

A deeper insight into the ethnic make-up of schools: evidence from The Netherlands

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Abstract

While the share of non-native students in a class is supposed to have a non positive effect on school achievement, little is said about the heterogeneity of the ethnic make-up. Ethnic diversity can stimulate the creativity of students, can push them to be proficient in the instructional language and culture, can reduce the scope of ethnic identification with all its possible drawbacks, but it may also make the job of teachers more difficult. We exploit the within school time variation in ethnic diversity of a rich data-set about primary education in the Netherlands to investigate whether ethnic diversity matters for school achievement, for who it matters and which can be the mechanisms working behind. We find that ethnic diversity has a positive impact on the test scores of minority students, especially for language skills and older students. We also find a negative relationship between ethnic diversity and school's social environment, that can partly explain the gains in test scores as a results of a more competitive environment.

Keywords: ethnic diversity; education; peer effects

JEL classification: I21; I28; J15

1 Introduction

The “white flight” from predominantly “black” schools is an issue that has attracted the attention of many governments and has also been documented in some studies (Nusche , 2009; Gramberg , 2007). The challenge is to understand what is the effect of migrant students on both native's and minority's achievement and to detect appropriate policies. The literature about the effect of the ethnic composition of classes on pupils' achievement does not provide a clear and easy picture of the issue. However, some general observations can be drawn.

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Primarily, it is commonly assumed that part of the effect of the share of ethnic minorities on test scores is driven by the selection and self-selection of students into schools. The pure effect of having schools with more ethnic minorities students is generally found to be negative (Hoxby , 2000; Hanushek *et al.* , 2002), though in some studies it does not seem to be significant, especially in experimental settings (Card and Rothstein , 2006; Angrist and Lang , 2004). Further, there is a shared evidence that the proportion of ethnic minorities students in a class mainly affects ethnic minority pupils and it has nearly no effect on native children (Hoxby , 2000; Angrist and Lang , 2004; Card and Rothstein , 2006; Gould *et al.* , 2004; Hanushek *et al.* , 2002). In particular, for the US the effect is stronger for the proportion of Afro-Americans on Afro-Americans themselves (Hoxby , 2000). There is no evidence that, if any, the effect of the ethnic share is stronger for language skills than for mathematical abilities.

The fact that different ethnicities have different influences of the ethnic majority group and on themselves is somehow puzzling. Why a class with 50% Afro-Americans should perform worse than a class with 50% Hispanic or Asian? Could it be that is not (or not only) the effect of being a Afro-American, having a given culture or having a long past of distress and discrimination, but the fact to study in school and classes in which they constitute the main ethnic minority? What is missing in the existing literature in applied economics of education is a look at how ethnic minorities form the ethnic share. What is done is to study whether the effect of having a class with 50% Afro-Americans has the same effect as having 50% Hispanics, not whether the effect of having 50% students from cultures different from that of the majority group are made up by a single or a dominant ethnicity or by a variety of different ethnicities. From minorities analyzed as a “black box” to ethnic specific analysis, the “mixing” of different minority groups is not considered in this type of literature¹. We want to point out that diversity in the ethnic make-up of a class can play a role in education and other social aspects of the life of young students.

Ethnic diversity can stimulate the creativity of students, can increase the incentive to adopt the instructional language and culture, can reduce the feeling of ethnic identification and the consequences it may generate and may also make the job of teachers more difficult. The contribution of this paper is to investigate whether ethnic diversity matters for school achievement, for who it matters and which can be the mechanisms it may generate. We want to show that apart from the quota of “immigrants” in a class, also the composition of this share matters.

We use a rich data-set about primary school education in the Nether-

¹However, the topic of ethnic fragmentation is extensively investigated in the macro and political economy literature and in experimental studies about firms’ performance. For a rich review of these other streams of literature, see Alesina and La Ferrara (2005).

lands, that allows us to exploit the within school time variation in ethnic diversity in order to estimate a causal effect of diversity on test scores. We find ethnic diversity has an overall positive impact on test scores, especially for language skills. This effect is significant for minority students, in particular in the last years of primary education. The positive effect holds for migrant pupils even at considerable high level of minority's share. On the other hand, we find a negative effect of ethnic diversity on the school social environment for the same group of children. So we think that a less favorable social environment may generate some competitive behaviour among pupils. We do not find a strong evidence that an ethnically heterogeneous composition of the classes significantly worsen the relationship between teachers and pupils.

The paper is organized as follows. Section 2 explains why ethnic diversity can play a role in school achievement, in relation to existing studies about ethnicity and the processes it may generate. Section 2.1 describes our measure of ethnic diversity. In Section 3 we explain the method used to estimate the causal effect of ethnic diversity on test scores and some refinement of the analysis. Section 4 introduces the data about primary school in the Netherlands and some descriptive statistics. Section 5 presents the results about ethnic diversity for the linear and the non-linear model. Section 6 strengthens our analysis with some robustness checks. Section 7 is an attempt to support some explanation about the mechanisms there can be behind the effect of ethnic diversity on test scores. Finally, Section 8 draws some conclusive comments.

2 Ethnic diversity

Ethnic identification and social behaviour is a topic that has long interested scholars. Akerlof and Kranton (2000) introduce the concept of identity in the utility function to explain apparently non-rational economic behaviours. They explicitly associate identity and self-image. In their model identification with the dominant group and its associated prescribed behaviour depends on the extent of the social exclusion imposed by the dominant culture, on the loss in economic returns for individuals of the non-dominant culture for adopting the behaviour prescribed for the dominant group and on the negative externality imposed by the non-dominant group on the peers of their group who choose the activity associated with the dominant culture. Some reasonable values of these factors generate a mixed equilibrium in which some individuals of the non-dominant culture adopt the self-destructive behaviour known as "oppositional identity". In the context of school, diversity can enter the utility function in the process generating the ethnic identification and its associated behaviour. If pupils consider as a reference group only the students of their own ethnicity and not the wider

group of non-native pupils and if the negative externality imposed by the reference group is an increasing function of the distribution of their ethnic group in the class, then ethnic diversity can generate equilibria with more non-native pupils adopting the dominant identity and behaviour. With special reference to education, Akerlof and Kranton (2002) describe the utility function of a student as composed by two parts: one follows standard economic theory (ability and effort) and the other follows the concept of identity. The second part of the utility function is maximized by the student by choosing a social category (for instance, “burnout”) in order to balance the social status corresponding to that category with “fitting in”, that in turn depends on the characteristics of the student (for instance, ability and look). In this model, ethnic diversity can have a (“positive”) effect of the choice of the social category if the weight associated to the identity part of the utility function is a (decreasing) function of diversity.

Fryer and Torelli (2005) demonstrate that there are large racial differences in the relationship between the students’ popularity and their academic achievement, corresponding to the notion known as “acting white”. Blacks are found to have a considerable more pronounced negative correlation between popularity and achievement than Whites. Interestingly, Fryer and Torelli (2005) find that the “acting white” behaviour is almost non-existent in predominantly black schools and in schools where interracial contact is low. They explain this finding with a two-audience signaling model where racial differences in the relationship between social status and academic achievement arise and are exacerbated in environments with more interracial contacts. If ethnic diversity deteriorates somehow the social interaction of pupils, it may have, on the other side, beneficial effects on achievement.

Furthermore, diversity can enrich students. A seminal paper of Lazear (1998) argues that as long as the ethnic minority culture is relevant, not overlapping with that of the majority group and understandable it enriches the majority group and *viceversa*. He argues that diversity may enrich the environment where individuals live and trade and may contribute to greater creativity. By extending the theory of Lazear (1998) to multiple ethnic minority groups we can apply this idea in the context of school achievement.

Bridging the theory of Lazear (1998) and the conclusions of Akerlof and Kranton (2000) and Fryer and Torelli (2005), O’Reilly *et al.* (1997) find that diversity is associated with an increase in conflict and that conflict has a negative impact on firm performance. In particular, they find that ethnic diversity has a positive effect on group performance but this effect occur independent of conflict, not because of it.

From a more pragmatic point of view, the value of assimilation is larger for small ethnic minority groups. As common culture and common language facilitate trade between individuals a small ethnic minority group has a bigger incentive to adopt the majority culture or skills as a mean for interaction (Lazear , 1999), unless different ethnic minority groups form a common eth-

nic minority culture (probably requiring much more effort and cohesion). In the school context, this incentive could lead to achievement gains as instructional language and culture is set by the majority group and teachers are mostly from the ethnic majority. As long as diversity entails smaller shares of the ethnic groups and a decline of dominant minority groups, we may expect ethnic diversity to have an effect on school achievement and, in particular, on language scores.

If ethnic diversity may entails benefits, it may also generate some cost. Alesina and La Ferrara (2005) show that the provision of public goods is lower in more fragmented societies, which they explain with a simple model where the utility function depends also on the consumption of a shared public goods and, since different ethnic groups have different preferences over the public good to provide, a higher heterogeneity reduces the utility. Indeed, a different hypothesis about the role ethnic diversity in the context of school might comes from teachers. It can be easier for teachers to deal with an homogeneous ethnic minority group. For instance, teachers can devote some instructional time for the language problems of one particular ethnic minority. The action of teachers can become more problematic if teachers have to target specific instructional time to multiple ethnic groups. Evidence in favor of this consideration is found in Hoxby (2000), where a share of Hispanic between 66% and 100% has a positive effect on their school achievement. We may also think that the cost for teachers of targeting instructional time to specific groups of foreigners is lower the more “relevant”, widespread, closer to the native and known is the culture of the minority group at stake.

We have mentioned the effect ethnic diversity might have in the context of school and the mechanisms there could be behind. The primary concern of this work is to investigate whether there exists any effect of ethnic diversity on test scores, as a result of whichever of these mechanisms and in whatsoever combination. Furthermore, as the literature points out that there may exist a relationship between ethnicity and the social environment of students, we explore the issue of the relationship between ethnic diversity and school environment.

For the purpose of this work, we can distinguish three broad and interlinked channels through which ethnic diversity may work: social environment, teacher’s attitude and (strategic) individual behaviour (as may be induced by the social environment or directly determined) as residual category. More in detail, we consider whether ethnic diversity have an effect on interest in school, as suggested by Lazear (1998), on self-esteem and social interaction, to be in line with the findings of Akerlof and Kranton (2000), Fryer and Torelli (2005) and O’Reilly *et al.* (1997) and on the relationship between teachers and pupils (as perceived by teachers). However, we do not prove that if ethnic diversity has an impact on some aspects of the school social environment, the effect of ethnic diversity on school achievement is

unequivocally and directly determined by these aspects. We can merely exclude or welcome some of the above mentioned hypotheses and leave the issue of whether the effect of ethnic diversity works *via* some forms of social behaviour or if the effect on social behaviour is determined simultaneously with test scores open for future research.

2.1 Ethnic diversity index

Non-native (student) population is quite diversified in the Netherlands. Some ethnic minority students are the offspring of the decolonization of Indonesia (and Moluccas islands), Suriname and Dutch Antilles. Some are the offspring of the Mediterranean “guest workers” of the ’60s: mainly Turkish and Morocco, but also Italians, Spanish, Portuguese, Greek and from former Yugoslavia. There are also students with Chinese and Vietnam origins and some from countries of a more recent immigration path and offspring of asylum seekers (Zorlu and Hartog , 2001).

We refer to ethnic diversity as an heterogeneous pool of minority students, where ethnicity is defined on the basis of the country of origin. The measure we chose for ethnic diversity is a continuous index that takes into account both the share and the number of ethnic minorities in the non-native group. The measure is an inverted Hirschman-Herfindahl index:

$$D_{gst} = 1 - \sum_{k=1}^K m_{kgst}^2 \quad (1)$$

$$if \ K = 1 \Rightarrow D = 0$$

$$\lim_{K \rightarrow \infty} D = 1$$

where m is the share of ethnic minority k in grade g , schools s and year t . The more groups and the more dispersed the groups, the higher the index D . When D is equal to zero it corresponds to full homogeneity of the ethnic minority group (e.g. there is only one ethnic minority in the non-native group). Higher values of D corresponds to a rise in the number of ethnic groups and to a lower variance of the ethnic groups’ shares. More precisely, the Herfindahl index can be decomposed into two effects²: the number of the ethnic minority groups and the symmetry of these groups. The symmetry of the ethnic minority groups can be measured as:

$$SYM_{gst} = 1 - [(1 - D_{gst}) - \frac{1}{K}] \quad (2)$$

where $1/K$ is a measure of perfect symmetry for a given number of ethnic minority groups K . This index measures the degree of asymmetry among

²The index is decomposed as: $D = -1/K + SYM$. However, in the regressions we use K instead of $-1/K$.

ethnic groups. Higher values of SYM indicates a more equally distribution of the ethnic minority groups. When the deviation from the situation of perfect symmetry is very large, the index tends to zero.

3 Empirical strategy

3.1 Baseline model

The make-up of schools and classes is generally considered to be endogenous. Parents who are very concerned about the schooling of their children tend to choose schools with a small share of immigrants, especially when their children are particularly talented. The rationale behind this choice is that parents look at the average test scores of schools and schools with higher share of immigrants have lower test scores. However, simple averages cannot disentangle compositional and causal effects. The same rationale may hold for the ethnic composition of schools, as more open-minded parents or more able children may choose schools and classes independently of the ethnic make-up (without clustering with relatives and friends) and may opt for ethnically heterogeneous schools and classes. The role of parents and ethnicity in the careful selection of the school for the children is confirmed by Gramberg (2007) for the case of Amsterdam.

In order to eliminate the sorting into classes we consider cohorts and to eliminate the self-selection into schools we adopt a first difference model within the same school. We consider separate learning functions for native and non-native and for each grade. The model is:

$$\begin{aligned} \bar{y}_{jgst} - \bar{y}_{jgst-1} = \\ \alpha_{jgt} - \alpha_{jgt-1} + \beta_{jg}(M_{gst} - M_{gst-1}) + \gamma_{jg}(D_{gst} - D_{gst-1}) + \varepsilon_{jgst} - \varepsilon_{jgst-1} \quad (3) \\ \forall j, g \text{ combinations} \end{aligned}$$

where \bar{y}_{jgst} is the average test score (in language, mathematics and reading understanding) of ethnic group j (native or non-native), in grade g , school s and year t ; M is the share of non-native children in the cohort, D is the measure of ethnic diversity³ (common to both the native and non-native groups), β and γ are ethnic (native and non-native) and grade specific coefficients for the effect of ethnic share and ethnic diversity and ε is the error term. Error terms are clustered at school and cohort level. Since we consider average values, the model is weighted by the average size of each group in the two consecutive cohorts, where larger weights designate more accurately measured observations.

³For the measure of ethnic diversity we consider all the different ethnicities present in the non-native group, while for the learning function we just distinguish between native and non-native students.

3.2 Non-linear model

We also consider non-linear effects of ethnic diversity. Indeed, the effect of ethnic diversity can be non-linear in the share of ethnic minority students. For example ethnic diversity might not matter when the ethnic share is below a certain threshold. We insert the non-linearity at the level of the ethnic share at which the change occurs. We define four intervals, corresponding to the quartile distribution of the share of minority students: below 12%, between 12% and 33%, between 33% and 63% and above 63%. The model is estimated as a variant of equation 3, by interacting the term $(D_{gst} - D_{gst-1})$ with an indicator that assigns the share of minority students of the initial cohort M_{gst-1} to one of the four intervals.

3.3 Robust model

We strengthen our baseline model by performing two additional checks. First, within the same school changes in the index of ethnic diversity from one year to the other can be endogenous. We instrument the ethnic diversity index with the residuals from the grade and school specific trend in the ethnic diversity index, as used in Hoxby (2000) for the share of minorities. The instrument for ethnic diversity D_{gst} is $\Delta\hat{u}$, where u derives from the following equation:

$$D_{gst} = \alpha_{gs} + \phi_{gst}t + u_{gs} \quad (4)$$

$\forall j, g \text{ combinations}$

The identifying assumption is that school/grade time trends in the ethnic diversity ϕ_{gs} are well summarized by a linear time trend.

Second, if the share and the mixing of ethnic minorities varies idiosyncratically from one year to the other, also other characteristics may vary and affect pupils' achievement. More precisely, if the change in these (omitted) characteristics is correlated with the change in ethnic diversity, the coefficients of ethnic diversity is biased. For example, a positive change in ethnic diversity could correspond to a positive change in the level of education of parents. The model is estimated as a variant of equation 3, where we add a set of changes in some controls $(Z_{gst} - Z_{gst-1})$ for other possible confounding effects. In particular, we control for changes in the share of parents with a low level of education, changes in the proportion of male pupils and changes in class size.

3.4 Mechanisms

In the attempt to investigate the mechanisms driving the effect of ethnic diversity on test scores we also consider the effect of ethnic diversity on some

subjective and relational outcomes for teachers and students⁴. Indeed, the coefficient γ in equation 3 could be enacted through various channels. The model we use is the same as in equation 3, where \bar{y}_{jgst} is replaced with the average quality of the relationship between teachers and pupils as perceived by the teacher, the average (self-assessed) school well-being, self-esteem and social interaction of students. We propose to use the last three variables to explain how ethnic diversity can affect the classroom environment and the first to explain if teachers are affected when dealing with an heterogeneous group of minority students. In one set of questions, students are asked to evaluate the general aspect of their classroom, while in the other set of questions teachers are asked to evaluate their relationship with students. We consider the effect of ethnic diversity on individual strategic behaviour as affected by the school environment as a possible residual explanation.

As a cross check of the mechanisms there could be behind ethnic diversity, we also consider a decomposition of ethnic diversity into an effect of the number of ethnic minority groups and of the symmetry of these groups. We estimate these separate effects by decomposing the term $(D_{gst} - D_{gst-1})$ into the change in symmetry of the ethnic minority groups $(SYM_{gst} - SYM_{gst-1})$ and the change in the number of ethnic minority groups $(K_{gst} - K_{gst-1})$.

4 Data and descriptive statistics

4.1 The PRIMA data

We use the PRIMA-cohort dataset, a large-scale survey of primary education in the Netherlands. The data were gathered twice a year from 1994 to 2004 in a representative sample of about 450 schools and in a sample of 200 schools containing a relative large number of disadvantaged pupils. The PRIMA data contain information about students in grade 2, 4, 6 and 8 of primary school. For some items the data are not available for all grades. The data include test scores in language (Dutch), maths and reading understanding, the degree of school well-being, self-confidence and social interaction of pupils, the extent to which teachers feel at ease with pupils and demographic characteristics of the pupils, such as parents' ethnic origin and level of education. In the Glossary we report the questions reported in Driessen *et al.* (2006), that they used to construct the socio-relational outcomes.

We consider each grade separately and we exploit the longitudinal feature of the data at the school level (not at the student level). We dropped the combinations of school/cohort in which the share of students with missing ethnicity of the parents was above 10%. We selected the remaining combinations of school/cohort that have been observed at least for three

⁴Lavy and Schlosser (2007) use the same approach to identify the mechanisms working behind gender peer effects.

subsequent years, in order to render the results comparable with the robust analysis⁵. Indeed, for the instrument presented in Section 3.3, we need at least three observations for each school in order to obtain the residuals from a linear time trend. The reading understanding test score was submitted to a random subsample of pupils in grade 6 and 8 and we have these scores only starting from 1998. Similarly, pupils’ self-assessments were given to a random subsample of students in grade 6 and 8, only starting from 1998 for the variable “social integration”. Also for the variable “teacher relationship with pupils” was drawn a random subsample and only starting from 2000, though for all grades. As a consequence, the sample size for the regressions of each outcome is different. The difference in sample size between native and non-native for the same outcome is due to classes with only “foreign” students.

We assign the ethnicity to the student, based on the ethnic origin of the father or, if missing, that of the mother. We standardize test scores by grade and year, keeping the share of non-native students in the representative sample constant at the level of the first year for which we have the data.

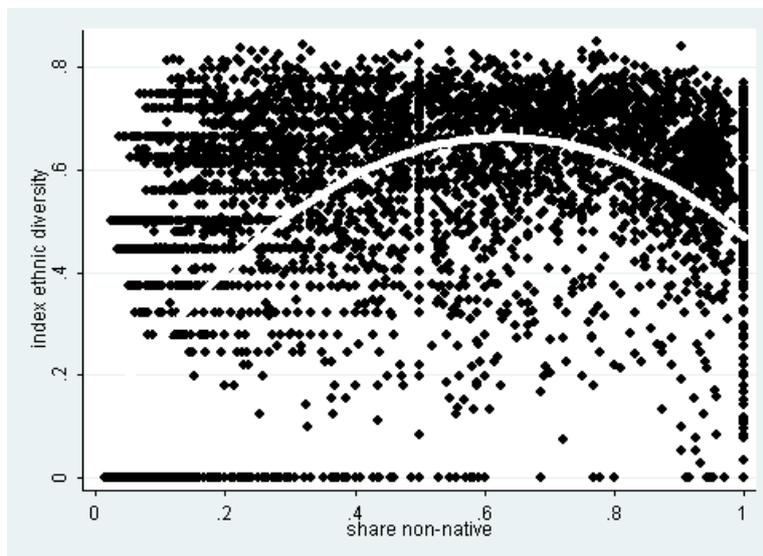
4.2 Descriptive statistics

Table 1 lists the ethnic minority groups present in our sample and their respective share, by grade. In the final sample native students account for about 61% of the total number of students, the four larger ethnic minority groups are students with Surinamese, Turkish, Moroccan and “other countries” origins. Table 2 reports the descriptive statistics of the outcome and explanatory variables, by native status. We only report the descriptive statistics of grade 8, however the tables for the other grades are very similar. Apart from the native *versus* non-native test scores gap, we notice that minority students have a slightly worse relationship with teachers and self-esteem, a slightly higher level of school well-being and social integration. With respect to demographic characteristics, ethnic minority students are in classes with a slightly higher level of students with a low educational family background and they are in slightly smaller classes. Non-native students are in classes with a slightly higher share of minorities and slightly more ethnically diverse, reasonably due to the presence in our sample of all-minority classes.

Figure 1 shows the correlation between ethnic minority share and ethnic diversity. The figure shows that there is considerable independent variation of the two variables, that is cohort/school combinations with the same share of ethnic minority students have different values in the ethnic diversity index.

⁵The original and the “selected” samples are not significantly different in terms of test scores and other characteristics. The only difference is that schools with more foreigners are oversampled in the “selected” sample, as explicitly provided for by the PRIMA-cohort survey.

Figure 1: Percentage of ethnic share *versus* ethnic diversity index



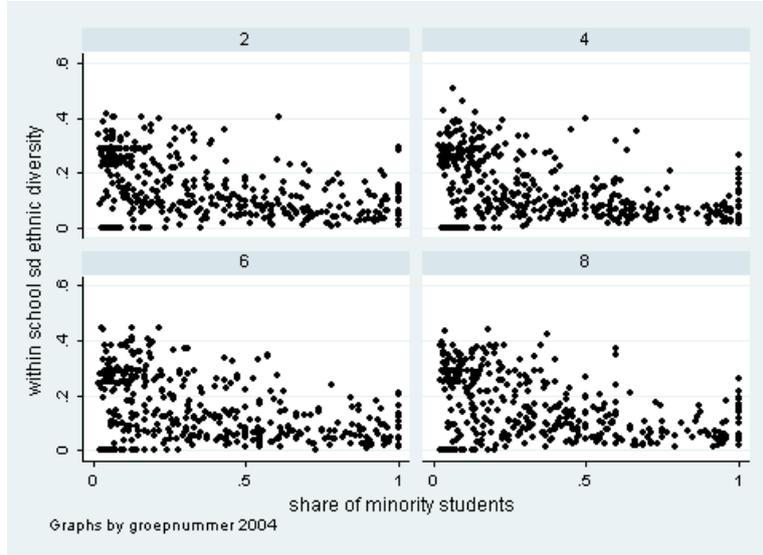
However, for our approach we need enough and independent variation in the ethnic diversity index. Table 3 shows that there is a considerable amount of within school variation in the ethnic diversity index, that explains about 33% of the total variance. Figure 2 plots the within school standard deviation of ethnic diversity: this variation is present at all levels of the share of minority students, though it is higher in schools with a smaller share.

Figure 3 shows the correlation between the change in ethnic share and the change in ethnic diversity and we see there is considerable independent variation, though there is a slight positive correlation between the two measures (0.28).

5 Empirical findings

Table 4 and 5 show the results for the language test score, for each grade and separated for Dutch and for the ethnic minorities group of students. Ethnic diversity definitively increases language test scores with one (non significant) exception, that is for native in grade 4. For all the other grades and for both the groups of native and “immigrants” the coefficient of ethnic diversity is positive and especially significant for the group of non-native. Table 7 and 8 report the results for math test scores. The effect of ethnic diversity is generally positive, in particular for “immigrants”, but the coefficients are not very significant. The only significant finding is for non-native in grade 8, where the effect of ethnic diversity seems to almost counterbalance the

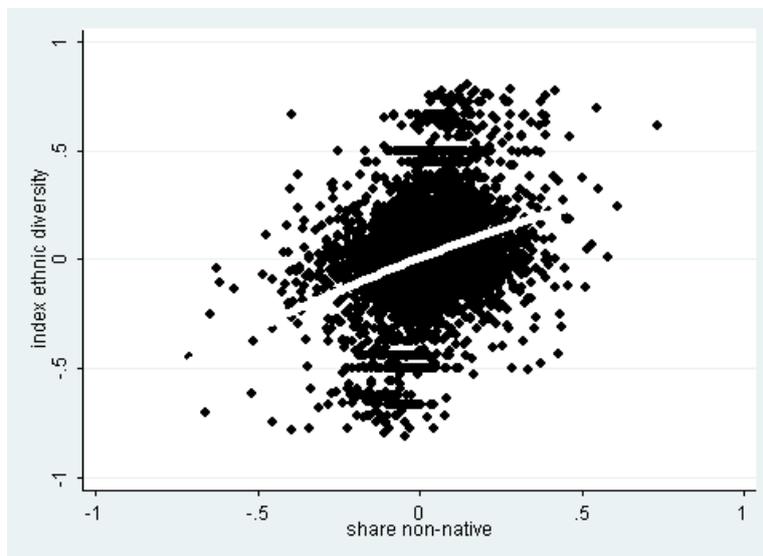
Figure 2: Within school standard deviation of the ethnic diversity index



negative effect of the ethnic share. For reading understanding (Table 6) we get strong and significant results of ethnic diversity on non-natives in both the grades for which this test is available.

Overall, there is no significant effect of ethnic diversity on the test scores of native students. This result is consistent with the evidence brought by the literature about the effect of ethnic share on school achievement, where “foreign” students turn out to be the most affected when a significant effect of ethnic share is found. Here we find that the test scores of native students are poorly sensitive to both the share of minority students and its ethnic composition. On the other hand, the effect of ethnic diversity is always positive and often significant for the ethnic minorities group in all the three subjects. The coefficients are bigger and more significant for the students in higher grades, especially in the *8th* grade and for language skills. Standardized coefficients reported in square brackets show that the positive and significant effect of ethnic diversity counterbalances the negative and rarely significant effect of ethnic share, though a change of one standard deviation in the ethnic share may not be comparable with a one standard deviation change in ethnic diversity. The magnitude of the effect of ethnic diversity is better explained by an example. A one standard deviation of the change in ethnic diversity (0.25) increases language test scores by 10.6% of the standard deviation (0.72), for *8th* graders. The gap between native and non-native language test scores in grade 8 is 0.55, so an increase in the diversity index of 0.25 points increases the test scores of non-native by 0.08

Figure 3: Change in ethnic share *versus* change in ethnic diversity index



points, reducing the native/non-native gap by 15%. However, a change in the ethnic diversity index of 0.25 points means going, for example, from two equally distributed minority groups ($D=0.5$) to four equally distributed groups ($D=0.75$), that is not a small change. More reasonably, a 0.1 point increase in the ethnic diversity index reduces the language native *versus* non-native test score gap by about 5%, the math test score gap by about 9% and the reading understanding test score gap by about 10%, for 8th graders.

5.1 Non linear effects of ethnic diversity

Tables 15 to 16 illustrate the results for the non-linearities in the ethnic share, respectively for language, math and reading understanding test scores. We only report the results for 6th and 8th graders. Some cautions in interpreting these results are due, as the number of observations in each cell is rather small.

Findings are non very straightforward. For all the three subjects, the significance of the non-linear coefficients of ethnic diversity tends to confirm that the heterogeneity of the minority group mainly affects minority students themselves. The sign of the effect of ethnic diversity is mostly positive for most levels of the percentage of minority students. However, if ethnic minorities seem to benefit from ethnic diversity the higher is the share of non-natives, native students seem to be adversely affected by ethnic diversity at high levels of the non-native student population. Indeed, the magnitude

of the coefficients in the even columns (minority) of Table 15, 17 and 16 is increasing by going from the top to the bottom of the panel, while in the odd columns (native) the coefficients in some cases turn negative, especially at high level of the ethnic share. An explanation could be that when the share of minority students is high, having minorities from many different ethnic groups may require additional efforts for teachers, obtained by removing some attention from native students. Overall, the coefficients for natives are almost never significant, with a (positive) exception for math and language scores when the share of minority is between 12% and 33%.

6 Robustness checks

Table 20 to 21 report robust results. We only report results for *6th* and *8th* graders.

First, changes in the ethnic composition may be correlated with changes in other observable characteristics of the cohort, like the proportion of children with low family background, the proportion of male and average class size. Even controlling for these characteristics, it does not significantly change the results. Indeed, even columns of Table 20, 22 and 21 confirm the results found with the baseline model, that are actually strengthened. We also observe that natives are affected by the peers' share of male, while minority students by the peer's share having a low level of parental education. Again, test scores in maths seem less sensitive than the two language scores to the characteristics of the peers', including the ethnic make-up.

Moreover, changes in the ethnic composition within schools could follow an endogenous path. Odd columns of Table 20, 22 and 21 report the results using the instrumental variable as in Hoxby (2000). Again, robust analyses tend to confirm the baseline results, indicating that changes in the ethnic diversity index within the same school from one year to the other are not really endogenous. We also perform the same analysis as in equation 3 on a restricted sample of schools/cohorts in order to exclude outliers. We selected the combinations school/cohort corresponding to the black mass of figure 3, whose change in ethnic share is between -0.3 and 0.3 , and the change in ethnic diversity is between -0.3 and 0.3 . The findings (not reported) confirm our previous results, though we find some negative and significant results for grade 2. Results for the other three grades are twice as large (and positive) as in the full sample.

7 Mechanisms of ethnic diversity

We find some different results for teacher's related outcomes and pupils' social behaviour. An increase in ethnic diversity rises the proportion of native students who were advised to follow a low level track of secondary educa-

tion (even by controlling for changes in average test scores). Conversely, an increase in ethnic share reduces the proportion of native students who got a low advice for secondary school (Table 11). So, teachers seem to have a positive “bias” towards non-native students when the ethnic minority group is more heterogeneous. Ethnic diversity does seem to make the job of teachers more difficult. In fact, the sign of the coefficients in Table 9 and 10 is often negative, though not significant. However, the coefficient for 8 graders is not far from being significant. We find no effect of ethnic diversity and ethnic share on the probability of a later drop-out of the student, as perceived by the teacher (Table 11).

As shown in Table 12 and 13, if the ethnic share increases the well-being and self-confidence of pupils, including natives, the effect of ethnic diversity has an opposite sign and, again, is only significant for 8th graders. Similarly, for social integration the effect of ethnic diversity is generally negative and only significant for minority 8th graders (Table 14).

Though the outcome variables we use for the analysis of the mechanisms are very general, we find a striking negative and sometimes significant effect of ethnic diversity. An increase in ethnic diversity reduces (self-reported) well-being, self-confidence and social interaction of both native and minority pupils. As all the three variables have a positive correlation with test scores, it is natural to wonder how a negative effect of ethnic diversity on the social aspects of the pupils’ life can translate into a positive effect on test scores, at least for minority students.

Table 18 and 19 report the results for the decomposition of the effect of ethnic diversity into a “number of ethnicities” part and a “symmetry” part. Both elements seem to be (favorably) important for language and reading understanding test scores (Table 18), though it seems difficult to establish which of the two components is more important. For the school well-being the symmetry of the ethnic minority groups seems more important than the number of ethnic groups. Interestingly, the pupils’ self-esteem seems to be unfavorably affected by an increasing number of ethnic minorities (Table 19).

What can we say now about the mechanisms there can be behind the positive effect of ethnic diversity on test scores? The negative effect of ethnic diversity on socio-relational outcomes may point in favor of an interpretation of the role of ethnic diversity as breaking down the moment of identity formation and all its possible (negative) consequences. The mere fact that ethnic diversity has an effect could suggest that pupils consider the students of their own ethnic group as their reference group, otherwise we should just find an effect of ethnic share. We can say that, overall, ethnic diversity reduces social interaction and identification of pupils that in turn may have a weaker incentive of punishing “acting white” behaviours or “oppositional cultures”. We do not find a supporting evidence of the idea that ethnic diversity may enrich the human capital of students. Indeed, we find a negative

effect of diversity on well-being (that also includes a question about interest in school). On the other hand, we find that the number of ethnicities (so the number of cultures) does play a role in increasing test scores. Moreover, we do not have test scores in subject such as history or geography, that could better measure this aspect. Hence, we cannot discard the theory of Lazear (1998). With respect to teachers, it seems they are slightly overloaded when they teach in too heterogeneous classes, though it does not seem that diversity significantly worsen their relationship with pupils. Though we favor the interpretation according to which ethnic diversity generates a trade-off between (better) achievement and (worse) school social environment, we cannot assert that is the worse social life of students that pushes them to perform better. Indeed, the favorable effect of ethnic diversity on school performance can come through a higher degree of (language) assimilation, made it easier by ethnic diversity. The especially beneficial effect of ethnic diversity on language proficiency may point in favor of this interpretation.

8 Final remarks

We have found that ethnic diversity does play a role in the learning function, especially with respect to the acquisition of language skills. The beneficial effect of ethnic diversity on test scores seems to hold even at high levels of non-native's share, for migrant students. The magnitude of the effect of diversity appears to considerably reduce the eventual negative effect of the share of minority students.

Consistently with the literature, we find that ethnicity has an effect mostly for minority students, while natives do not seem to be affected. We may think that natives and minorities base their behaviour as two separate and with different status groups, thus the within group heterogeneity of the minority group does not affect native pupils. We also found that diversity is particularly important for older students. A possible explanation for this finding can be that ethnic identification, competitive behaviour and so on are concepts that young children do not develop yet. Furthermore, it may be that since we use cohort level data the level of interaction and competition within a cohort rather than within a class is stronger for older students. Ethnic diversity may work by implicitly boosting minority students to adopt the dominant culture and by pushing them to be proficient in the dominant language. Another interpretation is that ethnic diversity reduces the scope of ethnic identification and its eventual negative consequences, such as the penalty for "acting white" and probably by inducing some other kinds of behaviours such as competitiveness. Indeed, we observe a trade-off between the effect of ethnic diversity on test scores and on the quality of the school social environment. The relationship between teachers and pupils can be hindered by the heterogeneity of the class, though our data do not really

support this evidence.

In conclusion, ethnic diversity could represent a factor to take into account in the policy options for migrant students, in particular in contexts of free school choice where the “white flight” is difficult to be avoided without contradicting the idea of free school choice itself. However, it seems that ethnic diversity bears a trade-off between achievement and social life. It should be noted that the effect of having low grades in primary school can fade away with age, but there can be more long-lasting behaviours towards school that can be developed during primary school. For example, a child’s well-being at school can be a good indicator of how the child will form his idea of going to school. The importance of these aspects are confirmed by Gibbons and Silva (2009). Hence, in order to corroborate the idea of the beneficial effects of ethnic diversity in school, the importance of social *versus* early academic outcomes for migrant children should be further investigated.

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A Glossary

The outcome “school well-being” is based on evaluation of pupils (agree/disagree, 5 options) of the following statements:

- I get well along with teachers
- I think I learn interesting things in school
- I find the school annoying
- I feel at home in school
- I feel comfortable with teachers
- I think the pupils of my class are nice

The outcome “school self-confidence” is based on evaluation of pupils (agree/disagree, 5 options) of the following statements:

- I can learn well
- I am one of the best pupils in the class
- Most of the pupils of the class can learn better than me
- The teacher thinks that I can learn well
- I need little help in the class

The outcome “social integration in the class” is based on evaluation of pupils (agree/disagree, 5 options) of the following statements:

- Most pupils of the class get along better with each other than with me
- I have few friends in this class
- I get well along with my classmates
- I am often teased by the other children of my class
- I think is nice to stay with my classmates
- If I ask my classmates for help, there are enough that can do it

The outcome “teacher-pupil relationship” is based on evaluation of pupils (agree/disagree, 5 options) of the following statements:

- The student feels at ease with me
- The student finds the school unpleasant

- The student has a good relationship with me
- The student would like to reduce the school
- The students has a difficult contact with me
- The student comes to school unwillingly

B Appendix

Table 1: Shares of ethnic groups, by grade

	<i>G2</i>	<i>G4</i>	<i>G6</i>	<i>G8</i>
Dutch	60,94 (28353)	61,35 (29417)	61,55 (26144)	62,13 (23861)
Surinamese	3,25 (1513)	4,67 (2237)	4,81 (2045)	5,30 (2037)
Antillean	1,57 (732)	1,46 (698)	1,28 (545)	1,22 (468)
Moluccan	0,20 (93)	0,25 (122)	0,31 (131)	0,33 (127)
Turkish	11,85 (5513)	11,16 (5349)	11,01 (4677)	10,66 (4093)
Moroccan	10,07 (4970)	10,42 (4995)	10,27 (4364)	9,85 (3781)
Greek	0,06 (28)	0,04 (19)	0,04 (16)	0,05 (20)
Spanish	0,17 (81)	0,16 (79)	0,16 (68)	0,22 (83)
Italian	0,09 (44)	0,07 (32)	0,09 (38)	0,10 (37)
Portuguese	0,15 (70)	0,14 (66)	0,16 (67)	0,19 (73)
ex Yugoslavian	0,85 (395)	0,84 (402)	0,94 (401)	0,96 (370)
Chinese	0,60 (277)	0,54 (261)	0,60 (253)	0,59 (228)
Vietnamese	0,27 (126)	0,26 (123)	0,29 (123)	0,28 (109)
Other countries	9,31 (4333)	8,65 (4146)	8,48 (3604)	8,12 (3118)
Total	100 (46528)	100 (47946)	100 (42476)	100 (38405)

Absolute values in parentheses. The sample includes combinations of school/cohort in which there is at least one student from an ethnic minority group.

Table 2: Descriptive statistics, grade 8

	<i>G8, native</i>		<i>G8, ethnic m.</i>	
	mean (sd)	N	mean (sd)	N
language	-0,08 (0,45)	1404	-0,63 (0,63)	1471
math	-0,11 (0,54)	1404	-0,32 (0,64)	1471
reading	-0,12 (0,51)	1005	-0,44 (0,57)	1049
rel. with teacher	3,98 (0,39)	686	3,95 (0,41)	675
well-being	3,75 (0,36)	1399	3,79 (0,4)	1463
self-esteem	3,22 (0,3)	1399	3,18 (0,37)	1463
social integration	4,10 (0,32)	1010	4,15 (0,33)	1053
share imm	0,36 (0,28)	1404	0,40 (0,31)	1471
share unknown eth.	0,01 (0,02)	1404	0,01 (0,02)	1471
ethnic diversity	0,45 (0,27)	1404	0,46 (0,27)	1471
n. ethnicities	3,15 (1,68)	1404	3,19 (1,64)	1471
eth. symmetry	0,90 (0,11)	1404	0,90 (0,12)	1471
cohort size	25,42 (12,15)	1404	25,14 (12,2)	1471
share low fam.backg.	0,17 (0,2)	1404	0,20 (0,23)	1471
share unk. fam.backg.	0,042 (0,13)	1404	0,43 (0,13)	1471
share male	0,48 (0,14)	1404	0,50 (0,13)	1471
share unk. male	0,05 (0,18)	1404	0,05 (0,18)	1471

Mean of average values for school/cohort combinations, per group (native and non-native). Standard deviation in parenthesis.

Table 3: Decomposition of variance in the ethnic diversity index

Grade		Sum of squares	Share of total	DF
2	between school	72.49	67%	398
	within school	36.42	33%	1141
	total	108.91		1539
4	between school	87.95	68%	429
	within school	40.55	32%	1202
	total	117.10		1606
6	between school	75.30	64%	404
	within school	41.78	36%	1266
	total	128.50		1695
8	between school	69.80	64%	387
	within school	39.74	36%	1111
	total	109.53		1498

Table 4: Language, grade 2 and 4

	<i>G2, native</i>	<i>G2, ethnic m.</i>	<i>G4, native</i>	<i>G4, ethnic m.</i>
Δ share imm	-0.026 (-0.153) [-0.006]	-0.139 (-0.804) [-0.031]	0.170 (1.074) [0.038]	-0.343* (-2.283) [-0.081]
Δ eth.diversity	0.006 (0.100) [0.003]	0.073 (0.604) [0.021]	-0.107 (-1.612) [-0.061]	0.257* (2.460) [0.080]
N	1025	1056	1155	1193

Table 5: Language, grade 6 and 8

	<i>G6, native</i>	<i>G6, ethnic m.</i>	<i>G8, native</i>	<i>G8, ethnic m.</i>
Δ share imm	-0.137 (-0.887) [-0.034]	-0.124 (-0.947) [-0.032]	-0.089 (-0.590) [-0.025]	-0.155 (-1.075) [-0.039]
Δ eth.diversity	0.087 (1.556) [0.057]	0.332** (3.735) [0.130]	0.023 (0.462) [0.017]	0.289** (3.117) [0.106]
N	1096	1137	986	1049

Table 6: Reading understanding, grade 6 and 8

	<i>G6, native</i>	<i>G6, ethnic m.</i>	<i>G8, native</i>	<i>G8, ethnic m.</i>
Δ share imm	0.019 (0.078) [0.004]	-0.132 (-0.791) [-0.030]	0.214 (0.977) [0.051]	-0.131 (-0.629) [-0.031]
Δ eth.diversity	-0.071 (-0.866) [-0.043]	0.193† (1.761) [0.068]	-0.034 (-0.484) [-0.021]	0.320* (2.513) [0.113]
N	672	692	618	654

Legend: † $p < 0.10$ * $p < 0.05$ ** $p < 0.01$. Beta coefficients in square brackets. t-value in round brackets. Standard errors (not reported) are clustered by school. All regressions include a control for the change in the share of unknown ethnicity.

Table 7: Math, grade 2 and 4

	<i>G2, native</i>	<i>G2, ethnic m.</i>	<i>G4, native</i>	<i>G4, ethnic m.</i>
Δ share imm	-0.177 (-1.062) [-0.038]	-0.242 (-1.519) [-0.054]	-0.076 (-0.467) [-0.017]	-0.260 (-1.545) [-0.057]
Δ eth.diversity	-0.044 (-0.640) [-0.025]	0.055 (0.487) [0.016]	-0.029 (-0.441) [-0.016]	0.121 (1.103) [0.035]
N	1025	1056	1155	1193

Table 8: Math, grade 6 and 8

	<i>G6, native</i>	<i>G6, ethnic m.</i>	<i>G8, native</i>	<i>G8, ethnic m.</i>
Δ share imm	-0.158 (-1.064) [-0.036]	-0.187 (-1.129) [-0.039]	-0.037 (-0.235) [-0.008]	-0.293 [†] (-1.950) [-0.061]
Δ eth.diversity	0.068 (1.051) [0.041]	0.134 (1.163) [0.042]	0.021 (0.349) [0.012]	0.198 [†] (1.898) [0.061]
N	1096	1137	986	1049

Legend: [†] p<0.10 * p<0.05 ** p<0.01. Beta coefficients in square brackets. t-value in round brackets. Standard errors (not reported) are clustered by school. All regressions include a control for the change in the share of unknown ethnicity.

Table 9: Relationship teacher-pupil, grade 2 and 4

	<i>G2, native</i>	<i>G2, ethnic m.</i>	<i>G4, native</i>	<i>G4, ethnic m.</i>
Δ share imm	0.110 (0.670) [0.038]	0.010 (0.061) [0.003]	0.350* (2.005) [0.101]	-0.184 (-1.151) [-0.058]
Δ eth.diversity	-0.001 (-0.016) [-0.001]	-0.007 (-0.046) [-0.003]	-0.074 (-0.967) [-0.054]	0.086 (0.497) [0.032]
N	373	361	398	372

Table 10: Relationship teacher-pupil, grade 6 and 8

	<i>G6, native</i>	<i>G6, ethnic m.</i>	<i>G8, native</i>	<i>G8, ethnic m.</i>
Δ share imm	-0.015 (-0.079) [-0.004]	0.196 (0.869) [0.051]	0.277 (1.180) [0.069]	-0.365 (-1.481) [-0.099]
Δ eth.diversity	-0.015 (-0.163) [-0.011]	-0.131 (-0.760) [-0.049]	0.047 (0.496) [0.031]	-0.204 (-1.456) [-0.082]
N	377	368	359	341

Table 11: Teacher advice for a low level secondary school (A) and probability of later drop-out (D), grade 8

	<i>G8, native</i>	<i>G8, ethnic m.</i>	<i>G8, native</i>	<i>G8, ethnic m.</i>
Δ share imm	-0.187† (-1.782) [-0.122]	0.150 (1.026) [0.067]	-0.013 (-0.403) [-0.018]	0.016 (0.380) [0.016]
Δ eth.diversity	0.065* (2.115) [0.111]	-0.016 (-0.179) [-0.011]	0.004 (0.423) [0.015]	0.003 (0.116) [0.005]
N	321	341	489	514

Legend: † $p < 0.10$ * $p < 0.05$ ** $p < 0.01$. Beta coefficients in square brackets. t-value in round brackets. Standard errors (not reported) are clustered by school. All regressions include a control for the change in the share of unknown ethnicity.

Table 12: School well-being, grade 6 and 8

	<i>G6, native</i>	<i>G6, ethnic m.</i>	<i>G8, native</i>	<i>G8, ethnic m.</i>
Δ share imm	0.014 (0.097) [0.004]	0.319** (2.737) [0.092]	0.182 (1.466) [0.053]	-0.130 (-1.143) [-0.038]
Δ eth.diversity	-0.032 (-0.631) [-0.024]	-0.008 (-0.102) [-0.003]	-0.110* (-2.161) [-0.084]	-0.148 (-1.644) [-0.064]
N	1091	1132	980	1038

Table 13: School self-confidence, grade 6 and 8

	<i>G6, native</i>	<i>G6, ethnic m.</i>	<i>G8, native</i>	<i>G8, ethnic m.</i>
Δ share imm	0.165† (1.650) [0.064]	0.245* (2.527) [0.086]	0.265** (2.630) [0.105]	0.142 (1.364) [0.051]
Δ eth.diversity	-0.012 (-0.355) [-0.013]	-0.011 (-0.141) [-0.006]	-0.036 (-1.065) [-0.037]	-0.136* (-2.010) [-0.072]
N	1091	1132	980	1038

Table 14: Social integration in the class, grade 6 and 8

	<i>G6, native</i>	<i>G6, ethnic m.</i>	<i>G8, native</i>	<i>G8, ethnic m.</i>
Δ share imm	-0.316† (-1.841) [-0.108]	-0.054 (-0.367) [-0.016]	-0.146 (-1.011) [-0.051]	-0.185 (-1.389) [-0.062]
Δ eth.diversity	-0.033 (-0.594) [-0.029]	-0.066 (-0.615) [-0.028]	-0.016 (-0.364) [-0.015]	-0.168† (-1.876) [-0.083]
N	680	706	622	658

Legend: † $p < 0.10$ * $p < 0.05$ ** $p < 0.01$. Beta coefficients in square brackets. t-value in round brackets. Standard errors (not reported) are clustered by school. All regressions include a control for the change in the share of unknown ethnicity.

Table 15: Non linear effect in share ethnic m. for language, grade 6 and 8

	<i>G6, native</i>	<i>G6, ethnic m.</i>	<i>G8, native</i>	<i>G8, ethnic m.</i>
Δ share imm	-0.137 (-0.893) [-0.034]	-0.113 (-0.872) [-0.030]	-0.087 (-0.583) [-0.024]	-0.158 (-1.098) [-0.039]
diversity*share1	0.056 (0.790) [0.028]	0.040 (0.226) [0.007]	0.039 (0.634) [0.022]	0.158 (0.825) [0.026]
diversity*share2	0.152† (1.746) [0.057]	0.357* (2.583) [0.075]	-0.012 (-0.143) [-0.005]	0.337* (2.353) [0.068]
diversity*share3	0.088 (0.566) [0.017]	0.414** (2.965) [0.086]	0.144 (0.969) [0.029]	0.427** (2.591) [0.080]
diversity*share4	-0.304 (-0.592) [-0.017]	0.444* (2.318) [0.085]	-0.806 (-1.625) [-0.057]	0.191 (0.859) [0.034]
N	1096	1137	986	1049

Legend: † $p < 0.10$ * $p < 0.05$ ** $p < 0.01$. Beta coefficients in square brackets. t-value in round brackets. Standard errors (not reported) are clustered by school. All regressions include a control for the change in the share of unknown ethnicity.

Table 16: Non linear effect in share ethnic m. for reading understanding, grade 6 and 8

	<i>G6, native</i>	<i>G6, ethnic m.</i>	<i>G8, native</i>	<i>G8, ethnic m.</i>
Δ share imm	0.024 (0.101) [0.005]	-0.155 (-0.923) [-0.036]	0.212 (0.958) [0.050]	-0.102 (-0.492) [-0.024]
diversity*share1	-0.095 (-0.942) [-0.045]	0.399† (1.657) [0.063]	-0.047 (-0.575) [-0.023]	0.162 (0.749) [0.027]
diversity*share2	0.012 (0.089) [0.004]	0.346† (1.918) [0.063]	-0.019 (-0.162) [-0.007]	0.010 (0.046) [0.002]
diversity*share3	-0.133 (-0.569) [-0.023]	0.418* (2.230) [0.072]	0.006 (0.019) [0.001]	0.438† (1.918) [0.078]
diversity*share4	-0.885 (-1.280) [-0.047]	-0.297 (-1.303) [-0.055]	0.156 (0.211) [0.009]	0.665* (2.300) [0.117]
N	672	692	618	654

Legend: † $p < 0.10$ * $p < 0.05$ ** $p < 0.01$. Beta coefficients in square brackets. t-value in round brackets. Standard errors (not reported) are clustered by school. All regressions include a control for the change in the share of unknown ethnicity.

Table 17: Non linear effect in share ethnic m. for math, grade 6 and 8

	<i>G6, native</i>	<i>G6, ethnic m.</i>	<i>G8, native</i>	<i>G8, ethnic m.</i>
Δ share imm	-0.146 (-0.992) [-0.033]	-0.191 (-1.156) [-0.040]	-0.036 (-0.229) [-0.008]	-0.275† (-1.799) [-0.057]
diversity*share1	0.051 (0.616) [0.023]	-0.170 (-0.938) [-0.024]	0.057 (0.774) [0.025]	0.101 (0.495) [0.014]
diversity*share2	0.167† (1.875) [0.057]	0.227 (1.329) [0.038]	-0.016 (-0.176) [-0.005]	0.011 (0.077) [0.002]
diversity*share3	-0.228 (-1.560) [-0.040]	0.400* (2.514) [0.067]	-0.124 (-0.682) [-0.020]	0.364† (1.829) [0.057]
diversity*share4	0.185 (0.306) [0.010]	-0.037 (-0.114) [-0.006]	0.165 (0.304) [0.009]	0.336 (1.324) [0.050]
N	1096	1137	986	1049

Legend: † $p < 0.10$ * $p < 0.05$ ** $p < 0.01$. Beta coefficients in square brackets. t-value in round brackets. Standard errors (not reported) are clustered by school. All regressions include a control for the change in the share of unknown ethnicity.

Table 18: Decomposition of ethnic diversity, for the ethnic minority group in grade 8

	language	math	reading
Δ share imm	-0.126 (-0.859) [-0.032]	-0.285† (-1.820) [-0.059]	-0.084 (-0.388) [-0.020]
Δ n.ethnicities	0.023† (1.833) [0.066]	0.018 (1.256) [0.044]	0.037* (2.054) [0.104]
Δ symmetry	0.280† (1.935) [0.069]	0.125 (0.647) [0.026]	0.485* (2.138) [0.115]
N	1049	1049	654

Table 19: Decomposition of ethnic diversity, for the ethnic minority group in grade 8

	relation t-p	well-being.	self-esteem.	social inter.
Δ share imm	-0.381 (-1.582) [-0.103]	-0.168 (-1.449) [-0.050]	0.158 (1.479) [0.057]	-0.211 (-1.561) [-0.070]
Δ n.ethnicities	-0.023 (-1.386) [-0.081]	-0.016 (-1.157) [-0.054]	-0.024* (-2.502) [-0.098]	-0.016 (-1.497) [-0.063]
Δ symmetry	-0.239 (-1.132) [-0.063]	-0.438* (-2.564) [-0.127]	-0.063 (-0.590) [-0.022]	-0.214 (-1.375) [-0.071]
N	341	1038	1038	658

Legend: † p<0.10 * p<0.05 ** p<0.01. Beta coefficients in square brackets. t-value in round brackets. Standard errors (not reported) are clustered by school. All regressions include a control for the change in the share of unknown ethnicity.

Table 20: Robust regressions for language, grade 8

	<i>G8, native</i>	<i>G8, native</i>	<i>G8, ethnic m.</i>	<i>G8, ethnic m.</i>
Δ share imm	-0.008 (0.046) [0.002]	-0.102 (-0.675) [-0.029]	-0.050 (-0.320) [-0.012]	-0.161 (-1.105) [-0.040]
Δ eth.diversity	0.020 (0.417) [0.015]	0.040 (0.725) [0.030]	0.286** (3.061) [0.105]	0.330** (3.081) [0.121]
Δ low fam.back.	-0.249† (-1.655) [-0.066]		-0.261* (-2.158) [-0.085]	
Δ share male	-0.174† (-1.7667) [-0.073]		-0.063 (-0.477) [-0.023]	
Δ cohort size	-0.001 (-0.382) [-0.014]		-0.000 (-0.266) [-0.011]	
IV		x		x
controls	x		x	
\bar{N}		986		1049

Legend: † $p < 0.10$ * $p < 0.05$ ** $p < 0.01$. Beta coefficients in square brackets. t-value in round brackets. Standard errors (not reported) are clustered by school. All regressions include a control for the change in the share of unknown ethnicity. Regressions for column 1 and 3 include controls for the change in the share of unknown family background and the change in the share of unknown gender.

Table 21: Robust regressions for reading understanding, grade 8

	<i>G8, native</i>	<i>G8, native</i>	<i>G8, ethnic m.</i>	<i>G8, ethnic m.</i>
Δ share imm	0.397† (1.735) [0.094]	0.212 (0.960) [0.050]	0.006 (0.024) [0.001]	-0.147 (-0.703) [-0.035]
Δ eth.diversity	-0.052 (-0.751) [-0.032]	-0.032 (-0.396) [-0.020]	0.310* (2.471) [0.109]	0.411** (2.972) [0.145]
Δ low fam.back.	-0.351 (-1.605) [-0.074]		-0.455* (-2.578) [-0.127]	
Δ share male	-0.476** (-3.396) [-0.153]		-0.223 (-1.376) [-0.075]	
Δ cohort size	0.003 (1.337) [0.061]		-0.002 (-0.947) [-0.043]	
IV		x		x
controls	x		x	
N	618		654	

Legend: † $p < 0.10$ * $p < 0.05$ ** $p < 0.01$. Beta coefficients in square brackets. t-value in round brackets. Standard errors (not reported) are clustered by school. All regressions include a control for the change in the share of unknown ethnicity. Regressions for column 1 and 3 include controls for the change in the share of unknown family background and the change in the share of unknown gender.

Table 22: Robust regressions for math, grade 8

	<i>G8, native</i>	<i>G8, native</i>	<i>G8, ethnic m.</i>	<i>G8, ethnic m.</i>
Δ share imm	-0.009 (-0.052) [-0.002]	-0.029 (-0.179) [-0.006]	-0.222 (-1.309) [-0.046]	-0.300* (-2.002) [-0.063]
Δ eth.diversity	0.014 (0.231) [0.008]	0.009 (0.132) [0.005]	0.201† (1.916) [0.062]	0.251* (2.027) [0.077]
Δ low fam.back.	-0.061 (-0.317) [-0.013]		-0.331† (-1.907) [-0.090]	
Δ share male	0.028 (0.252) [0.009]		0.227 (1.502) [0.069]	
Δ cohort size	0.001 (0.442) [0.017]		-0.004† (-1.935) [-0.068]	
IV		x		x
controls	x		x	
N	986		1049	

Legend: † $p < 0.10$ * $p < 0.05$ ** $p < 0.01$. Beta coefficients in square brackets. t-value in round brackets. Standard errors (not reported) are clustered by school. All regressions include a control for the change in the share of unknown ethnicity. Regressions for column 1 and 3 include controls for the change in the share of unknown family background and the change in the share of unknown gender.