DOES THE IMMIGRANT BACKGROUND AFFECT STUDENT ACHIEVEMENT? CROSS-COUNTRY COMPARISONS OF PISA SCORES[1]

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Abstract. The paper aims to analyze the learning differentials between natives and students with an immigrant background. Using econometric methods, we compare countries with different migration histories and the gap between immigrant and native students in other European countries. Through the analysis of the reading scores (OECD PISA 2018 tests), we deepen the gap between immigrants and native students. To investigate this gap, our study analyzes the role played by different variables such as gender, social and economic background, motivational characteristics, and school context to understand how they influence the educational gap between students with an immigrant background and natives. We find that the most important variables that contribute to the gap are the school's and family's socio-economic index and the language spoken at home.

1. Introduction

The gap in educational achievement between native-born and immigrant students has been extensively studied in the literature, and overall, there is a consensus in attributing this gap mainly to differences in parents' socio-economic background and, especially in non-English speaking countries, in speaking a foreign language at home (Marks, 2005; Mostafa, 2010; Teltemann *et al.*, 2022).

However, through studies using OECD PISA data it is possible to make international comparisons and investigate the differences found between countries, useful for shedding light on which dimensions can most influence the gap or conversely contribute to mitigating it (OECD, 2019). In fact, the size of the difference in educational achievement between immigrant and native students depends strongly on the country considered.

As is well known, the rate of immigrant (residents) population has progressively increased over the last century, first in Central European states and then in Southern and Northern European states. For this reason, the number of foreign-born babies and students tends to grow steadily, and integration issues are

[1] The article is exclusively expressing the authors' opinions. Although the paper is the result of joint work, sections are attributed as follows: paragraphs 3 and 4 to Valentina Ferri; paragraphs 2 and 5 to Giovanna Di Castro; paragraphs 1 and 6 to Salvatore Marsiglia.

increasingly topical, reshaping our societies (Castles and Miller, 2018). However, industrialized countries differ considerably in terms of the proportion of migrants, the socio-economic background of migrants compared to the native population, the characteristics of the education system, and the success of integration policies. Although foreign students in Europe are, on average, slightly less educated than natives, there is great heterogeneity between countries.

The aim of the study is to analyze the educational gap between native-born and foreign-born students in several European countries to investigate the impact of the condition of origin on students' educational achievement. Through the analysis of the results of the OECD PISA 2018 tests, the work aims to analyze the learning differentials between natives and students with immigrant backgrounds. Using econometric methods, we focus our attention on reading literacy scores deepening the gap in reading literacy between immigrants and native students. In addition to thus contributing to the existing academic debate, the study will provide useful insights to inform educational policies aimed at supporting the success of students with immigrant backgrounds.

2. Literature review

Numerous studies have shown that the educational disadvantages experienced by migrant students are mainly due to the precarious socioeconomic conditions of the family in the host country (Entorf, 2015; Bilgili *et al.* 2018). Differences in the economic and cultural resources available to families can affect access to educational opportunities and family support, creating a gap in educational achievement (Banerjee, 2016). In addition, some studies have attempted to analyse the impact of the phenomenon of "school segregation", understood as the concentration of male and female students in homogeneous classes by socioeconomic disadvantage; a condition that in standardised measures of educational achievement tends to be associated with lower academic performance (Perry, 2010; Chiurco *et al.*, 2023).

The use of a foreign language at home can also be a challenge for immigrant pupils, especially in non-English speaking countries. This can negatively affect their learning abilities and active participation in class, as well as being an indirect indicator of greater integration in the host country. Furthermore, foreign students who use a language at home different from that of the host country, or from that used in assessment tests, sometimes score lower than other foreign students (Entorf and Minoiu, 2005). Conversely, the association between the use of the host country's language at home and a greater sense of belonging at school and higher reading scores has been shown (Kilpi-jakonen and Alisaari, 2021). In some countries, speaking a minority language more frequently with parents may indeed have a positive impact on achievement, but it is important to strike a balance between minority languages at home and the language of instruction at school.

However, the relationship between language use at home and school performance appears to be more complex than how it has been conceptualised in most studies and is still an open area of analysis (Agirdag and Vanlaar, 2018).

It is important to consider that the size of the disparity in educational attainment between native and immigrant students varies widely across countries. This variation can be attributed to factors such as immigration policies, the socioeconomic diversity of migrants, the characteristics of the education system, and the resources available for integration (OECD, 2016). Migration across Europe is an increasing reality in recent decades, affecting countries with a long history of immigration as well as countries that are newer to the phenomenon. Therefore, there is no single explanation for the disparity, but rather a complex set of factors that must be considered in context.

3. Data and methodology

This study uses OECD PISA 2018 microdata on 15-year-old students' reading literacy proficiency, the edition's main survey domain. Furthermore, in addition to student proficiency data, the survey contains information on family socio-economic background, attitudes, beliefs, home possessions, school and learning experiences, and in-depth questions about computer familiarity and future expectations.

The countries considered in the study are Denmark, United Kingdom, Germany, Switzerland, Italy, and France. We have chosen these countries not only because there are some important differences in the history of immigration but also because of their different educational systems.

We apply the Oaxaca Blinder decomposition (Blinder, 1973; Oaxaca, 1973), to estimate the amount of the differential between foreign and native students.

Through this method, we distinguish which part is the result of the differences in characteristics included in model estimations and which part remains unexplained. We estimated the threefold decomposition, dividing the differences in reading literacy scores into endowments (E, due to differences in the predictors), coefficient (C, the contribution of the unexplained component), and interaction effects (I, indicating simultaneous differences) between the two groups:

$$E = \{E(X_M) - E(X_F)\}\,\beta_M \quad (1)$$

$$C = E(X_M)\,(\beta_M - \beta_F) \quad (2)$$

$$I = \{E(X_M) - E(X_F)\}\,(\beta_M - \beta_F)) \quad (3)$$

The group differences in predictors are weighted by the coefficients of the native student (reference group) to calculate the endowments effect. The variables included in the model are as follows in the next table 1.

Table 1 – *Variables included in the model.*

Variable	Note
Female	takes the value 1 if the student is female, 0 otherwise;
Escs	is an index that measures the access of students to family resources (financial capital, social capital, cultural capital, and human capital);
Mean_escs	is the average escs index at the school level;
Misced	takes the value 1 if the mother is graduated, 0 otherwise;
Fisced	takes the value 1 if the father is graduated, 0 otherwise;
Cultposs	is an index of cultural possession of the family;
Lang_at_home	takes the value 1 if the students speak the language of the country of destination/ mother tongue and 0 if he/she speaks another language;
Link	takes the value 1 if is available to use at home internet connection, 0 otherwise;
Computer	takes the value 1 if the students use computers at home, 0 otherwise;
Joyread	is an index of enjoyment of reading activities;
Resilience	is an index that measures the student-reported higher self-efficacy;
Compete	is an index that the student indicated a greater perception of competence/difficulty than the OECD average;
Belong	is the scale that indicates the sense of belonging at school;
Gfofail	is an index of the student's fear of failure;
Mastgoal	is an index of ambitious learning goals;
Workmast	is an index of motivation;
Age	includes age from 15 years and 3 completed months to 16 years and 4 completed months (14 possible options: ex. 15 years and 3 completed months; 15 years and 4 completed months; 15 years and 5 completed months);
Disclima	is a scale that shows that the student enjoyed a better disciplinary climate in language-of-instruction lessons;
Quietpl	is a quiet place to study;
Tschoolt	is a school program.

4. The results of the model and the differences in the predictors

Regarding the results of the model shown in Table 2, in Switzerland, Italy, France, and Denmark, both the explainable part of the distribution (i.e., due to differences in the characteristics of the two groups) and the "unexplainable" component (due to unobserved factors or discrimination) are significant.

The overall difference between the two groups can be explained by differences in the independent variables ranging from 38 points (for Italy) to 22 points (for France). Approximately 10 points of the difference is explained by exogenous unexplained characteristics.

This percentage is higher for Denmark where it reaches 30 points. In contrast, in Germany and GBR, the discriminating part of the breakdown is not significant.

As Table 3 shows, the variable that corresponds to a measure of the average socio-economic level of the school (mean_escs) is significant in all countries, indicating that the difference in scores between foreign and native students is greater in schools with a higher socio-economic level than in those with a lower

socio-economic level. However, the socio-economic and cultural level of the family of origin (escs) is significant in Germany (27 points), Denmark (11 points), Switzerland (11 points), and GBR (3 points) where this variable increases the differential between natives and foreigners.

Table 2 – *Oaxaca Blinder decomposition, overall results.*

	Germany	Denmark	France	United Kingdom	Italy	Switzerland
Group_1	537.7622***	519.0307***	518.6594***	524.6578***	491.3209***	512.9881***
	[1.7734]	[1.2462]	[1.3948]	[1.0260]	[0.9612]	[1.7371]
Group_2	486.6050***	456.7982***	475.7316***	508.0883***	447.8532***	466.8393***
	[4.7276]	[2.7818]	[3.8333]	[2.9149]	[3.1771]	[2.6459]
Difference	51.1572***	62.2325***	42.9278***	16.5695***	43.4677***	46.1489***
	[5.0493]	[3.0481]	[4.0792]	[3.0902]	[3.3194]	[3.1652]
Endowments	57.7829***	22.4711***	19.6399***	5.5719*	38.0436***	34.6398***
	[5.8912]	[3.7717]	[4.1416]	[3.3687]	[3.9140]	[3.2746]
Coefficients	79,128	29.7135***	9.4753**	32,955	10.6916***	9.7982**
	[5.8086]	[4.5210]	[4.0281]	[3.9661]	[3.0664]	[4.1030]
Interaction	-14.5385**	10.0480**	13.8126***	7.7020*	-52,676	17,109
	[6.5542]	[5.0573]	[4.0965]	[4.1961]	[3.7042]	[4.2025]

Source: Authors' elaboration on PISA data.

It could be noted (Table 3) that schools may have a different proportion of immigrant students, which, can also influence the socioeconomic status of a school. Moreover, previous studies have found that native students and students from higher socioeconomic backgrounds attend private schools with fewer immigrant students (Betts & Fairlie, 2003).

5. The contribution of unexplained component

The language spoken at home (lang_at_home), as evidenced by numerous studies in the literature, (Ferri *et al.*, 2023) is significant for all countries (first Germany 22 points) except for the United Kingdom. It seems clear that where the language of the host country is predominantly used at home, the student benefits from reporting better results on reading tests. The language spoken at home, in fact, represents, as is well known, not only a variable affecting better learning in foreigners but sometimes also a proxy for the level of integration in that family.

The United Kingdom deserves a separate discussion. The "English" language is the second most spoken language in the world and the one most studied in schools

around the world, contributing to the highest level of assimilation of the same. The results for this country are, for this reason, somewhat distant from the others and the language spoken at home is not one of the significant variables.

The UK is also the country where the difference between native and foreign students is lowest by far (16 points - table 2), and where foreign students perform best, compared to their foreign counterparts in other countries.

Table 3 – *Oaxaca Blinder decomposition, endowments.*

	Germany	Denmark	France	United Kingdom	Italy	Switzerland
Female	-0.0008	-0.2065	-0.0231	-0.1873	-0.0582	-0.1026
	[0.0907]	[0.3444]	[0.1853]	[0.2855]	[0.1117]	[0.1406]
Escs	26.7756***	11.4822***	0.8134	2.8951**	-5.2241	10.6138***
	[6.4753]	[3.6091]	[4.1286]	[1.4699]	[3.2747]	[2.5898]
Mean_escs	22.3008***	13.2645***	19.7913***	7.4178***	12.5063***	12.6973***
	[2.9797]	[2.1114]	[2.4959]	[1.1964]	[1.6884]	[1.4191]
Misced	-1.5694	-4.2388**	-4.0443*	0.8209*	0.3803	-2.3604**
	[2.3632]	[1.8347]	[2.0999]	[0.4719]	[0.6421]	[1.0305]
Fisced	-9.2624***	-0.6884	-1.7838	0.8531*	-0.024	-4.2870***
	[2.7107]	[1.2342]	[1.2173]	[0.4887]	[0.0811]	[1.1369]
Cultposs	-1.9443	-1.3891	2.7426**	-0.0923	0.6005	1.2414*
	[1.6738]	[1.5439]	[1.3939]	[0.2619]	[1.7297]	[0.6688]
Lang_at_home	22.2668***	6.5269***	1.5772	3.3938	13.8738***	13.1059***
	[4.3454]	[2.4437]	[2.5563]	[2.4156]	[2.6854]	[2.5423]
Link	0.0118	0.5295	0.1565	0.3821	0.5659	0.2495
	[0.1577]	[0.3230]	[0.2618]	[0.2715]	[0.3452]	[0.2628]
Computer	0.1308	0.011	0.9849*	-0.1532	3.5207***	0.4193*
	[0.4666]	[0.1444]	[0.5600]	[0.1725]	[0.8659]	[0.2460]
Joyread	0.2617	-2.4006***	1.5563	-7.6325***	1.0696**	0.3728
	[0.9451]	[0.8167]	[0.9624]	[1.2653]	[0.4802]	[0.7878]

Source: Authors' elaboration on PISA data.
Other variables included: resilience, compete, belong, gfofail, mastgoal, workmast, age, disclima, quietpl, tschoolt.

Regarding the observed gap in the coefficient effect (table 4), the variable that always seems to play a very relevant role in increasing the gap is the father's education level. It might be reasonable to think, therefore, that the parent with a higher level of education may be discriminating in the increase of the reading score, thus creating a greater distance in the scores of foreigners and natives.

This situation happens in Switzerland, Germany, and Great Britain. There could also be another explanation. Often, having a high level of education enables families to have their children attend schools that keep the origin foreign language, but this could also penalize the acquisition of German or English in this case.

It is worth observing that in Germany the coefficient effect is not significant at all, which means that the model explains the gap with observable characteristics. The same situation also occurs in Great Britain.

Relative to Great Britain, there are many factors that seem to increase the unexplained component. Of all of them, it is worth pointing out that having a mother with a degree decreases the coefficient effect, which could be because it increases the score of foreigners. The mother plays a large role in terms of language acquisition. Having a mother with a university degree, of course, could also favor natives, but we assume that, since it is a coefficient effect, the more correct interpretation is that it increases the socio-economic status of the foreign family, thus favoring a lower "discrimination" effect.

Immigrant parents have a deep apprehension about the education of their children, but they face many challenges because of their limited language proficiency and limited understanding of the new educational context (Garcia-Reid *et al.*, 2015). The language spoken at home is very important because it helps to reduce the coefficient effect; we could probably imagine that an individual's linguistic distance would favor his or her isolation in the classroom. Being able to express oneself with one's peers and teachers to the best of one's ability is obviously a predictor of greater inclusion of the individual in the school context, as well as better study results.

The Swiss system seems to show very interesting results in the coefficient effect: possession of cultural tools as well as access to the internet seem to affect the discrimination effect and seem to diminish the unexplained coefficient effect. We may therefore think that the family economic profile as well as the availability of tools flattens the coefficient effect (table 4).

It emerges a personal dimension that opens space for different interpretations, for example, goal orientation and fear of failure. Results also re-emerge in interactions.

In Italy, family income seems to be very relevant, as well as the presence of a computer at home, this suggests a probably lower socio-economic index for foreigners, and this leads to a discriminatory effect linked to family economic aspects. In this sense, the mother with a high educational qualification, proxied by a more affluent and probably more integrated life, would greatly reduce the reading differential (table 4).

It is also important to make some observations concerning the general level of scores in the various countries (table 2).

If we don't consider the UK, which for the reasons mentioned above has the highest score, the group of foreign students from Germany has the highest performance in reading tests among the countries considered. The difference with

Italy's foreign colleagues is around 40 points (table 1) on the tests, which corresponds almost to one school year of learning according to the OECD.

Table 4 – *Oaxaca Blinder decomposition, coefficient effect.*

	Germany	Denmark	France	United Kingdom	Italy	Switzerland
Female	0.9989	-5.8039*	4.5459	-0.3431	-4.3036	-2.7346
	[4.2126]	[3.2623]	[3.7207]	[3.5523]	[3.1487]	[2.7165]
Escs	14.8779***	0.1035	-5.0296	-0.3798	-10.1881**	-0.9574
	[5.1328]	[0.4854]	[3.4238]	[0.8523]	[4.1468]	[1.8377]
Mean_escs	-0.9015	-5.8927**	2.1764	-0.4427	-4.0202	-0.1434
	[1.9531]	[2.3514]	[1.4606]	[1.2820]	[2.6483]	[0.5578]
Misced	0.4684	24.6433**	12.7812	-37.4457***	-16.0837**	-3.3521
	[9.2819]	[10.7913]	[9.9863]	[11.2442]	[8.0622]	[7.5426]
Fisced	37.9464***	3.9268	3.8731	23.1726**	-6.637	20.1681**
	[11.0175]	[9.1378]	[10.2343]	[11.4438]	[8.3862]	[8.7299]
Cultposs	-0.5435	-3.6031**	1.5007	-0.2281	-0.5328	1.4620**
	[0.5102]	[1.5411]	[3.0279]	[0.2235]	[0.6292]	[0.6889]
Lang_at_	8.5821	-11.0179***	-8.0896**	-14.0209***	9.7979***	-2.2429
home	[6.2813]	[4.2616]	[3.6412]	[3.8669]	[3.6581]	[4.4232]
Link	6.3852	-74.2754*	-20.9076	-37.5493	-8.1065	-63.7192***
	[30.5916]	[44.8313]	[25.2035]	[31.7901]	[12.8447]	[23.8142]
Computer	25.4638*	-22.6572	0.6757	-6.4211	-23.5165***	-1.0712
	[14.2555]	[24.1229]	[10.2769]	[11.0397]	[6.6941]	[12.3121]
Joyread	-0.8373	-1.6829***	-0.3655	1.2125**	-0.0352	-0.6161
	[1.0323]	[0.5915]	[0.5579]	[0.5229]	[0.2023]	[0.7737]
_Cons	-460.4400**	-75.9598	-162.9733	-249.2944	-73.1188	11.9531
	[226.9693]	[161.6118]	[185.3429]	[157.8590]	[148.8042]	[149.1679]

Source: Authors' elaboration on PISA data.
Other variables included: resilience, compete, belong, gfofail, mastgoal, workmast, age, disclima, quietpl, tschoolt.

6. Conclusions

The study provided an overview of the educational outcomes measured by PISA tests in reading of foreign-born versus native-born students in several European countries, including Switzerland, Italy, France, Denmark, Germany, and the United Kingdom.

These differences in performance can be explained by a factor's combination, including both those related to the characteristics of the two groups, as well as those due to unobserved or "discrimination" factors, which were analyzed through econometric analysis.

Among the explicit variables, the average socio-economic level of schools emerges as the only significant factor in all the countries analyzed. This relevant

result shows that the difference in scores between foreign and native students is more pronounced in schools with a higher socio-economic level than in those with lower levels.

One possible explanation for this result is that schools with a higher socio-economic level might have a higher concentration of native students from favorable socio-economic backgrounds in environments where they would benefit more from shared interactions and learning opportunities, as opposed to foreign students who might be more likely to come from more socio-economically diverse backgrounds and might be at a disadvantage, accentuating the differential between the two groups. Immigrant families have often lower levels of ESCS, and the parents of immigrant students are less educated than parents of native students (Schleicher, 2006). The group of native students, in economically advantaged backgrounds, may also have greater access to educational resources, and a greater amount of cultural stimulation in their families of origin.

Furthermore, it is found that the socio-economic and cultural background of the family of origin is significant only in Germany, Denmark, Switzerland, and the UK, where the difference between native and foreign students increases further. This is not the case in Italy, and France, suggesting that the social composition of schools, contextual factors, or social dynamics play a more important role in influencing the achievement gap between these two groups of students. For example, there may be differences in the quality of teaching and access to additional educational resources that are not directly reflected by the measure of the socio-economic level of students at the individual level.

The language spoken at home, as shown by numerous studies (see also Ferri *et al.*, 2023), also significantly influences the achievement gap between foreign and native students in all countries considered, except Great Britain. Foreign students who speak the language of the host country at home tend to have better reading performance than those who speak a different native language more frequently at home.

We can assume that the language spoken at home, for foreign students, not only represents a vehicle for learning and consolidation but also reflects a proxy for the level of integration of the family. This underlines the importance of providing adequate language training to students' families and support to foreign students to facilitate their academic success.

The United Kingdom (GBR) scenario requires a separate, in-depth analysis. It is evident that English, as the predominant language, is assimilated by foreign students more quickly than other languages used in the countries under comparison. English is considered the second foreign language par excellence, it is assimilated more easily by students due to its presence in the media or social media, and its global relevance. It is likely that every student and family already has a knowledge base of this language in addition to studying it in class as an additional subject. This factor contributes to distancing the UK's results from the other countries surveyed. This is also the country where the difference between

native and foreign students is lowest by far (16 points), and where foreign students perform best, compared to their foreign counterparts in other countries.

We also feel it is important to note that in Germany and Great Britain, the coefficient effect is not significant at all, which means that the reasons for the gap between natives and foreigners are well explained by the characteristics observed in the model. Analyses of the observed gap in the coefficient effect do, however, reveal a significant role of the father's level of education in widening the gap between foreign and native students, especially in Switzerland, Germany, and Great Britain.

It is supposed that the higher educated parent may influence the increase in reading scores, thus creating a greater disparity between foreign and native students. However, there could be another explanation: the higher education of immigrant families could allow them to have their children attend schools that maintain their mother tongue as their first language, in order not to lose the value of this cultural and identity resource, which could penalize language acquisition in the host country.

In the UK, and in Italy, several factors seem to increase the unexplained gap component, including the fact that having a mother with a university degree reduces the coefficient effect. This could be due to the increased scores of foreign students, as the role of the mother is also crucial for language acquisition. Presumably, the presence of a mother with a university degree also increases the socio-economic status of the foreign family, the possible integration, and the likelihood of speaking the language of the host country at home, reducing the discriminatory effect.

In the Swiss context, factors such as possession of cultural tools and access to the Internet seem to influence the discrimination effect by decreasing the unexplained part of the gap. This suggests that family economic profile and availability of resources have a leveling effect on the coefficient effect.

Finally, some relevant observations emerged by analyzing the differential in the scores of native and foreign students across countries. The lowest difference between the two groups is found in the United Kingdom, probably due to the mentioned factors such as language and other elements that favor the assimilation of English by foreign students. On the other hand, the highest difference between the two groups is observed in Denmark, followed by Germany, Switzerland, France, and Italy. On the other hand, foreign students in Germany show the highest performance in reading tests compared to the other countries examined. Consider that the difference between foreign students in Germany and those in Italy is around 40 points in the tests, corresponding to almost one school year of learning according to the OECD.

The results presented underline the importance of considering the national context and country-specific factors when analyzing differences between foreign and native students. It is crucial to understand the role of language, as well as parental education level and socio-economic conditions to correctly interpret the

observed disparities in test scores. On the other hand, the most significant role for all countries seems to be that corresponding to the socio-economic composition of schools.

This provides significant insights to guide educational policies aimed at reducing differences and promoting the inclusion of foreign students in the school system.

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