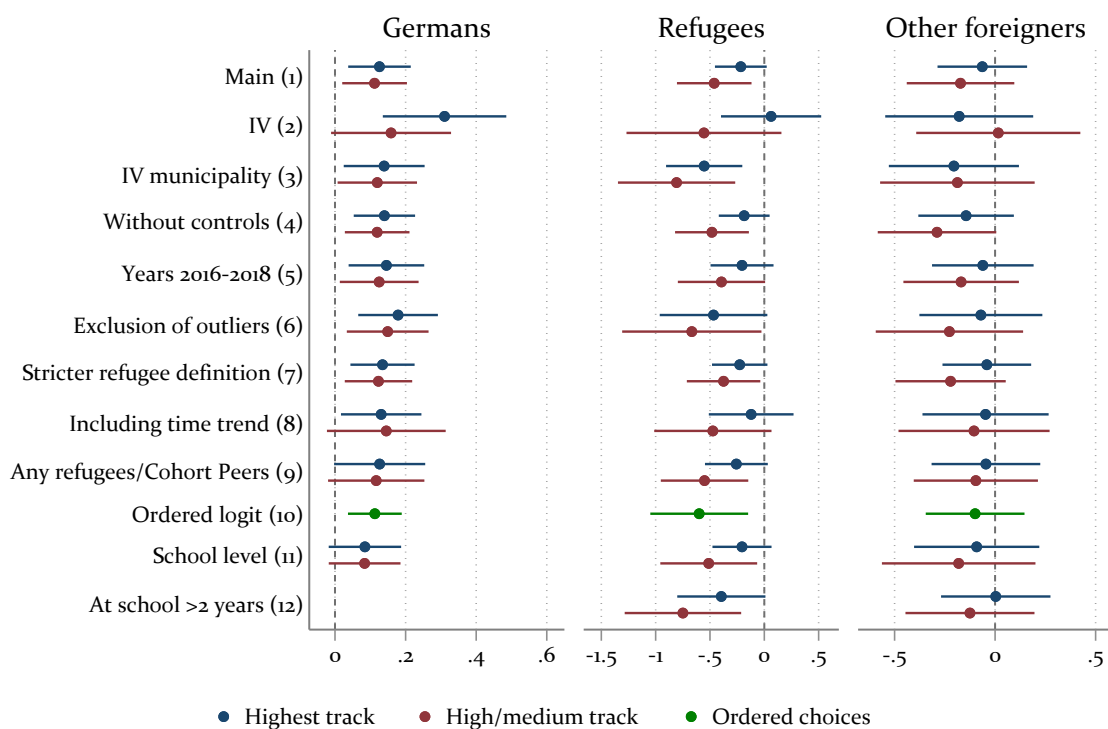
Notes: The figure shows the coefficient and 95%-confidence bands of the share of refugees among cohort peers in the years 2015-2018 for the main and various slightly adjusted specifications as stated by the columns description. Each specification is run separated for Germans, refugees, and other foreigners and two outcomes: a dummy for visiting the highest track and one for not visiting the lowest track (visiting the highest or the medium track). In the case of the ordered logit specification, only a single outcome is considered, which is transformed by 1/5 to make the coefficients comparable to the others. Additionally, the nationality dummies are not used as control variables in the ordered logit specification to allow computability.

also argue that sorting among grades does not take place at the school but at the municipality level.[22] Specification (3) uses the share of refugees among all elementary school graduates in a municipality as an instrument and shows the robustness of the specification. The strong first stage is reported in Appendix Table A.8.

The remaining specifications show that the results are robust to excluding special cases or varying the estimation methods. Specification (4) excludes the control variables, while still including fixed-school and year effects, as well as the share of refugees and other foreigners in other grades. Specification (5) considers the years 2016-2018, excluding 2015 to stabilize the trend in refugees composition. Specification (6) focuses on schools with a refugee share below 11.11%, the 95% percentiles of schools with at least one refugee, to exclude large outliers. To verify the robustness of the refugee definition, specification (7) defines refugees as foreigners with citizenship

---

[22]This could appear due to exceptions in allocation in which the authorities assigned refugees to other schools due to insufficient space or staff.

that have a share of more than 60% refugees in Germany instead of the 50% in the main specification.[23] Specification (8) includes school-specific linear time trends following among others Schneeweis (2015) and Brenøe and Zölitz (2020). The effects of the refugee share among cohort peers on Germans stay significant, while the effect on refugees becomes insignificant but stays similar in size. Specification (9) considers only observations that have at least one cohort peer who is a refugee to study the intensive margin effect. Specification (10) employs a within-school ordered logit model using the method of Baetschmann *et al.* (2020).[24] The outcome variable secondary school track takes the values 3 if the highest track, 2 if the medium track, and 1 if the basic track is chosen. Specification (11) employs schools as observation units instead of individual students and shows similar but slightly less precise results. Specification (12) considers only non-German students who visited the school for more than two years, while using as an explanatory variable the usual share of refugees. This demonstrates that a correlation between recently arrived refugees, who have a low likelihood to visit the higher tracks, and the share of refugees among cohort peers does not drive the negative effects.

Effect of Variables Related to the Refugee Share   Figure 5 reports specifications that use related variables as explanatory variables to show that the effect of refugees among cohort peers cannot be replicated by other nationalities or students in the school. Next to the main specification (1), specification (2) uses the share of Syrians, which is the most common citizen among refugees, and mostly replicates the results. If instead shares of common non-refugee citizenships are used, as Romania (2) or Turkey (3) the results do not replicate the main results and remain insignificant. Specifications (5), (6), and (7) adopt a similar approach as Gould *et al.* (2009) to assess the impact of unobserved school characteristics. The specifications use as independent variables the share of refugees and other foreigners among first, second, and third graders in the same school year, meaning students that visit the school at the same time but are not in the same grade and therefore mostly not in the same classrooms.[25] Germans' secondary school track choices are not affected by the share of refugees among other graders. Refugees are affected by the share of refugees among first graders. This could show a connection between the share among first graders and the output for non-German graduates, for example by a change in the school's culture, but could also be a random occurrence. Clearly none of the shares from other grades in the

---

[23]This changes the share of refugees and other foreigners and the *N* of refugees and other foreigners and reduces the amount of refugees by roughly 8%.

[24]For readability of the figure the results of this specification are transformed by 1/5 in the figure.

[25]The number of combined classes in Bavaria, which teach students of several grades in one class, rised up to 1512 in 2018/19 (Bayerisches Staatsministerium für Unterricht und Kultus, 2023a), which is less than 10% compared to 18,957 classes in 2018/2019 in this cleaned dataset.

school, which are not fellow students in a graduate's grade have the same effects as the actual share.

Figure 5: Effect of Variables Related to the Refugee Share
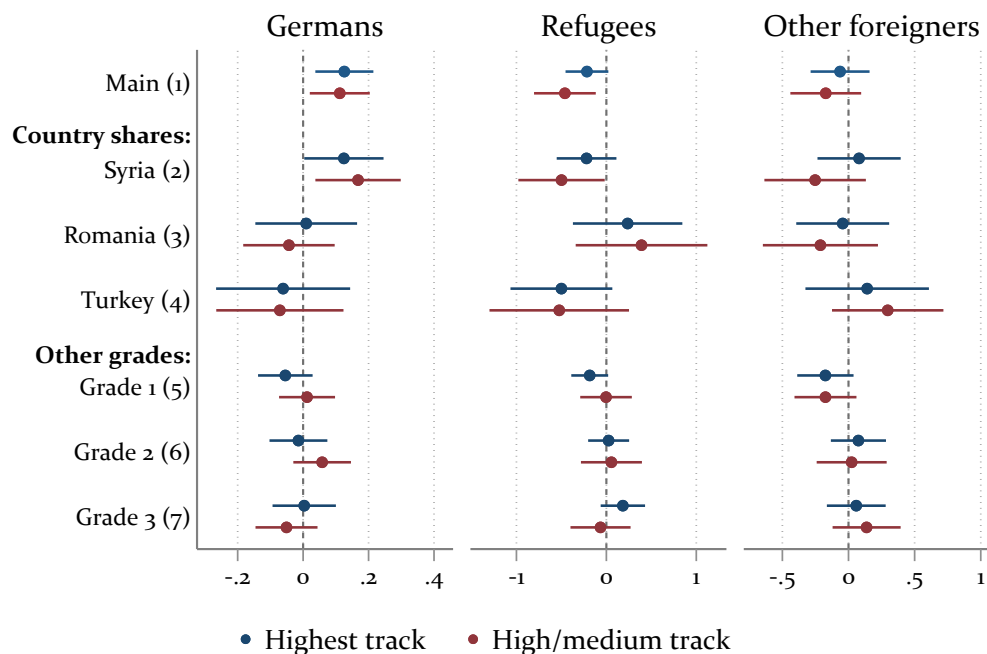
● Highest track   ● High/medium track

Notes: The figure shows the coefficient and 95%-confidence bands of the share of refugees among cohort peers in the years 2015-2018 for the main specifications and variations of it which use other explanatory variables. The explanatory variables are displayed in the row headers. Each specification is run separated for Germans, refugees, and other foreigners and for two outcomes: a dummy for visiting the highest track and one for not visiting the lowest track (visiting the highest or the medium track).

Heterogeneity   To figure out whether the effects are purely or strongly driven by certain subgroups, I study possible heterogeneities in Figure 6.

The gender section of the figure demonstrates that female and male Germans are affected similarly and positively by the share of refugees in their class. The effect of male refugees is partially stronger on Germans, while the effect of female refugees is insignificant. Only female refugees are significantly negatively affected by the share of refugees in their grade, while for male refugees the negative effect is slightly reduced in size and becomes insignificant. Female refugees are affected stronger by male refugees among cohort peers. The effects on other foreigners remain insignificant.[26]

The integration class section of the figure splits the schools by integration classes, while any of the considered graduates visited the school (2012-2018). It separates

---
[26]A small share of the immigrant peer literature studies gender heterogeneity with mixed results. Schneeweis (2015) finds that migrants in general have a significant negative effect on male migrants, while migrants with the same nationality have only a significant negative effect on female migrants. Tumen (2021) find that refugees have higher positive effects on native males than on females.

Figure 6: Heterogeneity Effect of Refugee Share
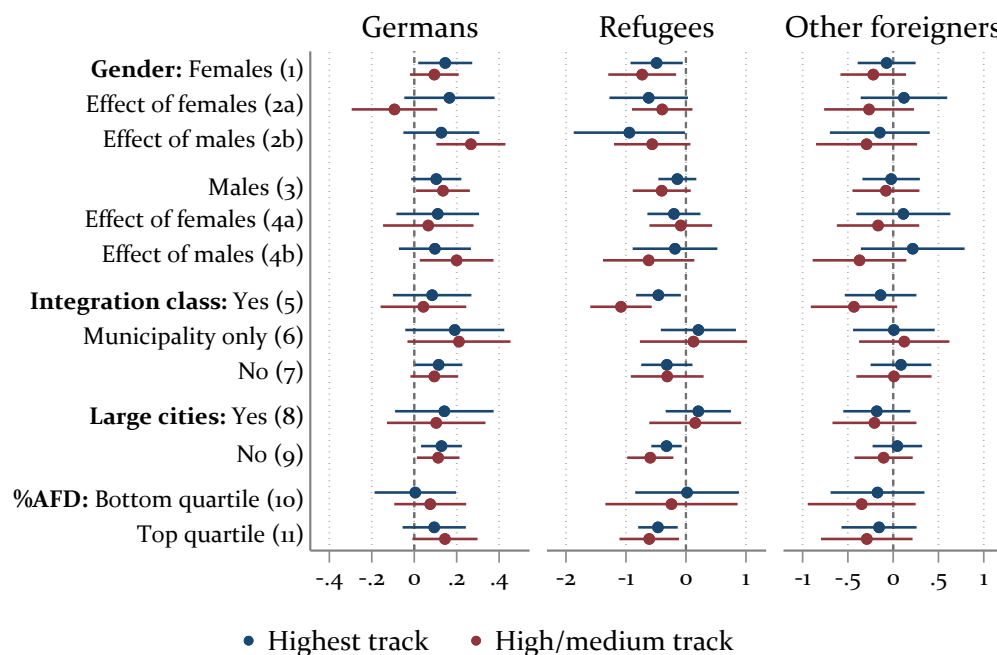
Notes: The figure shows the coefficient and 95%-confidence bands of the share of refugees among cohort peers in the years 2015-2018 for the main specifications on splits of the sample. The gender section of the figure extends the main specification by splitting the refugee effect into the effect of female and male refugees. Each specification is run separated for Germans, refugees, and other foreigners and for two outcomes: a dummy for visiting the highest track and one for not visiting the lowest track (visiting the highest or the medium track).

schools that have such a class in the observed period, schools in municipalities with such schools but without the classes themselves and schools in municipalities without integration classes at all. The split shows that the effects in municipalities with integration classes differ strongly depending on hosting them in the own school. Schools with such an class have stronger negative effects on refugee students and weaker positive effects on German students, while schools with such a class only in the municipality display larger positive effects on German students with no significant effects on refugees. The effects in schools in municipalities without any integration classes show the same pattern as the main specification although slightly less precise. This indicates that in municipalities with any integration classes some sorting occurs, which results in different effects of refugees.[27]

The large city section of the figure differentiates between the eight largest cities in Bavaria (more than 100,000 inhabitants) and the rest of the municipalities, in which the effects persist. The largest cities have on average higher incomes, higher

---

[27]I find no significant negative effect of a switch of integration class from no to yes within schools (not reported). In contrast Höckel and Schilling (2022) find that those classes themselves have a negative impact on refugees' performance.

unemployment shares, and a lower share of individuals voting for the right-wing party, therefore they differ from the majority of observations. In the largest cities, the effects on Germans are imprecise, while the effects on refugees become highly insignificant and slightly positive. Therefore the main effects are not driven by the largest cities but by the remaining municipalities.

The AfD (Alternative for Germany, right-wing party in Germany) section of the figure splits the municipalities by their 2018 election shares for the AfD and presents that a low share of right-wing voters eliminates the effects. The results show that while in the lowest quantile of votes for AfD, the results are close to zero and insignificant, in the largest quantile a significant positive effect on Germans avoiding the lowest track persists. The results on refugees in the lowest quantile are mixed and insignificant, while there are significant negative effects of refugees choosing the highest track in the largest quantile.[28]

4.3 Additional Effects on Foreigners

While I find strong effects of and on refugees, there are no effects of or on non-refugee foreigners in the main specification. Therefore the following analysis studies the share of peers with the own language or citizenship.

To analyze the non-refugee foreigners further I use the share among cohort peers with the same language as spoken in the own country of citizenship[29] and the share of cohort peers with the same citizenship in Table 4. The first four columns show the results for refugees and the following four the results for non-refugee foreigners. The probability of refugees choosing the highest track is not affected by the share of own-language speakers or by the share of cohort peers with their own citizenship. The probability of avoiding the lowest track is not significantly affected by the two shares but the negative effect of refugees among cohort peers persists. For other foreigners, a higher share of cohort peers speaking their own language has a significant negative effect on the probability of visiting higher secondary school tracks. The share of foreigners with their own citizenship has a significant negative effect, which overrides the effect of their own language.[30]

---

[28]The share of voting for AfD correlates with several other observables like municipality size or income per capita. The results remain similar if only the non-large city municipalities are considered, which eliminates the strong correlation between inhabitants and AfD. Results on the reduced sample not reported.

[29]I used the most complete dataset found for languages officially, regionally or widely spoken in the own country (Wikipedia, 2023). When two foreign graduates in a school and cohort had a common language according to their citizenship in the list they were both assigned one cohort peer with their own language. Austria, Belgium, Liechtenstein, Luxembourg, and Swiss were excluded from the regression since they have all German students speaking the same language as them.

[30]When interacting the ten most common non-refugee foreign nationalities with the share of own citizenship the interactions of Romania, Hungary and Bulgaria have a significant negative, Turkey,

Table 4: Effects of Own Citizenship and Language

Track choice:	Refugees				Other Foreigners			
	High		High/Medium		High		High/Medium	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Refugees/Cohort peers	-0.069 (0.189)	-0.063 (0.188)	-0.617** (0.253)	-0.608** (0.254)	-0.075 (0.115)	-0.081 (0.115)	-0.157 (0.138)	-0.165 (0.137)
Other foreigners/Cohort peers	0.125 (0.093)	0.125 (0.093)	0.047 (0.131)	0.046 (0.131)	-0.011 (0.066)	-0.007 (0.067)	-0.014 (0.076)	-0.010 (0.076)
Own language/Cohort peers	-0.222 (0.218)	-0.135 (0.274)	0.234 (0.258)	0.357 (0.326)	-0.303** (0.137)	0.395 (0.245)	-0.546*** (0.150)	0.284 (0.292)
Own citizenship/Cohort peers		-0.139 (0.208)		-0.197 (0.274)		-0.924*** (0.289)		-1.098*** (0.343)
N. of Obs	8,181	8,181	8,181	8,181	27,178	27,178	27,178	27,178
Mean dep. var.	0.107	0.107	0.228	0.228	0.264	0.264	0.453	0.453

Notes: The table shows fixed-effect regressions using as dependent variable dummies of the secondary school choice of elementary school graduates in Bavaria in 2015-2018. All regressions include school-, and year-fixed effects, the share of foreigners among non-graduating students, and individual, school, municipality, and county controls. Columns (1) and (2) cover refugees, and (3) and (4) non-refugee foreigners excluding German-speaking countries (Austria, Belgium, Liechtenstein, Luxembourg, and Switzerland). The outcome variable in columns (1), (3), and (5) is a dummy =1 when a student chooses the highest track (Gymnasium), and in (2), (4), and (6) a dummy =1 if a student chooses one of the two higher tracks (Gymnasium, Realschule) and therefore not the lowest (basic) track. Standard errors (clustered at school level) in parentheses. * p <0.10, ** p <0.05, *** p <0.01

The analyses support the hypothesis that certain groups of foreigners, such as refugees, or having a common citizenship or language, are separated socially from the rest of the class. A recent paper by Danzer *et al.* (2022) shows that having German friends has a positive impact on the German language skills although it is not a mediator of the effect that living in an ethnic enclave, a region with a high own ethnic concentration, harms foreign children's German skills. I do not observe the effect of ethnic enclaves in the place of living since the effects analyzed are within schools, but the probability of having friendships with Germans is likely to decrease if individuals have students in their grade with their own language or citizenship background. Similarly Schneeweis (2015) studies the effect on foreigners of foreigners with their own citizenship and finds negative results which she suspects come from missing contacts with natives.

5 Potential Drivers Behind the Effects on Germans

That the share of refugees among cohort peers has a robust positive effect on the German students' track choices, leads to the question of which mechanisms drive that

---

Croatia, and Italy have an insignificant negative and Poland and Kosovo have an insignificant positive effect on avoiding the lowest track.

effect. I will discuss three potential ways the track choice could be influenced in the Bavarian setting.[31] First, the actual performance of German elementary students could increase. This could result from a more diverse classroom, better teachers assigned to grades with a high refugee share, or a higher motivation to study, potentially driven by the parents. Second, teachers could grade German students better without an actual performance increase. The secondary school track recommendation given by the school is purely based on grades given by the teacher. Therefore a reduction in average quality in the class or changed preferences about the students' secondary track could influence the teachers' grading. Third, parents could send their children to higher secondary school tracks than before. Parents always have the option to send their child to a school track, which has lower requirements than the recommended track and they could reduce this behavior. They could also enforce that their children take an additional test to be allowed to visit a higher secondary school as recommended by the elementary school. Understanding the influence of the three possible channels would be of high interest. Since the administrative dataset I am using includes no information about objective performance, grades, or who recommends which secondary school, I can only shed some light on that issue.

5.1 Performance change as mechanism

I am not able to observe actual performance changes, however, results from a different dataset I use do not point to this mechanism. Previous literature that studied objective test scores found mixed results (Jensen and Rasmussen, 2011; Ohinata and Van Ours, 2013; Brunello and Rocco, 2013; Tonello, 2016; Ballatore *et al.*, 2018; Brandén *et al.*, 2019; Figlio and Özek, 2019; Tumen, 2021; Green and Iversen, 2022). None of the previous evidence is from Germany. Therefore, I study the effect of immigrants on Germans and immigrants' performance using the National Educational Panel Study (NEPS) Starting Cohort 2 (NEPS Network, 2022; Blossfeld and Von Maurice, 2019) in Appendix, Section B.[32] I find a positive effect on German students' metacognition, the ability to solve problems, but not on German and Science scores in the years 2012-2014. But while German and Science grades, together with Math grades, determine the

---

[31]The Math German and general science grades that students receive in grade 4 determine the schools track recommendation. Parents have the option to choose whether they want to enroll their child in the recommended secondary school track, opt for a lower track, or have their children undergo tests for a higher track, for which they did not achieve the required grades.

[32]This paper uses data from the National Educational Panel Study (NEPS): Starting Cohort 2 – Kindergarten, doi:10.5157/NEPS:SC2:1.0.0. From 2008 to 2013, NEPS data were collected as part of the Framework Programme for the Promotion of Empirical Educational Research funded by the German Federal Ministry of Education and Research (BMBF). As of 2014, the NEPS survey is carried out by the Leibniz Institute for Educational Trajectories (LIfBi) at the University of Bamberg in cooperation with a nationwide network.

secondary education track recommendation, metacognition does not directly and does not seem to be large enough to drive performance strongly. I therefore find no relevant performance effects of immigrant peers in the NEPS data. These findings do not rule out actual performance effects as drivers in my main results since they are from a different time frame and study immigrant peer effects, not refugee peer effects. Though not dismissing the possibility, the evidence does not strongly support this explanation.

5.2   Grading schemes as mechanism

The second potential explanation, that teachers change their grading to a more lenient scheme if more refugees are in the cohort, is related to the concept of grading on a curve (Calsamiglia and Loviglio, 2019), which could apply here. When teachers grade on a curve, a student's grade is influenced not only by their absolute performance but also by their classmates' performance. In essence, a student may receive a lower grade if their classmates perform exceptionally well and a higher grade if they are in a class with lower-performing peers.[33] In Appendix, Section B, I show that the proportion of immigrants in the NEPS dataset has a positive and partially significant impact on teachers' assessments of the German performance for both German and immigrant students. This might be caused by immigrant peers performing worse in German because immigrants are often non-native speakers, which leads to better performance assessments by teachers without improved performance in German. While the NEPS dataset does not allow to study how this transfers into grades and then influences secondary school choices, this finding supports the explanation for the positive effect on Germans' secondary school choices, by a change in teachers grading standards. Although I can only observe this in a different period than my main results and only the share of immigrants is reported, it strengthens the credibility of changed grading schemes as found by Calsamiglia and Loviglio (2019) as an explanation for the improvement in German students' secondary school track choices. This is further supported by the heterogeneity results in Table 6 which show that the effects are stronger for schools without separated classes for non-German speakers. Therefore, the findings could suggest that the increase in refugee shares among their cohort peers could change the teachers' grading scheme.

---

[33]Recently the literature showed the relevance of relative performance in school for further outcomes (Elsner and Isphording, 2017; Murphy and Weinhardt, 2020; Denning *et al.*, 2023; Carneiro *et al.*, Forthcoming).

5.3   Implementation of the track recommendation as mechanism

The last potential explanation is that even if students' performance and their grades do not change, parents could use their scope for decision-making to increase their children's secondary school choices. This is related to the "white flight" literature in the US (Baum-Snow and Lutz, 2011; Li, 2009), which shows that white parents send their children to private schools or schools in other areas, due to an increase of minorities in public schools. This is not observed in Germany, where most children visit a public school determined by their school district. However, vertical segregation by Germans avoiding the lowest secondary educational track could exist. This is possible since parents have some leeway in the decision of which school they send their child to, with the option to select a lower-ranked school than recommended or send them to a trial face in a higher-ranked school. Recent literature (Falk *et al.*, Forthcoming; Bach, 2023) illustrates that socio-economic status influences how often parents follow teachers' recommendations. Bach (2023) demonstrates that an expected change among future classmates can impact the tendency to choose the recommended high track. This suggests that a change in the refugee share among potential peers could change parents' preferences for their children's secondary school tracks. Unfortunately, the data does not allow to observe the teachers' recommendations and parents' decisions.

Observing future composition in secondary schools could give some insights into the influence of future peers on track choices. Among the secondary school tracks, the lowest track has mandatory school districts, which encompass up to ten (on average three) elementary school districts. Consequently, I can calculate the refugee and foreigner share a student will face if visiting the lowest track the following year, by observing the secondary school track choices across all elementary schools within a shared basic school district. Table 5 presents an extension of the main specification for Germans, which additionally includes the share of refugee and other foreign graduates among fellow elementary schools in the same lowest track school district and the composition the student would face if visiting the basic track in the following school year.[34] The composition is split by the students who are cohort peers of the individual and the students who visited different elementary schools.

The effect of refugees among cohort peers remains positive, while the share of refugees among graduates in different schools in the district has a negative influence on German students' secondary school choices. Focusing on those refugees and other foreigners from the fellow schools that choose the basic track, significantly positive effects of the share of refugees and other foreigners emerge.[35]   For completeness

---

[34]The sample is restricted to elementary schools that share a basic school district with other elementary schools. Schools with unclear fellow schools in a basic school district are excluded.

[35]The effect of refugees/graduates from fellow schools becomes insignificant when not conditioning on the general refugee share in the fellow schools.

Table 5: Effect of Refugee Share in Future Basic Schools

Track choice:	Germans			
	High (1)	High/Medium (2)	High (3)	High/Medium (4)
Refugees/Cohort peers	0.159*** (0.053)	0.159*** (0.057)	0.411*** (0.087)	0.364*** (0.100)
Other foreigners/Cohort peers	-0.025 (0.031)	0.004 (0.029)	0.001 (0.042)	0.032 (0.040)
Refugees/Graduates in fellow school	-0.154** (0.078)	-0.121 (0.081)	-0.139* (0.079)	-0.109 (0.082)
Other foreigners/Graduates in fellow school	-0.057 (0.043)	-0.027 (0.039)	-0.053 (0.043)	-0.024 (0.040)
Composition future basic school:				
Refugees/Graduates from fellow school	0.022 (0.025)	0.037* (0.021)	0.020 (0.025)	0.036 (0.022)
Other foreigners/Graduates from fellow school	0.052*** (0.019)	0.064*** (0.020)	0.052*** (0.019)	0.065*** (0.020)
Refugees/Cohort peers from own school			-0.111*** (0.029)	-0.091*** (0.032)
Other foreigners/Cohort peers from own school			-0.021 (0.018)	-0.021 (0.017)
N. of Obs	269,840	269,840	269,840	269,840
Mean dep. var.	0.432	0.728	0.432	0.728

Notes: The table shows fixed-effect regressions using as dependent variable dummies of the secondary school choice of elementary school graduates in Bavaria in the years 2015-2018. The sample is restricted to elementary schools that share a basic school district with other elementary schools. Schools with unclear fellow schools in a basic school district are excluded. All regressions include school-, and year-fixed effects, the share of refugees and foreigners among non-graduating students, and individual, school, municipality, and county controls. Columns (1) and (2) cover Germans, (3) and (4) refugees, and (5) and (6) non-refugee foreigners. The outcome variable in columns (1), (3), and (5) is a dummy =1 if a student chooses the highest track (Gymnasium), and in (2), (4), and (6) a dummy =1 if a student chooses one of the two higher tracks (Gymnasium, Realschule) and therefore not the lowest (basic) track. Standard errors (clustered at school level) in parentheses. * p <0.10, ** p <0.05, *** p <0.01

columns (3) and (4) show a negative impact of the share of refugees and other foreigners in the same school, who opt for the basic secondary education track, conditional on the share of refugees and other foreigners in the grade. This effect is not causal since reverse causality or omitted variable bias due to variables like teacher ability or funding of the school may play a role.

The observations suggest that a high share of refugees and foreigners in basic schools from other elementary schools reduces the inflow of Germans to those. Since the students from different schools had no direct contact, parents preferences for future peers of their children might explain this effects. It remains unclear whether this can be transferred to the own school level, but seems a plausible hypothesis. The heterogeneity of right-wing party election shares in Figure 6, highlighting the emergence of the positive effect only in regions with a higher voting share for the

right-wing party, could also indicate that parents' preferences for their children's peers influences the track choice. Therefore, the scope of the parents when choosing a track could be a mechanism for the positive effect of refugees on Germans' secondary school track choices.

6 Conclusion

This paper uses a unique administrative dataset from Germany's largest federal state Bavaria to analyze the effect that a higher share of refugees and other foreigners has on the secondary school track choice of Germans, refugees, and other foreigners. I find that a higher share of refugees among cohort peers has a positive effect on Germans' secondary school track choice. In contrast, it has a negative effect on refugees' choices and no effects on other non-refugee foreigners.

I analyze the positive effect of the refugee share on Germans further. The effect could be driven by an actual performance increase, better grading by the teacher, or choosing higher secondary tracks more often given the same grades. Using further data and analyses gives some hints that a genuine performance effect is unlikely and that the observed effects might be more related to shifting teacher grading standards and parents' preferences for schools with fewer foreign students.

I find negative effects on refugees of the share of refugees among cohort peers, while not finding any effects on other foreigners. When considering the share of students among cohort peers who speak the same language or have the same citizenship, these factors have a negative effect on non-refugee foreign students. This could be an indicator that foreign students get harmed by generating a subgroup with other foreigners similar to themselves, as other refugees or students with their own citizenship.

These findings are especially interesting because they represent the first study of its kind in Germany and one of few studying the impacts of the large influx of refugees to Europe in 2015 on education outcomes. The literature so far showed that peer effects of immigrants depend on the specifics of the situation, as the host country and immigrant inflow. Getting these insights for Germany, which became the world's fifth largest refugee host country during the *refugee crisis* is of relevance not only for German students but also for the refugees to allow them to integrate into society. While German students may choose higher tracks when having a greater proportion of refugees in their grades, it harms refugees' track choices. Insights from the literature show that visiting lower tracks at an early age, as it is the case in Bavaria, affects lifelong educational and labor market outcomes (e.g. Hanushek and Wößmann, 2006; Piopiunik, 2014; Chetty *et al.*, 2011). The impact of refugees on secondary school track

choice can therefore contribute the nationality gaps in the labor market (Algan *et al.*, 2010; Brell *et al.*, 2020).

References

ALGAN, Y., DUSTMANN, C., GLITZ, A. and MANNING, A. (2010). The economic situation of first and second-generation immigrants in france, germany and the united kingdom. *Economic Journal*, pp. F4–F30.

BACH, M. (2023). Heterogeneous Responses to School Track Choice: Evidence from the Repeal of Binding Track Recommendations. *Economics of Education Review*, **95**, 102412.

BAETSCHMANN, G., BALLANTYNE, A., STAUB, K. E. and WINKELMANN, R. (2020). feologit: A New Command for Fitting Fixed-Effects Ordered Logit Models. *The Stata Journal*, **20** (2), 253–275.

BALLATORE, R. M., FORT, M. and ICHINO, A. (2018). Tower of Babel in the Classroom: Immigrants and Natives in Italian Schools. *Journal of Labor Economics*, **36** (4), 885–921.

BAUM-SNOW, N. and LUTZ, B. F. (2011). School Desegregation, School Choice, and Changes in Residential Location Patterns by Race. *American Economic Review*, **101** (7), 3019–3046.

BAYERISCHES LANDESAMT FÜR STATISTIK (2023a). Arbeitsmarkt: Kreise, Arbeitslose, Arbeitslosenquoten, Jahresdurchschnitt. Available at `https://www.statistikdaten.bayern.de/genesis//online?operation=table&code=13211-003r`, accessed on January 30, 2023.

BAYERISCHES LANDESAMT FÜR STATISTIK (2023b). Bevölkerung: Gemeinden, Stichtage (letzten 6). Available at `https://www.statistikdaten.bayern.de/genesis//online?operation=table&code=12411-001`, accessed on January 30, 2023.

BAYERISCHES LANDESAMT FÜR STATISTIK (2023c). Landtagswahl: Gemeinden, Erst-/Gesamtstimmen, Parteien, Wahltag. Available at `https://www.statistikdaten.bayern.de/genesis//online?operation=table&code=14311-005r`, accessed on January 30, 2023.

BAYERISCHES LANDESAMT FÜR STATISTIK (2023d). VGR der Länder: Kreise, Primäreinkommen, verfügbares Einkommen, Jahr. Available at `https://www.statistikdaten.bayern.de/genesis//online?operation=table&code=82411-101r`, accessed on January 30, 2023.

BAYERISCHES STAATSMINISTERIUM FÜR UNTERRICHT UND KULTUS (2023a). LehrplanPLUS Grundschule. Available at `https://www.km.bayern.de/jahrgangskombinierteklassen`, accessed on December 04, 2023.

BAYERISCHES STAATSMINISTERIUM FÜR UNTERRICHT UND KULTUS (2023b). Schulische Integration und Förderung der geflohenen Kinder und Jugendlichen aus der Ukraine im Schuljahr 2023/2024. Available at `https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwj99K2Vm5aBAxUBxAIHHbR9Ak8QFnoECA8QAQ&url=https%3A%2F%2Fwww.km.bayern.de%2Fdownload%2F27285_2023-02-14_Rahmenkonzept_`

2023_2024_2.pdf&usg=AOvVaw3WDXgaB4iC3kVjDBrmKzKs&opi=89978449,   accessed on December 04, 2023.

BIEWEN, M. and TAPALAGA, M. (2017). Life-Cycle Educational Choices in a System with Early Tracking and 'Second Chance' Options. *Economics of Education Review*, **56**, 80–94.

BLOSSFELD, H.-P. and VON MAURICE, J. (2019). *Education as a Lifelong Process: The German National Educational Panel Study (NEPS) Edition ZfE (2nd ed.)*. Springer VS.

BRANDÉN, M., BIRKELUND, G. E. and SZULKIN, R. (2019). Ethnic Composition of Schools and Students' Educational Outcomes: Evidence from Sweden. *International Migration Review*, **53** (2), 486–517.

BREDTMANN, J., OTTEN, S. and VONNAHME, C. (2021). Linguistic Diversity in the Classroom, Student Achievement, and Social Integration. *Education Economics*, **29** (2), 121–142.

BRELL, C., DUSTMANN, C. and PRESTON, I. (2020). The Labor Market Integration of Refugee Migrants in High-Income Countries. *Journal of Economic Perspectives*, **34** (1), 94–121.

BRENØE, A. A. and ZÖLITZ, U. (2020). Exposure to More Female Peers Widens the Gender Gap in STEM Participation. *Journal of Labor Economics*, **38** (4), 1009–1054.

BRUNELLO, G. and ROCCO, L. (2013). The Effect of Immigration on the School Performance of Natives: Cross Country Evidence Using PISA Test Scores. *Economics of Education Review*, **32**, 234–246.

CALSAMIGLIA, C. and LOVIGLIO, A. (2019). Grading on a Curve: When Having Good Peers is Not Good. *Economics of Education Review*, **73**, 101916.

CARNEIRO, P., AGUAYO, Y. C., SALVATI, F. and SCHADY, N. (Forthcoming). The Effect of Classroom Rank on Learning Throughout Elementary School: Experimental Evidence from Ecuador. *Journal of Labor Economics*.

CHETTY, R., FRIEDMAN, J. N., HILGER, N., SAEZ, E., SCHANZENBACH, D. W. and YAGAN, D. (2011). How Does your Kindergarten Classroom Affect your Earnings? Evidence from Project STAR. *The Quarterly Journal of Economics*, **126** (4), 1593–1660.

DANZER, A. M., FEUERBAUM, C., PIOPIUNIK, M. and WOESSMANN, L. (2022). Growing up in Ethnic Enclaves: Language Proficiency and Educational Attainment of Immigrant Children. *Journal of Population Economics*, **35** (3), 1297–1344.

DENNING, J. T., MURPHY, R. and WEINHARDT, F. (2023). Class Rank and Long-Run Outcomes. *Review of Economics and Statistics*, **105** (6), 1426–1441.

ELSNER, B. and ISPHORDING, I. E. (2017). A Big Fish in a Small Pond: Ability Rank and Human Capital Investment. *Journal of Labor Economics*, **35** (3), 787–828.

FALK, A., KOSSE, F. and PINGER, P. (Forthcoming). Mentoring and Schooling Decisions: Causal Evidence. *Journal of Political Economy*.

FEDERAL OFFICE FOR MIGRATION AND REFUGEES (2023). The Stages of the German Asylum Procedure. Available at `https://www.bamf.de/SharedDocs/Anlagen/EN/ AsylFluechtlingsschutz/Asylverfahren/das-deutsche-asylverfahren.pdf?__ blob=publicationFile&v=18`, accessed on December 04, 2023.

FIGLIO, D. and ÖZEK, U. (2019). Unwelcome Guests? The Effects of Refugees on the Educational Outcomes of Incumbent Students. *Journal of Labor Economics*, **37** (4), 1061–1096.

GEAY, C., MCNALLY, S. and TELHAJ, S. (2013). Non-Native Speakers of English in the Classroom: What are the Effects on Pupil Performance? *The Economic Journal*, **123** (570), F281–F307.

GOULD, E. D., LAVY, V. and DANIELE PASERMAN, M. (2009). Does Immigration Affect the Long-Term Educational Outcomes of Natives? Quasi-Experimental Evidence. *The Economic Journal*, **119** (540), 1243–1269.

GREEN, C. and IVERSEN, J. M. V. (2022). Refugees and the Educational Attainment of Natives: Evidence from Norway. *Economics of Education Review*, **88**, 102258.

HANUSHEK, E. A. and WÖSSMANN, L. (2006). Does Educational Tracking Affect Performance and Inequality? Differences-in-Differences Evidence across Countries. *The Economic Journal*, **116** (510), C63–C76.

HÖCKEL, L. S. and SCHILLING, P. (2022). Starting off on the Right Foot: Language Learning Classes and the Educational Success of Immigrant Children, Ruhr Economic Papers No. 983.

HOXBY, C. (2000). Peer Effects in the Classroom: Learning from Gender and Race Variation, NBER Working Paper No. 7867.

HUNT, J. (2017). The Impact of Immigration on the Educational Attainment of Natives. *Journal of Human Resources*, **52** (4), 1060–1118.

JENSEN, P. and RASMUSSEN, A. W. (2011). The Effect of Immigrant Concentration in Schools on Native and Immigrant Children's Reading and Math Skills. *Economics of Education Review*, **30** (6), 1503–1515.

KOBER, U. and KÖSEMEN, O. (2019). *Willkommenskultur zwischen Skepsis und Pragmatik: Deutschland nach der "Fluchtkrise"*. Bertelsmann Stiftung.

LI, M. (2009). Is there "White Flight" into Private Schools? New Evidence from High School and Beyond. *Economics of Education Review*, **28** (3), 382–392.

MORALES, C. (2022). Do Refugee Students Affect the Academic Achievement of Peers? Evidence from a Large Urban School District. *Economics of Education Review*, **89**, 102283.

MURPHY, R. and WEINHARDT, F. (2020). Top of the Class: The Importance of Ordinal Rank. *The Review of Economic Studies*, **87** (6), 2777–2826.

NEPS Network (2022). National Educational Panel Study, Scientific Use File of Starting Cohort First-Year Students, Leibniz Institute for Educational Trajectories (LIfBi), Bamberg.

Ohinata, A. and Van Ours, J. C. (2013). How Immigrant Children Affect the Academic Achievement of Native Dutch Children. *The Economic Journal*, **123** (570), F308–F331.

Pädagogisches Institut (2021). The School System in Bavaria, Available at `https://www.pi-muenchen.de/wp-content/uploads/2021/05/Uebersicht_Schulsystem_Englisch.pdf`, accessed on December 04, 2023.

Piopiunik, M. (2014). The Effects of Early Tracking on Student Performance: Evidence from a School Reform in Bavaria. *Economics of Education Review*, **42**, 12–33.

Schneeweis, N. (2015). Immigrant Concentration in Schools: Consequences for Native and Migrant Students. *Labour Economics*, **35**, 63–76.

Staatsinstitut für Schulqualität und Bildungsforschung München (2016). Bayerische Bildungsberichterstattung: Aktuelles 2016. Available at `https://www.las.bayern.de/qualitaetsagentur/bildungsberichterstattung/downloads/bayerische_bildungsberichterstattung_aktuelles_2016.pdf`, accessed on December 04, 2023.

Standing Conference of the Ministers of Education and Cultural Affairs (2021). The Education System in the Federal Republic of Germany 2018/2019. Available at `https://www.kmk.org/dokumentation-statistik/informationen-zum-deutschen-bildungssystem/dossier-englisch.html`, accessed on December 04, 2023.

Statistisches Bundesamt (Destatis) (2023a). Ausländer: Bundesländer, Stichtag, Geschlecht/Altersjahre/Familienstand, Ländergruppierungen/Staatsangehörigkeit. Available at `https://www-genesis.destatis.de/genesis//online?operation=table&code=12521-0021`, accessed on August 25, 2022.

Statistisches Bundesamt (Destatis) (2023b). Ausländer: Kreise, Stichtag, Geschlecht. Available at `https://www-genesis.destatis.de/genesis//online?operation=table&code=12521-0040`, accessed on January 30, 2023.

Statistisches Bundesamt (Destatis) (2023c). Bevölkerung: Kreise, Stichtag. Available at `https://www-genesis.destatis.de/genesis//online?operation=table&code=12411-0015`, accessed on January 30, 2023.

Statistisches Bundesamt (Destatis) (2023d). Schutzsuchende: Bundesländer, Stichtag, Geschlecht/Altersjahre/Familienstand, Ländergruppierungen/Staatsangehörigkeit. Available at `https://www-genesis.destatis.de/genesis//online?operation=table&code=12531-0021`, accessed on August 25, 2022.

Statistisches Bundesamt (Destatis) (2023e). Schutzsuchende: Kreise, Stichtag, Geschlecht. Available at `https://www-genesis.destatis.de/genesis//online?operation=table&code=12531-0040`, accessed on January 30, 2023.

THE UN REFUGEE AGENCY (2019). Global Trends Forced Displacement in 2019. Available at `https://www.unhcr.org/statistics/unhcrstats/5ee200e37/unhcr-global-trends-2019.html`, accessed on January 15, 2024.

TONELLO, M. (2016). Peer Effects of Non-Native Students on Natives' Educational Outcomes: Mechanisms and Evidence. *Empirical Economics*, **51** (1), 383–414.

TUMEN, S. (2021). The Effect of Refugees on Native Adolescents' Test Scores: Quasi-Experimental Evidence from PISA. *Journal of Development Economics*, **150**, 102633.

WIKIPEDIA (2023). List of Official Languages by Country and Territory. Available at `https://en.wikipedia.org/wiki/List_of_official_languages_by_country_and_territory`, accessed on December 04, 2023.

APPENDIX: FOR ONLINE PUBLICATION ONLY

A   Appendix Tables and Figures

Table A.1: Descriptives at School Level

	Schools	
	2011-2014	2015-2018
#Pupils	180.2	184.1
	(101.2)	(107.9)
#Classes	9.0	9.5
	(4.4)	(4.9)
Inhabitants municipality (10K)	11.3	11.7
	(33.5)	(35.0)
Income in county (1K)	22.0	24.1
	(2.5)	(2.8)
Unemplyment in county in %	3.5	3.1
	(1.3)	(1.1)
Foreigner in county in %	8.5	11.5
	(5.8)	(6.4)
Refugee in county in %	0.5	1.3
	(0.5)	(0.9)
Observations	7891	7891
N. of Schools	1973	1973

Notes: The table shows the mean for school characteristics. Standard deviations in parentheses.

Table A.2: Correlation of Refugees and Other Foreigners among Graduates

	School level		Municipality level	
Refugees:	Share (1)	# (2)	Share (3)	# (4)
Other foreigners/graduates	-0.021** (0.009)		-0.020* (0.011)	
#Other foreigners graduates		0.062*** (0.012)		0.047*** (0.018)
Constant	0.016*** (0.001)	0.526*** (0.050)	0.013*** (0.001)	0.425*** (0.049)
Observations	7892	7892	5416	5416
R^2	0.034	0.059	0.026	0.053

Notes: The table shows fixed-effect regressions using as outcome the share of refugees among graduates or number of refugees among graduates in 2015-2018. All regressions include year-fixed effects, regression (1) and (2) school fixed effects and (3) and (4) municipality fixed effects. Clustered standard errors clustered in parentheses. * p <0.10, ** p <0.05, *** p <0.01

Table A.3: Definition of Refugee Status by Citizenship per Year

|	Share of refugees among foreigners with citizenship > 50%							
	2011	2012	2013	2014	2015	2016	2017	2018
Afghanistan	1	1	1	1	1	1	1	1
Armenia	0	0	0	0	0	1	1	1
Azerbaijan	1	1	1	1	1	1	1	1
Bhutan	1	1	1	1	1	1	1	1
Congo, Democratic Republic	0	1	1	1	1	1	1	1
CoteDIvoire	0	0	0	0	0	0	0	1
Djibouti	0	0	0	0	0	1	0	0
Eritrea	1	1	1	1	1	1	1	1
Ethiopia	0	1	1	1	1	1	1	1
Gambia	0	0	0	0	0	0	1	1
Guinea	0	0	0	0	0	0	0	1
Guinea-Bissau	1	0	0	0	0	1	1	1
Iran, Islamic Republic	0	0	0	0	0	1	1	1
Iraq	1	1	1	1	1	1	1	1
Mali	0	0	1	1	1	1	1	1
Myanmar	1	1	1	1	1	1	1	1
Nigeria	0	0	0	0	1	1	1	1
Pakistan	0	0	0	0	0	1	0	0
Palestinian Territories	0	0	0	0	0	1	1	1
Senegal	0	0	1	1	1	1	1	1
Sierra Leone	1	1	1	1	1	1	1	1
Somalia	1	1	1	1	1	1	1	1
South Sudan (as of 09. 07.2011)	0	1	1	1	0	0	0	1
Syria	0	0	1	1	1	1	1	1
Uganda	0	0	0	0	0	0	1	1

Notes: The table shows dummy variables that indicate whether more than 50% of the foreigners with the citizenship listed on the left living in Bavaria, were refugees in the given years. The columns mark one year each (e.g. year 2011 is then used for the school year 2011/12).

Table A.4: Reported Secondary School Choice and Actual Appearances

| Reported Track:		Low	Medium	High	Other	Total	Share observable	Share in reported track of observables	of all
			Visited track in following year:						
Low	31,525	29,209	515	287	41	30,052	0.953	0.972	0.927
Medium	29,757	253	25,794	446	74	26,567	0.893	0.971	0.867
High	42424	96	745	36,221	15	37,077	0.874	0.977	0.854

Notes: The table is based on calculations from the "Landesamt für Statistik Bayern" for the school year 2017/2018.

Figure A.1: Share of Refugees and Other Foreigners
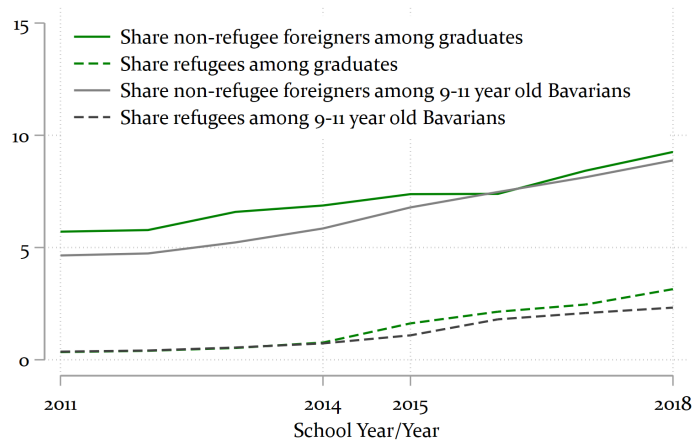

Notes: The figure shows shares of refugee and other foreign Bavarian elementary students graduates or Bavarian inhabitants. The year (e.g. 2011) is the school year (e.g. 2011/2012) and the year (e.g. 2011) for the shares among Bavarians. The shares among Bavarians are calculated using administrative data based on the legal status from the year in which the school year started.

Figure A.2: Citizenships of Foreign Graduates
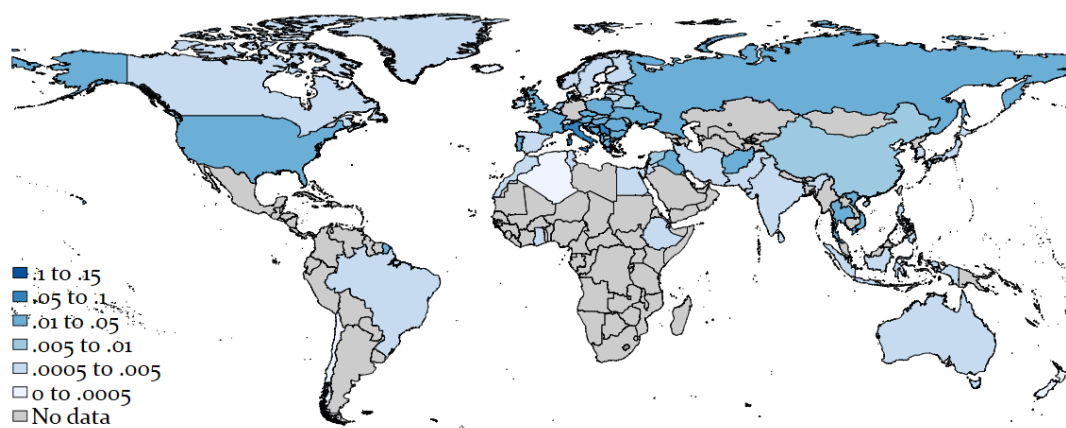
2011
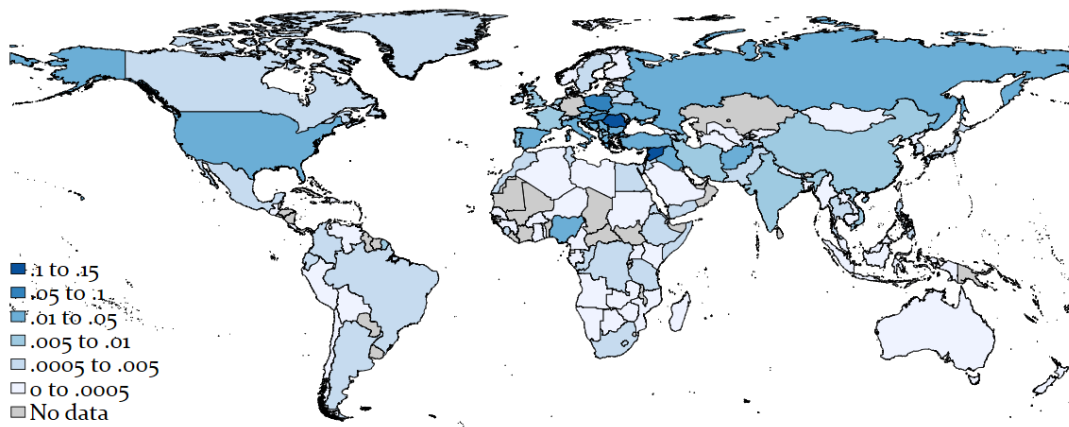
2018

Notes: The figure illustrates the countries of citizenship among foreign graduates. The colors show the proportion of all foreign graduates in the respective year holding citizenship from the respective countries.

Table A.5: Descriptives of Schools with and without Refugees after 2015 in 2011-2014

|	Without	With	diff
Female graduates in %	49.4	49.3	0.177
	(10.5)	(8.4)	
Average age graduates	9.3	9.4	-0.0213***
	(0.1)	(0.1)	
Gymnasium in %	34.7	38.3	-3.625***
	(15.1)	(14.8)	
Realschule in %	35.0	29.2	5.790***
	(14.2)	(11.8)	
Basic in %	29.3	31.2	-1.923***
	(12.4)	(12.5)	
Refugee graduates in %	0.0	0.5	-0.468***
	(0.4)	(1.5)	
Non-refuge foreign graduates in %	2.0	5.9	-3.939***
	(3.5)	(7.3)	
Amount graduates	30.7	51.2	-20.50***
	(18.7)	(26.3)	
Inhabitants in Municipality (10k)	2.9	14.5	-11.53***
	(15.2)	(37.8)	
Average income in county (1k)	21.4	22.2	-0.792***
	(2.0)	(2.7)	
Unemployment rate in municipality	3.2	3.6	-0.451***
	(0.9)	(1.4)	
Foreigners county in %	6.6	9.2	-2.660***
	(4.0)	(6.1)	
Refugees county in %	0.3	0.5	-0.200***
	(0.3)	(0.5)	
Observations	2192	5700	

Notes: The table shows the mean for school characteristics between 2011-2014 for schools with and without refugees after 2015. Standard deviations in parentheses. The column diff reports the difference between the two groups and the significance of a t-test. * p <0.10, ** p <0.05, *** p <0.01

Table A.6: Correlation of Graduate and County or School Composition

	No school fixed effects		School fixed effects	
	(1)	(2)	(3)	(4)
Refugee share in county	0.894***		1.398***	
	(0.121)		(0.140)	
Refugees share in non-graduate grades		0.644***		0.304***
		(0.0189)		(0.0292)
N	7892	7892	7892	7892
R^2	0.059	0.354	0.034	0.056

Notes: The table shows regressions using as outcome variable the share of refugees or other foreigners among graduates or the number of refugees among graduates in the years 2015-2018. All regressions include year-fixed effects.

Figure A.3: Within-school Variation

Foreigner/asylum share

Secondary school choice
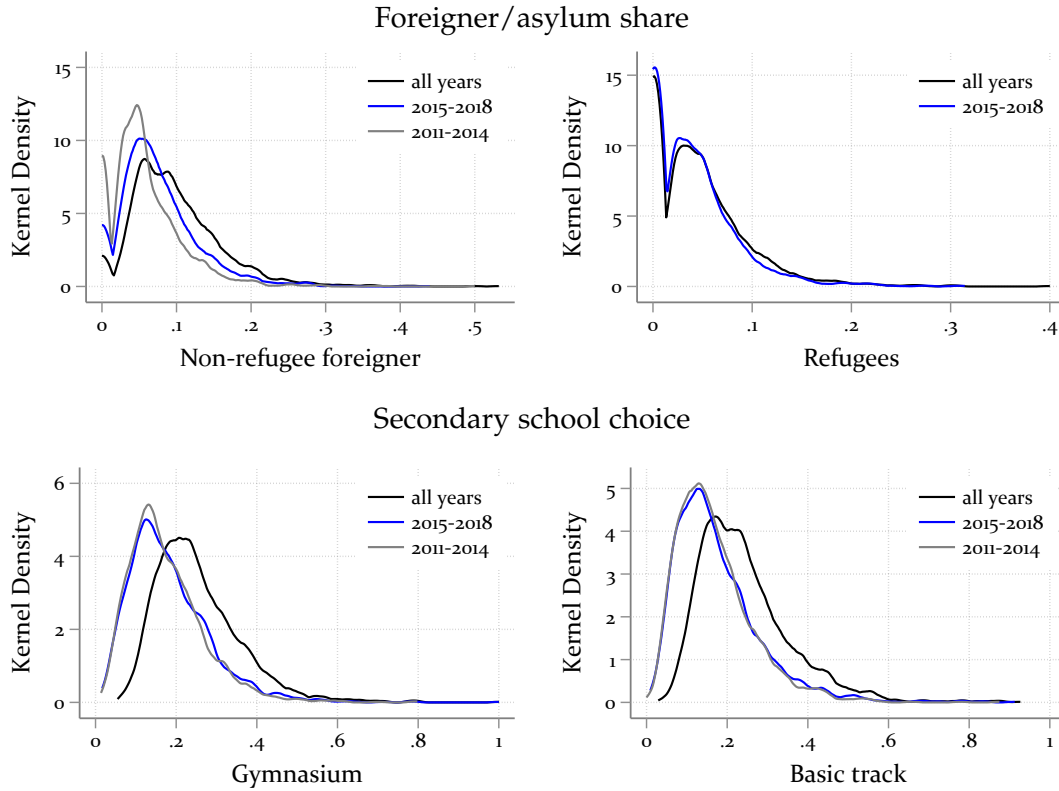
Notes: The figure shows kernel density functions of within-school variation over all eight years, 2011-2014 and 2015-2018 for the depending variable and the two regressors of interest.

Table A.7: Effects on Secondary School Choice (2011-2014)

| Track choice:	Germans		Refugees		Other Foreigners	
	High (1)	High/Medium (2)	High (3)	High/Medium (4)	High (5)	High/Medium (6)
Refugees/Fellow graduates	0.012 (0.121)	-0.109 (0.105)	-0.087 (0.646)	0.193 (0.720)	-0.418 (0.267)	-0.398 (0.277)
Other foreigners/Fellow graduates	0.042 (0.031)	0.018 (0.032)	-0.023 (0.258)	-0.083 (0.263)	-0.081 (0.068)	-0.079 (0.087)
N. of Obs	338,347	338,347	1,741	1,741	21,755	21,755
Mean dep. var.	0.410	0.706	0.185	0.361	0.282	0.463

Notes: The table shows fixed-effect regressions using as dependent variable dummies of the secondary school choice of elementary school graduates in Bavaria in the years 2011-2014. All regressions include school-, and year-fixed effects, the share of refugees and foreigners among non-graduating students, and individual, school, municipality, and county controls. Columns (1) and (2) cover Germans, (3) and (4) refugees, and (5) and (6) non-refugee foreigners. The outcome variable in columns (1), (3), and (5) is a dummy =1 if a student chooses the highest track (Gymnasium) and in (2), (4), and (6) a dummy =1 if a student chooses one of the two higher tracks (Gymnasium, Realschule) and therefore not the lowest (basic) track. Standard errors (clustered at school level) in parentheses. * p <0.10, ** p <0.05, *** p <0.01

Figure A.4: Time Variation of the Effects on Secondary Track Choices

Panel A. Effect of Share all Foreigners
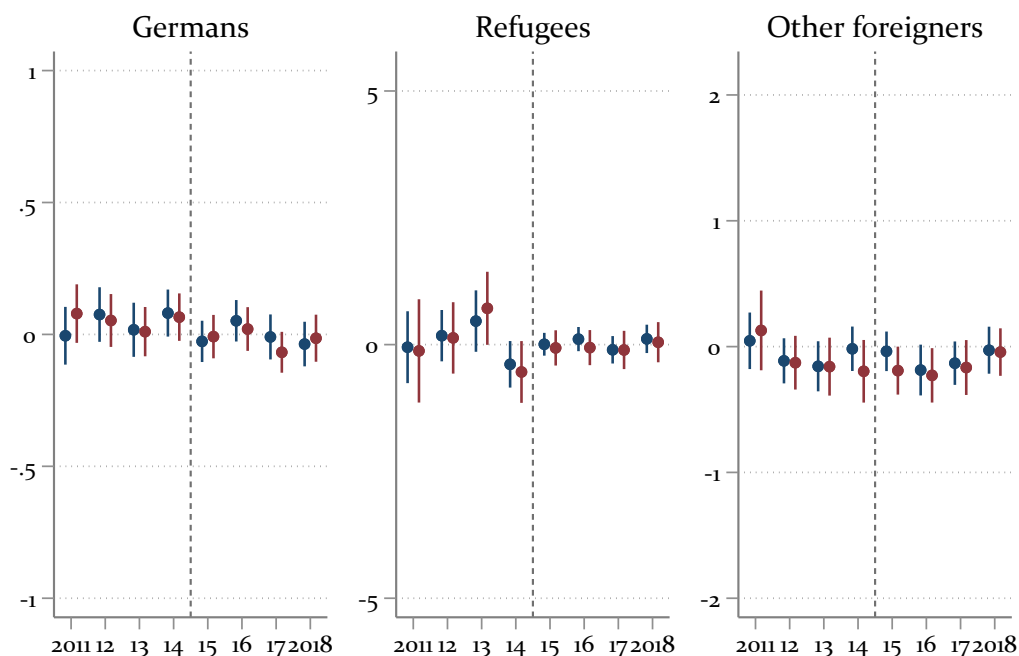
Panel B. Effect of Share Refugees
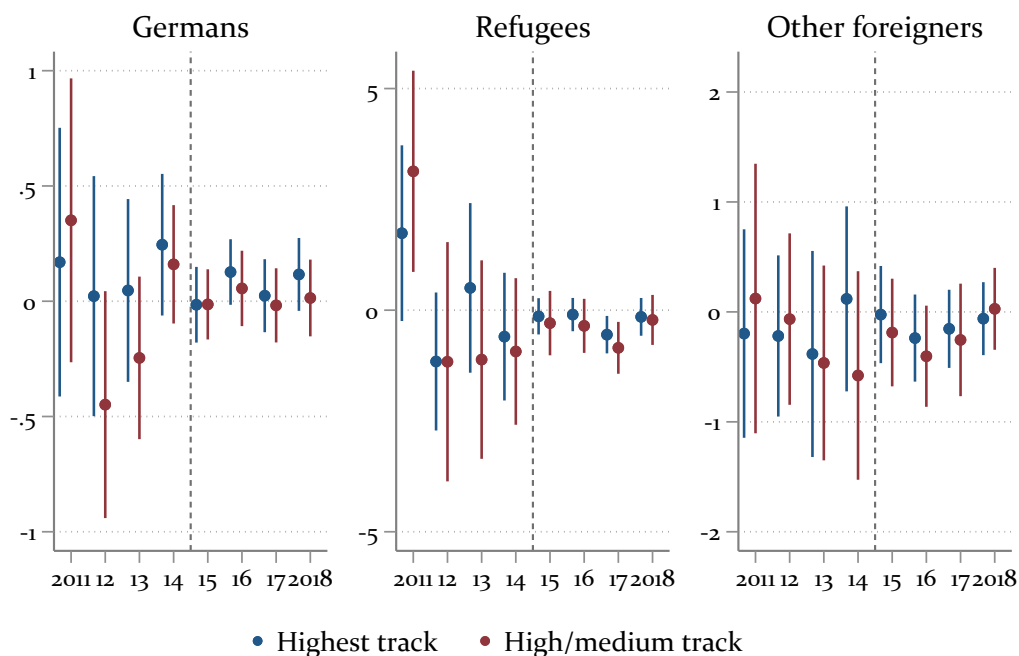
● Highest track   ● High/medium track

Notes: The figure shows the coefficient and 95%-confidence bands of the share of all foreigners (Panel A) and share of refugees (Panel B) among cohort peers interacted with the school years. Each plot displays two regressions wit the outcomes: a dummy for visiting the highest track and one for not visiting the lowest track (visiting the highest or the medium track). The year represents the start of the school year. e.g 2011 is the school year 2011/12)

Table A.8: First Stage Estimates of IV

Refugees/Fellow graduates	Share predicted by age in school			Share predicted by municipality share		
	(1)	(2)	(3)	(4)	(5)	(6)
Predictive share	0.647***	0.602***	0.714***	0.994***	1.065***	1.039***
	(0.0225)	(0.0512)	(0.0325)	(0.0114)	(0.0323)	(0.0287)
N. of Obs	319,619	8,181	27,972	319,619	8,181	27,972
Underident. Test	284.087	56.560	125.264	646.668	193.169	184.907
Weak IV Test	413.269	69.620	248.596	3469.461	480.399	696.524

Notes: This table shows results of the share of refugees among cohort peers on predicted shares of refugees. Columns (1)-(3) report the predictive share based on the age in a school in that year. Columns (4) - (6) the predictive share based on all graduates in the municipality. All regressions include school and year-fixed effects and controls. The under-identification and weak identification tests are the heteroskedasticity-robust Kleibergen and Paap (2006) rk LM and Wald F statistics, respectively, as reported by the ivreg2 Stata command. Standard errors (clustered at school level) in parentheses. * p <0.10, ** p <0.05, *** p <0.01

B Analysis using Neps Data

To investigate the impact of a higher share of immigrants on objective performance improvement and teacher assessment of German elementary students, I use the National Educational Panel Study (NEPS) Starting Cohort 2 (NEPS Network, 2022; Blossfeld and Von Maurice, 2019) data in the following to gain more insights on potential mechanisms. The NEPS data is based on a repeated student, parent, and teacher survey that generates a panel. I focus on the school year 2012/13 (grade 1 of elementary school) and school year 2014/2015 (grade 3) because those two waves include information about immigrant shares in the grades. This aligns with the period before the *refugee crisis* I consider, during which the foreigner share in the grade has an insignificant but positive impact on German secondary school choice. In both years the share of immigrants[36] in the grade the students visit and the school is reported by the school's principal. The share of immigrants is on average 22%. A separation of the share of refugees from other immigrants is not possible.

Unfortunately, a causal identification of secondary school choices on immigrant shares is not possible in the described NEPS dataset since secondary school choices are only observed once in time due to the data's structure. This prohibits the usage of fixed effects. However, Table B.1 shows that the non-causal correlation differs substantially from my main results. The correlation between the share of immigrants and the secondary school track choice is negative, but cannot be interpreted causally.

Table B.1: Correlation of Immigrant Shares and Track Choices in the NEPS Dataset

	Germans				Immigrants			
Track choice:	High (1)	High (2)	High/Medium (3)	High/Medium (4)	High (5)	High (6)	High/Medium (7)	High/Medium (8)
Immigrants/1. graders	0.0261 (0.146)	-0.0972 (0.183)	0.0846 (0.153)	0.0151 (0.190)	0.0676 (0.219)	-0.0111 (0.321)	-0.189 (0.247)	-0.214 (0.335)
Immigrants/3. graders	-0.124 (0.148)	-0.407** (0.197)	-0.186 (0.155)	-0.366* (0.204)	0.356 (0.223)	0.458 (0.311)	0.0857 (0.261)	0.278 (0.336)
N. of Obs.	2228	1648	2228	1648	600	434	600	434
Controls	No	Yes	No	Yes	No	Yes	No	Yes

Notes: The table shows regressions using as dependent variable dummies of the secondary school visited by students in Germany in the year 2016. Columns (1) to (4) cover Germans and (5) to (8) immigrants. The outcome variable in columns (1), (2), (5), and (6) is a dummy =1 if a student chooses the highest track (Gymnasium) and in (3), (4), (7) and (8) a dummy =1 if a student chooses one of the two higher tracks (Gymnasium, Realschule) and therefore not the lowest (basic) track. Standard errors (clustered at school level) in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

It is however possible to analyse the effect of outcomes that are observed in both years in which the immigration share is observed. I study the effects using school

---

[36]Immigrants are students who are either born abroad or have at least one parent born outside Germany.

Table B.2: Effects on Educational Outcomes in the NEPS Dataset

	Germans				Immigrants			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. Test scores								
Panel A.1. German								
Immigrants/Students in grade	-0.303	-0.209	-0.252	-0.242	-0.0214	-0.118	0.193	0.120
	(0.240)	(0.286)	(0.172)	(0.209)	(0.527)	(0.625)	(0.356)	(0.456)
N. of Obs.	5712	4760	5712	4760	1540	1287	1540	1287
Panel A.2. Metacognition								
Immigrants/Students in grade	1.095***	1.141***	1.030***	1.174***	-0.949	-1.468*	-0.809	-0.922
	(0.331)	(0.339)	(0.337)	(0.386)	(0.662)	(0.867)	(0.657)	(0.766)
N. of Obs.	5633	4690	5633	4690	1503	1255	1503	1255
Panel A.3. Science								
Immigrants/Students in grade	-0.0858	-0.0245	-0.0547	-0.00625	-0.0545	-0.704	-0.0498	-0.419
	(0.361)	(0.456)	(0.242)	(0.314)	(0.618)	(0.758)	(0.435)	(0.560)
N. of Obs.	5714	4716	5714	4716	1536	1285	1536	1285
B. Teacher assesment								
Panel B.1. German								
Immigrants/Students in grade	0.299	0.366	0.554**	0.503	0.908*	0.751	0.758	0.932
	(0.301)	(0.313)	(0.256)	(0.326)	(0.471)	(0.558)	(0.462)	(0.575)
N. of Obs.	5161	4234	5161	4234	1359	1143	1359	1143
Panel B.2. Science								
Immigrants/Students in grade	-0.0354	-0.113	-0.0593	-0.352	0.618	0.625	0.894	0.857
	(0.302)	(0.357)	(0.259)	(0.350)	(0.426)	(0.804)	(0.556)	(0.834)
N. of Obs.	5090	4169	5090	4169	1340	1126	1340	1126
Controls	No	Yes	No	Yes	No	Yes	No	Yes
School FE	Yes	Yes	No	No	Yes	Yes	No	No
Individual FE	No	No	Yes	Yes	No	No	Yes	Yes

Notes: The table shows fixed-effect regressions using as dependent variable standardized test scores or teachers assessments. All regressions and year-fixed effects. Columns (1) to (4) cover Germans and (5) to (8) immigrants. Columns (1), (3), (5) and (7) include controls. Columns (1), (2), (5), and (6) include school fixed effects, columns (3), (4), (7) and (8) individual fixed effects. Standard errors (clustered at school or individual level) in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

and individual fixed effects in Table B.2. Part A of the Table focuses on standardized performance from the objective tests conducted by NEPS, while Part B reports the teachers' assessments of the student's skills. The results are reported separately for Germans and immigrants.

The effects of the immigrant share in the grade on German and Science scores are insignificant and mostly negative, while significantly positive on metacognition for Germans and partially significantly negative on immigrants' metacognition. Importantly, the results are due to large standard errors imprecise, from low-stake tests and from years earlier than the main results. Anyhow, the pattern in the results in metacognition mirrors the direction of the main results. Considering that secondary school track choices are determined by German, Math, and Science grades, and the absence of significant effects on German or Science scores, it can be concluded that no

performance change was found that could directly account for the results in the main specification. Anyhow metacognition could effect the students grade indirectly.

Part B. of the table provides evidence for a changed assessment of performance by teachers.[37] It shows that with an increasing share of immigrants the teacher asses the German performance of German and immigrant students, partially significantly, better. The same cannot be observed for Science, here the effects on Germans and immigrants go in opposing directions and remain insignificant. These findings could indicate that teachers assess students' abilities based on their fellow students' performance in their grade. If more fellow students are immigrants the average German skill is lower and therefore the individual skill is evaluated better in comparison. Although not shown this effect could transfer to grades, which affect track recommendations.

---

[37]Suvey question: Please assess the following skills and abilities of the child. Compare it with other children of the same age. German: Language skills (e.g. vocabulary and sentence structure); Science: knowledge of animals, plants, and the environment.