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STUDENTS: REJECTION OR INTEGRATION?

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ABSTRACT: While the immigration policy in the U.S. is mainly oriented to family reunification, in Australia, Canada and the U.K. it is a points-based immigration system which main objective is to attract high skilled immigrants. This paper compares both immigration policies through the transition for the U.S. and Mexico. I find that: (i) The point system increases the average years of the immigrants by 3.5 years. (ii) The Mexican immigrants suffer a 10% reduction in their effective hours of labor when they move to the U.S. (iii) Migration reduces inequality, more significantly if the immigration policy is the point system and increases output per capita differences between both countries. (iv) The offspring of the immigrants invest more in human capital than the U.S. natives. (v) The earnings ratio immigrants to the U.S. natives is lower under the quota system than under the point system but along the transition it reverses converging at the steady state.

JEL Codes: J15, I21, I28

Keywords: Peer effects, native and non-native students, social interactions

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1. Introduction

In the last two decades, a lot of Western countries have experienced massive immigration waves. Despite the growing relevance of this phenomenon in Europe, and the well-established (de)segregation literature in the U.S., studies investigating the peer interaction between native and non-native students in European schools are just a few. Although it is widely accepted that non-native students typically face more problems at school and have lower scores in standardized tests, causes, consequences and possible policy implications are still unclear (OECD, 2010). Moreover, while there is a vast literature on the effects of immigration on native labour market outcomes, economic literature on the effects of non-native students on native peers' achievement is quite limited, and the specific question of whether non-native peers affect natives' educational outcomes has received relatively little attention and presents mixed evidence (Brunello and Rocco, 2011; Gould *et al.*, 2009²). For instance, Jensen and Rasmussen (2008) find a negative effect of school ethnic concentration on cognitive outcomes for Danish native students³. Brunello and Rocco (2011) provide cross-country evidence of a negative but small effect of the share of immigrants on natives' educational attainment exploiting PISA data for a sample of 27 countries (mainly from Europe and the Anglo-Saxon world).

This paper focuses on 'social interactions'⁴ among pupils of different ethnic origins attending the same class or the same school. In the existing literature social interactions among schoolmates are commonly referred to as 'peer effects' or 'peer-groups effects'⁵. Peer influence in general, but also in the specific case of the interactions between native and non-native students, studied different outcomes such as achievement levels (as measured by test scores), teen pregnancy, delinquency, smoke and drug use, high school attrition and drop-outs, college choice (Hanushek *et al.*, 2003), and it may have an effect in the accumulation and development of both cognitive and non-cognitive skills (Neidell and Waldfogel, 2010). Indeed, there is not clear evidence on possible consequences of social interactions between natives and non-natives in educational settings, and it

² Gould *et al.* (2009), "[...] the effect of immigration on the local labour market has received considerable attention in the literature, but little is known about the impact of immigration on the school system".

³ Evidence on school composition and immigrant lower test scores for Denmark and Switzerland is also provided by Schindler (2007) and Meunier (2010), respectively.

⁴ We define 'social interactions' all forms of interdependencies among individuals in which preferences, beliefs and constraints faced by one socioeconomic actor are *directly* influenced by the characteristics and choices of others (Durlauf and Ioannides, 2009). Peer group influence is a particular form of social interaction. It refers to contemporaneous, and usually reciprocal, behavioural influences within a reference group so that the propensity of an agent to behave in some way varies positively with the prevalence of this behaviour in the group (Durlauf, 2004, and Manski, 2000). These interactions usually produce the well documented empirical regularity that "[...] agents belonging to the same group tend to behave similarly" (Manski, 2000).

⁵ This terms usually indicates social interactions of children or young adults with people of similar age, in order to make a distinction from the broader 'neighbourhood effects' stemming from interactions with superiors, family or teachers (Gibbons and Telhaj, 2006).

might happen that such interactions (if they exist) could tend either to increase or decrease the existing attainment gaps. On top of that, even less is known on the possible underlying mechanisms that such peer interactions may follow (De Giorgi and Pellizzari, 2011).

The aim of the paper is twofold. On the one hand, we propose a theoretical framework to stylize the possible mechanisms of peer interactions that could lead to an ‘integration’ or a ‘rejection’ of non-native peers, depending on the degree of isolation experienced by non-native students in each school. On the other hand, we test the theoretical predictions identifying the causal link between non-natives’ school concentration and the educational outcomes of native students⁶. Which kind of social mechanism may work in peer interaction between native and non-native students? Do different levels of non-native school share have different impacts on natives’ attainments? We use as outcome measure attainment levels proxied by standardized test scores exploiting a unique dataset combining *INVALSI First Cycle Exams* (test scores of all 8th grade students enrolled in Italian junior high schools⁷) with census and administrative records on schools characteristics and socio-economic environment.

The theoretical framework is based on Lazear (2001) model of education production and on the ‘subculture model’ proposed by sociological literature in the U.S. (Fordham and Ogbu, 1986). The basic intuition is the following. Non-native and native students are characterized by different levels of propensity to ‘disrupt’: non-native students are more disruptive because they typically need more help from teachers. Thus, in mixed schools, the presence of non-native students tends to have a negative impact on natives’ attainment levels. However, if non-native students are relatively isolated, peer interactions with natives may be helpful for them so that their propensity to disrupt decreases, and so does their negative impact on natives’ attainments. Disruption is mitigated through an ‘integration mechanism’ that can be at work only for sufficiently low levels of non-native school concentration. On the other hand, if non-native students are enough to create some ‘critical mass’ (i.e. they are not isolated), they tend to cluster and do not interact with native, so that they continue to be, on average, more disruptive and thus cause negative impacts on natives’ attainment. This ‘rejection mechanism’ may be due to different reasons, for instance, natives may be willing to make sufficient effort to include a few minority members but unwilling to make the effort to include numerous non-native schoolmates.

⁶ Data from Italian Ministry of Education generally only distinguish between *Italian* and *non-Italian* students, thus referring to a pure citizenship criterion. In the reminder of the paper we define to as ‘non-native’ student an individual enrolled in the Italian school system and having both parents without Italian citizenship. This definition coincides with the definition of the Italian Ministry of Education Statistical Service (MIUR 2009a) of ‘non-Italian students’. Notice that if a student has one of the parents who is Italian, he automatically gains the Italian citizenship (because of the *ius sanguinis* rule) and so he is defined as ‘native student’ independently from the country of birth.

⁷ 8th grade students, i.e. students finishing their third year of the Italian middle grade comprehensive school. The Italian ‘Junior High School Diploma’ corresponds to ISCED level 2.

From the empirical point of view, solving serious problems of sorting and omitted variables bias is crucial in the correct identification of the effect. Our identification strategy is based on school-level averages in order to sidestep the non-random allocation of non-native students across classes and school fixed effects, and exploits the within school idiosyncratic variation in non-native share between adjacent cohorts (Hoxby, 2000; Gould *et al.* 2009; Brunello and Rocco, 2011).

This paper contributes to the existing literature in a number of ways. It provides additional evidence on peer effects between native and non-native students in the Italian junior-high schools contexts. It overcomes problem of under-representation of immigrant shares typical of survey data exploiting a rich administrative dataset containing information on all 8th grade students enrolled in Italian junior high schools. Finally, it links the empirical evidence to the theoretical framework of peer interaction based on ‘integration’ and ‘rejection’ mechanisms to shed light on the interpretation of the results. Our results show that non-native school share has small and negative impacts on Language test scores of natives’ peers, while it does not significantly affect Math test scores. The stylized predictions of the theoretical framework are confirmed in the analysis of heterogeneous and non-linear effects. In particular, heterogeneous effects show that the negative effects to natives’ attainment are concentrated only in schools characterized by low levels of non-natives’ isolation (or, alternatively, high exposure), while they are not statistically different from zero when isolation is high. Non-linearity analysis shows that non-natives’ school share below 10% for Language, and 20% for Math, does not significantly affect natives’ attainment. To give a numerical intuition for these results, we calculate that, on average, a non-native school share of 10% corresponds to 9 non-native students in the school or, equivalently, 1 or 2 non-native students in each class. Below these critical mass average values, the ‘integration’ mechanism is at work, and non-native students are assimilated with native peers. The opposite is true for the ‘rejection mechanism’, which is working above the critical mass value found.

The rest of the paper is organized as follows: Section 2 presents a review of the literature; Section 3 explains the theoretical framework, Section 4 describes the econometric model and identification strategy designed to test the stylized predictions of the theoretical framework; Section 6 discusses the main characteristics of the dataset and provides general descriptive evidence; Section 5 and Section 6 discuss the results and conduct sensitivity checks. Section 7 concludes and provides some policy implications.

2. Literature

The empirical analysis of the effects of non-native students' on native peers educational outcomes stems from the 'desegregation' literature⁸, which examines the effect of minority students on the achievements of the other students in the U.S. schools (Gould, Lavy and Paserman, 2009). Early desegregation literature proposes a variety of analyses on the relationship between ethnic origins and achievement (among the others: Armor, 1995; Cook, 1984; Crain *et al.* 1978), but does not consider social interactions between native and non-native students as a potential educational input to explain the persistent attainment gap. The first study mentioning the contribution that the class and school ethnic composition has on the individual achievement is the 'Coleman Report' (Coleman, 1966)⁹. Starting from Coleman (1966), scholars in the sociology of education have long argued that, apart from students' ability and background, peers influence is an important determinant of students' achievement (Kramarz *et al.*, 2008). Economic literature on peer effects among native and non-native students only appears in the Nineties, while interest on the economic analysis of social interactions was flourishing. Although the great variety of studies on social interactions in educational outcomes, empirical evidence and theoretical models on peer effects between native and immigrant students still presents mixed findings and just a few analysis on possible channels and mechanisms at work (Sacerdote, 2010).

Empirical literature in the U.S. traditionally focused on achievement gaps between black (or other minority students) and white students, and only in the last decade peer interaction has started to be seen as one of the possible causes of many observed different behaviours between white and black students (Heckman, 2011). Early contributions were given by Evans, Oates and Schwab (1992) and Cutler and Glaeser (1997), while Hoxby (2000), Hanushek *et al.* (2009) and Hanushek and Rivkin (2009) are the first to define 'racial peer effects' as a particular group of social interactions taking place between students belonging to different ethnic groups. Hoxby (2000) exploits idiosyncratic variation in the racial and gender composition of adjacent cohorts within the same grade and within the same school to estimate the effects of exposure to minority school share on achievement of white and minority students. Her results show that immigrant school share has

⁸ For decades economists and sociologists studied the effects of desegregation plans imposed by U.S. Courts, starting from *Brown vs. Board of Education*, 347 U.S. 483 (1954). The ruling in *Brown v. Board of Education* (1954) held that 'separate but equal', while not inherently unconstitutional in all areas, was unconstitutional in the case of education because separate education for blacks and whites could not be equal. This ruling led to dramatic changes in schools throughout the country (Hanushek *et al.*, 2009).

⁹ "[...] those inputs characteristics of schools that are most alike for Negroes and whites have least effect on their achievement. The magnitudes of differences between schools attended by Negroes and those attended by whites were as follows: least, facilities and curriculum; next, teacher quality; and greatest, educational backgrounds of fellow students. The order of importance of these inputs on the achievement of Negro students is precisely the same: facilities and curriculum least, teacher quality next, and backgrounds of fellow students, most", Coleman (1966).

weak effects on students' achievement, but these effects are generally higher among students of the same ethnic group than among students belonging to different ethnic groups. Hanushek *et al.* (2009) and Hanushek and Rivkin (2009) base the estimation strategy on individual fixed effects retrieved tracking the same students and cohorts over time: the estimation of peer group effects relies therefore on cohort differences in the changes in racial composition as students' progress through school. They find that black students test scores are strongly decreasing in the black school share: their estimates imply that excess exposure of black students to black grade mates causes the black-white test score gap to grow by 0.07 standard deviations with each year in school, but no effects on white students.

The general result that 'intra-race group' peer effects are stronger compared to 'extra-race group' effects is also found by Angrist and Lang (2004) who exploit the quasi-natural variation in the fraction of minority students provided by one of the most important desegregation plan implemented in Boston school districts (i.e. the Metco program), moving low-achievers black students to preeminently white schools in the rich Boston suburbs. A new strand of literature interprets this general result under the light of the 'acting-white' theory that says that black students may underachieve in order to fit with their peers' behaviour. Fryer and Torelli (2010) provide the first empirical evidence using the National Longitudinal Study of Adolescent Health (*AddHealth*) and estimating the effects on achievement of an 'index of social status' based on the individuals' contacts with same-race friends within the school. They show that this 'acting white' proxy variable varies a lot with respect to school characteristics and individual achievement. The effect is concentrated in schools with more interracial contact: their coefficient for 'acting-white' variable is twice as large in schools that are above the median in terms of segregation, whereas is significantly lower where black students are more isolated.

Outside the U.S., empirical evidence is still quite limited and generally points to a negative effects of non-native school shares on native students attainments. In order to identify the causal link of the immigrant concentration on the outcomes of natives, Gould *et al.* (2009) exploit the variation in the number of immigrants in 5th grade conditional on the total number of immigrant students in grades 4 to 6. IV results point to a strong adverse effect of immigrant concentration on native outcomes, but the estimates are not statistically different from the OLS coefficients. Their approach is interesting and new under two main aspects: first, they use a quasi-experimental evidence claiming that early '90 immigration waves in Israeli can be considered as an exogenous variation in immigrants' flows; second, they focus on long-term outcomes (rather than contemporaneous peers' outcomes effects). Jensen and Rasmussen (2008) analyse the effect of ethnic concentration in schools on the cognitive outcomes of children. They use a rich dataset for

Danish ninth-grade students, based on PISA test scores matched with administrative and census information. In order to correct for the endogeneity in school ethnic concentration authors apply school fixed-effects and IV, using as instrumental variable the ethnic concentration in a larger geographical area where school is located. Results show that there is a negative effect of ethnic concentration on students' outcomes, and that this is significant only for the native Danish children. Brunello and Rocco (2011) study whether a higher share of immigrant pupils affects the school performance of natives using aggregate multi-country data from PISA, and find a negative but small effect. The analysis is conducted exploiting aggregation at the country level to avoid sorting problems of immigrant students within each country, while fixed effects and country socio-economic indicators are used to solve the problem of across country sorting and time trends in immigrants residential choices. They also find evidence that, conditional on the average share of immigrant pupils, a reduction of the dispersion of this share between schools would have small positive effects on the test scores of natives. Finally, Maestri (2011) investigates how the heterogeneity of the ethnic minority composition within schools affects natives' and non-natives' attainment. She exploits the within school cohort-to-cohort variation in ethnic diversity of a rich dataset about primary education in the Netherlands and finds that ethnic diversity has a positive impact on the test scores of minority students, in particular for language skills. She also finds some evidence of a negative relationship between ethnic diversity index and a measure of school social interactions among pupils.

3. Theoretical framework

The theoretical framework combines Lazear (2001) 'bad apple model' for the education production process and the 'subcultural' model of interaction between white and blacks students proposed in the sociological literature (Fordham and Ogbu, 1986; Steele and Aronson, 1998). On the one hand, the 'bad apple model' is based on the driving idea that peer effects are important determinants of all educational processes in the classroom and proposes the 'disruption mechanism' as one of the possible explanation of peer pressure in educational settings. On the other hand, the subculture model identifies the 'integration vs. rejection mechanism' as a possible explanation of the 'social mechanisms' causing the black-white gaps in attainments levels. From a general perspective, in the 'subculture model' the native student (majority type) remains supportive of non-native students (minority type) as long as the latter is relatively isolated (Hoxby and Weinghart, 2006). When, however, minority students become prevalent enough to form a critical mass, the

majority type rejects them. The ‘subculture’ model can also explain the evidence of ‘acting-white’ behaviours found in U.S. schools (Austen-Smith and Fryer, 2005; Fryer and Torelli, 2010).

3.1 The disruption model with native and non-native students

Following Lazear (2001), define p as the probability that any student is not hurting his own learning or other’s learning at any moment in the time spent at school, and $(1 - p)$ as the probability that any given student initiates a ‘disruption’. Given a class size of n , the probability that disruption occurs at any moment in time t is $(1 - p^n)$. Define V as the value of a unit of learning, which is influenced by the likelihood that a student is not engaged in a disruptive behaviour in the given instant t , and Z the total number of student in the school. Then, total output for each school (Y) and per student output (y) are given by:

$$Y = ZVp^n$$

$$y = Vp^n$$

Disruption can actually follow many channels. It could be thought as students’ need of help causing the teacher to slow the activity of the class, as well as students’ propensity to disturb/interrupt or even to make questions to the teachers. The basic assumption made is that one child’s disruption hurts the learning process in that moment of all students (including the disruptive one). Therefore, disruption is a possible mechanism of peer interaction that directly influences the learning process and the attainment levels through externalities caused by peers’ behaviour¹⁰. Non-native students are lower achieving students (on average, as shown by descriptive statistics), and usually need more help and attention from teachers. Moreover, non-native students are always less numerous with respect to native peers. Therefore, we assume that non-native students ($j=NN$) causes more disruption (on average) with respect to native peers ($j=N$), and define as $(1-\theta)$ the proportion of native students in each school. Then, we can identify to types of students ($j=N, NN$) with different values of p_j : $p_N \geq p_{NN}$.

Lazear (2001) demonstrates that total output is maximized when students are segregated by type. To see this, suppose without loss of generality that $V=1$ and consider the output per student assuming class size equals n , the optimum class size with mixed classes. Per student output in mixed (y_{mix}) and perfectly segregated schools (y_{seg}) will be equal to:

$$y_{mix} = P_N^{(1-\theta)n} P_{NN}^{\theta n}$$

$$y_{seg} = (1-\theta)p_N^n + \theta p_{NN}^n$$

¹⁰ De Giorgi and Pellizzari (2011), Epple and Romano (2011) and Sacerdote (2010) point to the Lazear (2011) model as one of the potential model of peer interaction in the classroom, as well as Hoxby and Weinghart (2006) include the ‘Bad Apple model’ and the ‘subculture model’ in their analysis of possible model of peer interaction in the classroom.

Then:

$$(y_{seg} - y_{mix}) \Big|_{p_N = p_{NN}} = 0$$

$$\frac{\partial (y_{seg} - y_{mix})}{\partial p_N} \Big|_{p_N > p_{NN}} = (1 - \theta) n p_N^{n-1} \left[1 - \left(\frac{p_{NN}}{p_N} \right)^{\theta n} \right] > 0$$

Which implies that segregation induces a higher per student output with class size optimal for mixed classes whenever $p_N > p_{NN}$. Letting class size be optimal when schools or classes are segregated reinforces the results (Lazear 2001, Epple and Romano 2011).

3.2 The integration-rejection model of peer interaction

Segregation leads to the maximum output if only if $p_N > p_{NN}$. Peer interactions could intervene to reduce non-natives disruption probability ($1 - p_{NN}$) as far as native students' behaviour could exert positive spillovers on non-natives through an 'integration mechanism'. Native students' behaviour (i.e. less disruptive types' behaviour) could have a positive impact on non-native peers and, as a consequence of the integration process, $p_{NN} \rightarrow p_N$. Integration, however, has some cost which we assume to be the effort made by native students to integrate non-native peers. Intuitively, if non-native students are relatively isolated, then the integration mechanism is less costly for native students, whereas anytime non-native students become prevalent enough to form a critical mass, the native type rejects them because the effort of integration becomes too high¹¹. Conversely, whenever non-native students are relatively more isolated, they are somehow 'forced' to interact with native peers. Therefore, p_{NN} depends on the integration effort made by native students (e) which, in turn, is an increasing function of the proportion of non-native students, θ . Without loss of generality, we set to zero the effort cost in the case θ is lower than a certain critical value ($\tilde{\theta}$) and positive otherwise, and assume that native students do not exert integration effort unless it is zero (or, close enough to zero). Formally:

$$e(\theta) = \begin{cases} 0 & \text{if } \theta \leq \tilde{\theta} \\ > 0 & \text{if } \theta > \tilde{\theta} \end{cases}$$

¹¹ The basic intuition for this formalization of the 'integration' vs. 'rejection' mechanism based on non-natives relative isolation is already present in Lazear (2001) model: "[...] It is necessary that B 's can be *transformed* into A 's by being around them. If this effect is strong enough, then integrated classes are efficient. For example, if B 's were immediately transformed into A 's when integrated with them, and if this imposed no cost on A 's, then efficiency would be enhanced by mixing B 's with A 's. As a practical matter, transformation of B 's into A 's is most likely to occur when the ratio of A 's to B 's is large. If a school of 100 had 99 B 's and 1 A , it is unlikely that the one A student would change the behavior of all of the other B students", p. 791, original emphasis. The same intuition can be also found in the 'cultural assimilation model' by Lazear (1999).

$$p_{NN} = \begin{cases} p_N & \text{if } \theta \leq \tilde{\theta} \\ < p_N & \text{if } \theta > \tilde{\theta} \end{cases}$$

The formalization of the integration mechanism makes per student output depend on θ : if $\theta \leq \tilde{\theta}$, the integration mechanism prevails, $p_N = p_{NN}$ and $(y_{seg} - y_{mix}) = 0$; if $\theta > \tilde{\theta}$ the rejection mechanism prevails because integration is too costly and less likely to take place, therefore the previous results for mixed classes hold. Actually, the rejection may be due to different reasons: natives may be willing to make sufficient effort to include a few minority members but unwilling to make the effort to include numerous non-native schoolmates and but also unwilling to include some non-native students while rejecting others (Hoxby and Weingarth, 2005).

Focusing on the effects on non-native students, and given that (perfect) segregation cannot be observed in our data, if θ is sufficiently high, then the rejection mechanism is at work and disruption in a mixed class leads to lower levels of per student output for natives. On the other hand, if θ is sufficiently low, then the integration mechanism is at work, and per student natives' output is not hurt by non-natives disruption. We can stylize the predictions of the model in the following way:

- i) $\frac{\partial y_N}{\partial \theta} < 0$ if $\theta > \tilde{\theta} \rightarrow$ the rejection mechanism prevails
- ii) $\frac{\partial y_N}{\partial \theta} > 0$ if $\theta \leq \tilde{\theta} \rightarrow$ the integration mechanism prevails

4. Empirical strategy

As widely recognized in the literature, the vast majority of cross-sectional variation in students' peers is generated by selection: students self-select into schools based on their family background and income, parents' job locations, residential preferences, school rules, educational preferences and even ability (Hoxby, 2000). In the specific case of the estimation of peer effects between native and non-native students, first of all, one must account for the endogenous placement of immigrants into some geographical areas that are usually more likely to be populated also by lower-achieving native students, regardless of the local level of immigrant concentration (Gould *et al.*, 2009). As a consequence, non-natives' concentration in the schools may be endogenous because of parents' housing decisions: individuals sort into neighbourhoods because they want - or do not want, or they are forced - to live in a 'ghetto' area, or in areas where an occupation is more likely to be found, or in areas where renting houses is less expensive, and so on. Second, the peer group can be the result of individual choices: for example, given the residential choice of the household,

2009

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