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Does Prior Achievement Matter? Early Tracking and Immigrant Children in Europe

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Does Prior Achievement Matter? Early Tracking and Immigrant Children in Europe *

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Abstract

Educational tracking is one of the institutional barriers to more equitable societies. Students with a modest social origin and/or an immigration background are underrepresented in the academic programs of secondary schools that would make them eligible later to access tertiary education. Literature on whether track placement reflects a student's aptitude remains largely scarce. We aim to contribute to this research strand and analyze the role of achievement prior to tracking on the odds of placement in an academic program among immigrant students and native peers with a similar level of academic ability. While the overall results suggest no disadvantage among immigrant students, the results by ethnicity and geographic region of origin reveal a large ethnic penalty for those of African, Turkish, Middle Eastern, or South European background. Our paper highlights the pertinence of students' origin on educational trajectories and the persisting bias in tracking policy in European school systems.

Keywords: academic track, vocational track, immigrant students, Europe, ethnicity and origin

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1 Introduction

The educational integration of children with an immigrant background remains an issue of concern in most European countries. Children with a foreign background consistently show lower scholastic achievement than their native peers, they are at higher risk of repeating a grade and dropping out of school, fewer access or graduate from tertiary education, and they experience a significantly more challenging transition to the labor market (Azzolini and Barone, 2013, Baert and Cockx, 2013, Boado, 2011, Crul et al., 2012, Heath et al., 2008, Kalter and Kogan, 2006, OECD/EU, 2015). At the same time, there are signs of progress between first and second generation migrant children, evidenced by the latter showing better performance in education and the labor market (Crul et al., 2017, OECD/EU, 2015). In other words, successful integration is an attainable goal, but one that is reached by only a small proportion of young people. Research into the causes of the interrupted progress of immigrants highlights the central role of institutions (including educational systems and policies) in receiving countries, with regard to shaping the successful integration of immigrant children into the host society (Crul et al., 2012a,b, Heath et al., 2008).

This paper focuses on a particular institutional feature applied in selected European countries, known as tracking; that is, the allocation of students to separate education programs at the end of primary education, or later at the end of lower-secondary school. Program selection is a crucial point for the future education trajectory of a child for two reasons. First, and most obviously, the curriculum content will become increasingly different between programs. While students in the general track advance in academic subjects, those in technical and vocational tracks acquire more work-related skills, with academic subjects being taught at a lower intensity. Second, and arguably more importantly, the type of secondary school program and the eventual graduation certificate determines the eligibility of a young individual for studying at the tertiary level. In many countries, university admission requires holding a certificate from an academic program (for example Abitur in Germany). Systems offer alternative access to tertiary education, mostly through professionally-oriented programs for which graduates from upper-level technical secondary schools are eligible. Nevertheless, the available evidence suggests that enrollment into academic programs is favored both by native and immigrant parents (Dustmann, 2004, Tjaden and Scharenberg, 2016). However, due to limited fluency in the language of instruction, older age at migration to the destination country, classroom and school ethnic composition, and potential discrimination on the part of teachers, immigrant children are less likely to attend general (academically-oriented) programs (Bonizzoni et al., 2016, Ver-

vaet et al., 2018).[1] What remains less explored, is the role of prior academic performance in decisions concerning tracking.

In stratified educational systems, school achievement in earlier grades plays a central role in programme placement (see Section 2.1 for further details). Teacher(s) or the school board form a recommendation based on past results and inform students and their families about the placement decision. Worryingly, many studies unveil partiality (conscious or not) from teachers in evaluating immigrant students' scholastic performance and providing track recommendations (Alesina et al., 2018, Glock et al., 2013, Luedemann and Schwerdt, 2013).

In light of these findings, we aim to contribute to existing literature by testing the premises of achievement-based tracking policy. We explore the likelihood of being enrolled into an academic program for immigrant children and their native-born counterparts with a similar level of pre-tracking academic achievement. Differences between them could imply that the tracking process is driven by criteria other than solely academic achievement. Our empirical analysis follows four synthetic birth cohorts of school children (between 10 and 12 years old) in systems with countries using early tracking: Austria, Belgium, Germany, Luxembourg, and the Netherlands. We construct pseudo-panel data by combining surveys for primary schools — PIRLS (Progress in International Reading Literacy Study) 2001 and 2006, and TIMSS (Trends in International Mathematics and Science Study) 2003 and 2007 — and secondary schools — PISA (Programme for International Student Assessment) 2006, 2009, 2012. Our results corroborate earlier studies, showing on average no evidence that immigrant students with comparable socioeconomic status are at a disadvantage after controlling for their imputed achievement scores prior to tracking. Somewhat surprisingly, we find evidence that in some countries, students with a foreign background have higher odds of being enrolled in an academic program than their native counterparts. Given the heterogeneity of the immigrant population in each receiving country and the persistent disadvantage faced by certain ethnic groups, we tested empirically whether the interethnic inequality originates partially from the implementation of tracking policy. Our findings suggest the existence of tracking bias toward children of African, Southern European, Turkish, and Middle Eastern origin; who are less likely than their native-born peers to be enrolled in academically-oriented programs. Immigrant students of Western European origin are, by contrast, more likely than natives to be

[1] Factors such as prior grade repetition and parents' educational and occupational background also predict the type of program, irrespective of migration history (Lange and von Werder, 2017, Schneeweis and Zweimüller, 2014).

selected into those tracks. These results demonstrate the importance of origin-specific data in immigration research.

The paper is structured as follows: in Section 2.1, we review pertinent contributions on school tracking and ethnic inequalities. Subsequently, in Section 2.2 we summarize the principles of tracking policies in the five countries in our study. Section 3 explains the methodology behind the data construction and provides the descriptive summary of variables. Section 4 presents our estimation strategy, the models, and the differences between the two parts of the analyses. In Section 5 we discuss the findings first by the immigrant generation, and following that by the ethnic background. Lastly, in Section 6 we summarize our findings, discuss the limitations of the research, and offer suggestions for future research.

2 Contextual Background

2.1 Tracking policies

School tracking continues to attract much scholarly attention (see, Bol and van de Werfhorst, 2013, Bol et al., 2014, Brunello and Checchi, 2007, Brunello et al., 2012, Gamoran and Mare, 1989, Hanushek and Woessmann, 2006, Kerckhoff, 1986, 1995, 2001, Lavrijsen and Nicaise, 2016, Pischke and Manning, 2006, Ruhose and Schwerdt, 2016, Shavit and Mueller, 2000, among many others). A vast body of literature suggests that tracking exacerbates socioeconomic inequalities and perpetuates class divides across generations (Gamoran and Mare, 1989, Kerckhoff, 1986, Mueller and Shavit, 2003, Shavit and Mueller, 2000). Children with a modest social background are more likely to be placed in vocational and technical programs at an early age, limiting their opportunities to access tertiary education and occupations of higher social ranks and earning potential later in life (Brunello and Checchi, 2007, Shavit and Mueller, 2000, 2003). Several countries — including Sweden, Finland, and Scotland — that moved away from *selective* school systems to adopt *comprehensive* ones,[2] have witnessed a partial decline in educational inequalities in younger cohorts (Gamoran, 1996, Meghir and Palme, 2005, Pekkarinen et al., 2009, Van de Werfhorst, 2018).

Curricular differentiation may better accommodate children's heterogeneous learning preferences and academic abilities (Gamoran and Mare, 1989, Kerckhoff, 1986), with the underlying assumption that educational tracks benefit both more academically inclined students and those more receptive to hands-on training and learning. For the latter, offering a curriculum that fosters job-specific skills may ease their transition into work, and as a consequence, reduce the risk of unemployment and other challenges in the passage to adulthood. In other words, tracking may provide a form of safety net for non-academically inclined young people (Estevez-Abe et al., 2001, Mueller and Shavit, 2003, Shavit and Mueller, 2000). In the aftermath of the global financial crisis, the sharper increase in youth unemployment in Ireland, Italy, and Spain compared with Germany, reignited the debate about the benefits of stratified education systems (OECD/EU, 2015, OECD, 2016b, Scarpetta et al., 2010).

One of the distinct features of the German education system is the young age of children at the time of tracking (10 years old). Comparative studies find notably larger effects of fam-

[2] Sweden in the late 1940s, Finland in the 1970s, and Scotland in the late 1970s - early 1980s.

ily socioeconomic and education status on learning outcomes in systems with early (10—12 years old) *vs* late (13 and above) selection (Van de Werfhorst and Mijs, 2010). The time required to master basic skills in reading, writing, and mathematics is a multidimensional process shaped by the levels of school preparedness, parents' background, as well as children's idiosyncratic learning abilities. Shorter exposure to high-quality primary education prior to tracking may hinder the ability of students to keep up with the skills and knowledge level of more academically-advanced peers.

In recent years, some German states (for example Hessen) have introduced reforms to defer tracking to the age of 12 instead of 10 (from grade 4 to grade 6) (Mühlenweg, 2008). Evaluation of this reform shows that delaying tracking resulted in improved academic achievement in mathematics, science, and reading among disadvantaged and first-generation migrant students. By contrast, the Bavarian state lowered the age of tracking in the opposite direction, from the age of 12 to 10, albeit with the same intention of helping students improve their academic performance (Piopiunik, 2014). Contrary to the expectations of the Bavarian state, and in line with literature, making the tracking decision at an earlier age reduced the average achievement of students in non-academic tracks and increased the proportion of low-performing students. At the same time, the average achievement of students in academic programs did not improve.

The effects of tracking on educational and occupational outcomes have been analyzed in a number of studies (Alba et al., 2011, Backes and Hadjar, 2017, Bol and van de Werfhorst, 2013, Dustmann et al., 2017, Krause and Simone, 2014, Lange and von Werder, 2017, Malamud and Pop-Eleches, 2011). By contrast, much less is known about the functioning of tracking policies. According to existing literature, there are three main groups of factors determining the placement decision: teachers' or school board decisions, students' and parents' preferences, and most importantly, pupils' academic achievement.

The role of teachers in decisions about tracking can be a determining factor, as demonstrated by a number of studies (Bonizzoni et al., 2016, Dustmann et al., 2017, Kiss, 2013). Students from low social strata need particularly high academic results in order to receive a teacher's recommendation for higher-level schools, such as Gymnasium in Germany (Pietsch and Stubbe, 2007). Empirical studies reveal that immigrant students receive lower grades compared with their native-born peers, even after accounting for cognitive ability (Sprietsma, 2013). As a result, in schools where tracking decisions are based on grades, students with a migrant background are more likely to be over-selected into low-level vocational programs. In other cases, despite having grades, behavioral records, and a social status all equal to their native peers,

they are still at a higher risk of being recommended or assigned to a lower track (Glock et al., 2013, Luedemann and Schwerdt, 2013). These findings corroborate evidence suggesting a lack of transparency in the decision process due to the absence of clear procedures, allowing for some subjectivity in the assessment of a student's true potential (Pietsch and Stubbe, 2007). In light of these findings, scholars argue in favor of centralized school (entry or exit) exams, which provide more-objective indicators of performance, and make schools and teachers more accountable (Bol et al., 2014). A selection process that is more transparent may reduce the risk of decisions being shaped by factors not directly related to the academic ability of students, such as family background (Dollmann, 2016).

Parents' preferences for the educational programs of their offspring do not play a major role in most of countries with early tracking systems, according to OECD PISA 2015 data (see Table 2). In Germany, however, differences exist across the 16 states (*Länder*). In six states, the placement decision into an academic track hinges on high grades and/or passing an entry exam, whereas in the other ten states, parents have the freedom to make the final decision (Dustmann et al., 2017). Immigrant and native parents show different preferences. Despite on average having a low socioeconomic status, frequently lacking knowledge of the education system, and possibly lacking some language skills, immigrant parents have higher ambitions for their children compared with native parents of comparable status (Jackson et al., 2012, Jonsson and Rudolphi, 2011, Tjaden and Hunkler, 2017, Tjaden and Scharenberg, 2016), a phenomenon referred to as *immigrant optimism*. While these aspirations can be realized in some education systems, this is less likely to be the case in stratified systems (Crul et al., 2017).

Research into the role of earlier grades or test scores on track placement remains limited. According to national education policies in European countries with early tracking, a student's academic record — including grades before tracking and/or school entry or exit examination results — plays a varying role in the transition to lower-secondary education, evidenced by sizeable cross-country differences (see Table 2 for further details). Notably, 75 percent and 79 percent of lower-secondary schools in respectively the Netherlands and Luxembourg based their admission decisions on earlier results in primary school. By contrast, only 27 percent of school headmasters in Belgium reported that students' past academic performance is always taken into consideration, followed by 40 percent in Germany. These differences are somewhat puzzling, especially for Belgium which relies on a standardized exit exam at the end of primary school as the basis for the program recommendation (see Section 2.2 for further details).

Notable policy differences across German federal states explain why fewer than half of the schools refer to previous achievement as the key factor in the admission process.

Studies analyzing the effect of grades on track placement by ethnicity/race are particularly scarce. A study of ninth-grade students in the U.S. found no evidence of racial bias (against African Americans) on tracking outcome, once previous grades and test scores had been accounted for (Archbald et al., 2009). However, tracking policies in the U.S. are less formalized, and the final placement decision requires parental consent. In addition, existing studies have limited their focus on subject-level tracking —English— due to the nature of tracking policies in the U.S. Studies from Germany reveal contrasting results. Several studies indicate no association between immigrant status and the likelihood of placement in non-academic tracks, after accounting for existing socioeconomic differences from native-born students (Caro et al., 2009, Cobb-Clark et al., 2012, Krause et al., 2015). At the same time, Luedemann and Schwerdt (2013) reached the opposite conclusions and offer evidence on track placement bias regarding second-generation immigrant students. Scholars additionally argue that ethnic background plays a significant role in track decisions, supported by evidence of a greater likelihood of children with Turkish and Italian ancestry to be enrolled in vocational programs (Kristen, 2000). However, only a few of these studies have controlled for student's prior achievement (Caro et al., 2009, Luedemann and Schwerdt, 2013).

Once a student's prior achievement is taken into consideration, studies find no evidence of institutional bias with regard to the track assignment of immigrant students. This does not necessarily imply that the initial tracking process is error-free and neutral to individual characteristics, but that the system allows for rectification at following stages; referred to as "the built-in possibilities for correcting earlier allocation" in Dustmann et al. (2017, p.1349). The possibility to switch to another track at a later point during secondary education is also known as "school system permeability" (Backes and Hadjar, 2017, Crul, 2013). A study of the educational careers of second-generation Turks demonstrates the wide range of such permeability in European education systems: 53 percent of students with low-educated parents were up-streamed in Austria, while in Germany the figure was 25 percent, with the Netherlands and Belgium being placed between these (Crul, 2013). While the available data does not contain information about between-track mobility, the lack of statistical differences between immigrant and native students would imply either that a placement decision accurately reflects the student's ability, or that possibly inaccurate decisions are corrected by up-streaming or down-streaming to a better-suited program.

2.2 Secondary school program placement: Country profiles

This sub-section briefly outlines the rules or principles in countries with early tracking. Information comes from official documents; frequently from education ministries or from policy researchers, for example the OECD.

Austria

The first placement decision into different tracks takes place at the end of grade 4, after students have completed four years of primary school. Students, on average ten years of age at the time of placement, can apply to either a general or an academic secondary school. "Excellent" or "good" grades in mathematics and German language, or a recommendation by the feeder school (in this case primary) are the main criteria for admission to an academic school. Alternatively, a student can take an entrance exam if they cannot fulfill either of the previous admission criteria (Ministry of National Education, Science and Research of Austria, 2018). Geographical location is generally of negligible relevance regarding admission to an academic school. However, in the case of high demand, factors including the school being in close proximity and having siblings already attending the school are taken into account. Transfer to an academic secondary school (without an examination) is conditional on the results in core subjects (mathematics, German, and foreign language) or completing a school year with distinction. Alternatively, a student can take an entry exam, which covers subjects not included in the entrance exam of the school previously attended by the student. Progression to upper-secondary school is, again, conditional on academic achievement.

Belgium

Education policy in Belgium is set up and regulated independently by the French, Flemish, and German-speaking communities, leading to *de-facto* three education systems. Some features, such as the starting age, duration of compulsory school attendance, and minimum requirements for issuing of school diplomas are uniform across the communities and are regulated at the federal level (EURYDICE, 2017). During the last grade of primary school, all children take standardized (within their respective language community) tests in mathematics, language, introduction to science, history, and geography. Students with scores above 50 percent receive a Primary Education Certificate.

Theoretically, the certificate is the basis for secondary-school program admission. However, teacher and school recommendations can still be used for a placement decision. Children in

the French-speaking community who fail to obtain the certificate have the option to either repeat the sixth grade of primary school or to enter the first year of differentiated education (Le Portail de l'Enseignement en Federation Wallonie-Bruxelles, 2018).

In the Flemish community, after graduating from primary school, students have the option to gain admission to two distinct tracks, A and B. Track A students follow two years of common curriculum (stage one) before pursuing one of four study paths: general (academically oriented), technical, arts, or vocational. In 2002, the Flemish government signed the Decree on Equal Educational Opportunities, with the intention of ensuring a fair school admission and enrollment process through a local consultation platform. This followed the results of international studies such as the OECD PISA, in which Belgian education was characterized as both high performing and highly socially unequal.

In 2013, the Flemish government approved new reforms for secondary education, which came into effect in 2018 (European Commission, 2016). These reforms include delaying the timing of tracking, a more comprehensive first stage of secondary education, and reducing the number of subject areas and courses in order to simplify the system and decrease the number of early school leavers. Some of measures are also designed to better integrate students who fail to obtain a primary school certificate. However, criticism has been voiced over abandoning a plan to broaden the first stage of secondary education and suppress tracks in the second and third stages (Nusche et al., 2015).

Germany

Primary school in most German states lasts for four years (six in Berlin and Brandenburg). There are no school-leaving examinations or certificate at the end of primary school (except for the state of Baden-Württemberg). Instead, in the final year of primary school, students receive a report summarizing their achievements and a recommendation (from the school) for a specific secondary-school program (The Standing Conference of the Ministers of Education and Cultural Affairs of Germany, 2017). There are normally three general programs: *Gymnasium* (academic), *Realschule* (vocational/general), and *Hauptschule* (vocational). Additionally, some states offer education in *Integrierte Gesamtschule* (comprehensive secondary schools), which do not stream students. A recommendation from the feeder school is either the basis for secondary school admission or helps in making a final admission decision. Parents are extensively consulted throughout the process. In some northern states, where there is no exit test and the teacher's recommendation is only optional, parents have the right to request

that their child is considered for admission into the highest tracks (Dollmann, 2016).

In some states, the choice of a specific track is binding at the start of lower-secondary school, whereas in other states it only becomes binding in the second or third year. Students also have the option to attend trial lessons or a trial semester to obtain a better assessment of their potential. High-achieving students can also apply to be transferred to a more demanding program (for example from *Realschule* to *Gymnasium*).

Several German states, including Saarland and Bremen, have (partially) moved away from tracking and introduced comprehensive schools *Gesamtschule* by merging general *Hauptschule* and intermediate *Realschule* tracks (Luedemann and Schwerdt, 2013).

Luxembourg

While primary school starts at the age of six, pre-school education is compulsory from the age of four for all children following the reform of fundamental education in 2009.

Starting at the age of four, children must follow four, 2-year cycles of primary education. Most children complete these four cycles by the age of 11 and transition to one of the two secondary-school programs: classical secondary education (*enseignement secondaire classique (ESC)*) or general secondary education (*enseignement secondaire général (ESG)*) (Ministry of National Education, Childhood and Youth of Luxembourg, 2018).

In most cases, the decision on placement is based on recommendations from teachers and a school committee. In cases where there is disagreement concerning the recommendation, parents can appeal the decision at an orientation committee and a student can take a written school admission test, standardized across the country, to assess their aptitude in German, French, and mathematics.

Theoretically, it is possible for a student to switch between education programs in the first three years of secondary school. In practice, however, while 46 percent of students experience between-track mobility during secondary school, less than 2 percent move upwards to a classical program (Backes and Hadjar, 2017).

The Netherlands

Primary education in the Netherlands starts at the age of five and lasts for eight years. At the age of twelve, students transition to secondary school: either general secondary *(alge-*

meen voortgezet onderwijs, HAVO or VWO) or preparatory secondary vocational education *(beroepsgericht voortgezet onderwijs, VMBO)*. In a similar way to other countries, placement is based on the recommendation of the feeder school, the preferences of students and parents, and the results of a national test at the end of primary school *CITO-toets*. The school's recommendation is usually the key criterion for program placement. However, if the results of the national test would allow a student to attend a program with a more challenging curriculum than the one proposed, the recommendations of the teacher and school can be overruled (OECD, 2016a).

3 Data and Descriptive Statistics

Our analyses rely on cross-sectional surveys from the PIRLS (Progress in International Reading Literacy Study), the TIMSS (Trends in International Mathematics and Science Study), and the PISA (Programme for International Student Assessment). We follow an approach partially similar that used by Alieva et al. (2018), Ammermüller (2013), Hanushek and Woessmann (2006), Jakubowski (2010), Jakubowski and Pokropek (2015), Lavrijsen and Nicaise (2016), Piopiunik (2014), Ruhose and Schwerdt (2016). The PIRLS is conducted every five years and focuses on the reading skills of fourth-grade pupils (average age of 10). The TIMSS is administered every four years and tests math and science skills in grades 4 and 8 and the final year of secondary school among students attending advanced mathematics and physics classes. The PISA survey runs every three years and tests the skills of 15-year-old students (regardless of grade) in all three subjects; reading, mathematics, and science. The surveys have a common conceptual goal, specifically to provide internationally-comparable measurements of students' knowledge and skills, and their ability to apply them to problem solving. The surveys are similar in their design, sampling strategy, and psychometric approach to measuring cognitive ability, resulting in high correlation and comparability between national results (Brown et al., 2007, Grisay et al., 2007, 2009).[3] Analyses on differences in sampling selectivity, enrollment rate, exclusion rate (dropout rate), [4] and non-response across these surveys do not reveal any significant bias for the overall results (Hanushek and Woessmann, 2011, Jakubowski and Pokropek, 2015).

In the current study, we construct a pseudo-panel for four birth cohorts of student by pooling the following surveys: PIRLS 2001 and PISA 2006 (students born between 1990—1991), PIRLS 2006 and PISA 2009 (students born between 1995—1996), TIMSS 2003 and PISA 2009 (students born between 1992—1993), and TIMSS 2007 and PISA 2012 (students born between 1996—1997). The aim of our approach is to identify the academic trajectory of the above-mentioned birth cohorts in primary education (at around 10 years old) before the transition to lower-secondary school, and after the placement in secondary education (at around the age of 15). This approach allows us to circumvent the absence of comparative and longitudinal

[3] Minor differences found in measured performance in mathematics between TIMSS and PISA are not large enough to cause significant concern over the robustness of comparative studies (Wu, 2010).

[4] Potentially higher dropout rates both in primary and secondary school do not appear to be a cause for concern. Participation in primary education is nearly universal, at least among developed economies, and enrollment into secondary education among 15-year-old children is at the average level of 96% (Jakubowski and Pokropek, 2015).

data containing individual information before and after track assignment.

[Table 1 about here]

We focus on countries with early tracking: Austria, Belgium (Dutch-speaking and French / German-speaking [5] regions are analyzed separately), Germany, Luxembourg, and the Netherlands. The estimation sample consists of 44,000 secondary-school students, nearly equally distributed by gender. Of these, 9.6 percent are second-generation immigrants (student born in the surveyed country, parents born abroad), 4.7 percent are first generation (student and parents born abroad), and 7 percent come from mixed families (one parent born abroad, the other in the surveyed country).

[Table 3 about here]

We use PISA data to identify the distribution of program placement of a particular birth cohort. While TIMSS also collects data on a sample of secondary-school students in grade 8 (at around age 14), it cannot be used in our study due to missing information on students' program/track. National education programs provided in the PISA survey are re-coded into a binary outcome variable: academic or non-academic (technical, (pre-)vocational,[6] and special education). Overall, 39 percent and 37 percent of respectively native and mixed-origin students are in general studies, followed by 30 percent among first-generation immigrants and almost 28 percent among the second generation. Skills and knowledge assessment scores collected in grade 4 in the PIRLS and TIMSS are used as our primary predictor of program placement in secondary education. The scores are re-scaled based on the standard approach found in literature: by setting the national average level to the mean value of 500 points and the standard deviation to 100 (Ammermüller, 2013, Hanushek and Woessmann, 2006). This step is repeated for each participating country, separately by survey and year of participation, to remove any residual bias in scale adjustments for different pools of countries in the OECD and IEA.

The individual-level covariates include student's gender, migratory background, number of

[5] Due to the data format in some surveys, we cannot separate French and German regions, hence we analyze them jointly.

[6] Due to the coding of some of the national programs in the original data, we cannot separate technical and vocational programs in a systematic manner, hence we group them together.

books at home (as a proxy for the education level of parents), and items related to the study environment (own computer and desk).

[Table 5 about here]

4 Empirical Strategy

To model the association between student migratory background, educational achievement prior to placement, and placement outcome into an academic track, we consider the following simple cross-sectional model:

$$Y_{i15} = b_0 + b_1 A_{i10} + b_2 I_i + v_i \quad (1)$$

where Y_{i15} is an indicator variable that $= 1$ if the student was enrolled in an academic program at age 15 and $= 0$ otherwise (technical or (pre-)vocational), A_{i10} is the achievement of a student in primary school (measured by the PIRLS or TIMSS) prior to tracking placement (grade 4), I_i is an indicator variable that =1 if a student has an immigration background, and v_i is a random error term.

As the PISA does not collect a measure of educational achievement prior to the age of 15, A_{i10} is not observed. To overcome this issue, we impute the potential test score for each student before being tracked by pairing each respondent in our PISA sample to an observationally comparable synthetic twin in the PIRLS or TIMSS using propensity score matching so that our model is given by:

$$Y_{i15} = b_0 + b_1 \hat{A}_{i10} + b_2 I_i + v_i \quad (2)$$

where $\hat{A}_{i10}$ is the predicted test score at 10 years old. We employ four types of matching algorithms (simple linear prediction, nearest neighbor, caliper, and mahalanobis) in order to obtain a more reliable estimation of earlier achievement.

Student placement to an academic track is likely to be influenced by predictors confounding the association between migratory background and academic placement. As an attempt to attenuate this bias, we estimate (2) using inverse probability of treatment weight (IPTW), defined in our application as the probability of being a foreign-born student, given a set of baseline covariates (PS_i).

In the first part of the analyses, we cluster immigrant students into the three groups defined in Section 3: first generation, second generation, and mixed. The mixed group makes up a sizeable proportion of the immigrant population and demonstrates successful integration outcomes (Azzolini and Barone, 2013, Kalmijn, 2015). As this group differs from both the

second-generation immigrants and the native born, we place them in a separate category. Pairwise comparisons between native and immigrant groups are carried out separately for each country and within each cohort.

In the second part, we focus on the origin of students, defined by larger geographical clusters. Some countries in the PISA survey, including those in our sample, collected information on the country of birth of immigrant students and their parents. Immigrants' regions of origin are defined as: Africa, Southern Europe, Western Europe, Eastern Europe, Europe, Turkey and Middle East, and "other".[7] Due to relatively small group sizes, we do not focus on the interpretation of generational differences, but report them nevertheless.

[7] Two of these groups — "Europe" and "other" — are heterogeneous, therefore we mostly focus on the interpretation of results for more clearly defined groups.

5 Results

5.1 Results by immigrants' generation

Tables 6 to 8 present estimates of the difference in the likelihood that first generation (1G), second generation (2G), and mixed background children will be enrolled in an academic track program at the age of 15 compared with their native counterparts. In each table, model specification (1) reports the estimates unadjusted for differences in socioeconomic status, (2) accounts for these differences using inverse probability weights, and (3) further controls for prior academic achievement as measured by the imputed test score in reading or mathematics skills at the age of 10 (grade 4).

[Table 6 about here]

In line with prior expectations, unadjusted estimates reveal that first-generation migrant children are generally significantly less likely to attend an academic track program than native children, with the exception of Austria (cohort 4) and Belgium (cohort 2, French and German-speaking regions), where no significant differences are found. At the same time, our estimates also suggest significant heterogeneity across countries and birth cohorts. In particular, 1G migrant children are 24.2 and 29.9 percentage points (p.p.) less likely to attend an academic program than their native counterparts in respectively the Netherlands (cohort 4) and Luxembourg (cohort 2).

Controlling for socioeconomic differences significantly narrows the unadjusted differences in most countries, sometimes reversing them (for example the Netherlands for cohort 1). Accounting for children's achievement prior to tracking further attenuates or reverses the predicted enrollment penalty, which ranges between an insignificant 8.9 p.p. disadvantage in the Netherlands (cohort 4) to a 10.9 p.p. and 29.6 p.p. advantage in respectively Germany (cohort 1) and Austria (cohort 4). The results in Austria can be explained in part by the high degree of permeability of its system as discussed earlier (Crul, 2013).

[Table 7 about here]

The estimates for second generation migrant children largely corroborate the pattern shown for their first-generation counterparts. Unconditional estimates show that 2G children are less

likely to attend an academic track program with the exception of Belgium (cohort 2, French and German-speaking regions) and Austria (cohort 4). Accounting for both socioeconomic differences and prior achievement either narrows or reverses the unconditional enrollment gap. More precisely, we find no significant differences in the likelihood of attending an academic track in the Flemish region of Belgium (cohorts 2 and 3), Germany (cohort 4), and the Netherlands (cohorts 1 and 4).

[Table 8 about here]

Unsurprisingly, children from mixed background households show smaller unadjusted differences in the likelihood to attend an academic program compared with their native peers than 1G and 2G children, with the largest enrollment gap of 6.1 p.p. in Luxembourg (cohort 2), 6.4 p.p. in Germany (cohort 4), and 6.7 p.p. in the Netherlands (cohort 4). Accounting for socioeconomic differences erases the enrollment gap in almost all countries, and further accounting for prior results shows that mixed-background children are more likely to attend an academic program than observationally comparable native children.

Regardless of the immigrant group considered, our estimates do not suggest that the placement decision of immigrant children is plagued by a systematic bias after accounting for socioeconomic differences and prior achievement. In this regard, our findings corroborate the results reported by Caro et al. (2009), Cobb-Clark et al. (2012), Ruhose and Schwerdt (2016). However, the immigrant children population in all countries under study is by no means a monolithic block, as evidenced in Table 4.

5.2 Heterogeneous effect by immigrants' origins

In this part, we further explore whether the above-discussed benchmark results mask heterogeneous placement outcomes across ethnic/racial groups. While the overall achievement and attainment of immigrant children in education have improved over generations, the progress remains unequal between ethnic groups (Alba et al., 2011, Azzolini and Barone, 2013, Borgna and Contini, 2014, Heath et al., 2008, Jackson et al., 2012, Kristen and Granato, 2007, Levels et al., 2008, Van Tubergen and Kalmijn, 2005).

The results reveal a strong polarization depending on the student's origin. Students with a Southern European, Turkish, or Middle East background have a lower predicted probability of attending academic programs in Germany in cohort 1. The difference remains significant after the socioeconomic background (model 2) and the imputed results of the reading test are included (model 3). In Luxembourg, students of Southern European (predominantly Portuguese-origin guest worker offspring) and African origin are significantly less likely to be among those attending an academic track. Other students, particularly of Western European and European origin have a 16 to 25 p.p. higher probability than native students to be enrolled in a more prestigious program. Belgian regions show partially similar results: in the Flemish region, immigrant and native children have the same probability to attend an academic track, and in the French- and German-speaking parts, immigrant children have higher probability to be in academic program.

[Table 9 about here]

The estimations for cohorts 3 and 4 include the imputed scores in mathematics, based on the TIMSS 2003 and 2007 data. The results in Flanders (the Dutch-speaking region of Belgium) show that children of Eastern European and European origin demonstrate a higher likelihood than natives of attending an academic program. Other origin groups do not show any statistically significant differences from native students. The case of the Netherlands suggests that students of African and Turkish/Middle Eastern origin are less likely to be enrolled in an academic track in cohort 3. In cohort 4, the results show that the negative differences between for students of Eastern European origin the difference is persistent and remains significant in the final model (23 p.p.). The results for Austria (cohort 4) reveal that ethnic minorities have a higher predicted probability to be in schools with an academic track: 37.8 p.p. for Western European and 9.9 p.p. for Turkish/Middle Eastern students. The imputed score in mathemat-

ics in model (3) has a marginal role on the enrollment probability. The results for cohort 4 in Germany differ partially from those observed for cohort 1: low predicted probabilities remain significant for students of Southern and Eastern European origin, but become insignificant for Turkish/Middle Eastern origin students (model specification (3)).

[Table 10 about here]

[Table 11 about here]

6 Discussion

Early school tracking has attracted much attention for its impact on individual learning outcomes and societal inequalities (Van de Werfhorst, 2018). Students in an advanced curricular program gain most from their education, as shown for Austria, Belgium, Germany, Luxembourg, and the Netherlands (Jakubowski and Pokropek, 2015), while their peers in non-academic programs lose out considerably (Bol and van de Werfhorst, 2013, Brunello and Checchi, 2007, Gamoran and Mare, 1989, Jakubowski, 2010, Kerckhoff, 1986). Scholars suggest that no society benefits from such a dispersion of outcomes (Hanushek and Woessmann, 2006), and future economic loss may become excessive unless countries tackle the issue of low educational achievement (Hanushek and Woessmann, 2012).

Our paper takes a closer look at tracks placement among immigrant students in European school systems with early selection. The key motivation underlying this work is the scarcity of empirical evidence on the role of earlier achievement (grades, entry/exit exams, or other standardized test results) on placement. Academic aptitude is the core criterion in placement decisions according to theoretical literature and the national education legislation in countries that utilize tracking. The focus on the academic/general program is not random: in countries with tracking, a graduation certificate or diploma from an academic track is one of the core eligibility criteria for subsequent university enrollment. In other words, the program placement of a 10 to 12-year-old child largely defines his or her future chances of pursuing tertiary education. Apart from the traditional academic tracks, there are a number of advanced technical tracks that would also offer the opportunity to engage in higher education (for example in universities of applied science or technical colleges/schools).

We provide an alternative way of addressing the issue of a shortage of longitudinal data, which would contain both the information on earlier achievement and later track placement. We start by assigning a performance measurement in reading or mathematics from primary school survey data (PIRLS and TIMSS) to individuals with a comparable socioeconomic and migratory background in secondary school (PISA). To ensure the robustness of matching results, we employ several types of matching: simple linear prediction, nearest neighbor, caliper, and mahalanobis. In the first step, we estimate the probability of attending an academic track by the migrant's generation (1G, 2G, or mixed). Overall, we find no evidence of a lower probability among immigrant students to attend an academic track compared with native peers. In fact, in some cases, immigrants have a higher likelihood of being enrolled into a more selective track

than natives. Our findings correspond to results reported in for example Germany (Caro et al., 2009).

The weakening negative effect of tracking is, at least partially, a result of educational reforms (Riederer and Verwiebe, 2015). We can observe improvement in the PISA performance among 15-year-olds since 2003 in Austria, Belgium, and Germany (OECD, 2015). For instance, Germany developed an extensive reform scheme with a 4 billion euro budget in order to provide more activities in kindergarten, teaching the German language, offering German language training to parents (Anderson et al., 2015), providing greater possibilities of moving between school tracks (Riederer and Verwiebe, 2015), and postponing tracking by two years (Piopiunik, 2014). Significant efforts have been made in Belgium, the Netherlands, and the Nordic countries to offer extra teaching time to address the specific needs of immigrant students, to provide teacher training in intercultural pedagogy and second-language acquisition, to give extra funding to schools with a higher proportion of immigrant students, and to fund improvements in the student-teacher ratio (Riederer and Verwiebe, 2015).

In the second step, we compared the placement probability by students' region of birth, compared with native students. We identify students born in Africa, Southern, Western Europe, Eastern Europe, and Turkey and the Middle East. Our results corroborate previous findings of an ethnic disadvantage for some: those of African, Southern and Eastern European, and Turkish and Middle Eastern origin. Our results demonstrate the pertinence of ethnic background data in relevant research. The higher probability of attending an academic program found in the first part of the analysis turns out to be only partially the case once we introduce data on the origin of students. Immigrant students from low-income and traditional guest-worker profile families remain disadvantaged even after controlling for their imputed primary school achievement in Germany, Luxembourg, the Netherlands, and the Dutch-speaking part of Belgium. However, our results also suggest that track selection does not disadvantage immigrant students in Austria and the French and German-speaking regions of Belgium.

There are several drawbacks to our study. One of these the potential bias in identifying synthetic twins in data and the subsequent step that involves the imputation of performance scores at the age of 10. The scores serve as a proxy for a student's aptitude prior to tracking, hence, our key explanatory variable. We aim to provide as robust a calculation of prior performance as possible, and implement several types of matching. The issue of imputed performance might be more relevant in the second part of the analyses, which are based on the ethnic origin of students: the drawback of the PIRLS and TIMSS data is the absence of information on coun-

try/region of birth. In other words, we cannot match for example a Turkish-origin student in PISA data to the same origin student in PIRLS or TIMSS data. However, given a probability of observing a proportion of the same students in primary and later in secondary school, we to some degree address this empirical challenge. The second possible source of bias is the coding of national programs in the PISA surveys. As we create a binary outcome variable based on this information, we pay particular attention to the meaning of each educational program.[8] The third potential issue is the correspondence between the ability measurements as generated in international education surveys vs national education systems. To the best of our knowledge, no studies have tested the correlation between a student's marks or grades in school and his/her corresponding scores in a survey such as the PIRLS or TIMSS. Teachers and school boards might have different sets of marks for a student with regard to making a decision concerning the future track. However, given the possible teacher bias in grading immigrant students, our imputed score in primary school tentatively provides a more objective measurement of a student's ability. In light of these potential data shortcomings, our next step will be to replicate our study using available national panel data, such as The German National Educational Panel Study (NEPS), Épreuves Standardisées (ÉpStan), a school monitoring survey in Luxembourg.

[8] Detailed re-coding of national programmes are available on request.

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7 Tables and Figures

Table 1: Cohort data summary

	Cohort 1 PIRLS 2001 - PISA 2006 (born 1990-1991)	Cohort 2 PIRLS 2006 - PISA 2012 (born 1995-1996)	Cohort 3 TIMSS 2003 - PISA 2009 (born 1992-1993)	Cohort 4 TIMSS 2007 - PISA 2012 (born 1996-1997)
Austria				x
Belgium (FR/DE)		x		
Belgium (NL)		x	x	
Germany	x			x
Luxembourg		x		
The Netherlands	x		x	x

Table 2: School admission criteria

	Academic record	Feeder schools	Parents endorsement	Special programme	Family members	Residence
Austria	54	5	8	39	12	46
Belgium	27	11	33	15	24	5
Germany	40	31	10	44	12	57
Luxembourg	79	28	19	28	47	34
The Netherlands	75	84	27	24	12	12

Notes: Proportion of schools reported to always apply a particular selection criteria. Source: OECD PISA 2015.

Table 3: Sample size of students with a migratory background

	Native	1G	2G	1 Native Parent	Total
Cohort 1					
Germany	3522	277	378	229	4406
The Netherlands	3773	169	383	380	4705
Cohort 2					
Luxembourg	1908	702	1463	842	4915
Belgium (FR/DE)	2130	307	321	600	3358
Belgium (NL)	3729	178	280	460	4647
Cohort 3					
The Netherlands	3723	147	410	361	4641
Belgium (NL)	3689	162	218	356	4425
Cohort 4					
Austria	3455	205	499	408	4567
Germany	3105	151	507	286	4049
The Netherlands	3450	120	350	367	4287
Total	32484	2418	4809	4289	44000

Notes: 1G = First generation migrants,2G = Second generation migrants, 1 Native Parent = Mixed families with one native-born parent.

Table 4: Sample size of students by origin

	Native	Africa	South Europe	West Europe	East Europe	Europe	Turkey/M.East	Other	Missing	Total
Cohort 1										
Germany	3522		79	50	322		204	191	38	4406
The Netherlands	3773			51				682	199	4705
Cohort 2										
Luxembourg	1908	107	1307	771	227	231		343	21	4915
Belgium (FR/DE)	2130	235		606	72	150	59	97	9	3358
Belgium (NL)	3729	202		391	51	56	112	88	18	4647
Cohort 3										
The Netherlands	3723	130	28	82	21	68	182	385	22	4641
Belgium (NL)	3689	186		312	35	47	71	71	14	4425
Cohort 4										
Austria	3455			154	454		172	323	9	4567
Germany	3105		62	101	357		211	164	49	4049
The Netherlands	3450	96		102	44	74	153	352	16	4287
Total	32484	956	1476	2620	1583	626	1164	2696	395	44000

Notes: Maghreb and Sub-Saharan African countries are grouped together in the category “Africa”; the “East Europe” category also includes students from former Yugoslavia, and the former USSR.

Table 5: Descriptive characteristics by cohorts

	Native	1G	2G	1 Native parent
Cohort1				
Boy	0.51	0.52	0.51	0.53
Age	15.82	15.85	15.82	15.78
Achievement at 10	542.58	438.64	465.73	508.38
Books at home:				
<10	0.07	0.24	0.24	0.12
11-25	0.12	0.22	0.22	0.12
26-100	0.31	0.29	0.31	0.29
>100	0.21	0.14	0.13	0.20
Own computer	1.03	1.08	1.06	1.06
Own desk	1.03	1.02	1.03	1.03
Cohort 2				
Boy	0.50	0.52	0.50	0.50
Age	15.84	15.85	15.85	15.82
Achievement at 10	524.37	484.69	464.77	500.63
Books at home:				
<10	0.13	0.28	0.26	0.16
11-25	0.15	0.22	0.22	0.19
26-100	0.30	0.22	0.27	0.26
>100	0.18	0.15	0.11	0.17
Own computer	1.02	1.04	1.04	1.02
Own desk	1.03	1.05	1.04	1.04
Cohort 3				
Boy	0.50	0.49	0.47	0.49
Age	15.76	15.80	15.71	15.76
Achievement at 10	519.07	437.92	449.49	505.02
Books at home:				
<10	0.13	0.33	0.31	0.16
11-25	0.17	0.23	0.28	0.14
26-100	0.32	0.25	0.25	0.27
>100	0.16	0.11	0.09	0.17
Own computer	1.01	1.02	1.03	1.03
Own desk	1.04	1.07	1.04	1.06
Cohort 4				
Boy	0.50	0.50	0.49	0.48
Age	15.80	15.83	15.79	15.81
Achievement at 10	520.40	452.11	468.58	498.42
Books at home:				
<10	0.09	0.21	0.21	0.16
11-25	0.13	0.24	0.22	0.13
26-100	0.28	0.28	0.33	0.30
>100	0.21	0.08	0.13	0.16
Own computer	1.01	1.03	1.02	1.02
Own desk	1.03	1.03	1.04	1.04

Notes: All proportions are weighted using individual student weights. 1G = First generation migrants, 2G = Second generation migrants, 1 Native parent = Mixed families with one native-born parent.

Table 6: Tracked into academic programme: Native vs First-Generation Children

Country	**N**	(1)	(2)	(3)
Cohort 1: PIRLS 2001-PISA 2006				
Germany	3481	-0.138^{***}	-0.030	0.109^{*}
Netherlands	3941	-0.086^{**}	0.112^{*}	0.074
Cohort 2: PIRLS 2006-PISA 2012				
Luxembourg	2469	-0.299^{***}	-0.150^{***}	0.037
Belgium (FR/DE)	2437	0.021	0.054	0.065^{*}
Belgium (NL)	3907	-0.160^{***}	-0.088	-0.082
Cohort 3: TIMMS 2003-PISA 2009				
Netherlands	3869	-0.089^{**}	0.032	0.072
Belgium (NL)	3851	-0.037	0.034	0.154^{**}
Cohort 4: TIMMS 2007-PISA 2012				
Austria	3513	0.052	0.205^{***}	0.296^{***}
Germany	2992	-0.105^{**}	-0.014	-0.010
Netherlands	3570	-0.242^{***}	-0.101^{*}	-0.089

Notes: (1) Unadjusted baseline model. (2) Adjusted model using inverse probability weighting. (3) Model (2) controlling for predicted score in grade 4. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 7: Tracked into academic programme: Native vs Second-Generation Children

Country	**N**	(1)	(2)	(3)
Cohort 1: PIRLS 2001-PISA 2006				
Germany	3563	-0.185^{***}	-0.097^{***}	0.042
Netherlands	4155	-0.108^{***}	-0.006	0.117^{***}
Cohort 2: PIRLS 2006-PISA 2012				
Luxembourg	3260	-0.254^{***}	-0.110^{***}	0.071^{***}
Belgium (FR/DE)	2451	0.077^{**}	0.119^{***}	0.164^{***}
Belgium (NL)	4009	-0.092^{***}	0.017	0.111^{*}
Cohort 3: TIMMS 2003-PISA 2009				
Netherlands	4132	-0.136^{***}	-0.065^{***}	-0.008
Belgium (NL)	3907	-0.070^{*}	-0.014	0.092
Cohort 4: TIMMS 2007-PISA 2012				
Austria	3799	0.012	0.142^{***}	0.150^{***}
Germany	3318	-0.136^{***}	-0.042	-0.028
Netherlands	3800	-0.120^{***}	0.055	0.018

Notes: (1) Unadjusted baseline model. (2) Adjusted model using inverse probability weighting. (3) Model (2) controlling for predicted score in grade 4. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 8: Tracked into academic programme: Native vs Mixed Migrant Children

Country	**N**	(1)	(2)	(3)
Cohort 1: PIRLS 2001-PISA 2006				
Germany	3429	-0.050	-0.011	0.068^{*}
Netherlands	4152	0.038^{*}	0.036	0.071^{***}
Cohort 2: PIRLS 2006-PISA 2012				
Luxembourg	2709	-0.061^{***}	-0.013	0.014
Belgium (FR/DE)	2730	-0.004	0.018	0.058^{**}
Belgium (NL)	4189	-0.053^{**}	-0.012	0.014
Cohort 3: TIMMS 2003-PISA 2009				
Netherlands	4083	0.060^{**}	0.066^{**}	0.081^{***}
Belgium (NL)	4045	0.006	0.020	0.094^{***}
Cohort 4: TIMMS 2007-PISA 2012				
Austria	3703	0.126^{***}	0.119^{***}	0.103^{***}
Germany	3107	-0.064^{*}	-0.009	0.003
Netherlands	3817	-0.067^{**}	-0.036	0.003

Notes: (1) Unadjusted baseline model. (2) Adjusted model using inverse probability weighting. (3) Model (2) controlling for predicted score in grade 4. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 9: Tracked into academic programme: Native vs Immigrant Children (By Region of Origin)

	PIRLS 2001-PISA 2006			PIRLS 2006-PISA 2012								
	DE			LU			BE(FR)			BE(NL)		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Africa				-0.397^{***}	-0.295^{***}	-0.138^{**}	0.059	0.098^{***}	0.129^{***}	-0.047	-0.019	0.070
Southern Europe	-0.280^{***}	-0.291^{***}	-0.229^{***}	-0.349^{***}	-0.233^{***}	-0.042^{*}						
Western Europe	-0.121^{*}	-0.080	-0.017	-0.061^{*}	0.115^{***}	0.161^{***}	-0.142^{***}	-0.056	-0.025	-0.174^{***}	-0.052	-0.039
Eastern Europe	-0.111^{***}	-0.019	0.084^{*}	-0.285^{***}	-0.152^{***}	0.083^{*}	0.105^{*}	0.155^{***}	0.182^{***}	-0.106	-0.092	-0.080
Europe				-0.024	0.124^{**}	0.253^{***}	0.011	0.066	0.107^{**}	-0.212^{**}	-0.044	0.058
Turkey / M.East	-0.251^{***}	-0.195^{***}	-0.119^{**}				0.177^{***}	0.222^{***}	0.246^{***}	-0.232^{***}	-0.065	0.017
Other	-0.058	0.006	0.091	-0.108^{***}	0.027	0.195^{***}	0.253^{***}	0.250^{***}	0.271^{***}	0.044	0.160^{**}	0.230^{***}
Grade 4 ($\times 100$)			0.109^{***}			0.278^{***}			0.070^{***}			0.106^{***}

Notes: Grade 4 is the predicted test score before being tracked into academic vs technical/vocational programme. (1) Unadjusted baseline model. (2) Adjusted model using inverse probability weighting. (3) Model (2) controlling for predicted score in grade 4. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 10: Tracked into academic programme: Native vs Immigrant Children (By Region of Origin)

	TIMMS 2003-PISA 2009					
	BE(NL)			NL		
	(1)	(2)	(3)	(1)	(2)	(3)
Africa	-0.125^{***}	-0.035	0.110	-0.148^{***}	-0.119^{***}	-0.081^{*}
Southern Europe				0.000	0.000	0.000
Western Europe	-0.079	0.038	0.119	-0.038	-0.030	0.036
Eastern Europe	0.130	0.110	0.232^{*}	0.021	0.182	0.229
Europe	0.089	0.186	0.276^{*}	-0.053	0.068	0.132
Turkey / M.East	-0.088	-0.063	0.085	-0.137^{***}	-0.112^{***}	-0.074^{*}
Other	0.050	0.091	0.210^{**}	-0.062^{**}	0.034	0.089
Score4 ($\times 100$)			0.122^{***}			0.053^{*}

Notes: Grade 4 is the predicted test score before being tracked into academic vs technical/vocational programme (1) Unadjusted baseline model. (2) Adjusted model using inverse probability weighting. (3) Model (2) controlling for predicted score in grade 4. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 11: Tracked into academic programme: Native vs Immigrant Children (By Region of Origin)

	TIMMS 2007-PISA 2012								
	AU			DE			NL		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Africa							-0.179^{***}	-0.156^{***}	-0.156^{***}
Southern Europe				-0.280^{***}	-0.294^{***}	-0.278^{***}			
Western Europe	0.271^{***}	0.378^{***}	0.378^{***}	-0.111^{**}	0.020	0.038	-0.037	0.174	0.173
Eastern Europe	-0.053^{**}	0.041	0.056	-0.154^{***}	-0.095^{**}	-0.078^{**}	-0.225^{***}	-0.229^{***}	-0.230^{***}
Europe							-0.175^{**}	-0.080	-0.081
Turkey / M.East	-0.015	0.087^{*}	0.099^{*}	-0.181^{***}	-0.095^{*}	-0.068	-0.192^{***}	-0.058	-0.058
Other	0.245^{***}	0.371^{***}	0.400^{***}	-0.024	0.092	0.106	-0.029	0.104	0.103
Score4 ($\times$100)			0.052^{***}			0.051^{***}			-0.001

Notes: Grade 4 is the predicted test score before being tracked into academic vs technical/vocational programme (1) Unadjusted baseline model. (2) Adjusted model using inverse probability weighting. (3) Model (2) controlling for predicted score in grade 4. ***p < 0.01, **p < 0.05, *p < 0.1.

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