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Marina Murat

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RECent: c/o Dipartimento di Economia Politica, Viale Berengario 51, I-41100 Modena, ITALY
Phone +39 059 2056856, Fax +39 059 2056947, E-mail: RECent@unimore.it

Do immigrant students succeed?
Evidence from Italy and France based on PISA 2006

Marina Murat

University of Modena and Reggio Emilia, RECent.

Abstract. This paper uses data from PISA 2006 on science, mathematics and reading to analyse immigrant school gaps – negative difference between immigrants' and natives' scores - and the structural features of educational systems in two adjacent countries, Italy and France, with similar migration inflows and with similar schooling institutions, based on tracking. Our results show that tracking and school specific programs matter; in both countries, the school system upholds a separation between students with different backgrounds and ethnicities. Residential segregation or discrimination seem also to be at work, especially in France. Given the existing school model, a teaching support in mathematics and science in France and in reading in Italy would help immigrant students to converge to natives' standards.

Keywords: International migration, educational systems, PISA.

JEL: F22, I21

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1. Introduction

Recent homogenous cross-country data show that an immigrant gap in education – negative difference between immigrants' and natives' scores - is widespread (TIMSS, PIRLS, PISA).[1] While its implications are clear - unequal opportunities in labour markets (Dustmann, 2004) -, its causes are widely debated. The debate has mostly focused on the characteristics of immigrant students, seldom considering also those of receiving countries, as institutions and, particularly, schooling systems, despite the unquestionable importance of the latter (Schneeweiss, 2009; Ammermueller, 2007b; Entorf, and Minoiu, 2005; Entorf and Tatsi, 2009; OECD, 2006; Entorf and Lauk, 2006; Schnepf, 2006).

Some features of school systems vary substantially across countries, but their basic characteristics can be related to two main models: tracking and comprehensive. In the tracking system, students are channeled into schools with different programs, academic and vocational, with vocational schools ranked below the academic ones in terms of quality, program content and students' prospects of pursuing further studies at the tertiary level. In the comprehensive model, all students follow the same program for the entire cycle of compulsory education. Moreover, those paper that consider school systems tend to rely on macro indicators, which allow international comparisons between educational models and average performance across countries, but do not shed light on the relations between the performance of students, their background and the school type they attend (Schutz et al. 2008, Brunello and Checchi 2007, Wömann 2004, Ammermueller 2007a, Hanushek and Wömann 2006, Bauer and Riphahn 2006, Raitano and Vona 2010). For these relations, individual indicators are needed.

This paper uses data from PISA 2006 on the three fields of science, mathematics and reading to analyse the relations between immigrant gaps and schooling in two contiguous European countries: Italy and France. These countries have several characteristics in common - income and

[1] The Trends in International Mathematics and Science Study (TIMSS) and Progress in International Reading Literacy Study (PIRLS) and Programme for International Student Assessment (PISA) periodically assess the performance of students of school age in mathematics, literacy, or reading, and science in several countries.

institutions, school tracking, much of the immigrant population originating from North and Central Africa - and one relevant difference, the historical length of the immigration phenomenon, which dates back to before World War II in France and to only the mid-nineties of last century in Italy. This investigation can help to understand the role of educational institutions in fostering, or deterring, the educational integration of immigrants in these countries, and also to conjecture on the likely developments of the phenomenon in Italy.

In order to have a unified framework on schooling at the individual level, we have built a proxy of school tracks by splitting the schools of each country into three main types: academic, technical and vocational. The data show that, in both countries, immigrant students mostly attend non academic schools and, especially in Italy, repeat grades more than natives.[2]

The analysis is performed by measuring, on one hand, the immigrant gaps in pooled regressions on data concerning Italy, France and Western Europe and, on the other, the disaggregated performance of immigrants and natives in the two countries of interest. The Bayesian Information Criterion (BIC) is used to select variables from a wide set of potential regressors concerning the characteristics of students, their background, the school type attended, the grade they are in, the hours of study in each field and other factors.

Our results are as follows: the pooled regressions for natives and immigrants show that immigrant gaps are larger in Western European countries with school tracking. Among the three fields, the more negative gaps are in science; this holds for each of the three aggregates: Western Europe, Italy and France. In Western Europe and France, the gaps are narrower in reading, while in Italy the smaller gaps are in mathematics. Once an extended number of control variables have been taken into account, 'final' or unexplained gaps remain high and significant especially in France, suggesting that factors not captured by our regressors, as residential segregation or discrimination, may be at work. In this country, moreover, the gaps of second generation immigrant are similar to those of first generation ones, and not –as could be reasonably expected – smaller.

[2] Students in grades below the average one in relation to their age are not necessarily repeaters, but in what follows we will use this more concise form than 'grade below the expected in relation to age'.

The separate tests for immigrants and natives in each country show that in all cases and in the three fields scores are strongly related to the school types attended by students. Immigrants in Italy attending technical and vocational schools are disadvantaged with respect to those in academic schools especially in the field of reading, while in France they are disadvantaged especially in mathematics and science. On the other hand, while for natives grades repetition has the expected coefficient values, corresponding to about one school year for each grade, for immigrants it has less significant or lower values, suggesting that immigrants may be repeating grades unnecessarily, especially in Italy.

In both countries the performance of students, immigrants and natives, is related to family background but this happens especially in Italy. In the latter, several variables are significantly related to scores and the coefficients of interacted variables – concerning background or students' characteristics and schooling – are also significant.

Our findings show a lack of integration in education of immigrants in both countries and more clearly in France, where immigration has an older history. The paper is structured as follows. The following Section (2) presents the data and some descriptive statistics. Section 3 describes the estimation strategy adopted and the expected results. Section 4 presents the results and Section 5 concludes.

2. Data and descriptive statistics

The Programme for International Student Assessment (PISA) is an internationally standardized evaluation promoted by OECD and conducted every three years. Its main purpose is to collect data on the competencies of 15-year-old students in reading, mathematics and science, to be used to compare results both within and between countries. This paper is based on the third wave of PISA, based on data collected in 2006, which included 57 jurisdictions and focused on science. For OECD countries, scores have been standardized to an average of 500, with an international standard deviation of 100. Table A2 depicts the average performance of students in the three disciplines in

Italy, France and the main Western European countries, while the percentage of immigrant students in each country are depicted in Table A1 of the Appendix.

The age at which the type of school is selected varies from ten years old in some countries to sixteen in others. In our two countries of interest, France and Italy, selection occurs at age 14. The PISA student questionnaire includes an indicator (*ISCEDO*) that distinguishes between general, pre-vocational and vocational schools, but figures are missing or unreliable for some countries. Hence, we used the UNESCO (2006) classification of education systems to build a proxy of the 'school type' variable. More precisely, we split the schools of each country into three main categories, ranked in decreasing order in terms of educational quality: type 1 - academic -, type 2 - intermediate -, and type 3 - vocational-.[3] We then link this classification to the variable *(PROGN)* of the student database indicating the school attended by each student, and obtain, as a result, a proxy of school types at the micro level (classification of schools in Table A3 of the Appendix). This differs from previous studies on educational systems, where school models are considered at the aggregate country level.

A relevant phenomenon is the proportion of grade repeaters - students below the average grade -, which also varies significantly between countries. Grades repetition is related to educational customs rather than to institutional rules, but may be of interest if considered together with the structural features of educational systems.

Table 1 reports the values of an index of "specialization" of immigrants with respect to natives in each school type and grade in European countries. Schools are considered "comprehensive" when choice of track takes place at or after the age of sixteen. Index numbers are the ratio of the share of immigrant students in a given school type or grade to the share of native students in that school type or grade. Values above unity denote a relative specialization of immigrant students. The last column indicates the average grade for fifteen-year old students in each country, which is 10 for France and Italy.

[3] 'Special schools' – schools for children with special needs – have been included in type 3; within our sample, they are present only in countries with tracking.

Insert Table 1 here

Index numbers of France and Italy show that immigrant students are concentrated in vocational and technical schools and in grades 9 and below. The value of the index of repeaters in Italy is extremely high: immigrant students repeat grades eleven times more than natives.

3. Estimation Strategy

As a first step, immigrant gaps are measured in each of the two countries by regressing the students' scores on the dummy variable indicating the status of immigration. The coefficient of this dummy provides an unconditional measure of the immigrant gap. Gaps are then measured again, this time by including several regressors.[4] As a second step, in order to have a more disaggregated picture of the relations between the scores of immigrants and natives in each country, regressions are run separately for each group of students.

Unconditional gaps in each country are measured with the following specification:

$$Y_{is} = \beta_0 + \beta_I I_{is} + \varepsilon_{is} \quad (1)$$

where Y_i is the response variable representing the science score obtained by student i in school s. I_{is} is the student's immigrant status. We split immigrants into first and second generation in France, but not in Italy, where the proportion of second generation immigrants on the overall students' population is low. β_I denotes the variable's coefficient and ε_{is} is the error term. Gaps are measured by β_I.

[4] The more commonly used Oaxaca-Blinder specification, being based on the use of the entire dataset for the regressions concerning each group, tends to produce an over-representation of the "explained" part of the gap and, in some cases, leads to biased coefficients. It has been shown that the OLS coefficient of the group indicator in the pooled regression can be considered a reliable measure of the gap (Elder, Godeeris and Haider, 2010)

Final, or 'remaining' gaps, are the coefficients of the immigrant dummy in educational production functions specified as follows:

$$Y_{is} = \beta_0 + \beta_I I_{is} + \beta_G G_i + \beta_S S_{is} + \boldsymbol{\beta}_X \boldsymbol{X}_{is} + \boldsymbol{\beta}_{SX} (S_{is} \times \boldsymbol{X}_{is}) + \boldsymbol{\beta}_{GX} (G_{is} \times \boldsymbol{X}_{is}) + \varepsilon_{is} \qquad (2)$$

as in equation (1), β_I, is the coefficient of interest of the immigrant dummy, I_i, the immigrant status of students. Type of school and grade are, respectively, S_{is} and G_{is}, and β_S and β_G are their coefficients, $\boldsymbol{X}_{is}$ is a vector of background variables and $\boldsymbol{\beta}_X$ is the vector of coefficients. $S_{is} \times \boldsymbol{X}_{is}$ and $G_{is} \times \boldsymbol{X}_{is}$ are the interactions of background factors with *school types* and *grade,* and $\boldsymbol{\beta}_{SX}$ and $\boldsymbol{\beta}_{GX}$ are the vectors of coefficients. Table A4 shows the list of variables. Usual assumptions on errors are made. These gaps capture the part of the difference in scores between immigrants and natives that is left unexplained once all the above variables have been taken into consideration.

To compute model parameter estimates and their standard errors, the balanced repeated replications (BRRs) based on the weights provided in the PISA dataset are employed. OECD (2009) accounts for the two-stage sample design for selection of schools and students within schools. In particular, PISA provides a set of 80 alternative weights that has to be assigned to each student to form alternative samples at the country level. BBR weights are also employed to estimate regression coefficient standard errors. The confidence intervals for the inferences reported in Tables 3a and 3b are standard (1-α)% confidence intervals (α<0.05) based on the asymptotic normality assumption of the coefficient estimates. We performed diagnostic analysis on the BBR coefficient estimate replicates to confirm that such an assumption is trustworthy for all the reported results. In all cases, we shall refer to correlations between variables, not to causal relations.

Since second generation immigrants attend the entire school cycle in the country of residence, and their families have been living there for a longer time, their integration in education should be higher than that of first-generation ones (Schneeweiss 2009, Schnepf 2004). Hence, once all relevant factors have been controlled for, the scores of second-generation immigrant students in France should be more similar to those of natives than those of first generation ones.

The separate analysis regarding immigrants and natives in each country uses the Bayesian Information Criterion (BIC) to select relevant variables from a large set of potential candidates. Weighted OLS are then run with the chosen regressors. More precisely, backward selection is applied up to the point where taking away another regressor from the model increases the BIC (Burnham and Anderson 1998). The selection is applied five times, one for each student's plausible value (OECD, 2009), choosing the variables selected in all runs and weighting the regression for the student final weights. With the BIC, a common set of variables at the origin may imply that the OLS estimations concerning the two groups of students in each country contain different regressors. The advantage of the procedure is a parsimonious representation of the factors significantly related to the dependent variables.

For each country and group of students, immigrants and natives, the estimation equation now is the same of (2), except for the immigrant dummy:

$$Y_{is} = \beta_0 + \beta_G G_{is} + \beta_S S_{is} + \boldsymbol{\beta}_X \boldsymbol{X}_{is} + \boldsymbol{\beta}_{\boldsymbol{SX}} (S_{is} \times \boldsymbol{X}_{is}) + \boldsymbol{\beta}_{\boldsymbol{GX}} (G_{is} \times \boldsymbol{X}_{is}) + \varepsilon_{is} \qquad (3)$$

Among the set of potential regressors, the factors related to school include school type, grades and the hours of study at school in each field, *regular.lessons*. Given the presence of the variable *school.type*, the latter variable should capture the existence of different curricula within tracks. This is relevant especially for the study programs of schools of type 1, lyceums and gymnasiums, which are either science or humanities oriented, and for those of schools of type 2, which are more or less technologically oriented. As the educational quality of academic, technical and vocational schools can be ranked in decreasing order, we expect the coefficients of the last two to be negative. Negative coefficients are also expected for grades below 10, the mean grade for fifteen year-olds in both countries.

As they can capture the relation of scores with different factors, the coefficients of the variables *school.type* variable must be considered more closely. For example, if students in a country were sorted by school type only in relation to innate ability, then the school type coefficient would mainly denote the difference in ability between students in schools of type 2 and 3 and those in schools of type 1 (included in the intercept). However, neither innate ability nor – consequently - its influence on scores can be measured with a sufficient degree of accuracy. If, however, ability or, rather, capacity, is related to family background, the school type coefficient will capture an indirect relation between background and scores (the direct one going through background variables) even if students are sorted by capacity. Finally, if the choice of schools is made by families, and well-off families tend to send their sons to academic schools, and less well-off to technical and vocational ones, then the coefficient of the school type variable will mostly capture background factors, and only in a minor degree, capacity or ability (Checchi and Flabbi, 2007).

The sorting of students by school types depends mainly on families decisions in Italy and on school decisions, with the participation of families' representatives, in France. Hence, the correlations between scores and background factors and between scores and school types can be expected to be more significant in Italy than in France. The interactions between school types (or grades) and background can also be expected to be especially significant in Italy. These interactions may capture the performance of given groups within school types.

The coefficients of the *grade* variable should capture the capacity of students. On PISA data, one school year roughly corresponds to a third of an international standard variation, of 100 (Schuetz, Ursprung and Woessmann, 2008). Hence, if repeating grades mainly depends on actual capacities, we can expect the coefficients of this variable to be of about a third of an international standard deviation. As previously said, if capacity is related to background, or, simply, if the decision of making students repeat grades does not depend only on their abilities and capacities, then the coefficient of this variable will also capture indirect correlations.

4. Results

The left side of Table 1 depicts the immigrant unconditional gaps in France, Italy and Western European countries, estimated with the specification of equation (1). Western Europe is split into two subsets of data, one on countries with school tracking, the other on countries with comprehensive schools.

Insert TABLE 2 here

The Table coefficients show that immigrants tend to lag behind natives in measures ranging from one to almost two school years (using the PISA standard seen above). In the three cases under consideration, of Italy, France and Western Europe, the field of science registers the larger negative coefficients, while those of mathematics and reading depict heterogeneous results. The smallest gaps in France and in the group of Western European countries having comprehensive schools, concern reading; in France this applies to both first and second generation immigrants. An explanation of this is that a relevant proportion of the immigrant population in France originate from French ex-colonies. Part of the immigrant population in European countries with comprehensive schools also originate from ex-colonies (for example, in Spain), but their relatively less negative performance in reading may also depend on the characteristics of the comprehensive model, which is based on the study of the national language and of another modern language, the second often chosen by the student among a set of alternatives. Differently, in Italy, where immigrants from ex-colonies are a restricted minority, and where school programs often include the study of classical languages, as Latin and ancient Greek, the widest negative gaps are in the field of reading, while the smallest and less significant ones are in mathematics.

As specified in equation (2), final gaps are measured while controlling for a large set of variables (Table A4). These gaps are what remains “unexplained” once the variables potentially related to students’ scores have been taken into account. The right side of Table 2 shows that final gaps remain large and significant in the field of reading in Italy, and in the three fields, of science, mathematics and reading, in France. In this country, gaps correspond to about 87% of a school year in science and math, and to about a half school year in reading. Also, while unconditional gaps are larger for first generation immigrants (left side of Table 2), final ones do not differ much between generations. If the background, country of origin and other variables included in the regressions sufficiently control for differences between immigrant cohorts, the result signals a lack of integration of immigrants in education. Final gaps may depend on missing variables, as for example, school inputs - class size, sources of funding, existence of external examinations - not considered in this paper, but which in previous studies proved to be only weakly related to immigrants' scores (Entorf and Lauk, 2006), but can also depend on residential segregation or discrimination. The higher gap in the field of reading in Italy (initial and final) suggests that immigrant students in this country could reach higher levels of school performance with a specific support in subjects as Italian language and, more generally, in the humanities.

The results of separate regressions on immigrants and natives in each of the two countries are depicted in Tables 3a and 3b .[5] Each Table is partitioned into three parts, concerning students' characteristics and background, school factors and students' interests. It is evident at a glance that the list of selected and significant variables are longer in Italy than in France, both in the regressions concerning immigrants and in those regarding natives. This implies that several observable factors are significantly related to the school performance of students in Italy. Also, school types are almost always selected in both countries, with high and significant coefficients. The only exception is immigrant students in France (Table 3b) in the field of mathematics, where the *school.type* variable is not among the regressors, but the variable *regularlessons.sci* is instead selected, and its coefficient is strongly significant. Also, the interactions between school factors, as school tracks and grades, and students' characteristics or family background are significant in the regressions

[5] Regressions are run with the intercept capturing the more favourable alternative, which is students that speak the national and the test language at home, male, with background above average, in grade 10 (the average grade for fifteen years old in both countries), attending academic schools (type 1), studying science, reading or mathematics more than 4 hours per week, interested in science and in matters concerning the environment.

concerning Italy, in the field of mathematics. On the other hand, no significant interactions concern either natives of immigrants in France. This may be related to the different mechanisms of school selection existing in each country, mainly based on family choice in Italy and on teachers' evaluations in France.

Table 3a1, concerning data on immigrant students in Italy, shows that immigrant students attending technical and vocational schools lag substantially behind their peers in academic schools, in the three fields. The values of coefficients in science and reading correspond to more than one school year for those in technical schools, and to about three (in science) and five years (in reading) for those in vocational schools. Regarding mathematics, coefficient values must be considered together with those of the interacted variables.

The coefficients of *school.type2* and *school.type3* in the field of mathematics (Table 31a – math column -) are strongly negative, but they shrink for students originating from countries outside the European Union (EU), *student.other.country*, and for girls. In the first case, the coefficient of the variable *student.other.country* is -25.38, that of *school.type.3* is -170.14, and the value of the coefficient of the interacted variable, *student.other.country:school.type.3*, is 40.31, hence non EU students in vocational schools lag behind their peers in academic schools by 155.23 (-25.38 - 170.14 + 40.31); while the difference for EU immigrants in vocational schools is -170.14 (significance in all cases at 1%). This is consistent with what was expected: immigrant students from culturally distant (non EU) countries often attend vocational or technical schools because of a disadvantage in the subjects included under the label of 'reading', but once in these schools their performance in mathematics – a more culture-free subject than reading – is above that of other students. Similarly, female immigrant students perform below boys in mathematics, but this lower performance is partly compensated in schools of type 2 and 3. The coefficients of the interacted variables *female:school.type.2* and *female.school.type3* are both positive and significant. The performance of females in schools of type2 is -83.19 (-63.87 -83.13 + 63.81), not significantly different from the average (or from that of boys).

Both effects arise for similar reasons; in fact, the gender gap in mathematics is a well-known phenomenon that concerns several countries (Guiso at al., 2008; Fryer and Levitt, 2010). In Italy, in particular, the gender gap can be related to the distribution of girls between school curricula, even within tracks, and especially between curricula within academic schools. The programs of academic schools are differentiated between gymnasiums and lyceums, the first being centred on the humanities and classical studies and the second focusing more on science and mathematics. Girls attending academic schools are much more present in gymnasiums than in lyceums. Hence, these girls study less mathematics than boys (in terms of hours, of levels of difficulty, of related subjects). Consistently, the positive coefficients of the interacted variables *female:school.type2* and *female:school.type3,* in Table 3a1 show that the gender gap in mathematics is small or nil for immigrant girls attending technical and vocational schools and, conversely, remains high for those attending academic schools.

Results on grades are also informative. In Table 3a1, immigrant students in grade 9 lag substantially behind immigrants in grade 10 in the field of reading, but differences are small and much less significant in mathematics and science. For students in grades below 9, the lag in mathematics is not significant. Given the high incidence of immigrant repeaters in Italy (Table 1), the low values and scarce significance of the above coefficients suggest that many of these students may be repeating grades unnecessarily, especially for which regards mathematics and –for those in grade 9 - also science. A common practice in Italy is to almost automatically place immigrant students – especially first generation ones – in grades below those corresponding to their age. Besides, as shown by Table 1, immigrant students are concentrated in vocational and technical schools. Several, among the restricted group of immigrant students that attend academic schools, tend to shift to vocational or technical schools when they fail the exams and must repeat grades. With the shift, their study programs are levelled down in all subjects. The low significance of the coefficient in mathematics suggests that these students prevalently fail in the subjects related to reading.

Table 3a2, concerning native students in Italy, show that if immigrants repeaters lag behind especially because of reading, in the case of natives the pattern is reversed: native repeaters lag behind especially in mathematics. More generally, the difference between Italian repeaters in grade 9 and their peers in grade 10 is about one school year on PISA data, and that of those in grades below 9 is about two or more school years, which is what can be normally expected. This, together with negative coefficients being larger in mathematics, suggests a tighter correspondence between grades and ability than for immigrant students.

Furthermore, natives attending technical and vocational schools lag behind their peers in academic schools in all fields. Also in this case, the variables' coefficients must be considered together with those of the interacted variables. Girls lag behind boys in mathematics and, in this case, also in science, but, for similar reasons to the ones seen above, the lag shrinks for girls in technical and vocational schools. Interestingly, girls have a higher performance than boys in reading (this also is a result common to several countries) which becomes *larger* in schools of types 2 and 3.

The coefficients of the variables concerning the hours of study at school, *regularlessons*, add evidence to the importance of school curricula within tracks. In particular, in Table 3a2, the number of hours of lessons of science and mathematics are correlated with scores in the three fields, including reading, not just to those of science and mathematics. This may be due to schools with more hours of mathematics and science being of higher educational quality in all fields; or, also, to a positive selection of students – in terms of ability – in these schools.

Insert Tables 3a1, 3a2, 3b1, 3b2 here

Table 3b1 concerns immigrant students in France. As already observed, the scores of students in France are less correlated than in Italy to family background; also, there are no interacted variables – concerning school and background - among the selected regressors.

The coefficients of the school variables, *school.type* and *regularlessons*, are generally strongly significant.[6] In particular, immigrant students attending technical and vocational schools lag substantially behind those attending academic schools, except in mathematics (coefficient values of *school-type2* are -99.54 for science and -127.24 for reading, at 1% significance), where, however, students attending schools with less than four hours a week of science, a subject related to mathematics, lag behind their peers in a measure corresponding to almost three school years (or a 93% of a standard international variation on PISA data).

The hours of lessons of reading, *regularlessons.read*<4, in turn, are correlated to the scores in science. While the relation between the hours of study of science and the performance of students in mathematics may understandably capture a partial overlapping between the two fields, or the existence of reciprocal knowledge spillovers, that between the hours of study of reading and the scores in science seems to be rather the consequence of a general higher quality of education of schools with study programs that include more demanding courses (for example, classical studies of Latin culture and language). Students in these schools are likely to perform above average in all subjects. Hence, also in France, school programs matter significantly.

Regarding both countries and groups of students, the coefficients of the variables in the upper and lower parts of Tables 3a1-2 and 3b1-2 offer some other interesting insights. Table 3a2, concerning the characteristics and background of natives in Italy, depicts a long list of significant coefficients concerning family and home characteristics. Scores are correlated with a non national language spoken at home, with the occupation, job status, education of father and of mother, with the number of books at home, with having a pc at home, and with the three welfare indicators, wealth, cultural possessions, and home possessions (Table A4). They are also correlated with

[6] Immigrant and native students attending schools of type 3 in France are a small proportion of our database, hence more attention 2 will be given to schools of type 2.

factors that concern the interests of students, on environmental problems (*envaware*), on science and on related subjects.

The list is shorter in France. In Table 3b2, concerning natives, the occupation of father and mother are significant for the performance of students in science and mathematics, but coefficients are low, and wealth and home possessions matter for the results in reading. Several variables indicating the student's interest in problems related to the environment and to scientific matters are correlated with scores in all subjects. These variables may capture partly innate capacities and partly the influence of family, friends or school environment. In Table 3b1, concerning immigrants, only their interest for the environment and for scientific subjects and matters related to science are significantly correlated with scores.

5. Conclusion

In both Italy and France immigrant students attend mainly non academic schools and, especially in Italy, repeat grades more than natives. Our results show that, controlling for several variables regarding students characteristics, family background and schooling, immigrant school gaps remain negative and significant in both countries, especially in France. In this country, gaps are high in all fields - science, mathematics and reading - and do not differ significantly between first and second generation students. This suggests that factors not included in our regressions, such as residential segregation or discrimination, may be affecting the performance of immigrants. In Italy, gaps remain high especially in reading.

Looking separately at immigrants and natives in the two countries, we fiend that the school types attended are strongly correlated with scores for both groups of students, although with some disparities. Immigrants in Italy that attend non academic schools perform below those in academic schools especially in reading, while for natives the negative difference concerns the three fields. Also, immigrant students in Italy repeating grades perform below average especially in reading, the difference being nil in mathematics. Native repeaters, conversely, perform below average in all subjects.

School curricula matter almost as school tracks in France. For given school types, more hours of reading and of science are related to a better performance. This applies similarly to immigrant students and to natives, but in French academic schools more hour of reading often imply hours of classical studies - especially Latin culture and language - which are especially demanding for students originating from culturally distant countries.

Results in terms of equity are not encouraging. Future research, based on data from PISA (2009) will highlight whether the performance of second generation immigrants in Italy is nearer to that of natives, compared to that of first generation immigrants, or, as in France, differences persist. The results of this paper point in the direction of persistence. The educational institutions of the two countries, based on a marked differentiation between school tracks and even of curricula within tracks, tend to maintain the divide between students having different initial social conditions and backgrounds which especially affects immigrants (Murat, et al., 2010; Bertocchi and Spagat, 2004). Policies should aim to simplify the structure of study programs, to reduce the differentiation between curricula and to lower the number of students repeating grades (OECD, 2011). In both countries, a special teaching support should be provided to students originating from different countries and cultures. In particular, a support in the subjects grouped under the labels of reading and science would help immigrant students to avoid levelling down their education in all subjects.

References

Ammermueller, A. 2007a. PISA: What makes the difference? Explaining the gap in test scores between Finland and Germany. *Empirical Economics* 33: 263–287.

Ammermueller, A. 2007b. Poor Background or Low Returns? Why Immigrant Students in Germany Perform so Poorly in the Programme for International Student Assessment. *Education Economics* 15 (2): 215–230.

Bauer, P., and R.T. Riphahn. 2006. Timing of school tracking as a determinant of intergenerational transmission of education. *Economics Letters*, 91(1):90-97.

Bertocchi, G., and M. Spagat. 2004. The evolution of modern educational systems: Technical vs. general education, distributional conflict, and growth. *Journal of Development Economics*, 73(2): 559-582.

Burnham, K.P., and D.R. Anderson. 1998. *Model Selection and Inference*. Springer-Verlag, NY.

Brunello, G., and D. Checchi. 2007. School tracking and equality of opportunity. *Economic Policy*, pp. 782-862.

Checchi, D., and L. Flabbi. 2007. Intergenerational Mobility and Schooling Decisions in Germany and Italy: The Impact of Secondary School Tracks. *IZA Discussion Papers* 2876.

Dustmann, C. 2004. Parental background, secondary school, track choice and wages. *Oxford Economic Papers* 56: 209-230.

Elder, T.E., J.H. Godeeris and J.S. Haider. 2010. Unexplained gaps and Oaxaca-Blinder decompositions. *Labour Economics*, 17: 284-90

Entorf, H., and M. Lauk. 2006. Peer effects, social multipliers and migrants at school: an international comparison. *IZA Discussion Paper* No.2182.

Entorf, H., and N. Minoiu. 2005. What a difference immigration policy makes: A comparison of PISA scores in Europe and traditional countries of immigration, *German Economic Review*, 6(3): 355-376.

Entorf, H., and E. Tatsi. 2009. Migrants at School: Educational Inequality and Social Interaction in the UK and Germany, *IZA* DP No. 4175

Fryer, R.G, and S.D. Levitt. 2010. An Empirical Analysis of the Gender Gap in Mathematics. *American Economic Journal: Applied Economics* 2(2): 210–40.

Guiso, L., F. Monte, P. Sapienza and L. Zingales. 2008. Culture, Gender and Math, *Science,* May 30, Vol 320, 1164-1165.

Hanushek, E.A., and L. Wömann. 2006. Does educational tracking affect performance and inequality? Differences-in-differences evidence across countries. *The Economic Journal*, 116: 63–C76.

Murat, M., Ferrari D., Frederic, P. and Pirani G. 2010. Immigrants, Schooling and Background. Cross-Country Evidence from PISA 2006, *Materiali di Discussione, Dipartimento di Economia Politica*, n° 637; http://www.dep.unimore.it/materiali_discussione.asp

OECD. 2006. *Where immigrant student succeed- A comparative review of performance and engagement in PISA 2003*, Paris, OECD Publishing.

OECD. 2009. *PISA Data Analysis Manual. SPSS, second edition*. Paris, OECD Publishing.

OECD. 2011. *PISA 2009 Results: What Makes a School Successful? Resources, Policies and Practices (Volume IV)*. Paris, OECD Publishing.

Raitano, M., and F.Vona. 2010. Peer heterogeneity, parental background and tracking: Evidence from PISA 2006. *OFCE*, n° 2010-23.

Särndal, C.E., B. Swensson, and J. Wretman. 1992. *Model Assisted Survey Sampling*, Springer, Verlag.

Schnepf, S.V. 2007. Immigrants' educational disadvantage: an examination across ten countries and three surveys. *Journal of Population Economics*, 20:527–545.

Schneeweis, N. 2009. Educational institutions and the integration of migrants, *Journal of Population Economics* DOI 10.1007/s00148-009-0271-6.

Schuetz G., H.W Ursprung, and L. Wömann. 2008. Education Policy and Equality of Opportunity, *Kyklos* 61(2): 279–308.

UNESCO. 2006. *World data on education*. Sixth edition, 2006/07.

Wömann, L. 2004. How Equal Are Educational Opportunities? Family Background and Student Achievement in Europe and the United States. *CESifo Working Paper Series* 1162.

Wömann L. 2009. International evidence on school Tracking: A Review. *CESifo DICE Report 1*: 26-34.

Table 1. Grades and School types.

Index: % immigrant students / %native students

Countries	**Grade 9**	**Grade < 8**	**School 2**	**School 3**	**grade at 15**
AUT	1.20	2.58	0.98	1.16	10
BEL	1.82	5.49	0.97	4.18	10
CHE	0.88	1.60	1.01	0.81	9
DEU	1.02	2.11	1.19	1.27	9
FRA	**1.20**	**2.24**	**1.17**	**1.46**	**10**
GRC	8.24	6.47	3.05		10
IRL	0.90	3.50	0.96		9
ITA	**3.73**	**11.10**	**1.52**	**1.27**	**10**
LIE	0.80	1.50	0.91		9
LUX	1.14	1.74	0.77	1.17	10
NLD	1.37	3.02	0.87	2.01	10
PRT	0.93	2.45	1.33	0.38	10
DNK	0.86	2.02			9
ESP	1.69	1.74			10
FIN	0.70				9
GBR					11
ISL					10
NOR					10
SWE	0.92	3.53			9

Table 2. Unconditional and final school gaps of immigrants

Dependent variable: students' scores.

	Unconditional gaps						Final gaps					
	science		mathematics		reading		science		mathematics		reading	
France	-53.11	***	-50.74	***	-38.65	***	-23.68	***	-26.30	***	-15.53	***
	(1.60)		(2.62)		(2.12)		(2.05)		(3.27)		(2.35)	
First gen	*-66.82*	***	*-61.97*	***	*-45.42*	***	*-28.80*	***	*-28.68*	***	*-12.46*	***
	(2.72)		*(2.91)*		*(3.51)*		*(4.05)*		*(5.36)*		*(3.45)*	
Second gen	*-48.25*	***	*-46.76*	***	*-36.26*	***	*-23.06*	***	*-24.21*	***	*-15.26*	***
	(2.53)		*(3.51)*		*(3.05)*		*(2.13)*		*(2.98)*		*(2.60)*	
Italy	-58.36	***	-42.06	***	-58.06	***	-3.17		-0.59		-12.84	***
	(1.90)		(3.80)		(4.16		(2.11)		(3.05)		(3.55)	
WE tracks	-63.78	***	-53.61	***	-55.42	***	-20.10	***	-14.49	***	-5.94	***
	(1.10)		(0.85)		(1.49)		(1.39)		(2.25)		(1.86)	
	-46.73	***	-40.09	***	-35.47	***	-17.77	***	-11.51	***	-7.53	***
WE comprehensive	(1.69)		(1.75)		(2.38)		(2.97)		(2.91)		(1.64)	

Note. Unconditional gaps: OLS regressions on "immigrant" dummy only. Final gaps: pooled regressions, countries' fixed effects for WE. Robust standard errors in parentheses. List of variables in Table A4.

Table 3a1. ITALY – IMMIGRANTS

Dependent variables: immigrant students' scores

	science			math			reading		
(Intercept)	511.10	(6.16)	***	528.44	(11.56)	***	475.83	(19.68)	***
student.other.country				-25.38	(4.67)	***			
female				-63.87	(15.22)	***	47.16	(8.19)	***
occupation.father				0.83	(0.35)	*			
wealth							-72.02	(27.75)	**
cultposs							-37.80	(7.46)	***
homepos							78.67	(22.32)	***
grade9	-10.17	(4.42)	*	-13.42	(6.10)	*	-130.17	(39.70)	***
grade<9	-107.02	(37.73)	***						
school.type2	-44.33	(5.84)	***	-83.13	(12.27)	***	-52.08	(21.55)	*
school.type3	-102.77	(15.07)	***	-170.14	(14.47)	***	-174.42	(61.98)	***
envopt	-22.60	(3.14)	***	-20.17	(9.32)	*	-17.04	(3.84)	***
joyscie	17.78	(8.50)	*	14.10	(3.00)	***			
genscie							23.66	(10.16)	*
female:school.type2				59.67	(25.45)	*			
female:school.type3				63.81	(19.46)	***			
student.other.country:school.type3				40.31	(14.22)	***			
observations	852			778			780		
adj.R-squared	0.492			0.439			0.449		

Notes: robust standard errors in parentheses. Significance levels: *** 1%, ** 5%, * 10%

Table 3a2. ITALY - NATIVES

Dependent variables: native students' scores

	science			math			reading		
(Intercept)	510.64	(11.60)	***	523.09	(21.69)	***	506.72	(6.67)	***
other.language	36.98	(11.15)	***						
female	-21.38	(1.04)	***	-34.86	(1.30)	***	13.94	(2.36)	***
occupation.father	0.66	(0.15)	***						
occupation.mother				0.51	(0.21)	*	0.36	(0.09)	***
father.high-blue	14.06	(1.78)	***						
father.low-blue	18.55	(2.39)	***						
mother.high-blue				14.39	(4.10)	***			
mother.low-white							12.59	(4.07)	***
mother.low-blue							20.30	(1.78)	***
father.secondary	12.26	(3.00)	***						
no.pc.at.home	-16.50	(2.69)	***	-14.93	(2.33)	***	-25.48	(4.60)	***
books<100	-23.79	(1.13)	***	-14.01	(3.43)	***			
wealth				-23.18	(4.67)	***	-41.81	(3.09)	***
cultposs				-9.11	(0.82)	***	-12.78	(0.84)	***
homepos				21.69	(5.07)	***	38.96	(3.18)	***
grade9	-29.49	(3.08)	***	-38.26	(2.14)	*	-22.78	(4.63)	***
grade<9	-86.67	(31.94)	**	-105.58	(46.57)	***	-71.99	(23.57)	***
regularlessons.sci<4	-18.92	(2.77)	***	-19.63	(3.42)	***	-12.78	(2.22)	***
regularlessons.math<4	-10.58	(1.70)	***	-18.39	(1.27)	***	-10.97	(4.21)	**
school.type2	-29.14	(1.41)	***	-10.81	(4.97)	*	-43.36	(7.81)	***
school.type3	-63.40	(2.31)	***	-76.00	(3.04)	***	-105.06	(2.45)	***
envaware	20.99	(0.47)	***						
envopt	-16.36	(0.62)	***	-14.62	(0.65)	***	-12.28	(1.20)	***
envperc	-6.94	(0.91)	***	-5.17	(1.48)	***	-4.16	(1.10)	***
genscie	12.44	(0.45)	***	9.52	(2.44)	***	15.33	(1.08)	***
joyscie	10.55	(1.24)	***	7.10	(0.43)	***	9.50	(1.64)	***
instscie							-5.45	(1.08)	***
intscie							5.18	(1.72)	***
respdev	6.34	(1.18)	***						
perscie	-15.65	(1.25)	***	-8.70	(2.00)	***	-13.71	(1.66)	***
sciefut				3.54	(1.10)	***			
female:school.type2	7.98	(2.55)	***	6.28	(1.83)	***	14.45	(6.30)	*
female:school.type3	20.79	(1.87)	***	25.36	(2.50)	***	32.36	(4.76)	***
other.language:grade9	-61.27	(17.48)	***						
occupM:school.type2				-0.37	(0.12)	***			
female:grade9							-19.09	(2.94)	***
observations	16315			13449			12205		
adj.R-squared	0.406			0.320			0.336		

Note: robust standard errors in parentheses. Significance levels: *** 1%, ** 5%, * 10%

Table 3b1. FRANCE – IMMIGRANTS

Dependent variables: immigrant students' scores

	science			math			reading		
(Intercept)	534.40	(3.10)	***	527.24	(3.20)	***	531.93	(3.54)	***
regularlessons.read<4	-37.69	(2.34)	***						
regularlessons.sci<4				-93.00	(4.68)	***			
school.type2	-99.54	(3.20)	***				-127.24	(3.13)	***
school.type3	-168.45	(12.26)	***				-239.61	(24.90)	***
envaware	20.20	(1.25)	***						
joyscie	9.77	(1.02)	***	19.29	(1.74)	***			
observations	557			562			587		
adj.R-squared	0.4980			0.4997			0.4249		

Note: robust standard errors in parentheses. Significance levels: *** 1%, ** 5%, * 10%

Table 3b2. FRANCE - NATIVES

Dependent variables: native students' scores

	science			math			reading		
(Intercept)	538.38	(3.02)	***	552.95	(2.41)	***	548.93	(1.90)	***
female	-8.02	(1.52)	***	-15.09	(1.61)	***	23.14	(1.48)	***
occupation.mother	0.33	(0.07)	***	0.54	(0.05)	***			
occupation.father	0.39	(0.03)	***						
no.pc.at.home	-13.79	(2.75)	***	-12.57	(3.60)	***			
wealth							-21.28	(2.54)	***
homepos							23.00	(5.54)	***
grade9	-14.94	(3.79)	***	-30.96	(3.04)	***	-20.69	(3.79)	***
grade<9	-46.39	(4.82)	***	-64.93	(4.43)	***	-54.27	(4.17)	***
regularlessons.sci<4	-19.79	(2.10)	***	-22.51	(2.21)	***	-25.25	(2.02)	***
regularlessons.read<4	-12.45	(1.63)	***	-13.93	(1.74)	***			
regularlessons.math<4							-19.18	(0.73)	***
school.type2	-59.07	(3.28)	***	-52.15	(4.58)	***	-63.43	(4.24)	***
school.type3	-117.40	(22.50)	***	-109.51	(16.05)	***	-160.33	(10.00)	***
envaware	15.89	(1.19)	***	8.02	(1.15)	***	17.11	(1.03)	***
envopt	-10.27	(1.22)	***	-7.24	(1.27)	***	-4.63	(0.98)	***
respdev	7.38	(1.63)	***	5.00	(1.00)	***	7.32	(0.91)	***
joyscie	9.21	(3.54)	**	8.74	(2.21)	***			
instscie							-3.85	(1.08)	***
sciefu	7.00	(3.30)	*	6.94	(2.11)	***			
observations	2994			3242			3765		
adj.R-squared	0.5830			0.5761			0.5470		

Note: robust standard errors in parentheses. Significance levels: *** 1%, ** 5%, * 10%

APPENDIX

Table A1: Share of immigrant students

	Second generation	First generation
AUT	5.31	7.86
BEL	7	6.27
CHE	11.83	10.57
DEU	7.68	6.56
DNK	4.17	3.4
ESP	0.82	6.1
FRA	**9.6**	**3.4**
GBR	4.98	3.66
GRC	1.17	6.38
IRL	**1.06**	**4.5**
ITA	0.67	3.13
LUX	19.47	16.59
NLD	7.77	3.48
NOR	2.99	3.14
PRT	2.41	3.52
SWE	6.16	4.68

Note. Western European countries with more than 3% of immigrant students

Table A2. Average scores in Western European countries. PISA 2006

	SCIENCE		MATHEMATICS		READING	
AUT	511	*3.9*	505	*3.7*	490	*4.1*
BEL	510	*2.5*	520	*3*	501	*3*
CHE	512	*3.2*	530	*3.2*	499	*3.1*
DEN	496	*3.1*	513	*2.6*	494	*3.2*
DEU	516	*3.8*	504	*3.9*	495	*4.4*
ESP	488	*2.6*	480	*2.3*	*461*	*2.2*
FRA	**495**	***3.4***	**496**	***3.2***	**488**	***4.1***
GBR	515	*2.3*	495	2.1	495	*2.3*
GRC	473	3.2	459	3	460	4
IRE	508	*3.2*	501	*2.8*	517	*3.5*
ITA	**475**	***2***	**462**	***2.3***	**469**	***2.4***
LUX	486	*1.1*	490	*1.1*	479	*1.3*
NDL	525	*2.7*	531	*2.6*	507	*2.9*
NOR	487	*3.1*	490	*2.6*	484	*3.2*
PRT	474	3	466	3.1	472	3.6
SWE	503	*2.4*	502	*2.4*	507	*3.4*

Note. Western European countries with more than 3% of immigrant students. Standard errors in Italics

Table A3. List of school types by country

FRA	ITA
2500001 = 2	3800001 = 1
2500002 = 3	3800002 = 2
2500003 = 1	3800003 = 3
2500004 = 2	3800004 = 2
	3800005 = 3

Note: notation from PISA 2006 Student Codebook.

Table A4: Variables, PISA Codebook

immigr	Status of immigration of student (categorical variable: intercept=native) [*IMMIG*]
language	Language spoken at home (categorical variable: intercept= test language) [st12q01]
Fcountry, Mcountry, Scountry	Country of birth of father, mother and student (categorical variable: Western Europe, North America, Asia-rich countries, North Africa ,East Europe, South America, North Africa, Sub-Saharan Africa, Middle East, Asia-poor countries, other countries) [*COBN_F, COBN_M, COBN_S*]
occupation.father	Occupational status father [BFMJ (310)]
occupation.mother	Occupational status mother [BMMJ (309)]
father.low-white	Father white collar low skilled [FSECATEG (314)]
father.high-blue	Father blue collar high skilled
father.low-blue	Father blue collar low skilled
mother.low-white	Mother white collar low skilled [MSECATEG (313)]
mother.high-blue	Mother blue collar high skilled
mother.low-blue	Mother blue collar low skilled
father.secondary	Completed ISCED 3B, 3C [ST10Q01 (19)]
father.primary	Not completed ISCED 3B, 3C
mother.secondary	Completed ISCED 3B, 3C [ST07Q01 (14)]
mother.primary	Not completed ISCED 3B, 3C
gender	Gender of student (binary variable: intercept=male, 1= female) [*st04q01*]
books	How many books at home (binary variable: intercept= >100, 1 = <100) [*st15q01*]
pc	Computer at home (binary variable: intercept = yes, 1 = no) [st13q04. PISA codebook]
wealth	Family wealth [WEALTH (351)]
cultposs	Cultural possessions at home [CULTPOSS (331)]
homepos	Index of home possessions [HOMEPOS (337)]
regular lessons of science, mathematics, reading	Number of (weekly) regular lessons in science, mathematics and reading, respectively (binary variable: intercept = more than 4 hours, 1= up to 4 hours) [st31q01, st31q04, st31q07]
grade	The grade student is in (categorical variable: intercept = grade >9) [ST01Q01]
school	Type of school attended by the student. See Table A3.
envware	Index of students' awareness of environmental issues. [envaware]
envopt	Environmental optimism [ENVOPT (333)]
envperc	Perception of environmental issues [ENVPERC (334)]
genscie	General value of science [GENSCIE (335)]
joyscie	Enjoyment of science [JOYSCIE (340)]
instscie	Instrumental motivation in science [INSTSCIE (338)]
intscie	General interest in learning science [INTSCIE (339)]
respdev	Responsibility for sustainable development [RESPDEV (342)]
perscie	Personal value of science [PERSCIE (341)]
sciefut	Future-oriented motivation to learn science. [SCIEFUT (347)]

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