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Intergenerational Returns to Migration? Comparing educational performance on both sides of the German border

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Non-technical summary

A key motivation for immigration is greater opportunity for one's children. Yet research on the returns to migration usually focuses on the wage gains of the foreign born only. This paper examines intergenerational returns to migration by comparing the educational performance of the children of immigrants to the children in their parents' home countries. I utilize the 2003 and 2006 Programme for International Student Assessment (PISA) data which includes internationally standardized test scores for Italian, Polish, Turkish, former Yugoslavian, and former Soviet origin youth attending school in Germany, as well as nonmigrant youth attending school in the origin countries. Controlling for demographic characteristics and family background, I find that the children of immigrants in Germany perform better than non-migrants in every origin country with the exception of Italy.

Whether the generally superior performance of immigrant children in Germany relative to non-migrant children in the home country is due to the special characteristics of the immigrants themselves, or a more favourable educational environment in Germany, is difficult to measure. In the second part of the paper, I therefore apply several qualitative and descriptive methods to address the contours of selection among migrant parents, among them a series of counterfactual simulations as well as a description of the home and school environment reported by youth in the origin country and in Germany. I find that unobserved immigrant characteristics accounts for some, but not all, of the immigrant advantage I observe.

In the third part of the paper, I relate the findings reported here to current debates surrounding the gains and losses associated with migration. Although the decision to migrate is frequently conceptualized as a choice to maximize wages and financial gain, the decision to *settle* in the receiving country is linked to the perceived superiority of the educational opportunities available to children. This paper is the first to test that assumption, similar to empirical work addressing relative wages of immigrants and non-migrants in the sending state. Though the immigrant advantage in educational attainment I report is fairly modest due to the middle to high level of educational performance in the sending countries I observe, my conclusion of the general positive impact of migration on intergenerational educational mobility is similar to recent findings of the positive impacts of immigration on the intragenerational wage mobility of migrant workers.

Intergenerational Returns to Migration?

Comparing educational performance on both sides of the German border

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Abstract: This paper compares the educational performance of the children of immigrants to the children in their parents' home countries. I utilize the 2003 and 2006 PISA internationally standardized test scores for Italian, Polish, Turkish, former Yugoslavian, and former Soviet origin youth attending school in Germany, as well as youth attending school in the origin countries. Controlling for family background, I find that the children of immigrants in Germany perform better than peers in every origin country with the exception of Italy. Checks for selection bias suggest that positive selection may account for some, but not all, of this immigrant advantage.

Keywords: immigration, integration, second generation, Germany, PISA

JEL Codes: F22, J15

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1. Introduction

Over the past five decades migration has changed the face of Europe. Following WWII, massive numbers of workers from south and east Europe were recruited to rebuild the war torn Western European nations, and the 1970s, 80s, and 90s were marked by the inflow of refugees and persons from former colonial territories. The result is that unprecedented numbers of people are now living outside the border of the countries where they, or their parents, were born and raised.

This radical shift has demographic, political, and cultural consequences for receiving states. Most European states have historically been countries of *emigration;* many were ill prepared to deal with the longer term political and cultural consequences of a permanent and large scale settlement of foreigners within their borders. The stubbornly high unemployment rates faced by the majority of European countries since the 1970s have also disproportionately impacted the foreign born: as of 2008, over 1 in 8 foreign born adults were unemployed in Germany, Belgium, and France (OECD 2008, table 5.3). The children of the foreign born likewise face difficulty integrating in school, scoring at least half a standard deviation or more below their receiving country's means on standardized math and reading tests in Germany, Belgium and France (OECD 2006; table 2.1a and 2.1b). The challenge of increased diversity and inequality facing Europe is well known and widely documented. In the social sciences, the question of whether the long term returns to immigration are positive or negative is therefore a source of intense debate.

As the post WWII immigrants age and leave the work force, empirical inquiries surrounding this debate increasingly center on the educational outcomes of the immigrants' offspring. Whereas the vast majority of research on the children of immigrants concentrates on explaining the ways they differ from the children of the native born[1], I explore here the way that the children of immigrants compare to non-migrants of the same national origins, and the educational gains and losses experienced by these children relative to similar children whose parents remained in the country of origin. This paper thus provides an important, new perspective to the debate surrounding the long term impact of migration. Drawing from the economics literature that documents the tremendous wage gaps between sending and receiving states, I apply a cross-national perspective to analyze the *intergenerational* gains to migration: what are the educational gains or losses incurred by the children of immigrants relative to the children of non-migrants?

[1] One exception is Ortega (2009) in a paper that compares the probability of school enrollment for migrants and nonmigrants in the country of origin.

This paper describes the educational performance of young adults of Turkish, Polish, Italian, (former) Yugoslavian, and (former) Soviet descent. The primary contribution of the paper is to compare the educational performance of these youth in their countries of origin to Turkish, Polish, Italian, former Yugoslavian, and former Soviet children living in Germany, a major emigration destination for these countries. The first part of this paper creates baseline estimates of differences in mathematical performance controlling for individual observable traits. It does so with the 2003 and 2006 Programme for International Student Assessment (PISA), a unique international data source of standardized test scores, household characteristics, and parental information for 15 year olds enrolled in school. This data allows a comparison of mathematical performance of observably identical youth on either side of the German border, for each sending country. These data identify the students' country of birth, language use at home, household environment, and attitudes and sense of belonging in school. These rich covariates allow my definition of "observably identical" to go beyond standard covariates such as parent's education, sex, and country of residence. I can also compare descendents of parents of the same country of birth—implicitly controlling for culture, original language, the quality and relevance of parental schooling for children's outcomes.

The result is a more optimistic picture of the intergenerational impact of the migration process. Although the children of immigrants nearly universally perform worse than the children of native Germans, many appear to benefit from their parents' emigration decision, displaying similar or even *better* educational performance than their observably comparable peers who remained in the country of descent. Eastern European origin youth, in particular, have higher performance in Germany; yet even the children of low educated Turkish immigrants, the poorest group in Germany, also have better outcomes in Germany than their country of origin.

Whether the generally superior performance of immigrant children in Germany relative to non-migrant children in the home country is due to migration selection, the migration experience itself, or a more favorable institutional structure in Germany, is difficult to measure. In the second part of the paper, I therefore apply several qualitative and descriptive methods to address the contours of selection among migrant parents, among them a series of counterfactual simulations as well as a description of the home and school environment reported by youth in the origin country and in Germany. By pooling students in Germany and each receiving country while allowing the relationship between parental education and performance to vary across countries, I simulate the performance scores of the children of immigrants in the absence of selection (though I assume that returns to all characteristics except parental education are the same across countries). The results suggest that the advantage in educational performance observed among the children of former Soviet and Polish immigrants relative to the children in their parents' home countries is entirely attributable

to positive selection. This finding aligns with the fact that former Soviet and Polish immigrants are generally positively selected repatriated ethnic Germans. However, for all the other groups, the children of immigrants display an advantage in educational performance even under the assumptions of the counterfactual simulations. Moreover, migrant youth in Germany report a *worse* home environment, but a *better* school environment, than their non-migrant counterparts in the origin countries, further suggesting that the institutional structure in Germany is an important source of the immigrant advantage.

In the third part of the paper, I relate the findings reported here to current debates surrounding the gains and losses associated with migration. Although the decision to migrate is frequently conceptualized as a choice to maximize wages and financial gain, the decision to *settle* in the receiving country is linked to the perceived superiority of the educational opportunities available to children. This paper is the first to test that assumption, similar to empirical work addressing relative wages of immigrants and non-migrants in the sending state (Clemens et al 2008[2]; Chiquiar and Hanson 2005; Hanson 2009). Though the immigrant advantage in education I report is modest in comparison to the vast wage discrepancies reported by these authors, my conclusion of the general positive impact of migration is similar. Migration, while *increasing* educational inequality in Germany, *decreases* educational inequality globally between the descendents of native Germans and descendents of Turks, former-Yugoslavians, Poles, and former-Soviets.

2. Differences in Performance

Differences in academic performance across countries are documented in a variety of international studies. A summary of differences in test performances for the countries under consideration here, from three internationally standardized datasets, is presented in table 1. In addition, each country's gross domestic product (GDP), adjusted for purchasing power parity per capita differences in US dollars, are displayed for comparison.

[2] This paper borrows heavily from the work of Lant Pritchett, in particular his paper coauthored with Claudio E. Montenegro and Michael Clemens "The place premium: wage differences for identical workers across the US border." Specifically, the pooled regressions methods are drawn from this paper.

Table 1. Comparison of International Test Scores

	TIMSS Math Score		PIRLS Percent "High" Benchmark in Reading	PISA Math Test Scores		GDP per capita USD
All Countries						
Age	4th Grade	8th Grade	4th Grade	15 year olds		All
Year	2007		2006	2003	2006	2008
Average	500	500	41%	500 (OECD)	498 (OECD)	10,600
N Participating Countries	36	48	45	41	57	266
Selected Countries						
Germany	525		52%	500	504	34,200
Turkey		432		417	424	11,200
Poland			36%	490	495	17,800
Italy	507	480	52%	470	462	30,200
Slovenia	502	501	37%		504	28,200
Russian Federation	544	512	61%	474	476	15,200

Note: empty cells denote missing data for this country. TIMSS results from IES 2009; PIRLS results from Mullis et al. 2007; PISA 2003 from OECD 2004; PISA 2006 from OECD 2007; GDP purchasing power parity from CIA World Book 2008

The table shows moderate inequality in each of the test scores, with some variation between the former Soviet Russian Federation, Germany, Poland and the former Yugoslavian republic of Slovenia. The ranking of these countries is dependent on which test and outcome is under consideration. Only Turkey has consistently lower test scores, much lower across all tests than the other countries.

Though there is variation in test scores, it is immediately apparent that the inequality in test scores is much less than the inequality in per capita GDP. Turkey is the only sending country with very low mean test scores relative to Germany – and the test scores of the former Soviet state of the Russian Federation is consistently higher – despite having a per capita GDP that is only half that of Germany's. This suggests that, in contrast to wage differentials, differences between the scores of immigrants in Germany and the scores of non-migrants in the sending countries might not be extreme. However, though the design of each of these tests controls for the age of the student and

their enrollment (observing only children in a restricted age range who are enrolled in school), there are a variety of other compositional factors that may either mask or create differences in the scores between countries, for instance the educational attainment of their parents.

2.1 The estimation problem

The goal of this paper is to assess whether the children of immigrants in Germany benefit or suffer relative to the children of non-migrants in their home country. Ideally, I want to assess whether a child would have been better off if their parents had stayed in their home country, rather than immigrated to Germany, in terms of their educational attainment. To do this, I need to understand what part of the difference in scores between countries is due to differences in the performance of students who are equally endowed in terms of their academic potential. Such students should exhibit the same performance test scores (*p)* in Germany (*g*) as they do in the home country (*h)* but for a factor $\delta \geq 0$, so that $(1+\delta)p_h = p_g$.

The wedge $(1+\delta) \equiv (1+\delta_n)(1+\delta_i)$ is the result of two factors. The wedge δ_n represents the effect of natural adjustments caused by migration in the schooling process of the children of immigrants. Such adjustments may be conceptualized as costs, including language difficulties, the parent's lack of familiarity with the school system in the country of destination, a lack of social networks, and a cultural mismatch between parent and destination country culture. These difficulties should result in lower test scores for students in Germany relative to students in the sending country, where δ_n does not apply.[3] The other element, δ_i, represents the institutional differences between the sending and receiving country school systems. This includes differences in school funding, teacher-student relationships, educational support for parents and students, the degree of stratification among students within and between schools, and the tracking and enrollment policies of the sending and receiving countries. If these institutional factors better encourage performance in the receiving country, they may compensate for difficulties δ_n.

The performance of a student *i* born in Germany to German parents and residing in Germany is represented by p^i_{gg}, where the first subscript denotes the parents' country of birth and the second

[3] On the other hand, the adjustments may also be conceptualized as *gains*, if migration results in a more tightly knit family structure promoting mobility, for instance, or greater returns to ethnic social capital in the receiving country than would have been obtained in the sending state (see for instance, the class-cutting ethnic cohesion documented by Kasinitz et al 2008 among the Chinese in New York City). I address this possibility briefly when comparing the home environment of migrants and non-migrants. However, for the purpose of simplicity in this paper, I conceptualize δ_n as a "cost", noting that for some migrant groups, this "cost" may indeed be offset or even overcome by such gains.

subscript denotes country of residence. Student performance is a product of a function $\theta_{gg}$of a vector of individually specific observable traits x^i (parents socioeconomic status, educational resources in the home, sex) and a function $\varphi_{gg}$of a vector of unobservable performance determinantsx'^i. Thus, $p^i_{gg} \equiv \theta_{gg}(x^i)\varphi_{gg}(x'^i)$. Similarly, the performance of a student born to foreign born parents and residing in the parents' home country is $p^i_{hh} \equiv \theta_{hh}(x^i)\varphi_{hh}(x'^i)$. I want to compare these test scores to $p^i_{hg} \equiv \theta_{hg}(x^i)\varphi_{hg}(x'^i)$, the performance of a student with traits *x* and x' whose parents were born in the foreign home country but who resides in Germany.

This is captured simply by the difference in student performance for a person with parents born in the home country, $D^i = p^i_{hg} - p^i_{hh}$ so that:

$$E[D^i] = E[p^i_{hg} - p^i_{hh}] = (1 + \delta_n)(1 + \delta_i). \qquad (1)$$

The problem with (1) is that it is impossible to observe the counterfactual p^i_{hh} for those whose parents have migrated from the sending country to Germany because they are in school only in Germany and are never observed in the parents' home country.

2.2 Selection

Here, I compute the performance differences for *observably* equal students in Germany and each sending country, D_o. If I want to assume that $D_o = D_e$, the actual expected difference in performance outlined in equation (1), the following assumptions must be met[4]:

- the educational performance returns to a students' attributes, $\theta_{hg}(.)$ and $\varphi_{hg}(.)$, can be approximated by the observed educational performance returns to the observable and unobservable traits of those who are currently living in Germany, denoted by $\hat{\theta}_{hg}(.)$ and $\hat{\varphi}_{hg}(.)$;
- that the unobserved traits x'^i of the typical child of immigrants do not differ from the unobserved traits of the non-migrant child born to parents in the same country of origin;
- and that the partial association of performance and unobservable traits in the home country is independent of the same association in Germany $\left(E[\varphi_{hg}(x'^i) - \varphi hhx'i = E\varphi hgx'i - E\varphi hhx'i\right.$;

[4] This discussion borrows heavily from Clemens et al. 2008

If we restrict ourselves to the consideration of the child of immigrants, if we assume that the immigrant child's unobservable traits are identical to those children of non-migrants, and if we assume that the translation of unobserved traits into academic performance happens in independent fashion on each side of the German border, then we can estimate $D_e \equiv (1+\delta_i)(1+\delta_n)$, or the combined effect of migrant disadvantage and institutional differences. In this case, equation (1) reduces to:

$$D_e|A_1 \equiv E[D^i|A_1] = \left(\hat{\theta}_{hg}(x)E[\hat{\varphi}_{hg}(x'^i)]\right) - \left(\hat{\theta}_{hh}(x)E[\hat{\varphi}_{hh}(x'^i)]\right) \qquad (2)$$

The right hand side of (2) is observable. This is an estimate of the difference in performance for *the child of typically selected* foreign born parents with observed traits x^i and unobserved traits x'^i. Note that this does not assume that *observable* traits have the same effect on performance in both Germany and the home country – there is no superscript *i* for $\hat{\theta}$. We can test whether or not a foreign born parent with a tertiary education can secure the same advantages for their children in Germany, for instance, as they can in their home country.

By using these assumptions, we can measure the gains or losses associated with parental immigration for the educational performance of their children. This has several disadvantages, however. We make the strong assumption that the *unobserved* traits of immigrant children in Germany are the same as the *unobserved* traits of non-migrants. In particular, if there is positive selection on unobservables – for instance, parental ambition – that both positively contributes to the likelihood of being a migrant *and* children performance – then the estimates (2) will be biased upwards by a factor of $1+\delta_s$ ("selection"). If ambitious parents are both more likely to migrate *and* more likely to encourage their children to be ambitious in school, then we may falsely attribute any improvement in the educational performance of their children to migration to Germany when, in fact, this child would have benefited from the high ambition of their parent even if the parent had not moved. Similarly, return migration may also be a source of selection bias. If for instance less ambitious immigrants return home at higher rates than those with higher ambitions, then the sample of immigrants in Germany at the time of survey is positively selected on the unobservable characteristic of ambition, *even if* the original migrants to Germany were randomly selected.

In the case of selection, equation (2) will yield estimates of performance differences for observably identical children (D_o) rather than equally endowed children (D_e):

$$D_o = (1+\delta_s)D_e = (1+\delta_s)(1+\delta_n)(1+\delta_i). \qquad (3)$$

In this case, our assessment of whether the potential benefits from migration $(1 + \delta_i)$ outweigh its costs $(1 + \delta_n)$ for the academic performance of immigrant children will be biased by the inclusion of selection effects, $(1 + \delta_s)$.

2.3 Data

I estimate equation (2) using two unique, internationally standardized datasets of student performance: the 2003 and 2006 Program for International Student Assessment (PISA). Conducted by the Organization for Economic Cooperation and Development (OECD), the PISA study surveyed 15 year olds at the end of their compulsory education in 41 countries in 2003, and 57 countries in 2006[5]. This dataset is unique in that it includes internationally standardized measures of math, reading, and science competence. These measures were carefully constructed and rigorously tested for international comparability, with the aim of assessing the ability of students to utilize math, science and reading in real life situations rather than mastery of any particular educational curriculum (OECD 2005). This feature of international comparability and "neutrality" to the goals of any particular national educational system is particularly important for this paper, as I want to assess the gains and losses associated with migration from an international framework rather than using *relative* measures *within* a national system. To further increase international comparability, I use mathematical performance for my analysis. Because mathematical performance is less dependent on linguistic abilities, I expect that the migrant disadvantages component, $(1 + \delta_n)$, will constitute a smaller part of differences in mathematical performance than other measures[6].

[5] Although this paper looks at migrants in Germany only, the possibility of comparative studies as extensions of this project make the PISA dataset particularly attractive.

[6] I test this assumption empirically through a parallel set of all analyses with reading proficiency as the dependent variable, rather than mathematical ability. The results are presented in Appendix A, table A2. The immigrant advantage remains unchanged across outcomes for former Yugoslavian and former Soviet youth. For Polish origin youth, immigrant advantage is diminished, but does not disappear, when comparing relative reading scores to relative math scores. Thus, my findings for these three groups are robust to the outcome observed. For Italian and Turkish origin youth, however, the conclusion changes for reading proficiency. Italian origin immigrants report lower scores than nonmigrants on the reading outcome. The difference between math and reading is largest, however, among Turkish origin youth – Turkish origin immigrant children have lower reading scores than Turkish nonmigrants, and this difference is consistent and statistically significant.

These findings can be explained by two factors. First, reading proficiency is more sensitive to the likely disadvantages in German language ability faced by the children of immigrants. Thus, the costs of migration are higher for this outcome, as I expect. Another factor is the relative strengths and weaknesses of sending and receiving states in math and reading performance. The scores of youth in Turkey are closer to German scores across reading outcomes than math outcomes, thus the relative advantage of German residence is smaller for reading outcomes for Turks. In contrast, former Yugoslavian and former Soviet youth generally have better relative math performance than reading performance in the PISA. Because of this, the institutional advantage of living in Germany offsets the language difficulty for former

In addition to the internationally standardized indicators of academic competencies, PISA also includes a large number of contextual background variables reporting level of cultural and educational materials in the household, family demographics including parental education and occupation, and the child's own psychological well-being and attitudes towards schooling. These measures allow me to assess the impact of migration not only on achievement, but on well being and learning environment as well. The survey follows a complex sampling scheme, with both school-level and individual level measures. Replicate and individual weights are provided and are used in all analyses.

Although these data are unique in their inclusion of standardized measures of migrant and non-migrant schooling outcomes in several countries of origin and destination, they do suffer some weaknesses for the task at hand. First, the data lack the covariates necessary to predict migration. This precludes the use of sophisticated matching approaches to handle selection bias in comparisons of migrants and non-migrants. Second, in order to maximize the numbers of each immigrant group in Germany, I need to combine both survey years together. I can therefore only control for observable characteristics that are measured in both survey years, restricting the model I can use to calculate equation (2). I do use the 2003 data when possible in descriptive tabulations of differences in the attitude and educational environments of migrant and non-migrant youth. Tables 2 and 3 provide full descriptive information on all independent and dependent variables, including the years they are available.

Yugoslavian and Soviet youth, resulting in a similar advantage across reading and math outcomes for immigrant youth in Germany from these countries.

Table 2. Outcome and Covariate Variables in PISA Data

Concept	Year(s) Available	Measure
Mathematical Proficiency	**Both**	Mathematical skills: measured with pencil-and-paper tests Test items multiple-choice items and self response. Designed for international comparability.
Home Environment	**Both**	Cultural Resources: construct validated index derived from three items in the home: a) a work of classical literature b) a book of poetry, c) a work of art (e.g. painting).
	2003	Kindergarten: 1= if attended kindergarten, 0= did not
	Both	Educational Materials: construct validated index derived from five items in home: a) a desk b) a quiet place to study, c) a calculator, d) books to help with schoolwork, e) a dictionary.
	2003	Student Educational Expectations: expected educational level has the following categories: (1) None; (2) ISCED 2 (lower secondary); (3) ISCED Level 3B or 3C (vocational/pre vocational upper secondary); (4) ISCED 3A (upper secondary) or ISCED 4 (non-tertiary post-secondary); (5) ISCED 5B (vocational tertiary); and (6) ISCED 5A, 6 (theoretically oriented tertiary and post-graduate).
School Environment	**2003**	Educational Attitudes: derived from four items listed below. A four-point scale with the response categories recoded as "strongly agree" (=0); "agree" (=1); "disagree" (=2); and "strongly disagree" (=3). Positive values on this index indicate students' positive attitudes toward school, the second two items are inverted. (a) School has done little to prepare me for adult life when I leave school. (b) School has been a waste of time. (c) School helped give me confidence to make decisions. (d) School has taught me things that could be useful in a job.
	2003	Sense of Belonging: derived from students' responses to the six items presented below. A four-point scale with the response categories recoded as "strongly agree" (=0); "agree" (=1); "disagree" (=2); and "strongly disagree" (=3) is used. Positive values on this index indicate students' positive sense of belonging, items b and c are inverted: At school, I feel: (a) I feel like an outsider (or left out of things), (b) I make friends easily, (c) I feel like I belong, (d) I feel awkward and out of place, (e) Other students seem to like me, (f) I feel lonely.
	2003	Perceived Teacher Support: Items used for this index are a) Students get along well with most teachers, (b) Most teachers are interested in students' well-being, (c) Most of my teachers really listen to what I have to say, (d) If I need extra help, I will receive it from my teachers, (e) Most of my teachers treat me fairly.
Socioeconomic Background	**Both**	Male: 0/1 Indicator
	Both	Highest Parent Education: student reports on parents' education. Recoded as International Standard Classification of Education (ISCED) measures (see student expectations above)
	Both	Highest Parental Occupation: student reports on parent's occupation. Recoded according to four digit International Standard Classification of Occupation (ISCO 1988) and then mapped onto the international socioeconomic index of occupations (ISEI) (Ganzeboom and Treiman 1996)
Immigration History	**Both**	First Generation Status: 1/0 Indicator if born abroad
	Both	Foreign Language at Home: Language spoken in the home, coded as language of residence (=0) or other language (=1)

Finally, it is important to discuss limitations in the quality of the match between non-migrants in the country of origin and the children of immigrants in Germany. First, data for a large number of the former-Soviet states and former-Yugoslavian states are only available in 2006. Data from these

countries are therefore restricted to 2006 only. Moreover, because the designations "former-Soviet" and "former-Yugoslavia" do not refer to any existing states but rather are designations from the past used to describe immigrants to Germany, the match between these groups in Germany and these groups in the country of origin is not perfect. I include in Appendix A a description for how these nations were identified in the PISA data[7], as well as tests for heterogeneity in results by national origin group within these categories.

Second, the match between Turkish origin youth in Turkey and Turkish origin youth in Germany is also likely to be imperfect due to different enrollment coverage of the 15 year old population in both countries. I report PISA estimates of the 15 year old coverage for each country in the top rows of Table 3. Whereas 95% of 15 year olds are enrolled in school in Germany, only 47% of 15 year olds in Turkey are enrolled. Participation in secondary education in Turkey is therefore a much more *elite and selective* outcome than it is in Germany. This is problematic for my analysis, because it is likely that Turkish students in Germany may differ from the subpopulation of observably identical students who would be in school if they had never left Turkey. I will return to this issue later in the paper when discussing selection in my results.

[7] Appendix A also includes a summary of robustness tests for the former Soviet and former Yugoslavian categories. To test for heterogeneity amongst the several origin countries in each category, I run all bilateral regressions separately for each origin. The results are displayed in tables A3 and A4. For the former Soviet grouping, immigrant children perform better in Germany than in every origin country, though the size of the immigrant advantage varies greatly by country and by the educational attainment of the parent. Most importantly, the immigrant advantage is strong as compared to the children of nonmigrants in the Russian Federation, by far the most important sending country among the former Soviet States. The most notable variation is that the children of Kyrgyzstan nonmigrants are much more disadvantaged, and the children of Azerbaijani nonmigrants are much less disadvantaged, relative to the children of immigrants in Germany. Also notable is that there is less variation in Azerbaijani attainment by parental education – the children of the lowest educated parents do not differ significantly from the children of more educated parents in this country, net of the other controls. Similarly, there is also variation among the different Yugoslavian origin groups. The scores of nonmigrants from Serbia and Montenegro are lower than those from Slovenia and Croatia. There is also less variation in performance by parental education in Croatia, and due to the fact that there are very few parents with less than secondary education, I also collapsed the lowest three categories for this regression.

Despite the heterogeneity within the former Yugoslavian and former Soviet categories, the substantive results are fairly robust across origins: among the children with low parental education, living in Germany is associated with the greatest gains, and among the children with higher attainment, there is generally lower advantage or slight disadvantage associated with living in Germany. Because the lowest educated groups are overrepresented among immigrants in Germany, collectively, migration to Germany is associated with higher test scores for the children of former Soviet and former Yugoslavian parents.

Table 3. Descriptive Statistics

	Non-Immigrants in Home Country						Immigrants in Germany				
	GER	USSR	ITA	YUG	TUR	POL	USSR	ITA	YUG	TUR	POL
Data Quality Variables											
2006 Percent Target Population Covered											
	99	97	98	98	100	98					
2006 Percent 15 Year olds Covered											
	95	83	90	85	47	94					
N	6614	22924	29017	15475	8456	9570	347	120	108	373	224
2003 Only Variables											
Teacher Student Relations	-.022		-.304		.172	-.286	-.255	-.275	.003	-.161	-.214
Attitudes Scale	-.110		-.046		.144	-.118	.024	.356	.086	.149	-.144
Belonging Scale	.258		.071		-.401	-.162	.190	.341	.408	.224	.328
Did not Attend Kindergarten	.022		.041		.754	.037	.141	.019	.116	.104	.050
Household Structure											
Nuclear Family	.744		.811		.609	.861	.848	.865	.660	.862	.832
Expected Education											
ISCED 1	.004		.001		.001	.003	.000	.000	.000	.004	.010
ISCED 2	.378		.022		.017	.065	.483	.596	.557	.664	.382
ISCED 3b, 3c	.034		.052		.006	.229	.060	.029	.000	.029	.027
ISED 3a, 4	.348		.355		.107	.259	.278	.276	.222	.218	.301
ISCED 5b	.022		.041		.091	.141	.017	.000	.000	.000	.028
ISCED 5a, 6	.213		.530		.778	.304	.163	.100	.221	.086	.251

Table 3 Continued

2003 and 2006 Combined	Non-Immigrants in Home Country						Immigrants in Germany				
	GER	USSR	ITA	YUG	TUR	POL	USSR	ITA	YUG	TUR	POL
Math Proficiency Score	528	472	466	456	426	494	483	439	465	416	502
First Generation							.857	.163	.297	.103	.359
Foreign Language at Home	.002	.081	.002	.004	.018	.003	.391	.285	.432	.422	.221
Educational Resources at Home	.421	-.330	.195	-.024	-.559	.240	.278	.120	.091	.175	.252
Cultural Resources at Home	.099	.546	.243	.119	-.059	.191	-.008	-.127	.004	-.176	-.124
Highest ISEI Score	51	50	46	48	40	44	42	42	43	37	45
Highest Education of Either Parent											
None	.005	.001	.003	.002	.037	.001	.155	.085	.132	.205	.092
ISCED 1	.001	.000	.027	.001	.324	.002	.005	.007	.000	.040	.004
ISCED 2	.091	.010	.261	.048	.206	.030	.158	.210	.104	.284	.076
ISCED 3b, 3c	.206	.009	.056	.294	.012	.240	.104	.186	.151	.101	.101
ISED 3a, 4	.239	.539	.357	.183	.240	.519	.135	.197	.145	.131	.286
ISCED 5b	.170	.039	.107	.244	.056	.038	.154	.103	.132	.099	.156
ISCED 5a, 6	.288	.403	.190	.228	.126	.169	.289	.212	.335	.140	.285

Note: Replicate weights not applied (pweights only) for highest parental education and educational aspirations for immigrants in Germany due to empty and small cells. Empty cells denotes missing information.

2.4 Method

I want to estimate the gains or losses associated with migration for immigrant children by comparing the academic performance of equally educationally endowed students on both sides of the border (D_e); to begin, I estimate the performance difference for observably identical students (D_o). First, I compare the academic performance of students residing in one pair of countries at a time – Germany and the home country *j*, one of a set J including Italy, Turkey, Poland, a combined grouping of former Yugoslavian countries and a combined grouping of former Soviet countries.

I do this with three different regression specifications, including controls in stepwise fashion to observe how the performance gaps are correlated with composition differences between migrants and non-migrants across observable traits. For each *j* of set *J:*

$$p_{ij} = X_{ij}\varsigma\begin{pmatrix} \delta_j + \beta_j s_{ij} \\ \delta_j^m + B_j^m s_{ij} \end{pmatrix}\begin{pmatrix} 1 \\ I_{ij}^m \end{pmatrix} \qquad (4)$$

Where p_{ij} is the performance of student *i* whose parents are from country *j*. In the first specification, which I refer to as "SES", ς is a vector of coefficients to be estimated and X_{ij} consists of an indicator for sex, an indicator for year of survey, and a continuous measure of highest parental occupational attainment (occupational ISEI score). The highest level of schooling attained by parents is denoted s_{ij}, and each δ and β is a coefficient to be estimated. To allow flexibility in the functional form of the relationship between parental education and child's education, s_{ij} is a vector of five indicator variables for highest parental education (see table 2). I_{ij}^m takes the value 1 if a student *i* had parents born in country *j* but is living in Germany. The base group is students whose parents were born in country *j* and are currently residing in country *j*. The scalar β_0 is the effect of schooling for the children of parents born in country *j* and residing in country *j*, and $\beta_0 + B_j^m$ is the coefficient for the children of migrants from country *j*.

The second specification, noted as the "Resource" specification, is the same as the SES specification, only measures of household resources are included in X_{ij}. The first is cultural possessions, including student self reports of the presence of classical or poetry books and works of art in the home, and the second is home educational resources, including self reports of such indicators as having a quiet place to study, a desk to work at, etc (see Table 2 for further details). This model compares students who are observably similar not only across parental characteristics, but in their household educational environment as well.

Finally, the third specification also introduces in X_{ij} indicators for the country of birth of the *student* and the language used in the home. This allows me to control for two typical sources of unobserved heterogeneity: language ability[8] and the generation status of the student. In this "Migration" model, I compare migrants and non-migrants who are observably similar across parental and household characteristics, similar in the congruence between the language spoken in their home and in their current place of residence, and similar in their place of birth.

The full results from estimating equation (4) for each specification for Turkey, Poland, Italy, former-Yugoslavian countries, and former Soviet countries are given in Appendix B. From these regression results, I estimate (2), the difference in the expected performance score of a student whose parents were born in country *j* but who reside in Germany, to the expected performance score of the observably equivalent student whose parents were born in country *j* and who are currently residing in country j: $\widehat{D}_{o,j} \equiv \left(\hat{\delta}_j^m - \hat{\delta}_j\right) + (\hat{\beta}_j^m - \hat{\beta}_j)s$. The parameters $\hat{\delta}_j$, $\widehat{\delta}_j^m$ $\hat{\beta}_j$, $\widehat{\beta}_j^m$ are empirical estimates from the regressions (4).

2.5 Baseline estimates of performance differences

Table 4 displays the coefficients from four different models: (1) a basic model including an indicator for immigrant status, gender, and survey year, (2) an SES model adding controls for parental education, and parental occupational status, (3) Resources model controls for (2) plus household educational resources and cultural possessions, (4) Immigrant model controls for (3) plus the language spoken at home and generational status.

Immediately apparent is that, after the addition of socioeconomic controls, only the children of Italian and the children of the highest skilled Turkish immigrants perform significantly worse than the children of non-migrants in their parents' home countries. Moreover, Polish, former Yugoslavian, and former Soviet immigrants perform *better* than non-migrant students whose parents share the same socioeconomic characteristics in their country of origin.

[8] This measure is somewhat inefficient in that it captures both the language of the student and of the parent. However, the association between household language and child language ability is generally found to be strong and positive (Bleakley and Chin 2008).

Table 4: Expected Difference in Math Score between Migrants and Non-Migrants

	Basic	SES	Resource	Migration
Italian	-23.21			
ISCED LT1		-8.754	-9.962	11.36
ISCED 2		-12.159	-4.975	10.008
ISCED 3b/c		-14.763	-7.034	-1.44
ISCED 3a/4		-23.924	-20.962	-7.9
ISCED 5b		-29.414	-34.392	-7.13
ISCED 5a/6		-7.916	-4.025	14.242
Polish	8.716			
ISCED LT1		39.4	41.64	49.08
ISCED 2		12.59	7.32	13.18
ISCED 3b/c		22.7	26.24	31.7
ISCED 3a/4		1.98	6.17	12.97
ISCED 5b		12.09	14.51	20.69
ISCED 5a/6		-6.99	0.01	6.83
Turkish	-7.623			
ISCED LT1		13.48	-5.02	22.42
ISCED 2		8.688	-3.956	20.311
ISCED 3b/c		15.811	-7.408	8.72
ISCED 3a/4		4.377	0.01	21.603
ISCED 5b		-11.02	-14.407	9.08
ISCED 5a/6		-72.02	-75.29	-47.25
Yugoslavia	1.59			
ISCED LT1		60.01	44.85	57.29
ISCED 2		39.50	26.13	36.75
ISCED 3b/c		53.57	46.88	44.30
ISCED 3a/4		-29.64	-31.17	-24.17
ISCED 5b		51.91	56.26	63.23
ISCED 5a/6		-11.87	-9.97	7.41
USSR	13.75			
ISCED LT1		65.54	41.75	59.89
ISCED 2		51.45	35.015	47.63
ISCED 3b/c		21.57	8.19	20.45
ISCED 3a/4		11.84	-0.61	14.31
ISCED 5b		86.06	65.44	81.58
ISCED 5a/6		24.69	21.12	37.2

Adding home resources into the specification changes the results slightly. For Turkish, former Yugoslavian, and former Soviet Union origin students, the addition of controls for home resources *decreases* D_o, the math performance scores of immigrant students relative to non-migrant students. Clearly, some of the advantage in math performance enjoyed by immigrant students of these origins relative to the children of non-migrants is due to the increased educational and cultural resources that immigrant parents can provide in Germany.

The addition of language and student place of birth indicators nearly completely eradicates any disadvantage faced by the children of immigrants relative to non-migrants, and increases the advantage in performance displayed by every group. Comparing students with the same language use at home and place of birth, in addition to identical parental socioeconomic characteristics, Polish, former Yugoslavian, and former Soviet immigrant students perform on average about one half of a standard deviation higher[9] in mathematical competency than the children of non-migrants. Low skilled Turkish immigrants similarly display about one fourth of a standard deviation higher score in Germany, and Italian immigrant children are indistinguishable from the children of observably identical children in Italy. The one significant exception to this generally positive trend is the lower math scores of the children of Turkish immigrants with tertiary education. This is explained in two ways: first, the Turkish secondary education system is extremely unequal, with greater variation in performance scores than the other countries under consideration here (see table 7). Students whose parents have tertiary degrees gain more relative to lower educated groups in Turkey than in Germany, partially explaining the relative disadvantage of tertiary educated migrant Turks in Germany to non-migrant Turks. Second, it is well documented that the highly skilled, in particular, face downward mobility in Germany due to difficulty transferring their skills (Dietz 2000; Greif et al 1999). This may also explain the concentrated disadvantage among the children of highly skilled Turks in Germany.

Comparing the coefficients from the Basic model, where only sex, year, and country of residence are controlled, to the coefficients from the full Migration model, we see that compositional differences between migrants and non-migrants conceal the superior performance of immigrant children in Germany. Despite the likely disadvantages inherent in the migration process, $(1 + \delta_n)$, the advantages from living in Germany $(1 + \delta_i)$, or the positive selection of immigrant parents $(1 + \delta_s)$, appear to outweigh the disadvantages in migration for the academic performance of the children of immigrants.

The coefficients displayed in Table 4 are, essentially, conditional means – D_o compares the distributions of educational performance of students with similar characteristics in Germany and their country of origin. Yet this first step D_o already provides a more positive perspective of the migration process to Germany than is currently known. Particularly because the differences in academic performance between the sending countries and Germany were already slight (see table 1), the advantage I observe here is all the more striking. Even migrant youth from countries with

[9] One standard deviation in mathematic performance is approximately 100 points for these groups

developed educational systems perform better in Germany. Whether we can interpret this advantage as the result of positive selection or the institutional advantage of living in Germany is the question to which we now turn.

3. Explaining Differences in Performance

I want to know what portion of the difference D_o is the result of a more positive institutional environment in Germany – in other words – what do the children of immigrants gain from their parents' migration relative to an equally endowed child of non-migrants in their country of origin?

Returning to equation (3), I want to know what portion of D_o represents unobservable differences between the children of migrants and non-migrants $(1 + \delta_s)$, the advantages from living in Germany $(1 + \delta_i)$, and the negative impact associated with migration$(1 + \delta_n)$. In fact, for my purposes, it is sufficient to isolate only $(1 + \delta_s)$, as the remainder of D_o can be understood as $(1 + \delta_i)(1 + \delta_n)$; the result will be positive if the benefits of migration to Germany outweigh its costs, and negative if they do not.

Drawing on additional descriptive data and basic theories of migration, I attempt to describe the contours of immigrant selection and institutional differences for the five origin groups under consideration here:

- A qualitative description of the migration histories of each group
- A comparison of home and school environment of migrant and non-migrant children
- A decomposition of the difference in distributions between migrants and non-migrants
- A version of the regressions that eliminates selection on unobservables, but introduces other assumptions regarding the performance-returns to observables

Though I cannot provide a definitive measurement of the degree of selection bias introduced in my measurement of $(1 + \delta_i)(1 + \delta_n)$, my findings from these explorations suggest that the institutional environment is an important contributing factor to the success of the children of immigrants. A brief review of the migration history of each of these groups suggests variation in migration selection processes – yet every group (except Italians) performs better in Germany. Furthermore, the school environment reported by immigrants in Germany, relative to non-migrants in their parents' home country, is much more positive than the differences reported between migrants and non-migrants in home environment. A counterfactual exercise plotting the distribution of math scores under counterfactual returns shows better performance throughout the distribution, showing

that migrants from a wide variety of *observable* characteristics benefit from the migration process (Dinardo et al 1996). Moreover, the differences in the distributions between migrants and non-migrants that are attributable to differences in the returns to characteristics are consistently greater than the difference that is attributable to the characteristics themselves. Finally, estimates purged of selection bias, though based on other assumptions, reveal a reduced, but still significant advantage among the children of immigrants relative to non-migrants.

3.1 Migration History

Both economic and sociological theory emphasizes the importance of migration circumstances in the selection process of migrants. The choice to migrate to any particular country is conceptualized as a cost-benefit decision, with the costs and benefits of migration varying across each person dependent upon their observed and unobserved characteristics. The circumstances of migration strongly influence the distribution of costs and benefits across the sending country population. For instance, refugees fleeing civil war or persecution will have a very different cost-benefit equation than labor migrants. The benefits of migration are likely to be non-wage for refugees, including safety, peace, and protection from violence. It is therefore less likely that refugees will be positively selected on labor market or integration capabilities, because the benefits of migration are independent of their labor market performance in the country of origin. It follows that while labor migrants will likely only move if they feel secure in increasing their wages in the country of origin, refugees might move *even if* they will experience economic hardship in the receiving country. Such differences will likely impact the distribution of unobserved characteristics found among refugee and labor migrant groups.

This above example is highly stylized, and migration processes are very complex. However, I provide in this section a brief overview of the migration circumstances for each group under consideration as a first step to understanding possible selection mechanisms among these groups. A summary of this discussion is found in table 5.

Table 5. Characteristics of Immigrant Groups

Immigrant Group	Primary Migration Type(s)	Peak Times of Arrival	Incorporation and Legal Status
Turkey	guest worker/family reunification	1961-1973	originally one year work temporary contracts, eventually permanent residents and sponsored family members. High unemployment and very low skilled. Very poor performance of children in school. Low naturalization rates due to historically restrictive naturalization laws and original temporary intentions
Italy	guest worker / family reunification , EU	1955-1973	originally one year temporary contracts, eventually permanent residents and EU migration Medium employment, fairly low skill. Children perform fairly poorly in school. Low naturalization rates due to historically restrictive naturalization laws and originally temporary intentions
Poland	ethnic German / refugee	1989-2000	If ethnic German: German ancestry, immediate rights to citizenship and integrative assistance. If refugee, initially temporary status, transfer to permanent after 3 years. High naturalization rates. Medium employment, similar skills as native Germans. Children perform well in school.
Former Yugoslavia	guest worker/refugee	1968-1973; 1991/1992	If guest worker, initial one year contract followed by family reunification and and permanent residency; if refugee, see above. High unemployment, medium skills. Children perform poorly in school.
Former USSR	Ethnic German/ refugee	1989-2000	If ethnic German: German ancestry, immediate rights to citizenship and integrative assistance. If refugee, initially temporary status, transfer to permanent after 3 years. High naturalization rates. Low employment, similar skills as native Germans. Greater difficulty transfering skills than Poles. Children perform well in school.

Each of the origin groups under study here arrived in Germany under different circumstances that likely effect both selection into migration and the educational performance of their children.

Italian, Turkish, and many former-Yugoslavian immigrants were recruited as “guest workers.” To aid in post-WWII reconstruction, Germany recruited over one million unskilled workers for one year contracts from 1955-1973. At the time of this recruitment, wages in Germany were much higher than in Italy, Turkey, or Yugoslavia, and the mostly young, male workers were drawn by the incentive to save wages (Dustman 1997) and acquire experience. In terms of observed characteristics, guest workers are negatively selected, disproportionately drawn from rural areas and with low levels of formal education and training. The decision to relocate for higher wages, however,

also suggests positive selection in terms of unobserved characteristics such as ambition and risk tolerance.

Regardless of the initial selection mechanisms, the provisional nature of the program discouraged investment in learning the German language or networking with Germans (Dustmann 1999; Diehl and Schnell 2006), and recruitment into the worst jobs marginalized guest workers in the labor market, blocking their mobility (Constant and Massey 2005; Bender and Seifert 1998; Fertig and Schmidt 2001) and placing them in occupations most susceptible to unemployment (Kogan 2004; 2007). Through strict naturalization laws and the introduction of return incentive schemes, the German government attempted to encourage migrants to return home throughout the 1970s and 1980s. Despite these efforts, a high percentage of immigrants settled permanently and reunified with spouses and children in their home country. These family reunification migrants were not selected on labor market characteristics, and the labor force participation rates of former guest worker groups declined precipitously in the 1980s and 1990s. The high unemployment rates and lower incomes of former guest worker groups suggest that family reunification and return migration patterns have made this group less selective than at the time of migration. The children of guest worker immigrants also have lower educational attainment than Germans, though this disadvantage is primarily explained through the lower educational attainment of their parents (Kirsten and Granato 2007; Luthra 2008).

Though the majority of former-Yugoslavians currently in Germany were recruited as guest workers, others arrived as refugees following the Yugoslav wars in the early 1990s (though these had a higher rate of return). Small numbers of the former-USSR youth in Germany may also be the descendents of refugees. Asylum seekers from Eastern Europe arrived in especially high numbers in the 1980s and early 1990s. These migrants display a bifurcated educational and occupational distribution typical of refugees, as those with the most resources are the most likely to have the means to leave and start a new life somewhere else, and those with the least to lose are most likely to seek haven in richer welfare states following the aftermath of a period of unrest. Particularly in Germany, where refugee restrictions were quite permissive until 1993 and benefits for asylum seekers fairly generous, it is likely that asylum seekers may be negatively selected in terms of their labor market potential. Less is known about the academic performance of the children specifically of refugees, however, the children of former Yugoslavian migrants are generally found to perform poorly (Kristen and Granato 2007; Education Report 2006; Luthra 2008), whereas the children of former-USSR immigrants perform better than other migrants (Soehn 2008).

Finally, most of the Polish and former-Soviet youth studied here are likely the offspring of ethnic Germans. Ethnic Germans are people of German ancestry who resided in Eastern Europe.

German citizenship and integrative assistance, including language assistance, recognition of foreign credentials, and housing support, are a legal guarantee for ethnic Germans, following the Basic Law of 1949. The cost of migration is therefore fairly low for ethnic Germans; however, the need to prove German ancestry – often through language (a necessity starting in 1997) and culture – means that this group is quite positively selective in terms of adaptation in Germany. Initial results on the educational performance of the children of ethnic Germans suggest that they benefit from their legal status, greater familiarity with German, and integrative assistance, displaying higher attainment relative to other migrant groups (Fuchs and Sixt 2008; Soehn 2008; Luthra 2008).

In sum (see also table 5), the immigrant groups under consideration represent a very diverse assortment of migration circumstances: refugees, repatriates, labor migrants, and family reunification immigrants. Given this discussion, we might expect that the children of refugees would benefit the least from positive immigrant selection – yet the immigrant group with the highest numbers of refugees, the former Yugoslavians, experience very high educational performance advantage relative to non-migrants. On the other hand, the more positively selected Italian labor migrants is the only group whose children enjoy no educational performance advantage in Germany. While far from conclusive, this evidence suggests that the variation in selection mechanisms across migration circumstances is not the only factor driving the differences in educational performance observed between migrants in Germany and non-migrants in the home country.

3.2 Home and School

Another way to approach the question of what component of D_o is comprised of selection effects $(1 + \delta_s)$ and what is comprised of the returns to migration $(1 + \delta_n)(1 + \delta_i)$, is to ask where the children of migrants themselves report a more positive environment – in the home with migrant parents (an approximation of positive selection effecting second generation outcomes $(1 + \delta_s)$) or in the school environment, a proxy for institutional differences $(1 + \delta_i)$. In this section, I triangulate several data sources to provide a picture of the home and institutional environment of migrants and non-migrant students. In doing so, I provide a description of *where* migrant children experience a better educational environment – in the home, with positively selected parents, or in school, suggestive of better educational institutions in Germany?

Selection and the Home Environment

A first step to addressing possible selection in *un*observable characteristics is to review available information about selection in observable characteristics, and a second step is to provide

descriptive data on reports of the home learning environments of the children of migrants and non-migrants. This information is found in table 6.

Table 6. Observable Differences in Migrants and Nonmigrants in Origins and in Germany

	Germany	Italy	Poland	Turkey	Former Soviet++	Former Yugo++
Differences in Student Reports of Home Environment, Controlled for Parental SES***						
Speaks Resident Country Language at Home		-.146	-.584	-.331	-.335	-.604
Home Educational Possessions		-.032	-.001	.781	.900	.134
Home Cultural Possessions		-.320	-.390	-.098	-.348	-.009
Expects Tertiary Education		-.269	.052	-.789		
Differences in Distributions of Education, Occupation ,and Family Structure						
Parent Education	**"Average Adult" National Distributions: Ages 24-65***					
ISCED 1 or Less	.031	.156	m	.614	.031	.024
ISCED 2	.137	.325	.142	.103	.080	.160
ISCED 3b, 3c	.492	.081	.330	.081	.162	.282
ISED 3a, 4	.100	.313	.350	.104	.182	.328
ISCED 5b	.089	.010	m	m	.334	.104
ISCED 5a, 6	.150	.122	.182	.101	.201	.109
Parental Education	**"Migrant Parent" In Germany: 15 Year Old in School****					
None	.005	.085	.092	.205	.155	.132
ISCED 1	.001	.007	.004	.040	.005	.000
ISCED 2	.091	.210	.076	.284	.158	.104
ISCED 3b, 3c	.206	.186	.101	.101	.104	.151
ISED 3a, 4	.239	.197	.286	.131	.135	.145
ISCED 5b	.170	.103	.156	.099	.154	.132
ISCED 5a, 6	.288	.212	.285	.140	.289	.335
Highest ISEI Score	51.136	42.227	45.433	37.617	42.129	43.622
Nuclear Family+	.744	.865	.832	.860	.815	.660
Parental Education	**"Non-Migrant Parent" In Origin: 15 Year Old in School****					
None		.003	.001	.037	.001	.002
ISCED 1		.027	.002	.324	.000	.001
ISCED 2		.261	.030	.206	.010	.048
ISCED 3b, 3c		.056	.240	.012	.009	.294
ISED 3a, 4		.357	.519	.240	.539	.183
ISCED 5b		.107	.038	.056	.039	.244
ISCED 5a, 6		.190	.169	.126	.403	.228
Highest ISEI Score		46.767	44.738	40.354	50.342	48.510
Nuclear Family+		.811	.861	.609	m	m

Note: Replicate weights not applied (pweights only) for highest parental education for immigrants in Germany *2006 OECD Indicators of Education **2003/2006 PISA, own calculations ***PISA, adjusted for SES + Data from 2003 only ++ Calculated for Russian Federation and Slovenia

In the bottom three sections of table 6, I report educational distributions for an "average" 25-65 year old adult in each country, the average parent of a 15 year old child enrolled in secondary school in the country of origin, and the average migrant parent of a 15 year old enrolled in Germany. As is common, I observe a more bifurcated educational distribution among immigrant parents in Germany than in the country of origin, in particular much higher percentages in Germany who report very low parental education. However, Italians, Poles and former-Yugoslavians in Germany also report higher percentages of very highly educated parents in Germany than in their home populations. In agreement with their positively selected migration history as ethnic Germans, Poles appear very positively selected by educational attainment. These three groups, then, are positively selected in terms of education.

Also as expected, former Soviet and Turkish immigrants with a 15 year old enrolled in school have lower average educational attainment than Soviet and Turkish parents of an enrolled child in the country of origin. However, it is important to remind the reader that secondary education is very selective in Turkey. Although cohort differences in the parents of 15 year olds (who are generally younger than the average adult in each country) result in differences in the average and parent educational distributions in each country, the difference is particularly stark in Turkey, where 61% of the average adult population has a primary education or less (ISCED 1 or less), but only 36% of the parent population reports such a low education. Similarly, whereas only 20% of the Russian Federation population reports a tertiary degree, 40% of those with a 15 year old in secondary education report a tertiary degree.[10] This is because about 4 in 10 Turkish youth, and 1 in 5 Soviet origin youth, leave school at the age of 14. Turkish and Soviet origin migrants with a 15 year old in Germany are generally better educated than the average non-migrant in the country of origin, however, they are not as well educated as the more select group of Turkish or Soviet parents with a 15 year old in school.

This difference in the secondary education systems is important to the interpretation of my results. It is likely that I have *underestimated* the advantage of a Turkish or former Soviet migrant, relative to a *randomly selected* non-migrant 15 year old. The enrolled Turkish and Soviet non-migrant youth in my sample have already been "pre-selected;" they represent the more academically inclined among their 15 year old peers in their country of origin. As such, the average performance of a randomly selected non-migrant in Turkey or the former Soviet Union is almost certainly lower

[10] It should of course also be noted that these discrepancies between PISA averages and national averages may be due to misreporting by students (parental data is reported by students in PISA collection). It may also be due to cohort differences (those over 55 are unlikely to have a 15 year old in school).

than that of the enrolled population, and my estimates of the difference between the two groups is possibly downward biased.

Regardless of the different degrees of selectivity across parental education, nearly every origin group has a lower mean occupational status in Germany than in their country of origin. This is likely due to the well-documented difficulty in transferring skills acquired abroad in the German context (Konietzka and Kreyenfeld 2001). The one exception to this pattern is Polish migrants: Polish immigrants report similar average ISEI scores in Germany as in Poland. To explain this outcome, we turn again to the receiving context of ethnic German migrants reviewed above. Many of the Polish immigrants in this sample are likely to be ethnic Germans, guaranteed integration assistance and transferability of skills. It is therefore highly likely that their increased ability to transfer their credentials helps explain this anomaly.

In the first section of Table 6, I provide a description of the home educational environment as described by the students. The numbers consist of differences in the student's reports of home language use, kindergarten attendance, cultural resources in the home, educational resources in the home, and whether they expected to attain a tertiary degree (ISCED 5 or 6). For the cultural and educational resources scales, I present the non-migrant mean score subtracted from the migrant mean score (migrant-nonmigrant), and a unit change of 1 represents a change of one standard deviation in the OECD wide score distribution. For language use, kindergarten attendance and educational expectations of a tertiary degree, the number under each country column represents the percentage of non-migrants who answered affirmatively to questions of using the national language, kindergarten attendance and high educational expectations subtracted from the percentage of non-migrants who answered affirmatively on these questions. A positive score represents a *better* outcome in Germany than the country of origin. All of these scores are adjusted for parental educational and occupational attainment; adjusted differences in kindergarten attendance and educational expectations represent mean differences computed for children with a parent with ISCED level 2 education (lower secondary) and an ISEI score of 40 (a lower level service worker or skilled blue collar, such as an electrician).

In contrast to the fairly positive selection observed in terms of educational attainment of immigrant parents, the educational environment in immigrant households in Germany is not as generally positive relative to the households in the country of origin. Although immigrant households have similar or higher educational resources, such as a place to study, than non-migrant households in the country of origin, they also have lower levels of cultural possessions such as works of art and

poetry, and the immigrant youth in Germany report much lower educational expectations than their peers in the origin country. These differences all persist even after the addition of controls for parental socioeconomic status. Occupational expectations (not shown here because of a high degree of missing data prohibits adjustments) also suggests that immigrant children expect less in the labor market than non-migrant children in the country of origin. Some of this pattern may be explained by overall lower expectations in among the German resident population in general (calculations not shown), or the fact that Turkish and Italian students are disproportionately sorted into vocational secondary tracks in Germany. Yet at least as measured by the cultural environment and the aspirations instilled in children, immigrant youth do not appear to have positively selected parents in terms of nonmaterial measures.

Institutional Differences and the School Environment

Independent of the characteristics of the migrants themselves, sending and receiving country differences in wage structures, the wealth of the country, the returns to skills, and social insurance policies will influence the labor market success of migrants relative to non-migrants in the country of origin (Kogan 2007a; Kesler 2006; Van Tubergen and Kalmijn 2005; Crul and Doomerick 2003). Similarly, differences in the educational system, the wealth of the country, and the welfare structure should also impact the educational attainment of children (Levels et al 2008). Recent cross-national studies of immigrant performance emphasize several institutional factors that predict the educational advantage or disadvantage of immigrant children relative to the children of the native born: 1) the relative wealth of the country (Levels et al 2008), 2) the degree of stratification of the educational system, 3) the time spent in school, such as total hours yearly and the school entrance age (Crul and Vermuelen 2006) 4) the school system quality as measured as average performance of the students , and 5) the capability of the school in promoting learning and ensuring a positive learning environment. In table 7, I provide a summary of these institutional factors.

Table 7. Institutional Differences at a Glance

		Germany	Italy	Poland	Turkey	Former Soviet	Former Yugoslavia
Time and Attention at School	Ending age of compulsory education	16	15	16	14	15	14
	Age range at which over 90% are enrolled	4-17	3-15	6-18	7-12	7-15	6-17
	Percent of 15 year olds enrolled in school	98	94	97	59	84	98
	Hours of Instruction at 15, Typical	875	990	m	750	m	791
	Hours of Instruction at 15, Least Demanding	900	1089	m	810	m	908
	Class Size in Public Secondary Education	22.1	18.4	20.3	27.5	15.5	18.2
	Age at Secondary Stratification	10	14	16	15	15	15
Stratification	Percent of Upper Secondary in Vocational Tracks	0.612	0.628	0.495	0.373	0.415	m
	Student Variation in Math Scores (percentage of OECD average)	108.3	106.5	94.7	127.4	m	m
	Percentage of total student Variation in Math Scores between Schools (rho)	51.7	52.2	12.6	54.9	m	m
Wealth	USD/pupil spent on Secondary Education	7,636	7,648	3,055	m	1,754	7,065
Immigrant Student Reports Relative to Non-Migrants	Teacher Student Relations		.030	.072	-.333		
	Attitudes Scale		.402	-.027	.006		
	Belonging Scale		.270	.490	.626		
	Attended Kindergarten		.023	-.013	.651		

Source: 2008, 2006, 2007 OECD Education at a Glance; http://www.euroeducation.net/; CIA World Book 2008; 2003/2006 PISA Own Calculations Note: + for Russian Federation, ++ for Slovenia only

Similar to the GDP per capita differences noted in Table 1, there is considerable variability in the USD spent per pupil. Germany, Italy, and the former Yugoslavian state of Slovenia spend over 7,000 USD per pupil, whereas Turkey and the former Soviet state of the Russian Federation spend less than half this amount. Though Germans spend more money per pupil, German class sizes are slightly larger, and instruction hours lower, than the other sending nations with the exception of Turkey.

While we might expect students to benefit from the higher amount of resources dedicated to education in Germany, we also expect especially the children of lower skilled immigrants to benefit from its more egalitarian structure. As discussed above, the Russian Federation (former Soviet) and Turkish educational systems differ from the other countries because their secondary education is

more elite: only 84% of Russian 15 year olds, and only 59% of Turkish 15 year olds, attend school past the mandatory education at 15. Of these, a much smaller percentage is enrolled in vocational training than in the other countries: 42% in Russia and 37% in Turkey, compared to more than half in the other countries. In contrast, Slovenia, Italy and Germany are wealthier, and much less elite, with nearly universal enrollment of 15 year olds. Poland lies somewhere in the middle of these two "types." It's low GDP and USD per pupil is contrasted by its very high enrollment rate. In conclusion, Germany and Italy are wealthier and more egalitarian. This finding sheds light on why particularly the children of lower skilled immigrants perform better in Germany than the children of the low skilled in their parents' home country – they benefit from the greater resources, and also from greater access. This may also be a reason why there is no difference between Italians in Italy and Italians in Germany, as the two educational systems are the most similar of the sending countries.

In the bottom of table 7, I display reports of the education environment in school as experienced by migrants and non-migrant children. As in table 6, the student reports in Table 7 represent the mean score (or percent who reported kindergarten attendance) for non-migrant youth in the country of origin subtracted from the mean score (or percent attendance) for migrant youth in Germany (migrant-nonmigrant). Results are adjusted for parental educational and occupational status. Results are reported for Turkish, Polish, and Italian origin youth. Yugoslavian and Soviet origin youth are omitted from this discussion, because the necessary variables were present in 2003 only.

Across nearly all measures, migrant children report a better or similar school environment in Germany compared to non-migrant children in the home country. Polish, Italian, and Turkish youth in Germany report statistically significantly greater feelings of belonging in school. This advantage is strengthened after adjusting for immigrant parents' lower education levels (in the case of Turks and Italians) and their lower occupational status. Italian students in Germany, moreover, also report a more positive attitude towards the usefulness of schooling than Italian students in Italy. The one school environment outcome where immigrants in Germany report worse outcomes than non-migrants in the country of origin is the worse student-teacher relations reported by Turkish youth in Germany.

Omitting this one exception, however, migrant students in Germany report a similar or more positive schooling environment compared to their non-migrant peers in the country of origin. These indicators suggest that children from diverse immigration backgrounds benefit from the

superior educational environment in Germany, a finding that is particularly striking given that immigrant children in Germany are generally clustered in lower performing schools (Education Report 2006).This exploration further supports my interpretation that the educational advantage among immigrant youth relative to nonmigrants in the country of origin is strongly linked to an advantageous educational system in Germany.

3.3 Distributions: DFL Counterfactuals and Residuals

In the previous section, I used descriptive information on observable characteristics and student reports of home and school environment to understand the immigrant advantage I observe in the bilateral regressions. Differences in performance between the children of migrants and non-migrants may be the result of the differences in the distribution of characteristics such as parental schooling and occupational status that I describe above, or they may be due to differences in the returns to these characteristics because of the differences in the educational systems I summarized. In this section, I further develop my effort to better understand the role of differences in *composition* and *returns.* Drawing on the work of DiNardo et al (1996) and Chicquar and Hansen (2005), I decompose differences in the performance *distributions* of the children of migrants and nonmigrants. I use this decomposition to compute counterfactual performance densities of the children of immigrants in Germany, assuming that they receive the same returns to their characteristics as students in their parents' country of origin. I utilize this counterfactual in two ways. First, I provide a more thorough examination of selection in *observable* characteristics. I compare the counterfactual (performance of the children of immigrants to Germany were they to live in Turkey) to the performance distribution of the children of Turkish non-migrants living in Turkey. This allows me to decompose the difference in distributions attributable to differences in observed characteristics between the children of migrants and non-migrants, and to visually represent selection on observables. This measure can be conceptualized as a complete measure of the observable component of $(1 + \delta_s)$, or immigrant selection. Second, I compare the counterfactual to the *actual* distribution of the children of immigrants in Germany. This allows me to see *where* in the performance distribution immigrant children gain the advantage I observe in the summary measures obtained from the bilateral regressions. It provides a visual representation of the differences to returns to characteristics in sending and receiving states; these differences in returns can be conceptualized as one measure of $(1 + \delta_i)$, or institutional differences.

Let $f^j(p|x)$ be the density of math performance of a native born resident in country *j* of a set *J* consisting of Turkey, Italy, Poland or a combination of former Soviet or former Yugoslavian states,

conditional on a set of observed characteristics. Further, let $h^j(x|j)$ be the density of observed characteristics among students in country *j* and $h^j(x|g)$ be the density of observed characteristics of students whose parents immigrated from country *j* but who are currently residing in Germany. The observed density of performance for residents of country *j* is:

$$g(p|j) = \int f^j(p|x)h^j(x|j)dx. \quad (5)$$

Likewise, the observed density of performance for the children of immigrants from *j* residing in Germany is

$$g(p|g) = \int f^g(p|x)h^j(x|g)dx. \quad (6)$$

Differences in $f^j(p|x)$ and $f^g(p|x)$ capture differences in the returns to student characteristics in the country of origin *j* and Germany. Differences in $h^j(x|j)$ and $h^j(x|g)$ represent differences in the distribution of observed characteristics for residents of country *j* and the children of immigrants from country *j* in Germany. The counterfactual I seek to obtain is the performance density that would prevail for the children of immigrants if they received the same returns to their characteristics as non-migrants in their country of origin:

$$g_g^j(p) = \int f^j(p|x)h^j(x|g)dx. \quad (7)$$

This corresponds to the distribution of performance for residents of the country of origin *j* in (5), except that it is integrated over the distribution of characteristics for immigrant students from *j* in Germany. This distribution is not observed, but we can rewrite it as:

$$g_g^j(p) = \int f^j(p|x)h^j(x|g) \times \frac{h(x|j)}{h(x|j)}dx$$

$$= \int \theta f^j(p|x)h(x|j)dx, \quad (8)$$

where

$$\theta = \frac{h(x|g)}{h(x|j)}. \quad (9)$$

To estimate the counterfactual density outlined in (7), I utilize user written software in Stata that applies DiNardo, Fortin and Lemieux Counterfacual Kernel Density estimation (Azevedo 2005). This procedure takes the observed performance density for students in each country of origin *j* and reweights it to compute a counterfactual wage density as in (8). The weights are computed as:

$$\frac{1 - \Pr(j|\mathrm{x})}{\Pr(g|x)}$$

These weights are estimated parametrically through a logistic regression including parents education and occupation, household educational resources, household cultural resources, sex, and the year of the survey. Because language and generational status nearly perfectly predict migrant/non-migrant status, these variables are omitted here, but the results presented are for those who speak the resident country language at home only (i.e. speaking Turkish in Turkey and German in Germany)[11]. The resulting propensity scores are used to adjust the wage density of residents in *j* to reflect the characteristics of the children of immigrants from country *j* in Germany. After computing the weights, the counterfactual density is estimated nonparametrically with a kernel density estimator. This counterfactual density can be interpreted as the expected (based on observed characteristics) performance distribution of the children of immigrants from country *j* if their parents had stayed in country *j* and they received the same returns to their characteristics as their fellow residents.

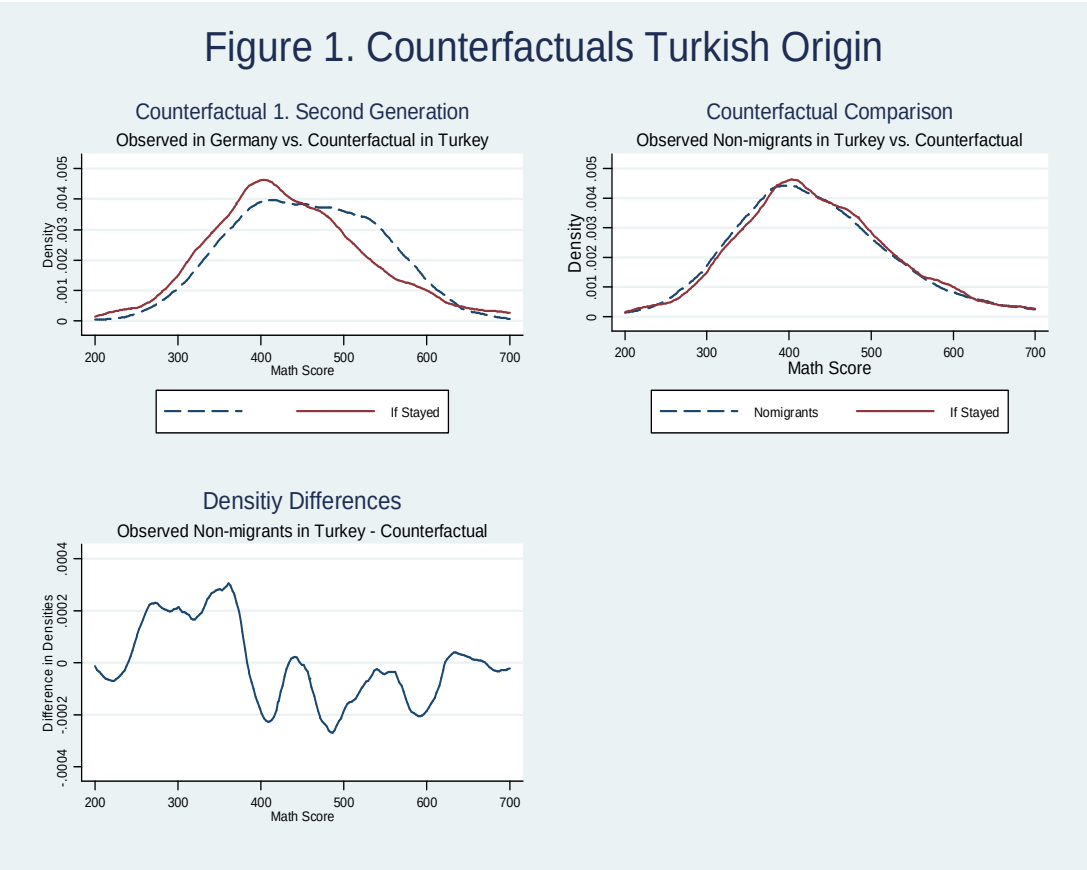
This resulting counterfactual is presented for each country in figures 1-5 below. The counterfactual is presented in three different ways in each figure. In the upper left hand corner, I plot the counterfactual performance density of immigrants from each country along with their actual observed performance density. This panel speaks to *institutional* differences in returns, the difference between the actual performance distribution of the children of immigrants and the performance that would have prevailed if their parents had not left the country of origin (contingent on observed characteristics only). The second panel in the upper right hand corner speaks to *selection* on observables: this compares the distribution of the counterfactual to the distribution of non-migrants in the country of origin - it is different only insofar as all the characteristics used in the model (parents education, household characteristics) differ between migrants and non-migrants. Finally, the bottom left panel provides another view of the selection on observables. This panel represents the *difference* in density between observed non-migrants in the country of origin and the counterfactual distribution of immigrants in Germany, which is

$$g_j(p) - g_g^j(p) \qquad (10)$$

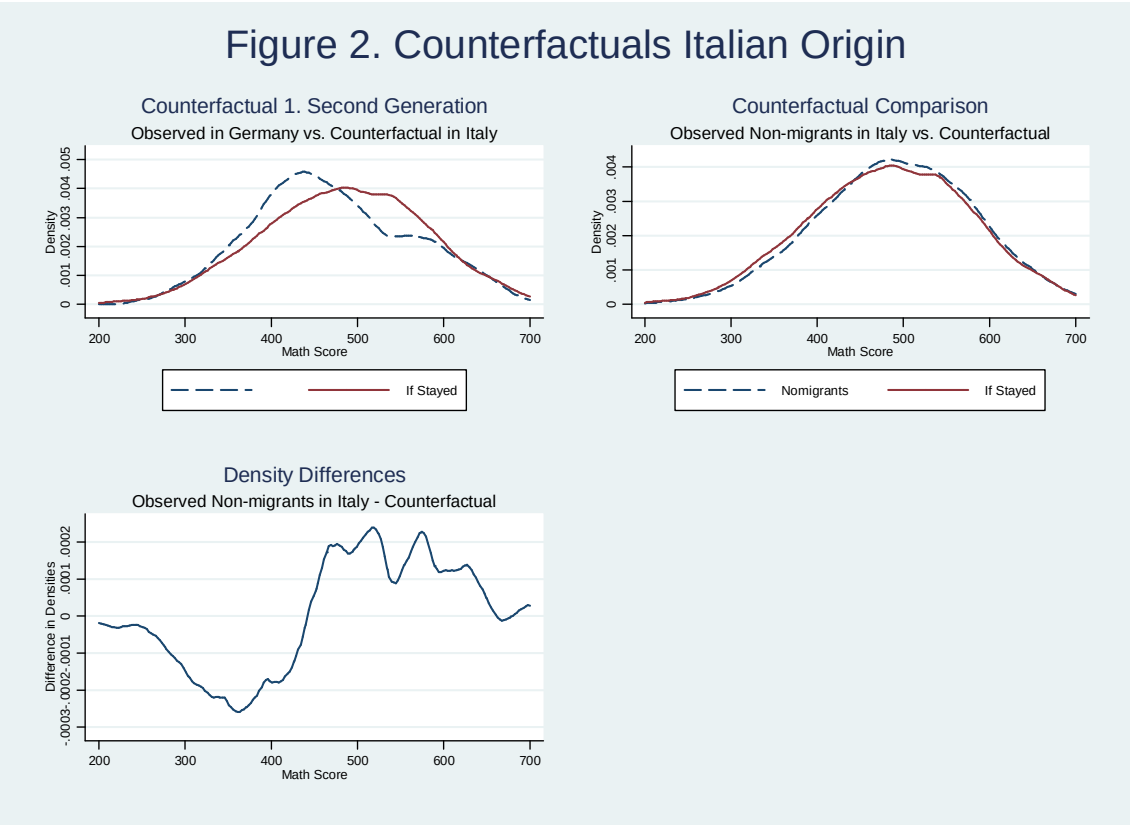
[11] The substantive results are largely the same when I restrict the children of immigrants to foreign language speakers only, though as expected, their observed performance density in Germany shifts to the left (lower performance) as foreign language speakers have lower performance in Germany. For the sake of controlling for observables as far as possible, I choose to present the results for those who speak the language of their residence in the household.

Where the children of immigrants are disproportionately drawn from a certain segment of the country of origin performance distribution (as predicted by their observed characteristics), the density difference will be *negative*, where the children of immigrants are underrepresented in the distribution, the density difference will be *positive.*

Figure 1 shows the results of the decomposition for Turkish origin students. The first panel on the upper left shows the actual distribution of Turkish immigrants in blue, and the in red the counterfactual distribution of a Turkish second generation student had they received the same returns to their parental and household characteristics as a Turk in Turkey. The results reflect the more bifurcated distribution of immigrants in Germany, and show that that although immigrants benefit throughout the distribution, the advantage is concentrated particularly in the upper range, showing much higher densities in the 500-600 score range than in the counterfactual distribution if their parents had not migrated. The second panel in the upper right hand shows another useful comparison – this is the distribution of the children of non-migrants in Turkey and the distribution of immigrants that would have prevailed if they lived in Turkey. We see that the results are very similar, suggesting only minor selection effects. The selection effects (on observables) are seen in greater depth in the bottom left hand panel. Here, we see the difference in densities between observed non-migrants in Turkey and the counterfactual if Turkish immigrants lived in Turkey. The difference is positive (above 0) where there is a greater density among the actual non-migrant Turks in Turkey than would be expected among Turkish immigrants in Germany. We see only a slightly higher density in the lower performance range among Turkish non-migrants, with slightly lower density in the high performance range. Thus, Turkish immigrants appear to be only very slightly positively selected on observable characteristics.

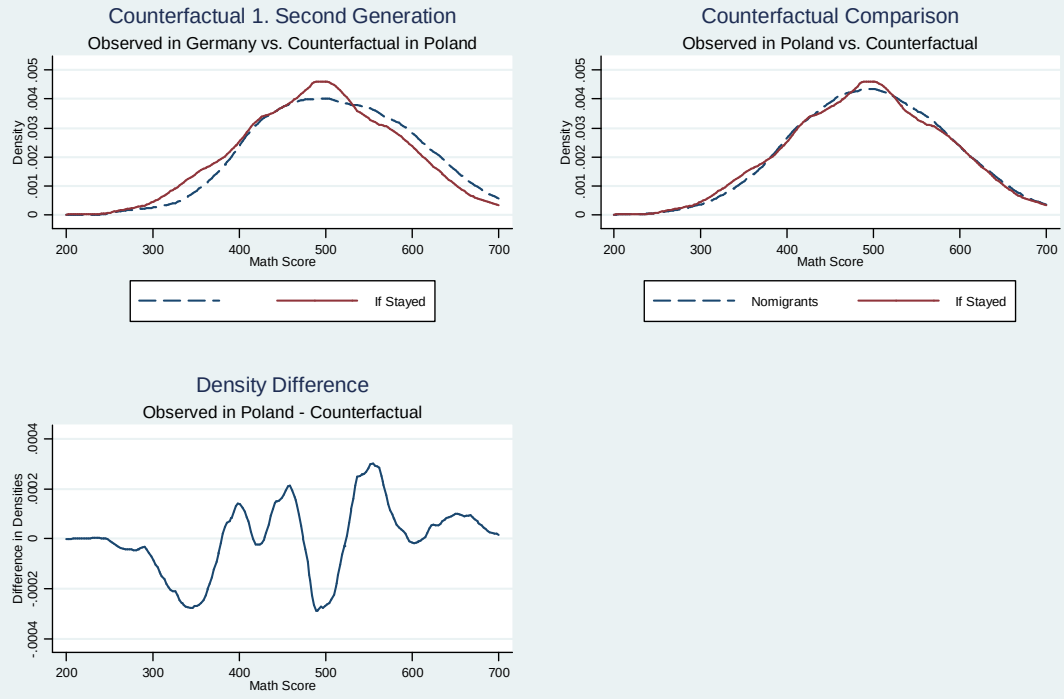


In figure 2, we see the same results for Italian origin immigrants. Here, the upper left hand panel reveals the opposite institutional effect than that observed for Turks – the counterfactual density shows higher density in the mid-high performance range were Italians to have stayed in Italy, rather than migrating. This is consistent with the bilateral results as well, as Italian origin students were the one group with consistently lower scores than their non-migrant counterparts. This disadvantage might also be partially be explained by negative selection – we see from panels 2 and 3 in figure 2 that Italian immigrants would have a slightly *lower* achieving performance density than non-migrants in Italy – panel 3 shows this most clearly in that non-migrants have a lower density along the low performance range and a higher density along the higher performing range.



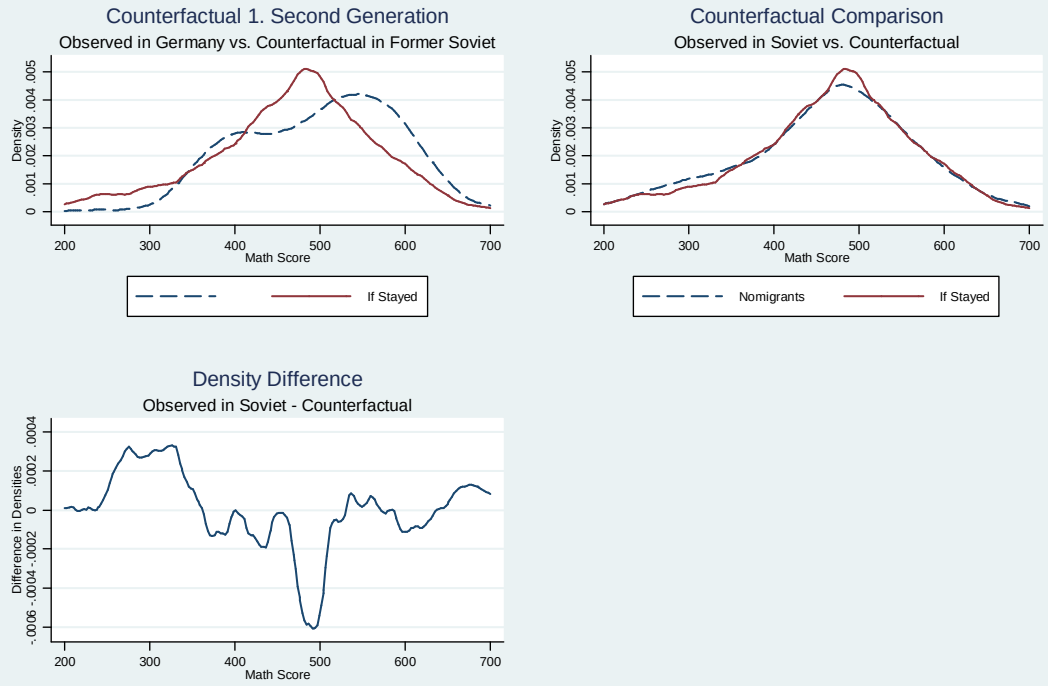
Counterfactual results for Polish origin youth are displayed in figure 3. Similar to what we observed in the bilateral regressions, Polish youth receive higher returns on their characteristics in Germany than in Poland, this advantage is particularly concentrated at the high range, from scores around 530 through the highest scores. Turning to selection on observables, some slight bifurcation is observed, with Polish non-migrants displaying higher densities in the middle performance range than Polish immigrants (see panel 3).

Figure 3. Counterfactuals Polish Origin



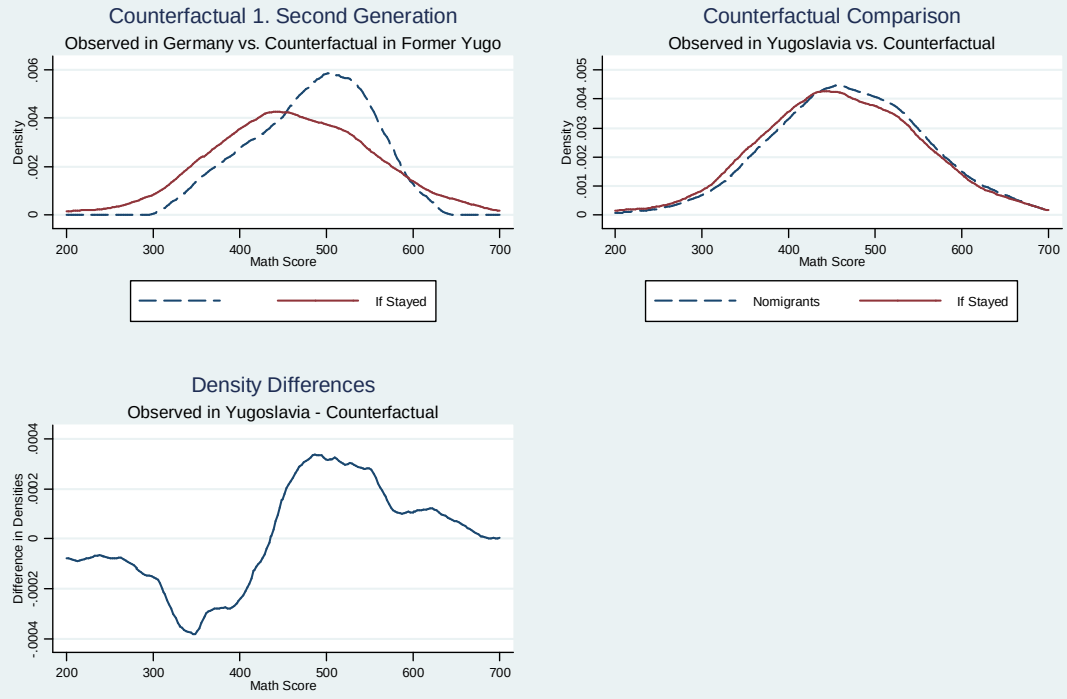
There are some similarities between the Polish outcomes and the former Soviet outcomes in figure 4. Similar to the Poles, former Soviet youth obtain higher performance returns on their characteristics in Germany than would be expected in the former Soviet Union. Their advantage is particularly concentrated in the upper end of the performance distribution. Also similarly, the hypothetical distribution for former Soviet immigrants and observed former Soviet non-migrants is a flatter distribution, with less concentration in the middle range scores. I suspect that these similarities are due to the fact that a proportion of the immigrants from both Polish and former Soviet origins are likely the children of ethnic Germans, explaining their much higher returns as well as the greater variability in their performance than non-migrants. The ethnic German/refugee distinction may explain the bifurcation of the scores.

Figure 4. Counterfactuals Soviet Origin



Finally, former Yugoslavian origin distributions are displayed in figure 5. Similarly to the other groups, the advantage of Yugoslavian immigrants, relative to the non-migrants in origin, is the higher density in the mid-high performance range, and for former Yugoslavian origin immigrants this advantage is substantial. In the second and third panels, we see that this advantage is *not* due to better observed characteristics. Rather, were former Yugoslavian immigrants to receive the same returns to their characteristics as non-migrants, they would have higher density in the low performance range and lower performance in the mid-high range than observably identical nonmigrants. Former Yugoslavians thus appear to gain the most from migration in terms of better returns to their characteristics in mathematic proficiency.

Figure 5. Counterfactuals Yugoslavian Origin



To conclude, these visuals provide further support for three conclusions. First, every immigrant group, with the exception of Italians, receives higher returns to their characteristics in Germany than they would have in the country of origin, based on their observed characteristics. Second, only Turkish origin immigrants appear to be positively selected on observed characteristics, and this selection was slight and likely due to the superior home educational resources of Turkish origin immigrants in Germany that we observed in the bilateral regressions. Third, for every group, the differences in the first panel - comparing the performance distributions of immigrants in Germany to the counterfactual if they had stayed in their country of origin – were much greater than the differences in the second panel, comparing the actual distribution of non-migrants to the counterfactual if immigrants had stayed in the country of origin. This firmly suggests that, in terms of observable characteristics, it is the returns - the institutional differences - that are driving the differences in performance, *not* the selection.

3.4 Pooled Regressions

The previous two sections sought to provide more descriptive data on selection on *observables.* Here, I utilize another method of assessing the impact of selection. Using a different set of assumptions, I can directly estimate performance differences that are purged of selection effects.

Rather than adopting the assumptions outlined in equation (2), I make here an equally strong, but different assumption – namely that observable student characteristics have similar returns across countries. Returning to equation (1), I adopt the following set of assumptions (A_2) that enable me to purge selection bias from my estimates of performance differences:

- parental socioeconomic status and other traits of immigrant students residing in Germany have the same association with performance as they do for students whose parents were born in Germany$\left(\theta_{hg}(x^i) = \theta_{gg}(x^i)\right)$;
- the mean unobservable contribution to performance does not differ across countries due to "culture" or other factors $\left(E\left[\varphi_{hg}(x'^i)\right] = E\left[\varphi_{gg}(x'^i)\right]\right)$
- that the partial association of performance and unobservable traits in the sending country is independent of the same association in Germany $\left(E\left[\varphi_{hg}(x'^i) - \varphi_{hh}(x'^i)\right] = E\left[\varphi_{hg}(x'^i)\right] - E\left[\varphi_{hh}(x'^i)\right]\right)$;

Here, equation (1) reduces to

$$D_e\,|A_2 \equiv E\left[D^i|A_2\right] = \theta_{gg}(x) - \theta_{hh}(x). \qquad (11)$$

The right-hand side of (11) is observable. It is the estimation of the difference in performance of the child of a non-migrant in the country of origin and the child of a parent who was *randomly selected* and obliged to migrate. Computationally, this is a pooled regression in which all migrants in Germany and nonmigrants in each origin country are analyzed together and the main effects and schooling coefficients are used to compute equation (11). It is, by definition, unaffected by selection. However, it makes the very strong assumption that returns to traits *x* do not depend on the origin of those traits; for instance, that a Turk with a Turkish college degree can pass along their advantage to their offspring in Germany as well as in Turkey. This assumption will be relaxed below.

3.4.1 No Adjustment for schooling quality

To estimate equation (11), I combine all students residing in Germany with all students in sending states $j \in J$, where *J* is Turkey, Italy, Poland, former Yugoslavia, and former Soviet countries. Using this sample, I estimate the regression equation

$$p_{ij} = X_{ij}\varsigma + \begin{pmatrix}\delta_0 + \beta_0 s_{ij} \\ \delta_j^r + B_j^r s_{ij}\end{pmatrix}\begin{pmatrix}1 \\ I_{ij}^r\end{pmatrix} \qquad (12)$$

where $\delta_0 + \beta_0 s_{ij}$ represents the intercept and returns to education in Germany, and $\delta_j^r + B_j^r s_{ij}$ the intercept and returns to education for a randomly selected resident in country *j* with characteristics *X*.

From these pooled estimates I calculate the difference in the expected performance of a student in Germany whose parents have *s* education to the expected performance of a student with identical characteristics residing in country *j* as: $\widetilde{D}_{o,j} \equiv -(\hat{\sigma}_j^r + \hat{\beta}_j^r s)$, (13)

where $\hat{\sigma}_j^r$, $\hat{\beta}_j^r s$ are empirical estimates of the corresponding parameters. Table 8 presents these results. The first column represents $\widetilde{D}_{o,j}$ using the controls applied in the full "Migration" specification outlined above, including controls for parental socioeconomic status, household characteristics, and student migration status. The column to the right presents the results from "migration" model $D_{o,j}$ for comparison.

For nearly every single education/origin group in table 8, the pooled regression results report *larger* differences, and a *greater* advantage, among a randomly selected resident of Germany with equivalent characteristics to a randomly selected resident of each sending country. There are only two exceptions: the children of immigrants from Poland and the children of low educated parents from the former USSR. This is likely because both of these origins send a large proportion of the very positively selected (in terms of integration in Germany) ethnic German migrants, as discussed earlier. Still, if we assume that the difference between $\widetilde{D}_{o,j}$ and $D_{o,j}$ is due to selection only, these estimates show evidence of *upward* selection bias for lower skilled Polish and Soviet immigrants only. The rest of the sending countries appear to be *negatively* selected, according to these assumptions.

This is a counterintuitive finding – if we expect positive selection on unobservable characteristics among the children of immigrants, we should see the opposite of what we observe– *smaller* advantage in the pooled estimates than in the standard estimates. One possible cause of this surprising result is the assumption that *s* parental schooling acquired in a foreign country is worth exactly the same for student achievement in Germany as it is in their country of origin.

Table 8. Expected Difference in Math Score between Migrants and Non-Migrants: Pooled Regression Results

	Pooled Regressions	Bilateral Regressions
Italian		
ISCED LT1	46.82	11.36
ISCED 2	13.68	10.01
ISCED 3b/c	28.23	-1.44
ISCED 3a/4	40.35	-7.90
ISCED 5b	72.62	-7.13
ISCED 5a/6	54.51	14.24
Polish		
ISCED LT1	20.27	49.08
ISCED 2	4.07	13.18
ISCED 3b/c	33.34	31.70
ISCED 3a/4	23.96	12.97
ISCED 5b	29.18	20.69
ISCED 5a/6	13.40	6.83
Turkish		
ISCED LT1	42.76	22.42
ISCED 2	49.28	20.31
ISCED 3b/c	73.74	8.72
ISCED 3a/4	65.82	21.60
ISCED 5b	96.24	9.08
ISCED 5a/6	33.67	-47.25
Yugoslavia		
ISCED LT1	63.81	54.59
ISCED 2	32.54	37.09
ISCED 3b/c	58.10	46.21
ISCED 3a/4	37.21	-25.35
ISCED 5b	82.55	61.42
ISCED 5a/6	60.08	1.29
USSR		
ISCED LT1	-22.76	57.29
ISCED 2	21.54	36.75
ISCED 3b/c	43.06	44.30
ISCED 3a/4	42.45	-24.17
ISCED 5b	84.13	63.23
ISCED 5a/6	54.02	7.41

3.4.2 With adjustment for school quality

In order to relax the assumption that parental schooling acquired abroad is worth the same in Germany, I need to adjust the reported schooling of origin country parents so that it reflects its worth in the German educational stratification system. To do this, I rely on another set of bilateral

regressions. This time, instead of regressing migrants in Germany together with non-migrants in the country of origin, for each country *j*, as in equation (4), I regress the children of immigrants in Germany together with the children of non-migrants in Germany:

$$p_{ij} = X_{ij}\varsigma\begin{pmatrix}\delta_0 + \beta_0 s_{ij}\\ \delta_j^m + B_j^m s_{ij}\end{pmatrix}\begin{pmatrix}1\\ I_{ij}^m\end{pmatrix}. \qquad (14)$$

With these regressions I obtain β_0, the returns to parental education for non-migrant German residents, and B_j^m, the returns to parental education for the children of immigrants from country *j* residing in Germany. For instance, for an increase in parental education from primary school or less to a secondary education with vocational training, β_0 =50 points for a native German, but β_j^m =18 for an otherwise observably equivalent former Yugoslavian origin immigrant. To adjust for this difference, I calculate the ratio of immigrant to German returns by dividing β_j^m/β_0 [12]. I then weight the $\hat{\beta}_0 s$ drawn from the pooled specification, by multiplying coefficient $\hat{\beta}_0 s \times (\beta_j^m/\beta_0)$. This allows me to calculate differences in performance between German and sending country residents but adjusting for the lowered returns to parental education obtained by the children of the foreign born in Germany. I thereby account for the lowered ability of migrant parents to transmit their human capital to their children. The first panel of Table 9 shows the difference in performance scores assuming equal returns to parental education, the second shows the adjusted differences, and the third the original bilateral differences.

The findings support my interpretation that institutional differences between sending and receiving state are a large and important part of the immigrant advantage in educational achievement. However, the role of selection, as determined by these estimates, appears to differ by each origin group. Notably, Italians appear to be negatively selected. The difference between the adjusted $\widetilde{D}_{o,j}$ estimates and $D_{o,j}$, with the exception of the lowest educational category, is *positive* – the adjusted pooled specification still results in higher scores than the bilateral regressions. Remember, the adjusted pooled specification is purged of selection effects, and represents the results *as if* I were to randomly select an Italian resident, compel them to migrate to Germany, and set their educational attainment to have the same returns for their children's educational performance as a typical Italian migrant. The result would be *better* outcomes than the actual Italian immigrants living in Germany.

[12] In some cases, the nominator in this ratio is negative – cases where the children of immigrants with parents who have attained higher education levels perform *worse* than the children of immigrants with parents of lower attainment. In these cases, a ratio does not make sense. For these cases, I compute the absolute difference between the German coefficient and the migrant coefficient, and subtract this amount from the pooled regression results.

From these findings, we can assume that were a randomly picked Italian with at least a secondary degree to migrate, their child would benefit more in Germany than the immigrants who actually came.

Table 9. Expected Difference in Math Score between Migrants and Non-Migrants: Adjusted Pooled Regression Results

	Adjusted Pooled	Pooled Regressions	Bilateral Regressions
Italian			
ISCED LT1	-27.43	46.82	11.36
ISCED 2	13.68	13.68	10.01
ISCED 3b/c	24.24	28.23	-1.44
ISCED 3a/4	21.44	40.35	-7.90
ISCED 5b	29.72	72.62	-7.13
ISCED 5a/6	41.47	54.51	14.24
Polish			
ISCED LT1	50.53	20.27	49.08
ISCED 2	-14.37	4.07	13.18
ISCED 3b/c	-0.98	33.34	31.70
ISCED 3a/4	-17.82	23.96	12.97
ISCED 5b	-9.41	29.18	20.69
ISCED 5a/6	-25.10	13.40	6.83
Turkish			
ISCED LT1	-8.13	42.76	22.42
ISCED 2	42.65	49.28	20.31
ISCED 3b/c	24.43	73.74	8.72
ISCED 3a/4	38.84	65.82	21.60
ISCED 5b	29.91	96.24	9.08
ISCED 5a/6	-22.58	33.67	-47.25
Yugoslavia			
ISCED LT1	28.98	63.81	57.29
ISCED 2	32.54	32.54	36.75
ISCED 3b/c	34.91	58.10	44.30
ISCED 3a/4	-24.24	37.21	-24.17
ISCED 5b	46.69	82.55	63.23
ISCED 5a/6	-1.44	60.08	7.41
USSR			
ISCED LT1	51.76	-22.76	59.89
ISCED 2	21.54	21.54	47.63
ISCED 3b/c	0.38	43.06	20.45
ISCED 3a/4	-8.92	42.45	14.31
ISCED 5b	52.63	84.13	81.58
ISCED 5a/6	7.16	54.02	37.20

Turkish immigrant students also appear to be negatively selected. Even after adjusting for the much lower returns they receive from their parents' education, a randomly selected Turkish student (as proxied by the adjusted pooled regression) would perform better in Germany than the actual Turkish immigrant children (as proxied by the bilateral regression). Again, if we assume that the difference between the adjusted $\widetilde{D}_{o,j}$ estimates and $D_{o,j}$ are due to selection, then the fact that the $\widetilde{D}_{o,j}$ estimates are nearly uniformly more positive suggests negative selection. The exception is the children of the very lowest educated Turkish parents – these children perform better in Germany.

We must also remember, as well, that the Turkish secondary school system is much more selective than the German system. When I compare the scores of Turkish students in Turkey to Turkish origin students in Germany, I am comparing a highly select group in Turkey (only 47% of the total 15 year old population) to the a group that still contains over 90% of the entire 15 year old German resident population. It is very reasonable to expect that Turkish secondary students are positively selected not only in terms of observable characteristics such as their parents' education (as we see in table 6) but in unobservable characteristics as well. Because of this, it is highly likely that I am underestimating the performance advantage of Turkish immigrants in Germany. This is likely part of the negative selection that I observe when comparing the adjusted pooled estimates to the bilateral estimates.

A comparison of the pooled and bilateral estimations for Polish origin students, however, reveals the opposite. As has been consistently shown throughout this paper, Polish immigrants appear to be the most positively selected migrants in Germany. Again, the pooled adjusted $\widetilde{D}_{o,j}$ estimates approximate the results were we to randomly select a Polish resident for migration to Germany. In such a counterfactual, we see no immigrant advantage with the exception of the students of the very lowest educated group, a group that represents only 10% of the Polish immigrants in Germany (see table 6). Thus, I assume that the advantage shown in the bilateral regressions for Polish immigrants to Germany is largely due to their positive selection as ethnic German immigrants. Polish immigrants in Germany perform much better, on average, than we would expect from a randomly drawn migrant who is observationally equivalent.

Finally, former Soviet and former Yugoslavian origin youth also display evidence of positive selection, but much weaker than that observed for Poles. The adjusted pooled coefficients are generally in between the non-adjusted pooled and the bilateral results. The consistently positive and fairly large (between one third and one half of a standard deviation in the test score measure) estimates from the adjusted $\widetilde{D}_{o,j}$ findings suggest that even a randomly selected former Yugoslavian

or Soviet origin student would perform better in Germany than in their home country. Yet the positive selection is apparent in that the bilateral estimates are consistently larger than the adjusted pooled estimates.

From this exercise I conclude that though all the eastern European groups under consideration are likely positively selected on unobservables, institutional differences between Germany and the home country still result in large advantages for former Yugoslavian and former Soviet students. In the case of Italian and Turkish immigrants, *negative* selection appears to be downwardly biasing the difference in performance that I observe, such that a randomly selected student from either of these countries would perform even *better* than the observably identical immigrant children that I actually observe in Germany. Polish immigrants are the only group where positive selection appears to predominately account for their immigrant advantage.

4. Conclusion

This study presents a thorough examination of the mathematical performance of the children of immigrants to Germany relative to the children of non-migrants in their parents country of origin. In the first section, I estimated a series of bilateral regressions that revealed that children of immigrants to Germany performed better, on average, than observably equivalent children in their parents native countries. In nearly every case, D_o, the observed difference between the children of non-migrants and the children of immigrants, was positive. On average, a child of immigrants in Germany performs approximately .3 standard deviations above the math performance of an observably identical student in their parents' home country.

In the next section of this paper, I grappled with the estimation problem in equation (3):

$$D_o = (1 + \delta_s)D_e = (1 + \delta_s)(1 + \delta_n)(1 + \delta_i)$$

namely, that D_o includes difference due to selection in addition to the costs and institutional benefits of migration.

I attempted to provide the reader a thorough description of the contours of selection through four methodologies: a) a qualitative description of the circumstances of migration, b) a comparison of observed individual, household, and institutional level characteristics between the sending and receiving states, c) a visual comparison of the performance distributions of the children of migrants, non-migrants, and a counterfactual distribution of the children of migrants had their parents not left

home, and d) an alternative estimation of D_o purged of selection effects but assuming equal returns to parental and household characteristics across countries.

The results of all four of these exercises are fairly similar. A brief review of the migration history of each of these groups suggests variation in migration selection processes – yet every group (except Italians) performs better in Germany. A comparison of parental education and occupation further suggests that no group is strongly positively selected on these observed characteristics. Finally, the school environment reported by the children of immigrants in Germany, relative to non-migrants in their parents' home country, is generally more positive than the differences reported between migrants and non-migrants in home environment. Though only impressionistic, these qualitative findings suggest that migrant selection does *not* appear to be strongly positive.

My statistical explorations confirm this first impression. A counterfactual exercise plotting the distribution of math scores under counterfactual returns shows better performance throughout the distribution, showing that migrants from a wide variety of *observable* characteristics benefit from the migration process (Dinardo et al 1996). Moreover, the differences in the distributions between migrants and non-migrants that are attributable to the returns to characteristics are consistently greater than the difference that is attributable to the characteristics themselves. This suggests advantage due to institutional factors, rather than the characteristic of the migrants themselves. These figures showed the contours of *observed* selection, revealing slight positive selection among Turkish immigrants, negative selection among Italian and Yugoslavian origin immigrants, and a wider spread among former USSR and Polish immigrants. As a further exploration, I pooled all students together and reestimated the returns to migration in estimates purged of selection bias, but based on assumptions of equal returns to observable characteristics. These findings revealed generally *greater* advantage than that observed among the actual immigrants. Even after relaxing the assumption of equal returns to parental education, the children of immigrants *still* performed better in Germany.

The pooled regression exercise revealed selection in *unobserved* characteristics that did not always align with the observed differences in the counterfactual performance densities. In terms of observed characteristics, Italians and former Yugoslavian immigrants appeared to be negatively selected. In terms of unobserved characteristics as captured by the pooled regressions, it is Italians and *Turkish* immigrants that appear negatively selected, with all other groups showing evidence of positive selection that accounts for some, but not all, of their advantage relative to non-migrants. These results can be understood in light of the migration histories. It is likely that many of the children of immigrants from Poland and the former USSR are ethnic Germans, and as such,

positively selected on traits that enable integration in Germany. The negative selection observed among Turks is likely explained by the greater selectivity of the Turkish secondary system. The students enrolled in secondary education in Turkey will differ from those in Germany, even after controlling for observable characteristics, because only approximately half of all Turks continue to education at age 15, and thus are a pre-selected group. This likely explains the negative selection I observe when comparing Turkish *enrolled* students, an elite group, to enrolled Turkish immigrants in Germany.

By triangulating different data sources and assessment techniques, it becomes clear that although I cannot provide a definitive measurement of the degree of selection bias introduced in my measurement of $(1 + \delta_i)(1 + \delta_n)$, it is almost certain that selection bias cannot account for all, and not even most, of the difference in performance scores that I observe. Rather, my findings from these explorations suggest that the institutional environment is an important contributing factor to the success of the children of immigrants.

Having now reviewed the major finding and discussed the possible bias from migration selection, it is important to reconsider the motivating question of this research: do the children of immigrants benefit, or suffer, from their parent's decision to migrate? This study suggests that they benefit, in terms of the educational environment they enjoy at school and also in terms of their mathematical performance. Despite their disadvantage relative to the children of native Germans, the children of immigrants in Germany are generally advantaged relative to the children of non-migrants in their country of origin.

Though this study cannot make definitive causal claims, migration is shown to impact the educational performance of children in several ways. First, the children of immigrants have higher math performance scores. Second, the children of immigrants report a positive school environment, and generally enjoy greater home educational resources and higher rates of kindergarten attendance. Third, for Turkish and former-Soviet students, simply living in Germany guarantees a greater likelihood of a secondary education, by virtue of its being mandatory (enrollment rates are an important source of educational inequality between migrants and nonmigrants world-wide, see Ortega 2009).

Finally, what does this study mean for the broader question of the returns to migration? On one hand, intergenerational returns to migration appear positive: the children of migrants have a better education than the children of parents who did not migrate. In concordance with what appears to be the major macro-level trend, migration *decreases* global inequality in educational performance

even as it *increases* inequality in educational performance within Germany. Applying a cross-national perspective opens up an entirely different way of viewing the migration process. Instead of concern for the lower performance of immigrant children relative to native children, *advantage* relative to nonmigrants is revealed. Instead of concern about the increase in inequality within borders that is introduced by migration, this perspective reveals a *decrease* (albeit small) in global educational inequality. Instead of concern for the possible decline in quality of life for natives, this perspective is concerned with the *improved* quality of education for immigrants.

On a final note, I also want to emphasize that the groups under consideration here likely represent the *lower bounds* of the gains to migration on the global level. With the exception of Turkey, every sending country under consideration here is a fairly wealthy, developed nation with high or medium-high mathematical performance. Could I extend this analysis to the children of immigrants from less developed nations, as those in North Africa, Latin America, or the Pacific Islands, it is likely that the gains in educational performance would be much higher. This paper thus presents but a first step in an important new direction for migration research – assessing the gains to migration on a global, rather than a national level.

Appendix A. Identifying Former-Soviet and Former-Yugoslavian Countries

	In German PISA Sample			Title and Ns in PISA Country Samples		
	Year	Title	N	Year	Title	N
Former Yugoslavia	2003/2006	Croatia	33	2003	Serbia	3,201
	2003/2006	Serbia	27	**2006**	**Serbia**	**3,526**
	2003/2006	Slovenia	6	**2006**	**Montenegro**	**3,569**
	2003/2006	Macedonia	8	**2006**	**Croatia**	**3,445**
	2003/2006	Montenegro	8		**Slovenia**	**5,043**
	2003/2006	Bosnia	26			
Total N Sample	2003/2006	Former Yugoslavia	108		Former Yugoslavia	15,583
Former Soviet	2003/2006	Russian Federation	8	2003	Latvia	3,039
	2003/2006	Other USSR	339	2003	Russian Federation	4,429
				2006	**Azerbaijan**	**3,824**
				2006	**Estonia**	**3,508**
				2006	**Krrgyzstan**	**4,335**
				2006	**Latvia**	**3,120**
				2006	**Lithuinia**	**3,917**
				2006	**Russian Federation**	**4,220**
Total N in Sample	2003/2006	Former-Soviet	347	2006	Former Soviet	22,924

Table A2: Expected Immigrant-Nonimmigrant Difference in Math vs. Reading Outcomes

	MATH					READING			
	Basic	SES	RES	MIG		Basic	SES	RES	MIG
Italian	-23.21				Italian	-35.58			
ISCED LT1		-8.754	-9.962	11.36	ISCED LT1		-38.87	-39.69	-15.52
ISCED 2		-12.159	-4.975	10.008	ISCED 2		-23.13	-14.93	0.57
ISCED 3b/c		-14.763	-7.034	-1.44	ISCED 3b/c		-25.31	-16.64	-9.598
ISCED 3a/4		-23.924	-20.962	-7.9	ISCED 3a/4		-27.19	-23.51	-8.296
ISCED 5b		-29.414	-34.392	-7.13	ISCED 5b		-34.889	-40.39	-8.87
ISCED 5a/6		-7.916	-4.025	14.242	ISCED 5a/6		-29.63	-25.01	-1.71
Polish	8.716				Polish	-10.6			
ISCED LT1		39.4	41.64	49.08	ISCED LT1		5.177	9.438	21.98
ISCED 2		12.59	7.32	13.18	ISCED 2		-11.063	-16.652	-4.02
ISCED 3b/c		22.7	26.24	31.7	ISCED 3b/c		-11.363	-6.712	0.51
ISCED 3a/4		1.98	6.17	12.97	ISCED 3a/4		-8.493	-1.952	9.42
ISCED 5b		12.09	14.51	20.69	ISCED 5b		-9.833	-5.702	4.65
ISCED 5a/6		-6.99	0.01	6.83	ISCED 5a/6		-29.563	-19.912	-3.94
Turkish	-7.623				Turkish	-42.37			
ISCED LT1		13.48	-5.02	22.42	ISCED LT1		-33.66	-49.95	-21.04
ISCED 2		8.688	-3.956	20.311	ISCED 2		-40.483	-50.953	-26.335
ISCED 3b/c		15.811	-7.408	8.72	ISCED 3b/c		-6.17	-26.43	-11.181
ISCED 3a/4		4.377	0.01	21.603	ISCED 3a/4		-16.21	-18.69	4.79
ISCED 5b		-11.02	-14.407	9.08	ISCED 5b		-41.372	-43.912	-19.932
ISCED 5a/6		-72.02	-75.29	-47.25	ISCED 5a/6		-84.67	-85.21	-55.13
Yugoslavia	1.594				Yugoslavia	-5.296			
ISCED LT1		60.01	44.85	57.29	ISCED LT1		63.45	45.09	60.08
ISCED 2		39.5	26.13	36.75	ISCED 2		17.47	2.67	16.25
ISCED 3b/c		53.566	46.881	44.3	ISCED 3b/c		50.27	42.118	41.68
ISCED 3a/4		-29.64	-31.17	-24.17	ISCED 3a/4		-29.35	-30.58	-21.98
ISCED 5b		51.909	56.26	63.227	ISCED 5b		26.07	30.59	37.93
ISCED 5a/6		-11.87	-9.97	7.41	ISCED 5a/6		-19.48	-16.67	1.57
USSR	13.75				USSR	54.56			
ISCED LT1		65.54	41.75	59.89	ISCED LT1		166	129.9	152.2
ISCED 2		51.45	35.015	47.63	ISCED 2		56.6	31.19	42.4
ISCED 3b/c		21.57	8.19	20.45	ISCED 3b/c		77.59	56.62	70.65
ISCED 3a/4		11.84	-0.61	14.31	ISCED 3a/4		70.23	51.21	64.43
ISCED 5b		86.06	65.44	81.58	ISCED 5b		141.8	111.65	133.03
ISCED 5a/6		24.69	21.12	37.2	ISCED 5a/6		59.8	53.4	71.47

A3. Sensitivity Test Former USSR Countries: Math Proficiency Scale Regression Coefficients and T-statistics for

	Azerbajian	Estonia	Kyrgyzstan	Latvia	Lithuinia	Russian Federation	USSR
Immigrant	6.879	48.680	227.500	94.020	71.940	50.430	59.89
	-.250	-1.710	-8.050	-3.060	-.950	-2.130	-1.89
ISCED 2	-8.457	42.430	33.940	66.680	27.980	-11.710	0.439
	(-0.57)	-2.040	-1.710	-2.890	-.380	(-0.59)	-0.02
ISCED 3b, 3c	-9.207	83.250	33.260	104.600	27.780	15.870	24.67
	(-0.72)	-4.590	-1.280	-4.490	-.380	-.570	-1.17
ISED 3a, 4	6.458	68.250	57.290	80.050	47.260	22.650	30.46
	-.560	-4.250	-3.460	-3.830	-.650	-.890	-1.54
ISCED 5b	-4.566	70.750	67.620	80.230	57.650	18.570	-4.746
	(-0.39)	-4.330	-4.090	-3.720	-.790	-.980	(-0.25)
ISCED 5a, 6	-2.893	82.160	68.010	98.300	70.620	27.380	28.45
	(-0.24)	-5.020	-4.070	-4.450	-.970	-1.070	-1.47
ISCED 2*Immigrant	-3.788	-54.850	-46.100	-79.320	-41.190	.000	-12.26
	(-0.15)	(-1.92)	(-1.68)	(-2.69)	(-0.54)	.	(-0.43)
ISCED 3b, 3c*Immigrant	-3.214	-96.320	-45.840	-118.100	-42.460	-29.510	-39.44
	(-0.14)	(-3.64)	(-1.44)	(-3.95)	(-0.56)	(-1.12)	(-1.37)
ISED 3a, 4*Immigrant	-10.270	-78.710	-68.230	-90.150	-61.900	-36.610	-45.58
	(-0.45)	(-3.15)	(-2.75)	(-3.22)	(-0.83)	(-1.53)	(-1.59)
ISCED 5b*Immigrant	32.180	-49.180	-45.780	-58.400	-38.810	.000	21.69
	-1.390	(-1.96)	(-1.84)	(-2.06)	(-0.52)	.	-0.79
ISCED 5a, 6*Immigrant	27.570	-66.510	-53.670	-81.730	-59.460	-19.100	-22.69
	-1.240	(-2.71)	(-2.24)	(-2.94)	(-0.80)	(-0.84)	(-0.80)
Male	12.250	25.590	19.780	25.880	19.790	6.562	7.328
	-3.000	-3.370	-3.980	-3.680	-3.440	-2.450	-3
Year 2003	-3.709	-7.810	-7.772	-7.475	-8.985	-8.135	-8.878
	(-0.33)	(-0.74)	(-0.72)	(-0.71)	(-0.86)	(-0.74)	(-0.72)
Highest ISEI	.173	.704	.756	.602	.733	.816	0.869
	-1.320	-2.960	-5.250	-2.730	-4.170	-8.860	-10.08
Educational Resources at Home	8.759	21.190	16.910	21.190	22.340	14.810	16.26
	-3.500	-3.890	-5.150	-4.450	-5.770	-10.490	-13.13
Cultural Possessions	-.700	-2.062	-.483	-1.203	2.975	6.395	8.243
	(-0.26)	(-0.46)	(-0.16)	(-0.30)	-.890	-4.000	-5.09
Foreign Language	-31.570	-36.350	-37.130	-36.000	-36.960	-21.210	-17.67
	(-3.52)	(-3.74)	(-3.94)	(-3.74)	(-3.78)	(-4.24)	(-2.05)
Language Missing	-34.130	-39.460	-37.070	-40.020	-42.240	-33.620	-42.47
	(-2.82)	(-2.77)	(-3.16)	(-2.88)	(-3.13)	(-2.56)	(-4.49)
1st Generation	-6.494	.640	-.023	.083	.574	-5.774	-5.943
	(-0.45)	-.040	(-0.00)	-.010	-.040	(-0.42)	(-0.37)
Constant	476.000	404.900	228.700	363.700	386.500	411.500	400.2
	-33.130	-19.250	-12.700	-16.350	-5.310	-16.170	-20.52
N	4171	3855	4682	3467	4264	4567	23271
R-Squared	.089	.188	.558	.167	.178	.112	0.1244

A4: Sensitivity Test Former Yugoslavian Countries: Math Proficiency Scale Regression Coefficients and T-statistics

	Croatia	Serbia	Slovenia	Montenegro	Ex-Yugoslavia
Immigrant	15.47	99.65	31.03	90.16	57.29
	-0.76	-3.31	-1.18	-3.48	-2.24
ISCED 2	collapsed	46.33	33.01	42.9	23.05
		-2.11	-2.07	-2.44	-1.22
ISCED 3b, 3c	10.82	72.73	55.12	52.45	41.3
	-1.47	-3.47	-3.74	-3.38	-2.26
ISED 3a, 4	32.3	84.48	53.25	59.09	69.09
	-4.82	-3.79	-3.55	-3.56	-3.7
ISCED 5b	5.869	49.38	74.65	49.11	26.94
	-0.84	-2.34	-4.57	-3.06	-1.49
ISCED 5a, 6	31.57	68.34	78.91	46.57	50.25
	-4.2	-3.15	-4.54	-2.56	-2.65
ISCED 2*Immigrant	collapsed	-44.09	-29.6	-37.79	-20.54
		(-1.12)	(-0.86)	(-1.09)	(-0.70)
ISCED 3b, 3c*Immigrant	10.21	-40.51	-23.13	-18.19	-12.99
	-0.4	(-1.25)	(-0.80)	(-0.65)	(-0.45)
ISED 3a, 4*Immigrant	-48.71	-97.41	-67.4	-69.87	-81.46
	(-1.94)	(-2.95)	(-2.43)	(-2.53)	(-2.87)
ISCED 5b*Immigrant	19.96	-17.63	-46.76	-18.12	5.937
	-0.73	(-0.50)	(-1.42)	(-0.58)	-0.17
ISCED 5a, 6*Immigrant	-43.2	-73.43	-84.8	-48.49	-49.88
	(-2.05)	(-2.42)	(-3.18)	(-1.78)	(-1.65)
Male	24.81	15.91	17.23	20.39	16.11
	-9.78	-3.81	-2.36	-2.03	-6.2
Year 2003	25.41	17.66	15.38	16.09	19.01
	-1.68	-1.26	-1.07	-1.1	-1.31
Highest ISEI	1.005	1.265	1.489	1.474	1.237
	-9.58	-7.39	-4.77	-3.49	-10.1
Educational Resources at Home	13.1	10.68	7.24	8.393	14.28
	-8.96	-6.34	-1.47	-1.61	-11.24
Cultural Possessions	13.34	14.08	8.075	4.353	12.06
	-8.95	-5.29	-1.85	-0.67	-7.08
Foreign Language	-1.832	-2.239	-4.072	-1.376	-0.348
	(-0.12)	(-0.15)	(-0.25)	(-0.09)	(-0.02)
Language Missing	-16.53	-24.43	-30.88	-20.55	-18.61
	(-1.26)	(-1.03)	(-1.25)	(-1.11)	(-1.18)
1st Generation	-25.74	-26.18	-23.07	-23.67	-42.4
	(-1.47)	(-1.35)	(-1.20)	(-1.24)	(-5.66)
Constant	391.4	300.7	361.7	296.4	345.2
	-53.89	-13.62	-18.96	-8.56	-17.29
N	3553	3634	5151	3569	15583
R-Squared	0.191	0.203	0.268	0.291	.219

Appendix B: Math Proficiency Scale Regression Coefficients and T-statistics for Italian Origin

	Basic	SES	Resource	Migration
Immigrant	-23.21	-8.754	-9.962	11.36
	(-1.92)	(-0.37)	(-0.48)	-0.67
Male	19.9	18.97	21.33	22.27
	-5.92	-6.61	-7.57	-8.2
Year 2003	1.298	4.329	7.574	5.49
	-0.38	-1.34	-2.45	-1.8
ISCED 2		34.63	30.79	29.6
		-6.34	-5.73	-5.62
ISCED 3b, 3c		69.22	60.4	57.61
		-11.9	-10.33	-9.82
ISED 3a, 4		62.52	53.52	51.61
		-11.03	-9.57	-9.31
ISCED 5b		31.47	22.1	20.77
		-5.21	-3.75	-3.59
ISCED 5a, 6		56.66	45.07	44.03
		-9.12	-7.44	-7.33
Highest ISEI		1.366	1.175	1.126
		-17.99	-16.28	-15.93
Educational Resources at Home			13.25	12.55
			-12.43	-11.41
Cultural Possessions			10.62	10.37
			-8.8	-8.62
Foreign Language				-47.81
				(-2.44)
Language Missing				-38.99
				(-13.52)
1st Generation				8.143
				-0.35
ISCED 2*Immigrant		-3.405	4.987	-1.352
		(-0.13)	-0.21	(-0.07)
ISCED 3b, 3c*Immigrant		-6.009	2.928	-12.8
		(-0.22)	-0.12	(-0.59)
ISED 3a, 4*Immigrant		-15.17	-11	-19.26
		(-0.51)	(-0.41)	(-0.81)
ISCED 5b*Immigrant		-20.66	-24.43	-18.49
		(-0.58)	(-0.63)	(-0.50)
ISCED 5a, 6*Immigrant		0.838	5.937	2.882
		-0.03	-0.2	-0.11
Constant	456.7	342.4	351.4	359.7
	-180.19	-57.67	-61.21	-63.17
N	29136	29136	29136	29136
R-Squared	0.0127	0.1215	0.1544	0.1702

Appendix B: Math Proficiency Scale Regression Coefficients and T-statistics for Turkish Origin

	Basic	SES	Resource	Migration
Immigrant	-7.623	13.48	-5.02	22.42
	(-1.02)	-1.53	(-0.55)	-2.34
Male	10.7	12.39	15.53	16.25
	-3.25	-4.39	-5.64	-5.92
Year 2003	-0.278	-4.599	-8.579	-9.043
	(-0.04)	(-0.82)	(-1.58)	(-1.67)
ISCED 2		-4.931	-12.17	-12.39
		(-1.73)	(-4.61)	(-4.66)
ISCED 3b, 3c		13.63	8.64	9.473
		-0.95	-0.71	-0.77
ISED 3a, 4		35.63	20.99	20.7
		-9.33	-6.13	-6.05
ISCED 5b		14.44	-2.314	-2.439
		-2.03	(-0.34)	(-0.36)
ISCED 5a, 6		90.27	68.15	67.89
		-8.58	-7.21	-7.17
Highest ISEI		1.024	0.776	0.776
		-7.99	-6.76	-6.75
Educational Resources at Home			17.55	17.29
			-13.5	-13.44
Cultural Possessions			4.843	4.818
			-3.22	-3.24
Foreign Language				-30.59
				(-5.15)
Language Missing				-43.71
				(-4.35)
1st Generation				-16.29
				(-0.97)
ISCED 2*Immigrant		-4.792	1.064	-2.109
		(-0.43)	-0.09	(-0.20)
ISCED 3b, 3c*Immigrant		2.331	-2.388	-13.7
		-0.13	(-0.13)	(-0.75)
ISED 3a, 4*Immigrant		-9.103	5.03	-0.817
		(-0.61)	-0.35	(-0.06)
ISCED 5b*Immigrant		-24.5	-9.387	-13.34
		(-1.35)	(-0.53)	(-0.78)
ISCED 5a, 6*Immigrant		-85.5	-70.27	-69.67
		(-4.64)	(-3.90)	(-4.10)
Constant	420.4	360.1	388.9	389.4
	-88.25	-61.63	-67.84	-68.22
N	8826	8826	8826	8826
R-Squared	0.003	0.1765	0.2236	0.2286

Appendix B. Math Proficiency Scale Regression Coefficients and T-statistics for Polish Origin

	Basic	SES	Resource	Migration
Immigrant	8.716	39.4	41.64	49.08
	-1.28	-1.82	-2.05	-2.19
Male	8.184	5.954	8.607	8.568
	-4.17	-3.2	-4.6	-4.56
Year 2003	-5.557	-8.459	-10.29	-10.56
	(-1.79)	(-3.01)	(-3.73)	(-3.78)
ISCED 2		-4.572	4.542	2.55
		(-0.33)	-0.35	-0.2
ISCED 3b, 3c		16.84	20.46	18.32
		-1.32	-1.77	-1.55
ISED 3a, 4		41.17	37.87	35.83
		-3.14	-3.19	-3
ISCED 5b		47.5	41.87	40.1
		-3.22	-3.1	-2.94
ISCED 5a, 6		60.6	55.25	53.49
		-4.58	-4.53	-4.36
Highest ISEI		1.348	1.123	1.111
		-17.78	-14.71	-14.44
Educational Resources at Home			10.87	10.85
			-10.32	-10.23
Cultural Possessions			9.956	9.908
			-8.95	-8.85
Foreign Language				-6.065
				(-0.59)
Language Missing				-29.59
				(-3.42)
1st Generation				-6.996
				(-0.55)
ISCED 2*Immigrant		-26.81	-34.32	-35.9
		(-0.86)	(-1.15)	(-1.17)
ISCED 3b, 3c*Immigrant		-16.7	-15.4	-17.38
		(-0.64)	(-0.65)	(-0.72)
ISED 3a, 4*Immigrant		-37.42	-35.47	-36.11
		(-1.28)	(-1.27)	(-1.27)
ISCED 5b*Immigrant		-27.31	-27.13	-28.39
		(-1.16)	(-1.24)	(-1.21)
ISCED 5a, 6*Immigrant		-46.39	-41.63	-42.25
		(-1.95)	(-1.85)	(-1.76)
Constant	493.1	398	404.9	408
	-197.29	-28.99	-33.17	-33.24
N	9792	9792	9792	9792
R-Squared	0.003	0.1365	0.1622	0.1639

Appendix B. Math Proficiency Scale Regression Coefficients and T-statistics for Soviet Origin

	Basic	SES	Resource	Migration
Immigrant	13.75	65.54	41.75	59.89
	-1.61	-2.21	-1.5	-1.89
Male	7.417	6.608	7.487	7.328
	-2.57	-2.47	-3.09	-3
Year 2003	-6.731	-5.956	-8.051	-8.878
	(-0.63)	(-0.42)	(-0.64)	(-0.72)
ISCED 2		8.37	-2.204	0.439
		-0.37	(-0.09)	-0.02
ISCED 3b, 3c		38.97	23.29	24.67
		-1.88	-1.1	-1.17
ISED 3a, 4		48.72	28.35	30.46
		-2.55	-1.42	-1.54
ISCED 5b		4.747	-5.532	-4.746
		-0.27	(-0.29)	(-0.25)
ISCED 5a, 6		51.4	26.39	28.45
		-2.74	-1.35	-1.47
Highest ISEI		1.149	0.866	0.869
		-13.34	-9.84	-10.08
Educational Resources at Home			16.86	16.26
			-13.09	-13.13
Cultural Possessions			8.491	8.243
			-5.26	-5.09
Foreign Language				-17.67
				(-2.05)
Language Missing				-42.47
				(-4.49)
1st Generation				-5.943
				(-0.37)
ISCED 2*Immigrant		-14.09	-6.735	-12.26
		(-0.47)	(-0.23)	(-0.43)
ISCED 3b, 3c*Immigrant		-43.97	-33.56	-39.44
		(-1.45)	(-1.15)	(-1.37)
ISED 3a, 4*Immigrant		-53.7	-42.36	-45.58
		(-1.73)	(-1.44)	(-1.59)
ISCED 5b*Immigrant		20.52	23.69	21.69
		-0.71	-0.86	-0.79
ISCED 5a, 6*Immigrant		-40.85	-20.63	-22.69
		(-1.33)	(-0.72)	(-0.80)
Constant	469.4	364.3	400.8	400.2
	-132.68	-19.56	-20.44	-20.52
N	23271	23271	23271	23271
R-Squared	0.0023	0.076	0.1202	0.1244

Appendix B. Math Proficiency Scale Regression Coefficients and T-statistics for Yugoslavian Origin

	Basic	SES	Resource	Migration
Immigrant	1.594	60.01	44.85	57.29
	-0.11	-2.46	-1.81	-2.24
Male	10.36	11.08	16	16.11
	-3.42	-4.21	-6.24	-6.2
Year 2003	20.61	16.9	15.79	19.01
	-1.12	-1.09	-1.03	-1.31
ISCED 2		29.1	26.93	23.05
		-1.36	-1.45	-1.22
ISCED 3b, 3c		55.37	43.55	41.3
		-2.65	-2.41	-2.26
ISED 3a, 4		87.17	72.2	69.09
		-4.08	-3.91	-3.7
ISCED 5b		42.84	27.87	26.94
		-2.07	-1.56	-1.49
ISCED 5a, 6		68.49	49.64	50.25
		-3.17	-2.63	-2.65
Highest ISEI		1.64	1.324	1.237
		-12.75	-10.57	-10.1
Educational Resources at Home			15.04	14.28
			-12.01	-11.24
Cultural Possessions			10.8	12.06
			-5.99	-7.08
Foreign Language				-0.348
				(-0.02)
Language Missing				-18.61
				(-1.18)
1st Generation				-42.4
				(-3.93)
ISCED 2*Immigrant		-20.51	-18.72	-20.54
		(-0.72)	(-0.64)	(-0.70)
ISCED 3b, 3c*Immigrant		-6.444	2.031	-12.99
		(-0.24)	-0.08	(-0.45)
ISED 3a, 4*Immigrant		-89.65	-76.02	-81.46
		(-3.39)	(-2.85)	(-2.87)
ISCED 5b*Immigrant		-8.101	11.41	5.937
		(-0.24)	-0.32	-0.17
ISCED 5a, 6*Immigrant		-71.88	-54.82	-49.88
		(-2.28)	(-1.84)	(-1.65)
Constant	450.6	311	337.1	345.2
	-186.44	-13.69	-17.28	-17.29
N	15583	15583	15583	15583
R-Squared	0.007	0.141	0.184	0.202

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