

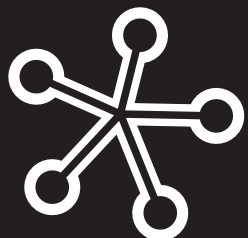


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**A deeper insight into the ethnic
make-up of school cohorts**
Diversity and school achievement

Virginia Maestri



Working Paper 11-108

January 2011

Acknowledgement

This article is the extract of one chapter of my PhD thesis (DEFAP-Catholic University of Milan, 2009). I gratefully acknowledge the Marie Curie Research Training Network “The Economics of Education and Education Policy in Europe” for supporting the research and DANS EASY for granting the access to the PRIMA data. I am grateful to Scholar-University of Amsterdam, where I work on this project in 2007 and 2008, in particular, Reyn van Ewijk and Hessel Oosterbeek. I am also grateful to Daniele Checchi and Francesco Drago for valuable comments. I thanks seminar participants at the University of Napoli-Parthenope 2009, Pavia 2009, Verona 2010 and Robert Baumüller for additional help with the PRIMA data and Dutch questionnaires.

January 2011

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Bibliographic Information

Maestri, V. (2011). A deeper insight into the ethnic make-up of school cohorts: diversity and school achievement. Amsterdam, University of Amsterdam, AIAS Working Paper 11-108

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A deeper insight into the ethnic make-up of school cohorts:

Diversity and school achievement

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Abstract

While the share of non-native students in a class is expected to have a non positive effect on school achievement, little is said about the heterogeneity of the ethnic minority make-up. Ethnic diversity can stimulate the creativity of students, can push them to be proficient in the instructional language, can reduce the scope of ethnic identification with all its possible drawbacks, but it may also worsen social interactions among pupils and make the job of teachers more difficult. We exploit the within school cohort 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 whom it matters and which can be the other mechanisms it may generate. 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 the school social environment.

Keywords: ethnic diversity; education; peer effects

JEL classification: I21; I28; J15

1. Introduction

The “white flight” from predominantly “black” schools has received considerable attention by both policy makers and academics¹. The rationale behind this phenomenon is that more affluent and/or educated parents simply look at average test scores of schools and schools with a higher share of non-native students have lower average test scores. However, to understand whether the test scores divergence between predominantly “Black” and predominantly “White” schools is merely a compositional effect or an additional effect of the “White flight” is more cumbersome. The challenge is to understand what is the effect of non-native² students on both native and minority students’ achievement and to detect appropriate policies.

A stream of the economics of education literature deals with the role played by the ethnic share of classes on pupils’ achievement. This literature agrees on 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 minority 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, 2007; Angrist and Lang, 2004). Further, there is an overall consensus on that the proportion of ethnic minority students mainly affects ethnic minority pupils themselves, while the effect is relatively modest on native children (Hoxby, 2000; Angrist and Lang, 2004; Card and Rothstein, 2007; Gould et al., 2009; 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 minorities’ share is stronger for language skills than for mathematical abilities.

The natural policy consequence of a negative and significant effect of the ethnic share, together with the asymmetry of this effect between the ethnic majority and the ethnic minority group (less or non relevant for the first) is to mix the two groups of students. Nonetheless, incentives to mix students are weakly implementable and more radical policies would be at odds with the popular realization of free school choice systems.

In this paper we want to analyse whether some other features of the ethnic school composition may affect the test score gap between natives and non natives, such that a possible favourable manipulation of the school ethnic composition would be compatible in a free school choice system. In particular, we want to

1 See for instance Nusche (2009) and Gramberg (2007).

2 In the next paragraphs I provide a precise definition of the status of “non-native” as used in this study. Here and through the text I will use the term “non-native” with reference to the European context, as it corresponds to the group of ethnic minorities. As for the studies about the US I will use the term “ethnic minority” accordingly.

point out that diversity in the ethnic minority make-up of a class can play a role in the education and in other social aspects of the life of young students. And more so because, from minorities analysed as a “black box” to ethnic specific analysis, the “mixing” of different ethnicities within the minority group did not receive much attention by this type of literature³.

Ethnic diversity is generally proved to have a negative effect on trust and social solidarity (Putnam, 2007), on conflict (O’Reilly *et al.*, 1998) and on the provision of public goods (Alesina and La Ferrara, 2005). On the other hand, 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, but may also worsen the social interaction of children and 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 proportion of “immigrants” in a class, also the composition of this share matters.

We use a rich data-set about primary school education in the Netherlands, that allows us to exploit the within school cohort variation in ethnic diversity in order to estimate a causal effect of diversity on test scores. We find that 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 non-native pupils even at considerable high levels of the 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. Thus, we think that ethnic diversity stimulates language proficiency and, perhaps, the provoked reduced social interactions among children translates into more time devoted to studying. We do not find a strong evidence that an ethnically heterogeneous composition of the classes significantly worsens 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 provides some intuition about the mechanisms that ethnic diversity may generate. Finally, Section 8 draws some conclusive comments.

3 However, 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). The implications of ethnic diversity are also treated in the sociological literature.

2. Ethnic diversity

Previous studies suggest both negative and positive consequences of ethnic diversity. In a recent article Putnam (2007) shows that, in the US, more ethnically diverse communities have a lower level of social solidarity and social capital. The individuals living in these communities seem to withdraw from community life and have both a lower level of inter-racial and intra-racial trust. It could well be that, for instance, people who have weaker social ties end up in neighbourhoods at random with respect to their ethnicity and that this, in turn, could partially explain the negative association between ethnic diversity and various social attitudes. However, his results hold even by considering over time changes within communities, though the diversity-trust association becomes less significant.

Similarly, Alesina and La Ferrara (2005) argue that the provision of public goods is lower in more fragmented societies: since different ethnic groups have different preferences over the public good to provide, a higher heterogeneity reduces the utility they can draw from the public goods. Teachers represent a quasi-public good in the domain of schooling. It can be easier for teachers to deal with a 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 favour of this consideration is found in a study of racial shares in Texan primary schools (Hoxby, 2000), where a share of Hispanic between 66% and 100% has a positive effect on test scores of Hispanic students, while a smaller share has not.

O'Reilly *et al.* (1998) 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 occurs independent of conflict, not because of it.

If the empirical literature about ethnic diversity suggests an overall negative effect, the theoretical literature abounds of positive effects. Indeed, 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 *vice versa*. He argues that diversity may enrich the environment where individuals live and trade and may contribute to greater creativity.

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 ethnic 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 group. 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.

Overall, ethnic diversity may increase or reduce ethnocentrism (Putnam, 2007) with its (possibly) associated negatives consequences, such as “acting White” and “oppositional culture”. For instance, 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 signalling 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.

The primary concern of this work is to investigate whether there exists any effect of ethnic diversity on test scores. 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. We consider whether ethnic diversity has 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), Putnam (2007), Fryer and Torelli (2005) and O'Reilly *et al.* (1998) 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, rather we provide some hints.

2.1. Ethnic diversity index

The non-native (student) population is quite diversified in the Netherlands. Some ethnic minority students are the offsprings of the decolonisation of Indonesia (and Moluccas islands), Suriname and Dutch Antilles. Some are the offsprings 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 offsprings 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 of the parents. 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:

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

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 effects⁴: 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 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.

⁴ The index is decomposed as: $D = -1/K + SYM$. However, in the regressions we use K instead of $-1/K$.

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. As put forward earlier, the rationale behind this choice is that parents look at the average test scores of schools and schools with a 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 diversity of schools. 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. However, for ethnic diversity the effect can go in opposite directions. On one hand, more open-minded parents, parents who assign more weight to the quality of the school than to its ethnic make-up or more able children may choose schools and classes independently from the ethnic make-up (without clustering with relatives and friends) and may opt for ethnically heterogeneous schools and classes. On the other hand, parents who do not cluster their children in same-ethnicity schools may do this because they have weak social ties. Therefore, the selection into different degrees of ethnic diversity can have, in principle, a positive or a negative correlation with a favourable educational environment⁵.

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 do not consider the native (Dutch) ethnicity into our measure of diversity, as we want to disentangle the effect of the share of native students from that of the ethnic diversity of the minority group. We consider separate learning functions for native and non-native and for each grade⁶. The model is:

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

5 A simple regression of test scores on ethnic diversity results in a negative coefficient. A negative coefficient of diversity in a cross-school analysis could be explained, for instance, by the selection of families with weak social ties into more ethnically diverse schools.

6 Previous literature on the effect of the ethnic share on test scores (see for instance Hoxby (2000)) suggests that the learning functions of natives and non-natives are different.

where \bar{y}_{jgst} is the average test score (in language, mathematics and reading comprehension) 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 diversity⁷ (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 two consecutive cohorts, where larger weights designate more accurately measured observations.

The interpretation of γ as the causal effect of ethnic diversity on test scores is based on the assumption that changes in ethnic diversity between two subsequent cohorts within the same school are not correlated with pupils' unobservable characteristics that may be relevant in the learning function.

3.2. Non-linear model

We also consider non-linear effects of ethnic diversity with respect to ethnic share. For example, ethnic diversity might not matter when the proportion of non-native pupils is below a certain threshold or when it is considerably high. We consider the non-linearity of ethnic diversity in the initial share of minority students. 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 idea is that parents may know that a school is becoming increasingly “ethnically mixed” and adjust the decision of where to enrol their children accordingly. However, parents may not be able to forecast exactly the ethnic composition of a particular cohort

⁷ For the measure of ethnic diversity we consider all the various ethnicities that are part of the non-native group, while for the learning function we just distinguish between native and non-native students.

of a school. Hence, we exploit the deviation of the actual ethnic composition from the one that could be expected on the basis of the previous trend as an “involuntary” school environment. 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 this section we consider the effect of ethnic diversity on some subjective and relational outcomes for teachers and students to bring some evidence on whether the effect of ethnic diversity on test scores can be possibly mediated by the effect of diversity on the school social environment⁸. More precisely, the coefficient γ in equation 3 could be an indirect effect of ethnic diversity through a change in the class social environment. 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 the work of teachers is affected by a heterogeneous pool of students. In one set of questions of the PRIMA survey students are asked to evaluate the general atmosphere of their classroom, while in the other set of questions teachers are asked to evaluate their relationship with each student.

⁸ Lavy and Schlosser (2007) use the same approach to identify the mechanisms working behind gender peer effects.

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 $(D_{gst} - \hat{D}_{gst-1})$ 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 comprehension, 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 used by Driessen *et al.* (2006) to construct the socio-relational outcomes that we use in this study.

We consider each grade separately and we exploit the longitudinal feature of the data at the school level (not at the student level). We select the combinations school/cohort with at least one minority student that have been observed at least for three subsequent years, in order to render the results comparable with the robust analysis⁹. 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 comprehension 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" a random subsample of students was drawn starting from 2000, for all grades. As a consequence, the sample size for the regressions of each outcome is different. The difference in sample size between natives and non-natives 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 mother or, if missing, that of the father¹⁰. We standardize test scores by grade and year¹¹.

9 The samples of schools observed at least three times and less than three times are not very different in terms of test scores and other characteristics. However, schools with more non-native students are oversampled in the "selected" sample, as deliberately intended by the PRIMA-cohort survey's design.

10 We exclude the combinations of schools/cohorts in which the share of students with missing ethnicity of both parents exceeds 10%.

11 In the standardization the share of non-native students in the representative sample is kept constant at the level of the first year for which we have the data.

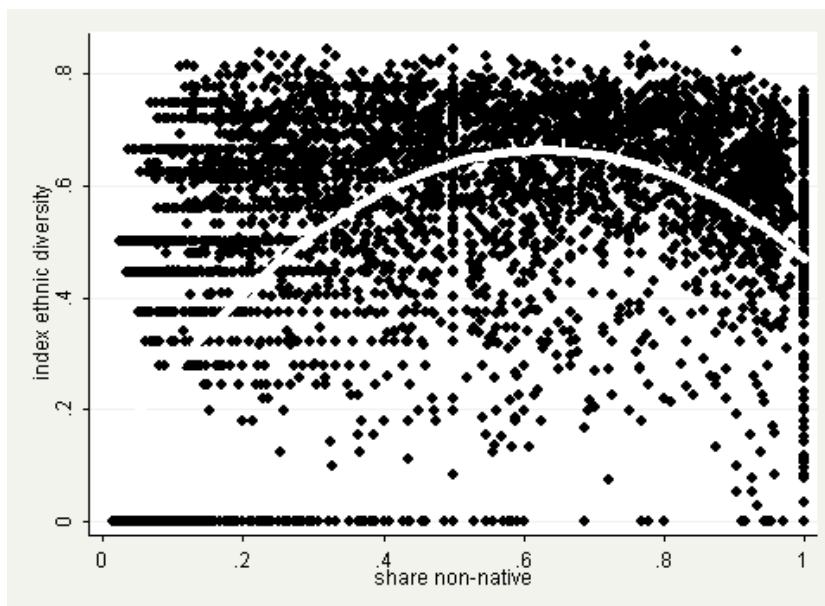
4.2. Descriptive statistics

Table 1 lists the ethnic minority groups included 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 the 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 the demographic characteristics, ethnic minority students are in classes with a slightly higher share 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.

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 holds 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).

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

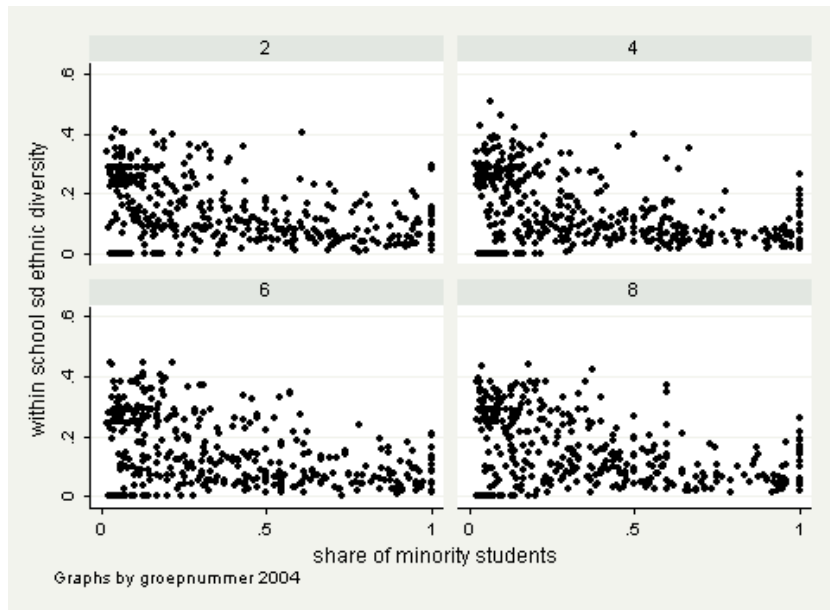
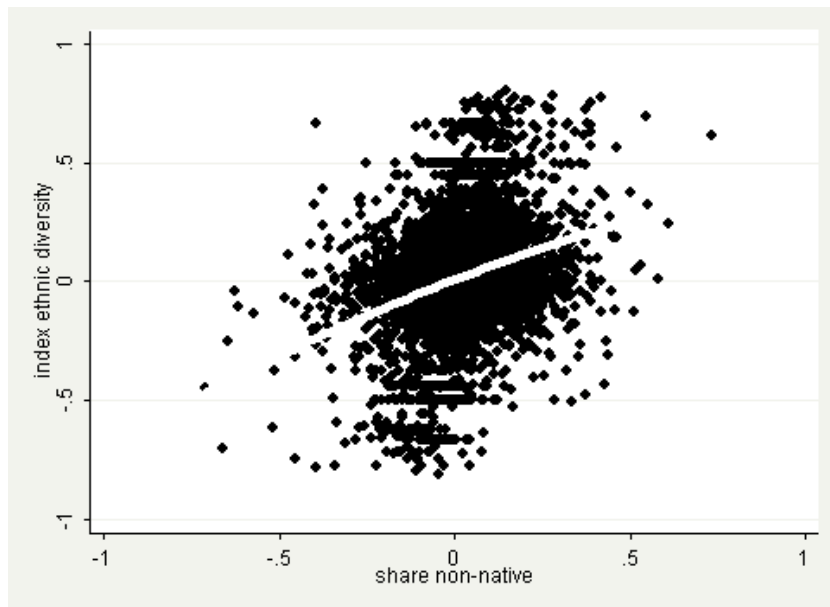


Figure 3: Change in ethnic share versus change in ethnic diversity index



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 definitely 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-natives. 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-natives in grade 8, where the effect of ethnic diversity seems to almost counterbalance the negative effect of the ethnic share. For reading comprehension (Table 6) we get strong and significant results of ethnic diversity on non-natives in both 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 provided 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. However, we cannot generalize this results to native students in fully native schools. On the other hand, the effect of ethnic diversity is always positive and often significant for the ethnic minority group in all 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 natives’ and non-natives’ 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 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 ($D=0.75$), which is not a small change. More reasonably, a 0.1 point increase in the ethnic diversity index reduces the language test score gap between natives *versus* non-natives by about 5%, the math test score gap by about 9% and the reading comprehension 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 comprehension 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 (natives) the coefficients in some cases turn negative, especially at high levels 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, as findings for lower grades are very similar.

First, changes in the ethnic composition may be correlated with changes in other observable characteristics of the cohort, like the proportion of children with a poor family background, the proportion of males and the average class size. Controlling for these characteristics 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 males, while minority students are affected by the peer's share with a low 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 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 opposite results, with respect to test scores, for teacher's related outcomes and pupils' social behaviour. Ethnic diversity seems to make the job of teachers only slightly 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). An increase in ethnic diversity rises the proportion of native students who were advised to follow a low level track of secondary education (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.

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 social outcome variables that we use for the analysis are not very specific, 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 (favourably) important for language and reading comprehension 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 unfavourably affected by an increasing number of ethnic minorities (Table 19).

The negative effect of ethnic diversity on socio-relational outcomes suggests different interpretations as why ethnic diversity has a positive and, at the same time, a negative effects in the school. Perhaps, ethnic diversity deteriorates 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 the ethnic share. We can say that, overall, ethnic diversity reduces social interaction and identification of pupils that, in turn, may reduce the scope of “acting white” and “oppositional cultures”.

Thus, ethnic diversity seems to generate a trade-off between (better) achievement and (worse) school social environment. However, we cannot assert that it is the worse social life of students that pushes them to perform better. Indeed, as far as the measure of self-confidence corresponds to a measure of competitive behaviour, we do find that ethnic diversity tends to reduce the competition in the class. The positive effect of ethnic diversity on test scores could be mediated by the worsened social environment, as long as this leaves more time to pupils to study and less, cynically, to hanging around.

Moreover, the favourable effect of ethnic diversity on school performance could be enacted by ethnic diversity, through a higher degree of (language) assimilation. The especially beneficial effect of ethnic diversity on language proficiency may point in favour of this interpretation. On the other hand, the beneficial effect of ethnic diversity is not mediated by the work of teachers.

As for the expected positive effects of ethnic diversity, we do not find a supporting evidence of the idea that diversity enriches the knowledge 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 completely discard the theory suggested by Lazear (1998).

8. Final remarks

We showed that ethnic diversity does play a role in the learning function of primary school pupils, 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 the non-native's share, for migrant students. The magnitude of the effect of diversity appears to reduce considerably the potentially negative effect bore by the share of minority students.

Consistently with the economic literature¹², we find that ethnicity has an effect mostly on minority students, while natives do not seem to be affected. We may think that natives and minorities base their behaviour as two separate groups, thus the within group heterogeneity of the minority group does not affect native pupils¹³. We also found that diversity is particularly important for older students. A possible explanation of this finding could be that processes such as ethnic identification are not yet developed by younger children. Furthermore, it may be that since we use cohort level data the level of interaction within a cohort rather than within a class is stronger for older students. The slightly worse relationship between teachers and pupils in heterogeneous classes does not explain why these classes perform better. The results of the analysis provide two main explanations as for the positive and negative effects of ethnic diversity in school. The especially significant results for language skills suggest that diversity is an incentive for “language proficiency”. Second, the overall negative effect of ethnic diversity on the school social environment may simply leave more time to students for school-related activities. A further interpretation (more intuitive than supported by the analysis) is that ethnic diversity reduces the scope of ethnic identification and its possible negative consequences, such as the penalty for “acting white”. Indeed, we observe a trade-off between the effect of ethnic diversity on test scores and on the quality of the school social environment. 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 school¹⁴. Hence, in order to corroborate the idea of the beneficial effects of

12 See for instance Hoxby (2000).

13 However, this conclusion may not be generalized to native students in schools/cohorts without any non-native student.

14 The importance of these aspects are confirmed, for instance, by Gibbons and Silva (2009).

ethnic diversity in the school context, 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 it 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 does not feel comfortable in the school
- The student has a good relationship with me

- The student would preferably avoid 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

	G2	G4	G6	G8
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)	<i>N</i>	mean (sd)	<i>N</i>
language	-0,08 (0,45)	1404 (0,63)	-0,63	1471
math	-0,11 (0,54)	1404 (0,64)	-0,32	1471
reading	-0,12 (0,51)	1005 (0,57)	-0,44	1049
rel.withteacher	3,98 (0,39)	686 (0,41)	3,95	675
well-being	3,75 (0,36)	1399 (0,4)	3,79	1463
self-esteem	3,22 (0,3)	1399 (0,37)	3,18	1463
social integration	4,10 (0,32)	1010 (0,33)	4,15	1053
share imm	0,36 (0,28)	1404 (0,31)	0,40	1471
share unknown eth.	0,01 (0,02)	1404 (0,02)	0,01	1471
ethnic diversity	0,45 (0,27)	1404 (0,27)	0,46	1471
n. ethnicities	3,15 (1,68)	1404 (1,64)	3,19	1471
eth. symmetry	0,90 (0,11)	1404 (0,12)	0,90	1471
cohort size	25,42 (12,15)	1404 (12,2)	25,14	1471
share low fam. backg.	0,17 (0,2)	1404 (0,23)	0,20	1471
share unk. fam. backg.	0,042 (0,13)	1404 (0,13)	0,43	1471
share male	0,48 (0,14)	1404 (0,13)	0,50	1471
share unk. male	0,05 (0,18)	1404 (0,18)	0,05	1471

Mean of average values for school/ cohort combinations, per group (native and nonnative).

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

	G2, native	G2, ethnic m.	G4, native	G4, ethnic m.
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

	G6, native	G6, ethnic m.	G8, native	G8, ethnic m.
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

	G6, native	G6, ethnic m.	G8, native	G8, ethnic m.
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

	G2, native	G2, ethnic m.	G4, native	G4, ethnic m.
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

	G6, native	G6, ethnic m.	G8, native	G8, ethnic m.
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

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

	G2, native	G2, ethnic m.	G4, native	G4, ethnic m.
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

	G6, native	G6, ethnic m.	G8, native	G8, ethnic m.
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

	G8, native	G8, ethnic m.	G8, native	G8, ethnic m.
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

	G6, native	G6, ethnic m.	G8, native	G8, ethnic m.
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

	G6, native	G6, ethnic m.	G8, native	G8, ethnic m.
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

	G6, native	G6, ethnic m.	G8, native	G8, ethnic m.
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

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

	G6, native	G6, ethnic m.	G8, native	G8, ethnic m.
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 comprehension, grade 6 and 8

	G6, native	G6, ethnic m.	G8, native	G8, ethnic m.
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

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

	G6, native	G6, ethnic m.	G8, native	G8, ethnic m.
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

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

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 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

	G8, native	G8, native	G8, ethnic m.	G8, ethnic m.
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 controls	x	x	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.

Table 21: Robust regressions for reading comprehension, grade 8

	G8, native	G8, native	G8, ethnic m.	G8, ethnic m.
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 controls	x	x	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

	G8, native	G8, native	G8, ethnic m.	G8, ethnic m.
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 controls	x	x	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.

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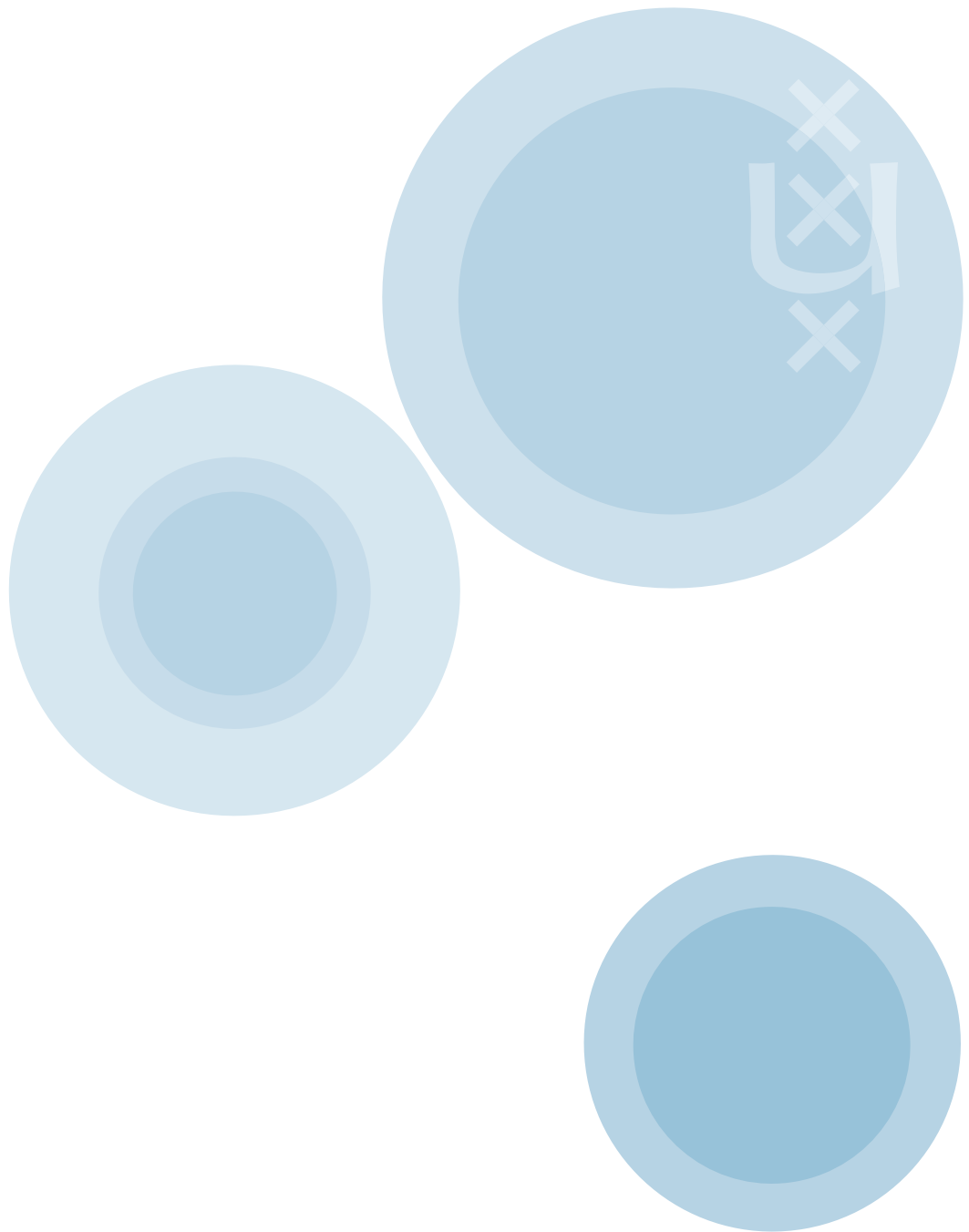
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- The cycles of policy learning and mimicking in labour market reforms in Europe
- The distribution of responsibility between the state and the market in social security
- The wage-indicator and world-wide comparison of employment conditions
- The projects of the LoWER network



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