Starting off on the right foot – Integrative schooling and the educational success of immigrant children

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Abstract

This study is the first empirical analysis to identify the causal effect of an educational integration model which focuses on language acquisition for newly immigrated primary school-aged children on their academic success. Employing unique administrative panel data from the German federal state Hamburg between 2013 and 2019, we use the quasi-random allocation of refugee children to neighborhoods and therewith schools to study the effect of attending a separate preparatory class for language learning on standardized test scores and the probability of attending an academic track in secondary school. Our results show that primary school-aged refugees who visit a preparatory class perform significantly worse in standardized test scores in fifth grade. The negative effect is particularly strong for Math and German, while we see no significant differences in the probability of attending the academic track. Overall, our results indicate that preparatory classes for newly immigrated children focusing on language learning do not foster their academic achievement more than integrating them directly into the regular classroom.

JEL-Classification: I24, I21, J13, J15

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1 Introduction

In 2020, international migration consisted of 281 million people, and 36 million of them were children (UNICEF, 2020). Changes in the composition of international migration flows increasingly affect receiving countries such as the United States, where over 5 million English learners made up for 10% of the student body in 2019 (National Center for Education Statistics, 2022). Few consistent strategies exist on how to integrate newly immigrated children into the countries' education system although industrialized countries often establish elaborate policies on how to integrate adult immigrants into their labor force. The economic literature has shown the benefit of a fast language acquisition for the long term social and economic integration of adult immigrants (e.g., Foged and Werf, 2022; Dustmann and van Soest, 2001; Dustmann and Fabbri, 2003; Lochmann *et al.*, 2019; Arendt and Bolvig, 2020; Arendt *et al.*, 2020; Zorlu and Hartog, 2018; Alan *et al.*, 2021b; Kanas and Kosyakova, 2022). For immigrated children, a school integration strategy which focuses on fast language acquisition could have similar effects, helping to overcome the large and persistent achievement gaps between native and immigrant students in many industrialized countries (e.g., Schnepf, 2007; Algan *et al.*, 2010; Giannelli and Rapallini, 2016; OECD, 2018).

This study is the first empirical analysis to identify the causal effect of an educational integration model which focuses on language acquisition on the academic achievement of primary school-aged refugee children. Employing unique administrative data from the German federal state of Hamburg following students between 2013 and 2019, we use this quasi-random allocation of newly immigrated refugee children to schools to study the effect of attending a preparatory class in primary school on standardized test scores and the probability of attending an academic track in secondary school.

Refugee children arriving in Germany with their parents are initially allocated to a federal state based on a quota system. In Hamburg, families are then centrally allocated to accommodations and school-aged children to schools by the school information center (SIZ) (Behörde für Schule und Berufsbildung, Hamburg, 2018). From the perspective of refugee

families, the school they are allocated to and whether it offers a preparatory class is random and unrelated to student characteristics. Typically, newly immigrated third and fourth graders attend preparatory classes in which they have a separated curriculum to focus on German language skills before being integrated into regular classes after approximately one year. Given the sudden demand for preparatory classes in 2015/16, where Germany was surprised by 1,22 million asylum applications of which around 25% were filed for children below the age of fourteen (Eurostat, 2020; BAMF, 2017), not all students ended up being taught in preparatory classes.

Our results show that primary school-aged refugees who have attended a preparatory class do significantly worse in their average standardized test score in fifth grade. This effect is strongest for Math and German. We see no significant differences in their probability of attending the academic track after fourth grade. Overall, our results suggest that – different to adults – newly immigrated children do not seem to universally benefit from an integration program that first focuses on language acquisition. Instead, they seem to pick up language skills better when interacting with native peers in the classroom. The preparatory classes' focus on language skills rather comes at the cost of neglecting other subjects.

Our analysis also shows that children visiting a preparatory class upon arrival are more likely to remain in the same classes as peers from their first visited classroom, typically other newly immigrated students, than children in regular classes. This finding suggests that the initial language acquisition could be negatively affected by the exposure to a higher concentration of individuals of similar ethnicity.

Our paper makes an important contribution to the economic literature discussing peer effects, educational integration programs, and the role of language in learning. The strand on peer effects shows that children benefit from heterogeneous classrooms (Hoxby, 2000; Matthewes, 2021; Burgess and Platt, 2021; Morales, 2022; Maestri, 2017). Studies by Bredtmann *et al.* (2021); Schneeweis (2015), and Jensen and Rasmussen (2011) find a negative effect for immigrant children (and descendants of immigrants) for being taught in classes with a high share of immigrant children. The effect is particular strong for

students in classes with a high share of same origin countries (Schneeweis, 2015) but does not vary by linguistic distance within a class (Bredtmann *et al.*, 2021). Chuard *et al.* (2022) find clustering of students speaking the same foreign language leading to a higher probability of vocational track attendance and lower predicted earnings, with one of the drivers being held back at language acquisition. Using the quasi-random allocation of guest workers in Germany, Danzer *et al.* (2022) find that children's acquisition of host country language skills and educational attainment suffer from exposure to a higher concentration of individuals with their own ethnicity. On the contrary, Morales (2022) finds that a higher share of refugee students increase Math scores in the US for both native and immigrant children.[1]

Second, our paper builds upon the economic literature that analyses different educational integration models for newly immigrated children. Using quasi-random allocation of Ethiopian refugees in Israel in the 1990s, Gould *et al.* (2004) find that the initial elementary school environment has an effect on students' high school dropout rates, repetition rates, and on the passing rate on matriculation exams. More recently, Alan *et al.* (2021a) evaluate an educational program designed to develop social skills and build social cohesion through perspective-taking in Turkish schools. Empathy from native classmates enhances the formation of inter-ethnic social ties, reception of emotional and academic support by classmates, and improves the language skills of refugee children. Related, Boucher *et al.* (2021) find that exposure to classes with a larger proportion of Turkish children improves Turkish skills for Syrian preschool refugee children.

For Denmark, Damm *et al.* (2021) analyze the effect of busing quasi-randomly selected dual language learners to school districts with students with a higher socio-economic

[1]For native students in Norway, Green and Vaag Iversen (2020) find notable negative effects of refugee children on the test scores of their native peers. These effects are strongest for native students who are most at risk of low performance such as boys and children from lower-educated backgrounds. Similarly Gould *et al.* (2009) find a higher concentration of Ethiopian refugees to reduce the probability to pass the high school matriculation in Israel. Using within-school variation Frattini and Meschi (2019) show that an increase in the immigrant share in the classroom has a small negative impact on the Math scores of low-achieving students in Italian vocational schools. Also, for Italy, exploiting rules of class formation, Ballatore *et al.* (2018) and find that adding one immigrant student and taking out one native reduces the Math and language test scores of natives by 0.16 standard deviations. In related work, Tonello (2016) finds a weak negative impact of non-native student share on the test scores of native peers, which are nonlinear and marginally increasing.

background but with less resources per student. They find negative effects on the academic achievement and well-being of students bused to a different district. The results suggest that language learners benefit from higher school resources and a peer group with similar characteristics, which may be due to the schools being more specialized and offering better teaching to language learners. This finding is in line with Tanaka *et al.* (2018) who show that immigrant inflows lead to a major increase in public school enrollment combined with a reduction in quality of public education, measured through public spending per student.

Third, our paper adds to the literature on language proficiency and academic achievement of immigrant students. A different language than the school instruction language spoken at home is one of the main explanations for foreign origin students scoring lower than native students in Math and reading (Dustmann and Glitz, 2011; Dustmann *et al.*, 2010). Figlio and Özek (2020) find that early grade retention of English learners and, therefore, an additional year of schooling with additional support improves English skills as well as the likelihood of taking advanced Math and Science courses. Using age at arrival to instrument for language proficiency, Fenoll (2018) finds no effect of English skills on Math results, while Isphording *et al.* (2016) find a strong influence of reading performance on Math using PISA waves.

This paper contributes to the literature in three ways. First, it adds to the scant evidence on the causal relationship between educational integration models for newly immigrated children and their academic achievement. To our knowledge, this paper provides the first causal evidence on an educational integration model which separates newly immigrated children to focus on their language acquisition before they are integrated into regular classes. Second, this paper focuses on the educational integration of children arriving in an industrialized country during the time of the large refugee influx. While the literature has vastly focused on bilingual education provision in the US (Chin *et al.*, 2013; Valentino and Reardon, 2015; Damm *et al.*, 2021), this paper contributes to a growing body providing evidence on the recent refugee influx to Europe and, therewith new insight into how to integrate a diverse body of newly arriving students into the educational system. Third, given the large and persistent achievement gap between native and immigrant

students in many European countries, this evidence fills an important gap in the scarce literature that analyses education programs targeted towards immigrant students. The paper's unique administrative data allows us to derive policy recommendations for fostering the school integration of newly immigrated elementary school-aged children.

The remainder of the paper is organized as follows. Section 2 gives a short institutional overview of the German education system and the integration program studied. Section 3 discusses the empirical strategy and section 4 introduces the data. Section 5 presents the findings and section 6 concludes.

2 Background

2.1 Refugees Immigration to Germany

In recent years, a huge migration flow to the EU has been determined by refugee migration. In 2015 and 2016, the EU received around 2.6 million asylum applications, with over 75% of these individuals fleeing from war in Syria, Iraq, and Afghanistan (Eurostat, 2020; Spindler, 2015). Germany was a leading destination country for new arrivers in these years with around 1.22 million registered asylum seekers between 2015 and 2016 (Eurostat, 2020; BAMF, 2017). Afterwards, the number of non-EU immigrants to Germany declined as the Western Balkan countries closed access to migrants and the EU-Turkey deal was established which implied refugees being deported back to Turkey. In 2015 and 2016, around 75% of Non-European immigrants were asylum applicants. Figure 1 illustrates the number of immigrants and – with a one year lag – the number of asylum applicants. The lag in the number of asylum applicants is due to delays in registration which occurred because of the unexpected large number of applications. Figure 1 further shows that around 25% of the asylum applications in Germany in 2015 and 2016 came from children below the age of fifteen.

While immigrants with a permit to reside can choose freely where to settle, asylum seekers are randomly allocated to initial reception facilities (Zentrale Erstaufnahmeein-

richtung) all over Germany. The overall allocation of refugees follows the quota of the so-called "Königsteiner Schlüssel", which is based on tax revenue ($\frac{2}{3}$) and population ($\frac{1}{3}$) of each federal state (§45 AsylG) (BAMF, 2019). In Hamburg, 40,868 asylum-seekers were registered in 2015 prior to the reallocation. Of those, 22,315 remained in Hamburg and 21,081 needed an accommodation (Behörde für Schule und Berufsbildung, Hamburg, 2019).

2.2 The School System and Refugee Children

In Germany, school education is not the responsibility of the federal government but of the sixteen German federal states. However, it is the goal of the Standing Conference of the Ministers of Education and Cultural Affairs to harmonize education policies to guarantee uniformity and comparability of degrees and quality standards across all federal states. Accordingly, main conditions like mandatory school ages and degrees are typically similar across federal states. In Hamburg, a child is supposed to attend school in August, if it turned six before July 1^{st}.[2] Similar to many other states, in Hamburg schooling lasts for eleven school years and ends the latest at the age of 18. Primary school lasts four years,[3] providing general education in Math, German, Science, Art, Music, Physical Education, Religion, English, and school specifications such as Turkish.

At the end of primary school, around the age of ten years, teachers evaluate the performance and ability of the students and give a recommendation for the secondary track school. In Hamburg, the teacher's recommendation is informational and non-binding, leaving the final decision on the school choice to the parents.

Regarding secondary schools, Hamburg does not offer the school types general and intermediate secondary school (*Hauptschule and Realschule*) as an addition to high school (*Gymnasium*). Instead, parents have the choice between two school tracks, the so-called city district school (*Stadtteilschule*) and high school (*Gymnasium*). Gymnasium prepares high-achieving students to take the A-Level after the twelfth year, which qualifies students

[2] In Germany compulsory schooling starts with six years. The threshold dates vary by federal state.

[3] In Berlin, Brandenburg as well as at selected schools in Hamburg, primary school lasts for six school years.

to continue their education either at a university, a college, or begin vocational training. While city district schools offer preparation for apprenticeship and other forms of vocational education after grade nine or ten, students can also continue their school education and do their A-levels after the thirteenth school year, which also qualifies them to enter a university or college.[4]

In Hamburg, both for refugee and immigrant children, schooling is compulsory from the beginning they reside in Hamburg and regardless of their resident status. Typically, refugee children who have just arrived in Germany live in initial reception facilities until their asylum status is processed.[5] There, they are taught German daily for five to six hours by specially trained teachers and social workers in non-age-specific study groups. After approximately three months, families are assigned to group accommodations, and children start entering the school system (Pittelkow, b). Newly immigrated students are admitted throughout the school year, and until the age of 16 they are referred to a school by the SIZ.

2.3 School Integration Models

While the government requires the federal states to implement the law on compulsory schooling, few guidelines on how to organize the school integration of newly immigrated children exist (Massumi *et al.*, 2015). Therefore, how newly immigrated children are schooled varies dramatically along federal states. The two most common models are the parallel and the integrative model which are illustrated in Figure 3. The parallel model separates newly immigrated children from regular classes. It is supposed to provide a protected space for (refugee) children, who are unable to understand the teaching language and might have been affected by traumatizing incidents. In parallel classes, newly immigrated students focus on the German language and are slowly prepared for a transition into regular classes.

The integrative model includes refugee children into regular classes from the start and

[4]Figure 2 illustrates that the share of foreign and native students in city district schools in Hamburg resembles the German average for general and intermediate schools.

[5]An exception are recently arrived refugees from Ukraine, often living in private accommodations.

provides them with additive language training. Even though they interact early on with their native peers, the model bears the danger that they are exposed to overly excessive demands regarding language requirements (Brüggemann and Nikolai, 2016).

Like many other states, Hamburg uses both models. Up to the second class, newly arrived children are typically integrated directly into the regular class. They have additional language tuition but are otherwise assumed to catch up relatively fast (Pittelkow, a). For third graders and older students, Hamburg implemented the parallel model with separate preparatory classes in 2014 (Behörde für Schule und Berufsbildung, Hamburg, 2018). While the main focus of these classes lies in learning German (18 hours per week), immigrant students also attend Math (4 hours per week), Science (2 hours per week), Physical Education (2 hours per week), and other elective subjects. The duration is planned for no longer than twelve months, and according to the guideline, classes should consist of no more than 15 students. Afterwards the children are assigned to regular classes, with no more than four newly immigrated students in the same class, where they receive additive language training for another year (Bürgerschaft der Freien und Hansestadt Hamburg, 2018).

Underaged immigrants who never, or only to a small extent, visited a school before, lack basic skills in writing and reading, or cannot read the Latin alphabet first attend a so-called basic class (or previously called alphabetization class) for a maximum period of one year to acquire basic words and write in the Latin alphabet. Only afterward they attend a preparatory or regular class (Pittelkow, a; Behörde für Schule und Berufsbildung, Hamburg, 2019).

Overall, the demand for preparatory classes increased dramatically after the refugee influx. While in 2013, 206 elementary school children visited preparatory classes, at it's peak in the school year 2017/18 1175 children attended this separate classes (Behörde für Schule und Berufsbildung IfBQ, 2021). The decision which schools offer preparatory classes is the responsibility of the authority for school and vocational training ("Behörde für Schule und Berufsbildung") and is based on the identified need of each region and good accessibility (Behörde für Schule und Berufsbildung, Hamburg, 2018; Bürgerschaft der Freien Hansestadt

Hamburg, 2015). This stark expansion hints at a use of preparatory classes to manage the integration of the large numbers of refugee students without overwhelming the capacity of regular classes.

3 Empirical Strategy

We are interested in the educational success of newly immigrated refugee children visiting a preparatory class compared to those that are directly integrated into a regular class. Therefore, we estimate the following equation:

$$Y_{ics} = \alpha + \beta PrepClass_i + \delta Ind_i + \nu School_s + \gamma Neigh_s + \lambda Class_c + \varepsilon_{ics} \qquad (1)$$

where Y_{ics} is our main outcome of interest, capturing the standardized test scores in grade five or the academic school track which refugee child i, in class c of school s is visiting. The key regressor of interest, $PrepClass_i$ is a binary variable indicating whether the child has ever visited a parallel preparatory class. We control for individual characteristics (Ind_i) gender, area of birthcountry, whether the child visited a school offering a preparatory class, whether the child has diagnosed educational needs, and the RISE development index.[6] To ensure that the time in the German school system or age at migration does not drive our results, we also control for month and year of birth, dummies for the year of immigration, and the first grade entered at the individual level.

School characteristics $School_s$ include the number of children per school in the three cohorts, whether it is a full-day school and which type. We include neighborhood characteristics $Neigh_s$ which include decile categories of the unemployment share in 2012, the purchasing power in 2012, and the foreign population in 2012 at the 1x1 kilometer grid around the school. Finally, we also control for characteristics $Class_c$ at the class

[6]The RISE development index is a framework program for integrated urban district development defined by the city of Hamburg for the residence of the child. It is based on the indicators of the share of children and youth with migration background, single parents, recipients of social benefits and asylum benefits, unemployed, children receiving minimum security benefits (Mindestsicherung), seniors receiving minimum security benefits (Grundsicherung), and share without a school leaving degree (Behörde für Stadtentwicklung und Wohnen, Hamburg, 2021; Amt für Wohnen, Stadterneuerung und Bodenordnung, Hamburg, 2010).

level including the number of children per class and the migrant share per class.[7] For the regressions on the standardized tests, we also include the average class result of the test to account for peer effects. Standard errors are clustered at the class level to account for similarity within the classrooms (Cameron and Miller, 2015).

The key identification assumption of our empirical strategy relies on the random allocation of refugee children, from the SIZ to the schools. Therefore, from the perspective of the refugee child and family the assigned school and whether this school offers a preparatory class is random or based on a random feature such as age or immigration year. A threat to our identification strategy would be if children were allocated to preparatory classes based on their ability or if schools offering preparatory classes were systematically better or worse schools in comparison to those who do not and more ambitious parents could self-select into those better schools.

Although we do not observe which refugee accommodations the children live in, we do know that refugee accommodations in Hamburg are spread all over the city. Figure 4 shows the location of both refugee accommodations and elementary schools in Hamburg. It illustrates that the refugee accommodations do not systematically cluster in one part of the city but that refugee children have very different elementary schools close by.

Additionally, Table 1 illustrates summary statistics for refugee students based on whether they attended a preparatory class or not.[8] While some personal characteristics are significantly different between children visiting preparatory classes and those who do not, (girls and children with educational needs are less likely to visit preparatory class, while children arriving at the age of going to the third grade are more likely) importantly, school quality and neighborhood characteristics are not significantly different between the two groups. Further, the table shows that a school's distance to a refugee accommodation is not different for children who visit a preparation class and those who do not.

To ensure that refugee children are not systematically sorted in lower quality classrooms

[7]With Gymnasium as our outcome variable, we use school and class control variables at the last observed elementary school. Since some students are still preparatory classes, we use the migrant share of the school instead of the classroom as a control variable.

[8]The observation numbers are slightly higher, as we use every observation defined as a refugee in elementary school, unconditional of the student still being observed in secondary school.

within schools once they go to regular classes, Table 3 illustrates that the allocation of refugees into the classroom is compatible with random assignment with respect to the average RISE development index of students. We regress the RISE development indexes in third grade on the share of new refugee children arriving in the classroom in grade four. In column (2) with class controls included, there is a positive and significant sorting of refugees to classrooms with a higher average RISE development index. However, once we include school fixed effects in column (3) there is no significant relationship between the refugee share within the classroom and the RISE development index in grade 3.[9]

4 Data and Descriptive Statistics

Measuring educational success of refugee students on the individual level in Germany is very difficult due to data limitations. We received unique and confidential administrative data from the city state of Hamburg which consist of all children visiting a public primary school in Hamburg who were of school starting age in the school years 2013/2014, 2014/2015 and 2015/2016 (Behörde für Schule und Berufsbildung, Hamburg, 2020b,g,c,d,e,f,h).[10] The data allows to follow these children from the first grade they attend in Hamburg until the school year 2019/2020 irrespective of how often they changed public schools within Hamburg. As the residence status of children is not collected in the data, we define refugee children as children who have immigrated in 2013 or later and are born in Afghanistan, Syria, Iran, Iraq, or Eritrea.[11]

A great asset to our dataset from Hamburg is that the city state implements its own standardized tests, the KERMIT („Kompetenzen ermitteln"- *Identify competencies*) in second, fifth, seventh, and ninth grade in German, Math and for secondary school also Natural

[9]We use the RISE development index in third grade and sorting in fourth grade, as this is the first grade we have standardized test scores for the children. Using test scores as outcomes, we also do not find any evidence for sorting within schools (Table A1).

[10]In 2015 12.7% of elementary school children visited a private school and are not observed in our dataset. This number has been declining since and only 10.3% of elementary school children are in a private school in 2021 (Behörde für Schule und Berufsbildung IfBQ, 2021).

[11]Figure A1 illustrates that these nationalities accounted for the majority of asylum applications in Hamburg in 2015. We do not consider potential refugees from Albania as there also exists a sizable share of Albanian non-refugee migrants in Hamburg (BAMF, 2017). However, in the robustness section, we include them in Table 10.

Science, and English. Those tests are additional to the VERA tests ("VERgleichsArbeiten" - *Comparison tests*) in grade three and eight, which have been established since 2008 and in which all federal states in Germany take part. Results for those standardized test scores (KERMIT) in third, fifth and seventh grade are observed for each student (Klitsche *et al.*, 2019a,b, 2020; Schöber *et al.*, 2022).[12] As a second measure of educational success, we observe the choice of secondary school, so whether the child chooses the academic track at the high school or a city district school. We limit the dataset to a sub-sample consisting of children that arrived in elementary school and attended at least one year of elementary school in Germany. Furthermore, we limit the sample to observations with non-missing values in their RISE development index, country of birth and migration background.

For the schools in our dataset, we complement the administrative student data with neighborhood data from the RWI-GEO-GRID dataset. This data is based on uniformly defined grid by 1×1 kilometer raster cells. The grids are time-consistent and equally spread across the entire territory of Germany. In all areas with residential or commercial properties a rich set of household, demographic, mobility and development information is made available (RWI; microm, 2021).

Table 2 describes the variables contained in our dataset. We observe 1153 refugee children who have participated in one of the KERMIT tests in grade 5. The KERMIT 5 test is supposed to give teachers at the new secondary school objective information about the educational needs of their classes. The test is executed by trained external test conductors over four school hours and includes an assessment of the subjects German (written and reading comprehension), English (hearing comprehension), Math, and Natural Sciences. The KERMIT score in absolute numbers varies between 480 and 1300 points (in German) as scores below a certain threshold are not considered. We standardize the results with a mean of 0 and a standard deviation of 1. The standardized average KERMIT

[12]The matching was realized after the examination of the data protection legitimacy through a crosswalk between KERMIT, the school year statistics and the data of the RWI provided by the trust office of the Hamburg school authority using an anonymous student and school id. The data was made available on request by the trust office of the Authority for Schools and Vocational Training (Vertrauensstelle der Behörde für Schule und Berufsbildung) in Hamburg. Since this is administrative data, it cannot be made available on a replication server. Nevertheless, the data sources were cited so that the data could be requested again for replication purposes.

result with a mean of -0.96 indicates that refugee children perform significantly below the average of all students and we see that their performance is particularly bad in German. One in five refugee children attends a Gymnasium after primary school. This number is significantly smaller than the average of 50.14% for all fifth graders in our sample and official statistics of 52.8% for all children in Hamburg in the school year 2017 (Behörde für Schule und Berufsbildung, Hamburg, 2020a). Although the decision on whether a child attends a Gymnasium or not is ultimately up to the parents, the gap indicates that by secondary school, refugee children have not managed to catch up to their native peers.

In our dataset, 46% of students have attended a preparatory class and 15% a base class. The share of 46% fits well the average cohort year of 2014.28 which implies that the sample is quite balanced between children who would have entered the first grade in 2013 (and visited a preparatory class if they came in 2015) and 2014 or 2015 (and visited a regular class). Around 77% of children in our dataset have arrived in Germany during the large refugee influx with most children being born in Syria and Afghanistan. Of those children in the regular school system 4.7% are attested a special educational need and the RISE development index of 2.42 indicates that they live in rather average neighborhoods.[13] The majority of refugee children in our sample attend age appropriate grades in secondary school, however, around 35% of them attend lower classes in comparison to the classes they would have been assigned to by age. Regarding school and class controls, Table 2 shows that 80% of children attend schools which offer preparatory classes and the typical school has around 289 students in the three cohorts and an average of 23 students per class. The migrant share in class is composed based on the definition of the micro census as well as the information on citizenship and county of birth. The GRID controls unemployment rate, purchasing power and foreign population correspond to deciles which are balanced at the school level.

Figure 5 shows the distribution of children into preparatory classes by grade and cohort. It illustrates that especially for cohort 2013 and cohort 2014 the supply of preparatory

[13] As mentioned above, the RISE development index gives an estimation of the socioeconomic environment the child lives in. The average RISE development index over all observations is 2.82, the average RISE development index over all observations of children which recently migrated is 2.44.

classes that was established in short time was limited and the demand for preparation classes exceeded the supply. In particular for children who were at school starting age in 2015, we see some schools establishing preparatory classes for second graders. This gives us both within cohort but also cross cohort variation to evaluate the effectiveness of the parallel preparatory classes.[14]

5 Results

Our main analysis examines the effect of students visiting a parallel preparatory class – compared to those integrated directly in a regular school class receiving additional language classes – on their educational outcomes. First, we analyze the effect on standardized test scores in fifth grade. Therefore, we average across the standardized test scores in Math, German, English, and Natural Science in an index (i.e., each test score has an equal weight).

Table 4 presents in the first row the estimates of β, having visited a preparatory class. Step-wise, we include our control variables. In column (1), we include no controls and find a negative and significant correlation between visiting a preparatory class and the average KERMIT result in grade 5. In column (2), we add individual characteristics. Besides other individual characteristics it holds the students' year or birth, the year of immigration, and the first attended grade in Germany constant. This specification ensures that the time in the German education system is not driving the results. In column (3), covariates at the school and neighborhood level are included. In column (4), we control for the class composition. In summary, Table 4 illustrates that children visiting a preparatory class for language learning for up to one year prior to integration in the regular class do significantly worse in the standardized test in fifth grade.[15]

[14] We use the across cohort variation for a robustness check employing the immigration year interacted with the date of birth to instrument for the attendance of a preparatory class.

[15] While including school or class fixed effects at the initial elementary school would mostly absorb the characteristic whether the child has visited a preparatory class, Table A2 includes in Column (5) also school and schoolyear fixed effects and in Column (6) class fixed effects for the secondary school the child goes to. As this is not possible for the outcome of secondary school track we proceed without including those additional fixed effects.

To investigate if a particular subject is driving the result, Table 5 illustrates the results for the preferred specification (Table 4, column (4)) for the individual subjects separately. The table shows a significantly negative association between having attended a preparatory class and the KERMIT results for all subjects. Most interestingly, the effect is largest for Math and German. The negative results of attending a preparatory class in subjects other than German can be explained by the strong focus on language acquisition in preparatory classes. During the time when refugee children in preparatory classes learn language skills, the children who have been integrated into regular classes have more hours dedicated to other subjects such as Math and Natural Science. Surprising is that children who focus one year on language learning are still doing significantly worse in German compared to their peers who joined classes with other German students from the start. With respect to German language skills, the effect is stronger for children's reading skills than for writing skills (see Appendix Table A3).

Table 6 shows the results of the binary outcome whether the child is last observed in high school (Gymnasium). For this analysis, we can use a bigger sample than for the standardized test results, as we can include children who did not participate in the test as well as those who were not observed in the fifth grade, but again later. We see an overall negative correlation between participating in a preparatory class in primary school and attending the Gymnasium as their secondary school track, but this effect is statistically not different from zero once class controls are included in column (4). This finding can be explained by the overall low share of refugee children attending a Gymnasium and the parents' discretion in making the final choice on which school their children attend.

To study the heterogeneity of our results, Table 7 illustrates interaction terms with different characteristics. Column (1) shows the results from our main regression in Table 4. In column (2), we interact having visited a preparatory class with the gender dummy. The coefficient for visiting a preparatory class is slightly more negative for females, but not statistically significantly different from male students. Column (3) shows the results for interacting the participation in a preparatory class with the country of birth, with children from Syria as the reference group. While children from Iran are doing significantly better

than those from Syria when integrated directly in the regular class, they are doing worse when visiting a preparatory class, even though this effect is not statistically different from zero.[16]

5.1 Mechanisms

Surprisingly, despite the focus on language acquisition, students visiting a parallel preparatory class upon arrival score significantly worse in the German standardized test compared to students directly integrated into a regular class. A possible reason could be that students in parallel preparatory classes are surrounded mainly by other immigrant children as their first contact in Germany, and likely many students with the same mother tongue.[17] If they form long lasting friendships with other non-German speaking children, they possibly also interact after their integration into a regular class mainly with these other immigrant children and less with German students. Consequently, they speak less German with native speakers in their free time. This interpretation is in line with the literature finding negative impacts for immigrant children that are taught in classrooms with a high concentration of other immigrant children (e.g. Bredtmann *et al.*, 2021; Schneeweis, 2015; Jensen and Rasmussen, 2011,).

While we cannot observe social ties or friendships in our data, Table 8 shows that children who visit a parallel preparatory class are more likely to be in a class with other children from their initial preparatory class than those that were integrated directly in a regular class. A refugee student who has visited a preparation class is observed with 0.17 more children from the initial preparatory class in fifth grade. This effect persists for the last observed grade in 2019, one or two grades later, and is an indicator that children build social ties in their preparatory class that they keep after changing to secondary school. Children who visit a base class (and likely have two extra years before being integrated into the regular class) are not more likely to stay together with the children initially in their base class.

[16] Appendix Table A4 shows the results separately for each group.

[17] On average in preparatory classes around 25% of students have the same county of birth.

In line with the social tie mechanism, we show in Table 9 that refugee children who visit a preparatory class are in classrooms with a higher migrant share in secondary school, both in grade 5 as well as in their last observed grade. Having visited a preparatory class leads to being in a classroom with 2% more immigrants that arrived in or after 2013 in grade 5. For the share of refugee children, the effect also exists for the last observed grade.

5.2 Robustness Checks

First, we check for the robustness of our results by reducing our sample to refugee children who have not visited a base class. As can be seen in Table 4, children who have attended a base class do significantly worse and our main analysis includes all children that have visited a preparatory class irrespective of whether they have visited a base class before or not. The academic performance of children who have visited a base class is likely to be worse not because of the curriculum of base classes but rather because they have been assigned to base classes because they lag significantly behind. In Panel A of Table 10, we show that our results are robust to the exclusion of those children.

Second, we focus on children who have been of third or fourth grade age when arriving at a German school for the first time. Our main results could be driven by second graders who benefit from being directly integrated into regular classes. If that was the case, we could not rule out that our results are driven by second graders being schooled for an additional year in comparison to third and fourth graders. Therefore, we run a subsample analysis using only the variation in attending a parallel preparatory class among third and fourth graders. Panel B in Table 10 shows that the negative effect of attending a preparatory class remains when only considering these age cohorts.

Next, we verify that our effect is not driven by a within-school selection of more able children into regular classes by excluding the control variable whether the refugee child visited an elementary school that offered a preparatory class. As can be seen in Panel C of Table 10, the results stay the same if we allow for an across school identifying variation.

In Panel D of Table 10, we test if our analysis is robust to different refugee definitions

and cohorts. Therefore, we first rerun our analysis with only including refugee children arriving to Germany after 2015 and therefore at/after the height of the refugee influx where the randomness in being assigned to a preparatory class was largest. The result proofs the robustness of our main analysis.

Furthermore, we test our robustness defining refugee children in different plausible ways. First, we define as a refugee not all children that arrived in 2013 and after, but only those that arrived after they were at school starting age. We can see in Panel A of Table 11, that our sample size decreases only by 116 students to 1037 and the results remain the same.

Next, we expand our refugee definition and include more countries of origin. The five additional countries included have been amongst the ten citizenships with the highest inflow of initial applications in 2015. However, these nationalities have also existed as substantial non-refugee immigrants in Germany at the time or have had low acceptance rates. Panel B in Table 11 shows that our results hold and only change very little in magnitude if we define refugee children based on a broader group of countries of origin. To reassure that no sorting based on nationality might drive our result we run our main regression only with refugees from Syria who represent the largest group in our sample. Panel C in Table 11 shows for this group a significant negative effect of attending a preparatory class on their test result in fifth grade.

In Table 12, we validate our OLS results by instrumenting attendance in a parallel preparatory class through the interaction of the refugee child's birthdate and her immigration year. The exposure of refugee children to preparatory classes is determined by their age at arrival, which defines the grade the child will attend, and their immigration year, with the number of preparatory classes increasing over time. By holding the first grade ever attended constant, we exclude the possibility that an additional year of schooling would drive our effects. As before, control variables are added step by step, with column (4) showing our results, including class-level controls. The results confirm our findings that refugee children who have visited a preparatory class do significantly worse in standardized test scores in fifth grade and have, on average, a test score 0.38 standard deviation points

lower than children who attended a regular class from the beginning.[18]

As children who achieve non-sufficient results in the standardized test are classified as missing result, we cannot measure how low the achieved result might have been. While in our main regression analysis we exclude children who do not have at least a result in one subject in the standardized test scores, in Table 13 we set the test score to 450 if it is missing in fifth grade and run a censored regression. The coefficients in this regression are not standardized but confirm our main findings.[19]

6 Conclusion

Increasingly diverse migration flows around the world do not only require receiving countries to ensure a smooth integration of immigrants into the labor market but also their children's integration into the education system. Early academic success is a key determinant of both economic and psychological stability later in life, and the optimal promotion of the potential of immigrant children is in the best interest of both individual immigrants and the receiving country society.

Therefore, this paper addresses the research question of how newly immigrated primary school-aged children can be best integrated into a receiving country's education system. Do newly immigrated children benefit from being taught in parallel preparatory classes where they can focus on language acquisition and having teachers that can focus on their learning speed? Or do they gain from a fast integration into regular classes where they are immediately exposed to the expected learning content and can interact and learn from their native peers?

Employing unique administrative data from the German federal state of Hamburg, we use the variation in the existence of preparatory classes across schools to study their effect on standardized test scores and the probability of attending an academic track up to five years after the children started school in Hamburg. Due to the unexpected refugee

[18]The results stay similar in magnitude if we interact cohort and immigration year as instrument for attending a preparatory class.

[19]We do not see a difference by preparatory class on whether the children has a test result at all.

influx in 2015, not all newly immigrated children could be allocated to schools which offer preparatory classes, and children who have randomly been assigned to accommodation centers close to schools without preparatory classes often attended regular classes instead.

Our results show that attending a preparatory class has a negative effect on standardized test scores in fifth grade. The negative effect is strongest for the children's test scores in Math and German but also negative and significant for English and Natural Science. The negative results in German are particularly surprising due to the language learning focus of preparatory classes. We find no overall effect of attending preparatory classes on attending a Gymnasium. Instead, we show that refugee children who attended a preparatory class are more likely to attend a secondary school with a higher migrant share in their classroom than those who were directly integrated into regular classes. Furthermore, they are more likely to share classrooms in secondary school with students from their initial preparatory class. Both of those mechanisms can be an indicator that the students interact less with native German speakers, even years later, compared to those that directly join a regular classroom.

Overall, our results reveal that offering preparatory classes for newly immigrated children might not be the best solution for their educational success. While preparatory classes might have been an important tool to manage the large inflow of refugee children without overwhelming the schools, we show that the direct integration of refugee children into regular classes with additional language classes leads to better academic achievement. However, we are unable to test for the psychological advantages of offering newly immigrated children a safe space where they can learn the language first and we do not observe if the negative effect diminishes over time.

In summary, our paper is the first to provide causal evidence on an educational integration model for a recent and large immigration. It can serve both policy makers and educational practitioners in their mission to design future school integration schemes for newly immigrated children.

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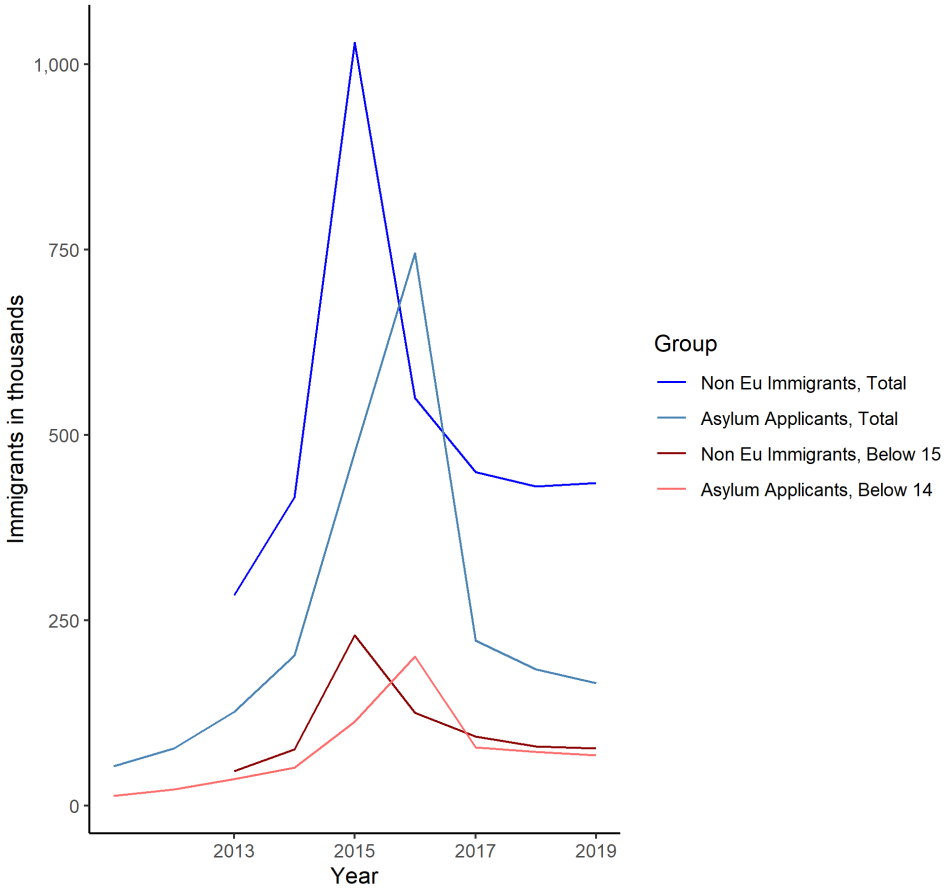
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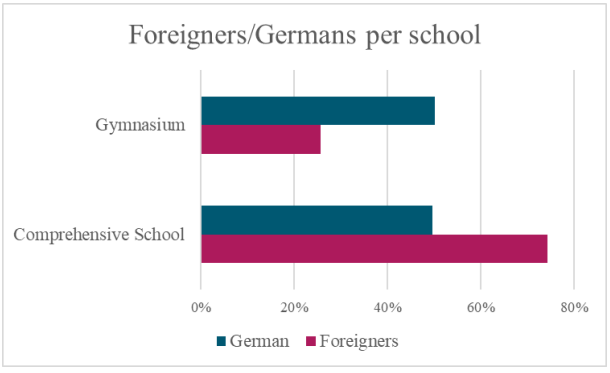
7 Tables and Figures

Figure 1: Immigration to Germany

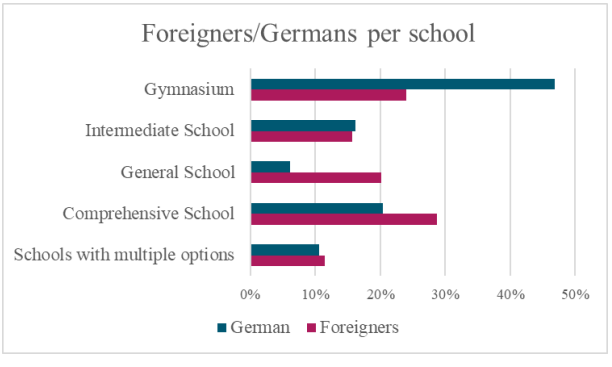


Source: Eurostat (2020)

Figure 2: Secondary School Tracks



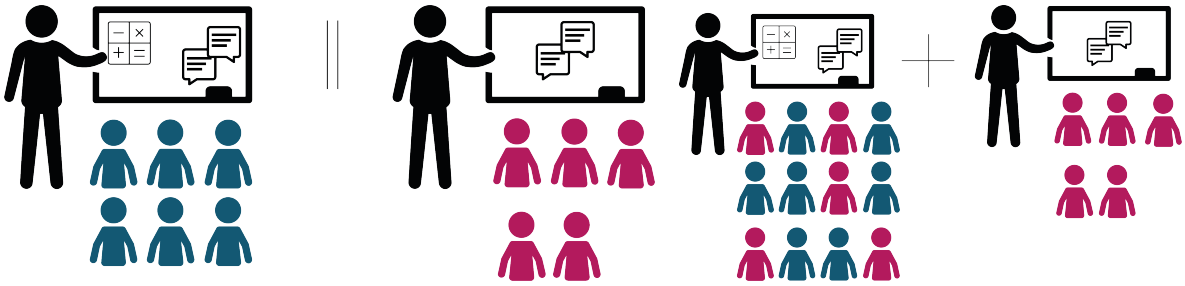
(a) Hamburg



(b) Germany

Source: Statistisches Bundesamt (2020)

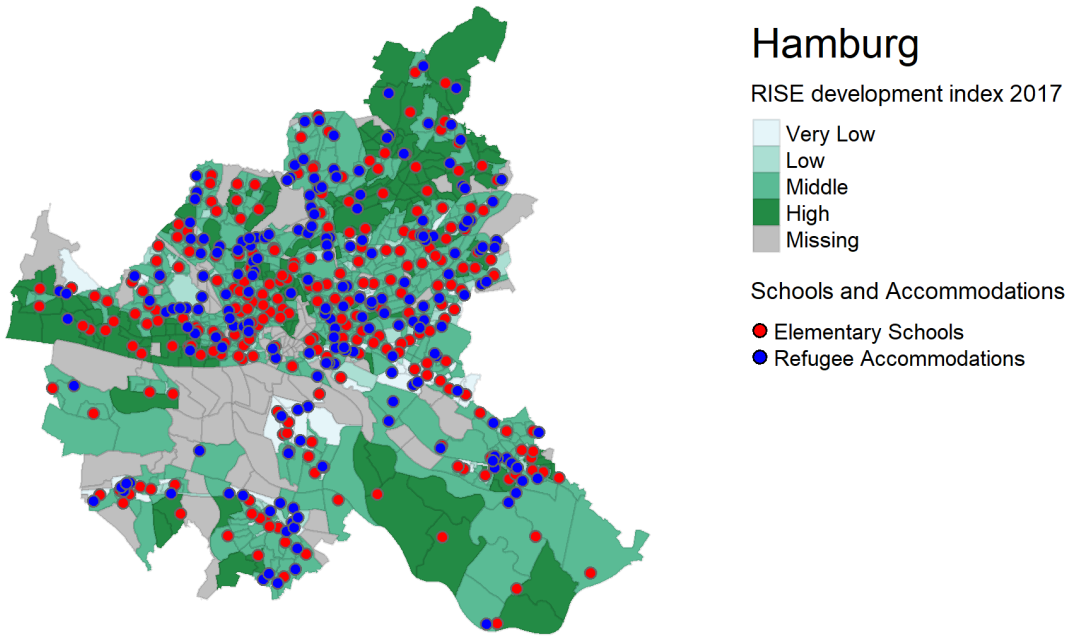
Figure 3: School Integration Models



(a) Parallel (b) Integrative

Own illustration.

Figure 4: Location of Refugee Accommodations and Elementary Schools in Hamburg



Source: Behörde für Stadtentwicklung und Umwelt, Hamburg (2017) Bildungsatlas Hamburg. Own illustration.

Figure 5: Grade at First Observation and Attendance in Preparatory Class

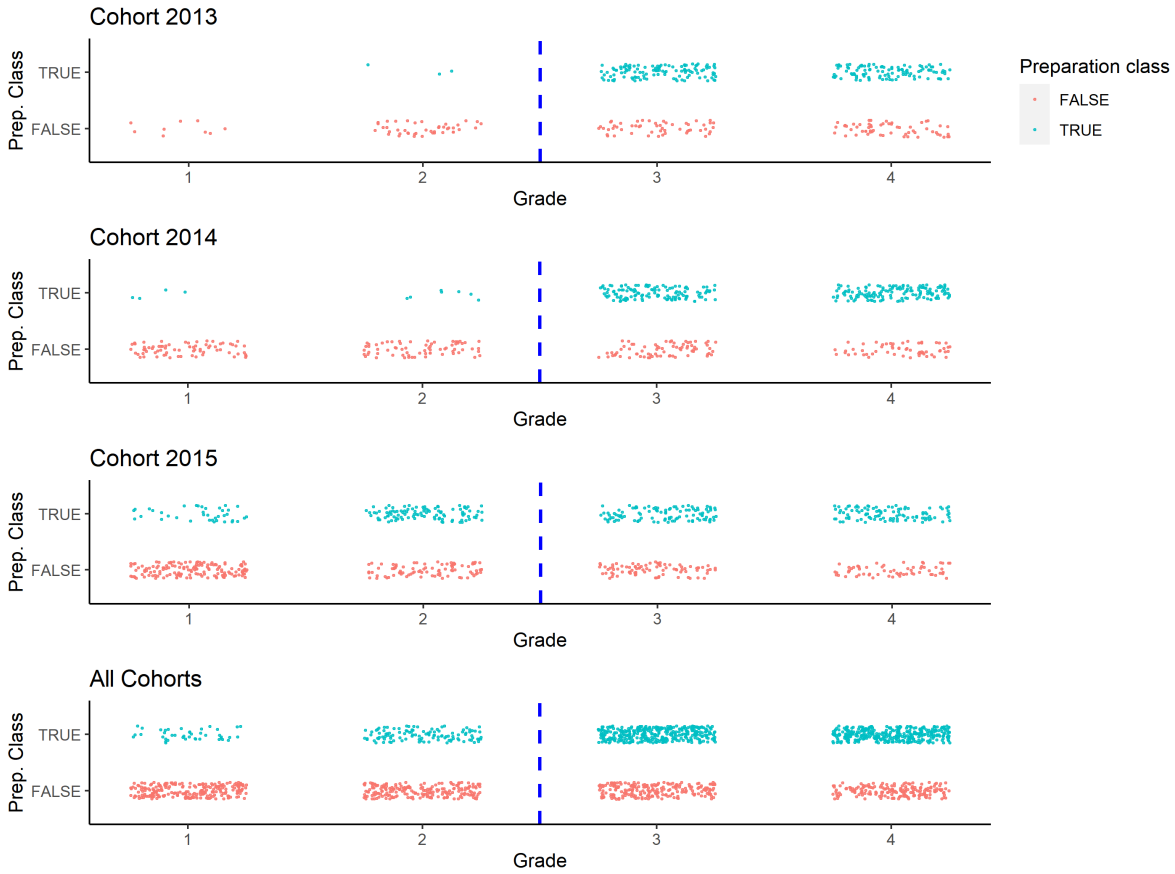


Table 1: Summary Statistics of all Refugees by Visit of Preparatory Class

Variable	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	**t-Test**
In preparatory class	No			Yes			
Individual characteristics							
Base class	0.18	0.38	828	0.23	0.42	854	***
Migrated since 2015	0.63	0.48	828	0.95	0.22	854	***
Female	0.51	0.50	828	0.46	0.50	854	*
Year of birth	2007.50	1.12	828	2007.31	1.21	854	***
Area of birth							
... Middle East	0.69	0.46	824	0.71	0.45	854	
... Africa	0.0049	0.07	824	0.0094	0.096	854.0	
... Asia	0.30	0.46	824	0.28	0.45	854	
Cohort	2014.27	0.77	828	2014.14	0.81	854	***
Educational needs	0.012	0.11	828	0.0047	0.068	854	*
RISE development index	2.61	0.89	828	2.66	0.92	854	
School/class controls							
School average KERMIT	-0.23	0.41	827	-0.20	0.39	854	
Av RISE dev index school	2.60	0.69	828	2.63	0.68	854	
Children per school	174.41	74.98	828	181.23	75.18	854	*
Children per class	18.09	5.64	828	10.75	4.11	854	***
Unemployment 2012	6.23	2.93	828	6.13	2.90	854	
Purchasing power 2012	5.33	2.87	828	5.55	2.81	854	
Foreign population 2012	5.81	2.89	828	5.74	2.90	854	
Acc distance	4.12	1.96	828	4.19	1.94	854	

Table 2: Summary Statistics in 5th Grade for Refugee Students

Variable	**Mean**	**SD**	**N**
Outcome			
Gymnasium	0.19	0.39	1153
KERMIT Average	-0.96	0.73	1153
KERMIT Math	-0.88	0.88	1130
KERMIT German	-1.12	0.93	1151
KERMIT English	-0.72	0.93	1092
KERMIT Natural Science	-1.03	0.78	1120
Individual characteristics			
Preparatory class	0.46	0.50	1153
Base class	0.15	0.36	1153
Migrated since 2015	0.77	0.42	1153
Female	0.49	0.50	1153
Year of birth	2007.35	1.02	1153
County of birth			
... Syria	0.46	0.50	1153
... Afghanistan	0.32	0.47	1153
... Eritrea	0.0052	0.072	1153
... Iraq	0.10	0.30	1153
... Iran	0.11	0.31	1153
Cohort	2014.28	0.76	1153
Educational needs	0.047	0.21	1153
RISE development index	2.42	0.91	1153
Age appropriate grade:			
... age appropriate class	0.51	0.50	1153
... older	0.47	0.50	1153
... younger	0.018	0.13	1153
School/class controls			
Elem. school w/ prep class	0.80	0.40	1153
Children per school	288.96	123.97	1153
Children per class	23.28	2.74	1153
Migrant share class	0.63	0.19	1153
Unemployment 2012	5.85	2.75	1153
Purchasing power 2012	5.47	2.50	1153
Foreign population 2012	5.77	2.88	1153

Table 3: Sorting of Immigrant Students into Quality of Classrooms (RISE Social Index)

	(1)	(2)	(3)
Refugee share class	0.12	1.55**	0.42
	(1.03)	(0.66)	(0.27)
Share female		0.01	0.05
		(0.14)	(0.07)
Migrant share class		−2.13***	−0.24***
		(0.09)	(0.05)
Children per class		0.04***	0.00
		(0.01)	(0.00)
Class controls	No	Yes	Yes
School FE x Year FE	No	No	Yes
R^2	0.00	0.59	0.95
Adj. R^2	−0.00	0.59	0.94
Num. obs.	1594	1594	1594
N Clusters	790	790	790

Note: Estimated regression coefficients of new arriving refugees in regular classes in grade four on third grade RISE social index of students in the classroom. Standard errors clustered at class level. * Significance at 0.1; ** Significance at 0.05; *** Significance at 0.01.

Table 4: Average Test Score Results and Attendance of Preparatory Class

	(1)	(2)	(3)	(4)
Ever in preparatory class	-0.37^{***}	-0.27^{***}	-0.22^{***}	-0.19^{***}
	(0.04)	(0.05)	(0.05)	(0.05)
Ever in base class	-0.38^{***}	-0.32^{***}	-0.32^{***}	-0.26^{***}
	(0.06)	(0.06)	(0.06)	(0.05)
Female		0.04	0.04	0.01
		(0.04)	(0.04)	(0.03)
Education needs		-0.75^{***}	-0.66^{***}	-0.53^{***}
		(0.09)	(0.09)	(0.09)
RISE development index		0.10^{***}	0.04^{*}	0.03
		(0.02)	(0.02)	(0.02)
Unemployment 2012			-0.01	0.00
			(0.01)	(0.01)
Foreign population 2012			-0.03^{**}	-0.00
			(0.01)	(0.01)
Migrant share class				0.33^{***}
				(0.12)
Average KERMIT result				0.76^{***}
				(0.06)
Indiv controls	No	Yes	Yes	Yes
First grade FE	No	Yes	Yes	Yes
Area of birth FE	No	Yes	Yes	Yes
Immigration year FE	No	Yes	Yes	Yes
School and neigh. controls	No	No	Yes	Yes
Class controls	No	No	No	Yes
Adj. R^2	0.11	0.19	0.30	0.43
Num. obs.	1153	1153	1153	1153
N Clusters	440	440	440	440

Note: Standardized KERMIT results in fifth grade. Standard errors clustered on class level. Not shown controls: Year of birth, month of birth, elementary school offering preparatory classes, children per school, form of full time school, purchasing power, children per class. * Significance at 0.1; ** Significance at 0.05; *** Significance at 0.01.

Table 5: Separate Test Score Results and Attendance of Preparatory Class

	(Math)	(German)	(English)	(Natural Science)
Ever in preparatory class	−0.22***	−0.25***	−0.15**	−0.17***
	(0.06)	(0.06)	(0.06)	(0.06)
Ever in base class	−0.32***	−0.28***	−0.20**	−0.19***
	(0.07)	(0.07)	(0.08)	(0.06)
Female	−0.19***	0.22***	0.07	−0.05
	(0.04)	(0.04)	(0.05)	(0.04)
Education needs	−0.77***	−0.64***	−0.25**	−0.24**
	(0.11)	(0.10)	(0.12)	(0.11)
RISE development index	0.04	0.03	0.05	0.00
	(0.03)	(0.03)	(0.03)	(0.03)
Unemployment 2012	0.00	0.01	−0.00	−0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Foreign population 2012	−0.00	−0.01	0.01	−0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Migrant share class	0.49***	0.33**	−0.05	0.43***
	(0.15)	(0.15)	(0.16)	(0.16)
Average math result	0.80***			
	(0.07)			
Average German result		0.80***		
		(0.06)		
Average English result			0.85***	
			(0.06)	
Average natural science result				0.65***
				(0.09)
Indiv controls	Yes	Yes	Yes	Yes
First Grade FE	Yes	Yes	Yes	Yes
Birthcountry FE	Yes	Yes	Yes	Yes
Immigration Year FE	Yes	Yes	Yes	Yes
School and Neigh. controls	Yes	Yes	Yes	Yes
Class Controls	Yes	Yes	Yes	Yes
Adj. R^2	0.31	0.42	0.35	0.22
Num. obs.	1130	1151	1092	1120
N Clusters	434	440	432	431

Note: Standardized KERMIT results in fifth grade. Standard errors clustered on class level. Not shown controls: Year of birth, month of birth, elementary school offering preparatory classes, children per school, form of full time school, purchasing power, children per class. * Significance at 0.1; ** Significance at 0.05; *** Significance at 0.01.

Table 6: Gymnasium Attendance and Participation in Preparatory Class

	(1)	(2)	(3)	(4)
Ever in preparatory class	-0.09^{***}	-0.05^{**}	-0.05^{**}	-0.04
	(0.02)	(0.03)	(0.03)	(0.03)
Ever in base class	-0.05^{**}	-0.03	-0.04	-0.01
	(0.03)	(0.03)	(0.03)	(0.03)
Female		0.01	0.01	0.01
		(0.02)	(0.02)	(0.02)
Education needs		-0.21^{***}	-0.20^{***}	-0.20^{***}
		(0.02)	(0.02)	(0.02)
RISE development index		0.02^{*}	0.03^{**}	0.02^{**}
		(0.01)	(0.01)	(0.01)
Unemployment 2012			-0.01^{*}	-0.01^{*}
			(0.01)	(0.01)
Foreign population 2012			0.02^{**}	0.02^{***}
			(0.01)	(0.01)
Indiv controls	No	Yes	Yes	Yes
First grade FE	No	Yes	Yes	Yes
Area of birth FE	No	Yes	Yes	Yes
Immigration year FE	No	Yes	Yes	Yes
School and neigh. controls	No	No	Yes	Yes
Class controls	No	No	No	Yes
Adj. R^2	0.02	0.05	0.06	0.06
Num. obs.	1320	1320	1320	1320
N Clusters	750	750	750	750

Note: Gymnasium attendance in the last observation. Standard errors clustered on class level. Not shown controls: Year of birth, month of birth, elementary school offering preparatory classes, children per school in elementary school, form of full time school in elementary school, purchasing power for elementary school, migrant share in elementary school, children per class. * Significance at 0.1; ** Significance at 0.05; *** Significance at 0.01.

Table 7: Group Specific Average Test Score Results and Attendance of Preparatory Class

	(Base)	(Gender)	(Origin)
Ever in preparatory class	-0.19^{***}	-0.16^{***}	-0.16^{***}
	(0.04)	(0.05)	(0.06)
Ever in base class	-0.26^{***}	-0.26^{***}	-0.26^{***}
	(0.05)	(0.05)	(0.05)
Female	0.02	0.05	0.02
	(0.03)	(0.04)	(0.03)
Country of birth: Iraq	0.02	0.02	0.03
	(0.04)	(0.04)	(0.05)
Country of birth: Afghanistan	−0.18	−0.17	−0.02
	(0.19)	(0.19)	(0.20)
Country of birth: Eritrea	−0.07	−0.07	−0.07
	(0.06)	(0.06)	(0.09)
Country of birth: Iran	0.19^{***}	0.19^{***}	0.24^{***}
	(0.05)	(0.05)	(0.07)
Average KERMIT result	0.75^{***}	0.76^{***}	0.75^{***}
	(0.06)	(0.06)	(0.06)
Prep class x female		−0.06	
		(0.07)	
Prep class x Iraq			−0.02
			(0.07)
Prep class x Afghanistan			−0.48
			(0.43)
Prep class x Eritrea			−0.01
			(0.12)
Prep Class x Iran			−0.16
			(0.11)
Indiv controls	Yes	Yes	Yes
First Grade FE	Yes	Yes	Yes
Birthcountry FE	Yes	Yes	Yes
Immigration Year FE	Yes	Yes	Yes
School and Neigh. controls	Yes	Yes	Yes
Class Controls	Yes	Yes	Yes
Adj. R^2	0.44	0.44	0.44
Num. obs.	1153	1153	1153
N Clusters	440	440	440

Note: Standardized KERMIT Results. Standard errors clustered on class level. Not shown controls: Year of birth, month of birth, RISE development index, education needs, elementary school offering preparatory classes, children per school, form of full time school, purchasing power, unemployment, foreign population, children per class, migrant share in class. * Significance at 0.1; ** Significance at 0.05; *** Significance at 0.01.

Table 8: Number of Students from First Grade and Attendance of Preparatory Class

	(5th Grade)	(Last Grade)
Ever in preparatory class	0.17***	0.15***
	(0.04)	(0.03)
Ever in base class	−0.02	0.00
	(0.04)	(0.04)
Female	0.05	0.04
	(0.03)	(0.03)
Education needs	0.04	0.04
	(0.09)	(0.10)
RISE development index	−0.01	−0.01
	(0.02)	(0.02)
Unemployment 2012	0.00	0.01
	(0.01)	(0.01)
Foreign population 2012	0.01	0.00
	(0.01)	(0.01)
Children per class	−0.00	−0.00
	(0.01)	(0.01)
Migrant share class	0.25**	0.19**
	(0.13)	(0.10)
Indiv controls	Yes	Yes
Indiv controls	Yes	Yes
First grade FE	Yes	Yes
Area of birth FE	Yes	Yes
Immigration year FE	Yes	Yes
School and neigh. controls	Yes	Yes
Class controls	Yes	Yes
Adj. R^2	0.10	0.10
Num. obs.	1222	1226
N Clusters	460	700

Note: Number of students from first observed grade and attendance of preparatory class. Standard errors clustered on class level. Not shown controls: Year of birth, month of birth, elementary school offering preparatory class, children per school, form of full time school, purchasing power. * Significance at 0.1; ** Significance at 0.05; *** Significance at 0.01.

Table 9: Refugee and Migrant Share in Secondary School and Attendance of Preparatory Class

	Recent Migrant Share		Refugee Share	
	(5th Grade)	(Last Grade)	(5th Grade)	(Last Grade)
Ever in preparatory class	0.02**	0.03***	0.00	0.01**
	(0.01)	(0.01)	(0.01)	(0.01)
Ever in base class	0.07***	0.06***	0.04***	0.03***
	(0.02)	(0.01)	(0.01)	(0.01)
Female	−0.01	0.00	−0.00	−0.00
	(0.01)	(0.01)	(0.00)	(0.01)
Education needs	−0.01	−0.01	−0.02*	−0.01
	(0.01)	(0.02)	(0.01)	(0.01)
RISE development index	−0.00	−0.00	−0.00	−0.00
	(0.01)	(0.00)	(0.00)	(0.00)
Unemployment 2012	0.00	0.00	−0.00	−0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Foreign population 2012	0.00	0.00	0.00	−0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Children per class	−0.02***	−0.03***	−0.02***	−0.02***
	(0.00)	(0.00)	(0.00)	(0.00)
Indiv controls	Yes	Yes	Yes	Yes
Indiv controls	Yes	Yes	Yes	Yes
First grade FE	Yes	Yes	Yes	Yes
Area of birth FE	Yes	Yes	Yes	Yes
Immigration year FE	Yes	Yes	Yes	Yes
School and neigh. controls	Yes	Yes	Yes	Yes
Class controls	Yes	Yes	Yes	Yes
Adj. R^2	0.45	0.54	0.38	0.46
Num. obs.	1272	1366	1272	1366
N Clusters	471	770	471	770

Note: Share of recent immigrants and refugees in classroom and attendance of preparatory class. Standard errors clustered on class level. Not shown controls: Year of birth, month of birth, elementary school offering preparatory class, children per school, form of full time school, purchasing power. * Significance at 0.1; ** Significance at 0.05; *** Significance at 0.01.

Table 10: Average Test Score Results for Different Sample Definitions

	(1)	(2)	(3)	(4)
Panel A: Without Children who visited a Base Class				
Ever in preparatory class	−0.38***	−0.27***	−0.24***	−0.24***
	(0.05)	(0.06)	(0.06)	(0.05)
Average KERMIT result				0.69***
				(0.06)
Adj. R^2	0.07	0.16	0.29	0.42
Num. obs.	980	980	980	980
Panel B: Refugees who visited 3rd or 4th as First Grade				
Ever in preparatory class	−0.28***	−0.24***	−0.19***	−0.16***
	(0.05)	(0.06)	(0.06)	(0.05)
Ever in base class	−0.40***	−0.37***	−0.35***	−0.27***
	(0.06)	(0.07)	(0.06)	(0.06)
Average KERMIT result				0.82***
				(0.08)
Adj. R^2	0.08	0.15	0.25	0.39
Num. obs.	746	746	746	746
Panel C: Without Controlling for Elementary School offering Preparatory Class				
Ever in preparatory class	−0.37***	−0.29***	−0.23***	−0.19***
	(0.04)	(0.05)	(0.05)	(0.04)
Ever in base class	−0.38***	−0.34***	−0.32***	−0.26***
	(0.06)	(0.06)	(0.06)	(0.05)
Average KERMIT result				0.76***
				(0.06)
Adj. R^2	0.11	0.19	0.30	0.43
Num. obs.	1153	1153	1153	1153
Panel D: Refugees arriving since 2015				
Ever in preparatory class	−0.32***	−0.26***	−0.22***	−0.18***
	(0.05)	(0.06)	(0.06)	(0.05)
Ever in base class	−0.39***	−0.35***	−0.35***	−0.27***
	(0.06)	(0.06)	(0.06)	(0.05)
Average KERMIT result				0.83***
				(0.07)
Adj. R^2	0.09	0.16	0.27	0.41
Num. obs.	893	893	893	893
Indiv controls	No	Yes	Yes	Yes
First Grade FE	No	Yes	Yes	Yes
Birthcountry FE	No	Yes	Yes	Yes
Immigration Year FE	No	Yes	Yes	Yes
School and Neigh. controls	No	No	Yes	Yes
Class Controls	No	No	No	Yes

Note: Standardized KERMIT results. Standard errors clustered on class level. Not shown controls: Female, year of birth, month of birth, education needs, RISE social index, education needs, elementary school offering preparatory classes, children per school, form of full time school, purchasing power, unemployment, foreign population, children per class, migrant share in class. * Significance at 0.1; ** Significance at 0.05; *** Significance at 0.01.

Table 11: Average Test Score Results for Different Refugee Definitions

	(1)	(2)	(3)	(4)
Panel A: Higher Immigration Year				
Ever in preparatory class	-0.35^{***}	-0.26^{***}	-0.22^{***}	-0.19^{***}
	(0.04)	(0.05)	(0.05)	(0.05)
Ever in base class	-0.39^{***}	-0.33^{***}	-0.32^{***}	-0.26^{***}
	(0.06)	(0.06)	(0.06)	(0.05)
Average KERMIT result				0.79^{***}
				(0.06)
Adj. R^2	0.10	0.18	0.29	0.42
Num. obs.	1037	1037	1037	1037
Panel B: Children from larger Refugee Categorization				
Ever in preparatory class	-0.34^{***}	-0.26^{***}	-0.22^{***}	-0.19^{***}
	(0.04)	(0.05)	(0.05)	(0.04)
Ever in base class	-0.38^{***}	-0.34^{***}	-0.33^{***}	-0.27^{***}
	(0.06)	(0.06)	(0.05)	(0.05)
Average KERMIT result				0.80^{***}
				(0.05)
Adj. R^2	0.10	0.18	0.28	0.43
Num. obs.	1266	1266	1266	1266
Panel C: Syrian Children				
Ever in preparatory class	-0.31^{***}	-0.21^{***}	-0.18^{**}	-0.15^{**}
	(0.06)	(0.08)	(0.07)	(0.07)
Ever in base class	-0.41^{***}	-0.35^{***}	-0.34^{***}	-0.30^{***}
	(0.09)	(0.09)	(0.08)	(0.07)
Average KERMIT result				0.74^{***}
				(0.08)
Adj. R^2	0.10	0.16	0.29	0.45
Num. obs.	534	534	534	534
Indiv controls	No	Yes	Yes	Yes
First Grade FE	No	Yes	Yes	Yes
Birthcountry FE	No	Yes	Yes	Yes
Immigration Year FE	No	Yes	Yes	Yes
School and Neigh. controls	No	No	Yes	Yes
Class Controls	No	No	No	Yes

Note: Standardized KERMIT results. Standard errors clustered on class level. Not shown controls: Female, year of birth, month of birth, education needs, RISE social index, education needs, elementary school offering preparatory classes, children per school, form of full time school, purchasing power, unemployment, foreign population, children per class, migrant share in class. * Significance at 0.1; ** Significance at 0.05; *** Significance at 0.01.

Table 12: Average Test Score Results and Attendance of Preparatory Class Instrumented by Date of Birth and Year of Immigration

	(1)	(2)	(3)	(4)
Ever in preparatory class	-0.72^{***}	-0.63^{***}	-0.50^{***}	-0.38^{**}
	(0.08)	(0.19)	(0.17)	(0.16)
Ever in base class		-0.34^{***}	-0.33^{***}	-0.27^{***}
		(0.06)	(0.06)	(0.05)
Female		0.03	0.03	0.01
		(0.04)	(0.04)	(0.03)
Education needs		-0.78^{***}	-0.68^{***}	-0.55^{***}
		(0.09)	(0.09)	(0.09)
RISE development index		0.11^{***}	0.05^{**}	0.03^{*}
		(0.02)	(0.02)	(0.02)
Unemployment 2012			-0.01	-0.00
			(0.01)	(0.01)
Foreign population 2012			-0.02^{*}	0.00
			(0.01)	(0.01)
Migrant share class				0.29^{**}
				(0.12)
Average KERMIT result				0.75^{***}
				(0.06)
Indiv controls	No	Yes	Yes	Yes
First Grade FE	No	Yes	Yes	Yes
Birthcountry FE	No	Yes	Yes	Yes
School and Neigh. controls	No	No	Yes	Yes
Class Controls	No	No	No	Yes
Num. obs.	1153	1153	1153	1153
F statistic	79.07	22.91	32.22	45.28
N Clusters	440	440	440	440

Note: IV regression with birthdate and immigration year as instrument for preparation class. Standardized KERMIT results. Standard errors clustered on class level. Not shown controls: Year of birth, month of birth, elementary school offering preparatory classes, children per school, form of full time school, purchasing power, children per class. * Significance at 0.1; ** Significance at 0.05; *** Significance at 0.01.

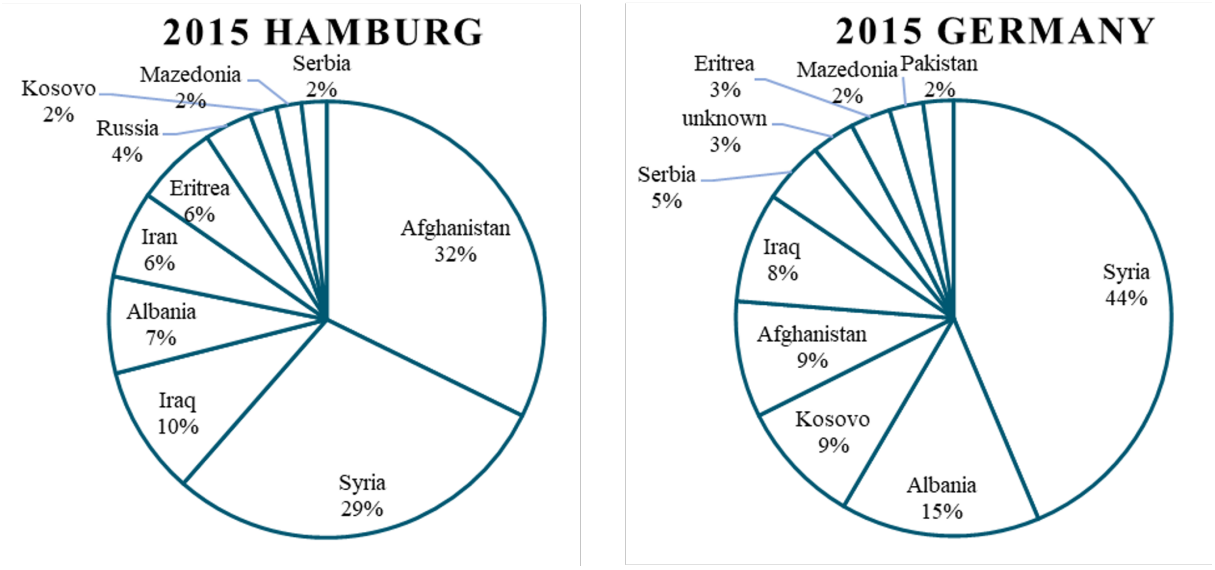
Table 13: Censored Regression Models of Average Test Score Results and Attendance of Preparatory Class

	(1)	(2)	(3)	(4)
Ever in preparatory class	-40.68^{***}	-35.47^{***}	-34.33^{***}	-19.37^{**}
	(7.68)	(9.46)	(9.40)	(8.26)
Ever in base class	-104.41^{***}	-97.69^{***}	-100.02^{***}	-49.33^{***}
	(12.84)	(12.70)	(12.76)	(10.31)
Female		12.48^{*}	12.63^{*}	7.77
		(7.40)	(7.26)	(6.42)
Education needs		-107.62^{***}	-101.60^{***}	-82.33^{***}
		(20.09)	(19.67)	(18.45)
RISE development index		5.68	2.28	-0.99
		(4.24)	(4.56)	(4.15)
Foreign population 2012			-3.31^{*}	-0.94
			(1.97)	(2.00)
Migrant share class				46.78^{*}
				(24.56)
Average KERMIT result				1.02^{***}
				(0.06)
Indiv controls	No	Yes	Yes	Yes
First Grade FE	No	Yes	Yes	Yes
Birthcountry FE	No	Yes	Yes	Yes
Immigration Year FE	No	Yes	Yes	Yes
School and Neigh. controls	No	No	Yes	Yes
Class Controls	No	No	No	Yes
Total	1272	1272	1272	1272
Left Censored	119	119	119	119
Uncensored	1153	1153	1153	1153

Note: Full Kermit results censored to 450 points if missing value. Standard errors clustered on class level. Not shown controls: Year of birth, month of birth, RISE social index, education needs, elementary school offering preparatory classes, children per school, form of full time school, purchasing power, unemployment, foreign population, children per class, migrant share in class. * Significance at 0.1; ** Significance at 0.05; *** Significance at 0.01.

Appendix

Figure A1: Asylum Applications in 2015



Note: Source: Statistisches Amt für Hamburg und Schleswig-Holstein (2016); BAMF (2016)

Table A1: Sorting of Immigrant Students fourth Grade and Performance of the Classroom

	(1)	(2)	(3)
New refugee share class	-1.72^{**}	-1.22^{**}	0.04
	(0.69)	(0.53)	(0.44)
Share female		-0.22^{*}	-0.16
		(0.12)	(0.13)
Migrant share class		-0.71^{***}	-0.26^{***}
		(0.08)	(0.09)
Kids per class		0.01	0.03^{***}
		(0.01)	(0.01)
Class RISE development index		0.26^{***}	0.07
		(0.02)	(0.06)
Class controls	No	Yes	Yes
School FE x Year FE	No	No	Yes
Adj. R^2	0.00	0.41	0.72
Num. obs.	1590	1590	1590
N Clusters	789	789	789

Note: Estimated regression coefficients of new arriving refugees in regular classes in grade four on third grade KERMIT results of students in the classroom. Standard errors clustered at class level. * Significance at 0.1; ** Significance at 0.05; *** Significance at 0.01.

Table A2: Average Test Score Results and Attendance of Preparatory Class

	(1)	(2)	(3)	(4)	(5)	(6)
Ever in preparatory class	−0.37***	−0.27***	−0.22***	−0.19***	−0.17***	−0.18**
	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.08)
Ever in base class	−0.38***	−0.32***	−0.32***	−0.26***	−0.29***	−0.30***
	(0.06)	(0.06)	(0.06)	(0.05)	(0.05)	(0.08)
Female		0.04	0.04	0.01	0.00	0.03
		(0.04)	(0.04)	(0.03)	(0.04)	(0.06)
Education needs		−0.75***	−0.66***	−0.53***	−0.49***	−0.50***
		(0.09)	(0.09)	(0.09)	(0.09)	(0.15)
RISE development index		0.10***	0.04*	0.03	0.02	0.03
		(0.02)	(0.02)	(0.02)	(0.03)	(0.04)
Unemployment 2012			−0.01	0.00		
			(0.01)	(0.01)		
Foreign population 2012			−0.03**	−0.00		
			(0.01)	(0.01)		
Migrant share class				0.33***	0.37**	
				(0.12)	(0.17)	
Average KERMIT result				0.76***	0.82***	
				(0.06)	(0.10)	
Indiv controls	No	Yes	Yes	Yes	Yes	Yes
First grade FE	No	Yes	Yes	Yes	Yes	Yes
Area of birth FE	No	Yes	Yes	Yes	Yes	Yes
Immigration year FE	No	Yes	Yes	Yes	Yes	Yes
School FE	No	No	No	No	Yes	Yes
Schoolyear FE	No	No	No	No	Yes	Yes
Class FE	No	No	No	No	No	Yes
School and neigh. controls	No	No	Yes	Yes	No	No
Class controls	No	No	No	Yes	Yes	No
Adj. R^2	0.11	0.19	0.30	0.43	0.43	0.39
Num. obs.	1153	1153	1153	1153	1153	1153
N Clusters	440	440	440	440	440	440

Note: Standardized KERMIT results. Standard errors clustered on class level. Not shown controls: Year of birth, month of birth, elementary school offering preparatory classes, children per school, form of full time school, purchasing power, children per class. * Significance at 0.1; ** Significance at 0.05; *** Significance at 0.01.

Table A3: German Reading and Writing Skills and Attendance of Preparatory Class

	Reading	Writing
Ever in preparatory class	-0.28^{***}	-0.22^{***}
	(0.07)	(0.06)
Ever in base class	-0.19^{**}	-0.31^{***}
	(0.09)	(0.07)
Female	0.12^{***}	0.27^{***}
	(0.05)	(0.05)
Education needs	-0.52^{***}	-0.60^{***}
	(0.13)	(0.10)
RISE development index	-0.01	0.06^{**}
	(0.03)	(0.03)
Unemployment 2012	0.02	-0.01
	(0.01)	(0.01)
Foreign population 2012	-0.03^{*}	0.02
	(0.02)	(0.01)
Migrant share class	0.21	0.36^{**}
	(0.18)	(0.15)
Average KERMIT result	0.72^{***}	0.74^{***}
	(0.08)	(0.06)
Indiv controls	Yes	Yes
First Grade FE	Yes	Yes
Birthcountry FE	Yes	Yes
Immigration Year FE	Yes	Yes
School and Neigh. controls	Yes	Yes
Class Controls	Yes	Yes
Adj. R^2	0.37	0.34
Num. obs.	1055	1150
N Clusters	431	440

Note: Standardized KERMIT results separate for German reading and writing. Standard errors clustered on class level. Not shown controls: Year of birth, month of birth, elementary school offering preparatory classes, children per school, form of full time school, purchasing power, children per class. * Significance at 0.1; ** Significance at 0.05; *** Significance at 0.01.

Table A4: Average Test Score Results and Attendance of Preparatory Class by Groups

	Gender		County of Birth			
	(Female)	(Male)	(Syria)	(Afgh)	(Iran)	(Iraq)
Ever in preparatory class	-0.24^{***}	-0.15^{**}	-0.15^{**}	-0.19^{**}	-0.36^{**}	0.09
	(0.07)	(0.06)	(0.07)	(0.08)	(0.15)	(0.14)
Ever in base class	-0.23^{***}	-0.28^{***}	-0.30^{***}	-0.23^{**}	-0.02	-0.26
	(0.07)	(0.07)	(0.07)	(0.09)	(0.15)	(0.19)
Female			-0.01	0.07	0.07	-0.07
			(0.05)	(0.06)	(0.12)	(0.13)
Education needs	-0.54^{***}	-0.49^{***}	-0.45^{***}	-0.37^{***}	-0.65	-0.91^{***}
	(0.12)	(0.13)	(0.12)	(0.10)	(0.70)	(0.27)
RISE development index	0.03	0.03	0.02	0.03	0.01	-0.04
	(0.03)	(0.03)	(0.03)	(0.04)	(0.07)	(0.07)
Unemployment 2012	0.01	-0.01	0.00	-0.01	0.00	0.04
	(0.01)	(0.01)	(0.01)	(0.02)	(0.03)	(0.04)
Foreign population 2012	-0.02	0.01	-0.01	0.02	0.04	-0.10^{**}
	(0.01)	(0.01)	(0.01)	(0.02)	(0.04)	(0.04)
Migrant share class	0.25	0.42^{**}	0.23	0.07	0.25	1.18^{**}
	(0.18)	(0.16)	(0.17)	(0.23)	(0.43)	(0.47)
Average KERMIT result	0.66^{***}	0.87^{***}	0.74^{***}	0.69^{***}	0.86^{***}	0.56^{***}
	(0.08)	(0.09)	(0.08)	(0.12)	(0.19)	(0.21)
Indiv controls	Yes	Yes	Yes	Yes	Yes	Yes
First Grade FE	Yes	Yes	Yes	Yes	Yes	Yes
Birthcountry FE	Yes	Yes	Yes	Yes	Yes	Yes
Immigration Year FE	Yes	Yes	Yes	Yes	Yes	Yes
School and Neigh. controls	Yes	Yes	Yes	Yes	Yes	Yes
Class Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.44	0.44	0.45	0.40	0.37	0.41
Num. obs.	568	585	534	370	124	119
N Clusters	314	313	309	231	106	98

Note: Standardized KERMIT results for different groups separately. Standard errors clustered on class level. Not shown controls: Year of birth, month of birth, elementary school offering preparatory classes, children per school, form of full time school, purchasing power, children per class. * Significance at 0.1; ** Significance at 0.05; *** Significance at 0.01.