Non-native speakers of English in the classroom: what are the effects on pupil performance?

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Non-native speakers of English in the classroom: what are the effects on pupil performance?*

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Abstract

There has been an increase in the number of children going to school in England who do not speak English as a first language. We investigate whether this has an impact on the educational outcomes of native English speakers at the end of primary school. We show that the negative correlation observed in the raw data is mainly an artefact of selection: non-native speakers are more likely to attend school with disadvantaged native speakers. We attempt to identify a causal impact of changes in the percentage of non-native speakers. Our results suggest zero effect and rule out negative effects.

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1. Introduction

In England, about 12 per cent of primary school children do not speak English as a first language. The actual number increased by about one third between 2003 and 2009. A significant driver of the increase has been immigration, although the trend might also be driven by higher birth rates among ethnic minority groups. In the media, this trend has been interpreted as being potentially detrimental to the educational prospects of native English

speakers.[1] For example, the chairman of a migration think-tank was quoted recently as saying '…it is primary school where the effect is being felt most acutely at present and where the education of [native] English-speaking children is bound to suffer as immigrant children require extra help'.[2] On the other hand, recent academic papers suggest that first and second generation immigrants have more favourable characteristics than the native population in terms of education. For example, Dustmann and Glitz (2011) show that the share of the foreign-born population with tertiary education exceeds that of the native-born population by 16.1 percentage points. Dustmann, Frattini, and Theodorpoulos (2011) show that second generation ethnic minority immigrants tend to be better educated than their parents' generation and better educated than their white native peers. In another recent paper Dustmann, Frattini and Halls (2010) consider the recent wave of immigration from Eastern Europe and show that these immigrants are substantially younger and better educated than the native population (as well as less likely to be on benefits and showing higher labour market attachment). All this positive selection on education suggests that non-native speakers may well have characteristics that compensate for any lack of language fluency. Furthermore, schools with a higher proportion of non-native speakers may qualify to receive additional resources through the 'Ethnic Minority Achievement Grant'. This aims to support minority ethnic pupils at risk of underachieving and bilingual pupils.[3]

Using a census of all children in English primary schools, we ask the following questions: What is the association between the percentage of non-native English speakers in the year group and the educational attainment of native English speakers at the end of

[1] 'Native English speakers' are defined here as pupils whose first language is English and 'non-native English speakers' as pupils whose first language is not English. This does not necessarily reflect nationality as many English people from ethnic minority backgrounds will speak another language as their first language. It also does not reflect fluency in English.

[2] Sir Andrew Green, chairman of MigrationWatch UK. The Sunday Times. 28 November 2010.

[3] The amount received is small in relation to overall school resources and will vary by local authority. Furthermore schools have discretion about how to use this additional funding. There are no prescribed ways to spend the funding – although the Department of Education has published (fairly general) advice on best practice. http://www.education.gov.uk/childrenandyoungpeople/strategy/financeandfunding/a0076833/ethnic-minority-achievement-grant

primary school? How does this change as controls are added? In particular, under what circumstances can we interpret this as a causal relationship? We also split the data into white and non-white non-native speakers. Although the latter is more important numerically, the former shows a very sharp increase on account of Eastern European enlargement. We consider whether there is any evidence of heterogeneity in this dimension.

There is a negative raw correlation between the educational attainment of native English speakers and the proportion of non-native speakers in their year group. We are interested to consider how this changes as controls are progressively added to the regression. Such an approach would be misleading if the composition of native English speakers were changing as a direct response to the increase in non-native speakers. We find that this could be an issue because the probability of moving school (for native speakers) is correlated with the percentage of non-native speakers in the year group. To mitigate this concern, we look at the relationship between the percentage of non-native speakers and test outcomes of native English speakers (at age 11) using schools attended at age 7 (i.e. regardless of whether they moved schools after that).[4] We find that the raw correlation (which is negative) reduces very quickly – and dramatically – even if only including a few controls for native English speakers. This holds true when we further distinguish between non-native speakers who recently arrived in the census and all others. It is also the case in subsamples of the data where we look at potential effects on native English speakers who are exposed to a greater concentration of non-native speakers (e.g. in London) or who might be more vulnerable to other demands on teachers' time (e.g. economically disadvantaged or low ability native

[4] Individual level test scores of native English speakers (at age 11) are related to the percentage of non-native English speakers in their year group. However, 'the year group' refers to the school that the native English speaker attended at age 7. This overcomes the potential problem that native English speakers might move school between the age of 7 and 11 in response to a sudden increase in the percentage of non-native English speakers in the year group. However, in the Appendix we show a regression where we use the actual school attended at age 11 (for the same individuals). The results are not very sensitive to this issue.

English speakers). Our findings are similar if we consider the number of languages spoken in a year group, rather than the percentage of non-native speakers.

Our approach identifies a causal impact if all relevant controls are added, leaving only idiosyncratic variation in the percentage of non-native English speakers within the same school across cohorts of pupils in the final year of primary school (Year 6). This is similar to the strategy used by Hoxby (2000) and many other papers that try to identify peer group effects. We investigate whether this assumption is plausible by looking at whether the percentage of non-native speakers is correlated with individual controls when a very detailed set of controls is added. While the assumption looks tenable for non-white non-native speakers, it is less so for white non-native speakers. The coefficient on the percentage of white non-native speakers may have some downward bias due to white non-native speakers having a higher probability of attending schools that are declining in quality. However, the strategy suggests that there is highly unlikely to be a negative causal impact of the increase in the percentage of non-native speakers of English on the educational attainment of native speakers.

We use another approach to look specifically at the percentage of non-native speakers who are of white ethnic origin. The timing of the change over time reflects the impact of Eastern European enlargement in 2005. Many of the new immigrants came from Poland – a largely Catholic country. We show that there was a sharp increase in the percentage of 'white non-native speakers' attending Catholic schools after 2005. We use this fact as the basis of an Instrumental Variable strategy where the interaction between year and sector identifies the 'white, non-native' effect in Catholic schools. Although this strategy has a strong first stage, the reduced form effects are inconclusive for reading and writing. We find a small positive

(and significant) effect for maths. This makes sense in that there are much smaller differences between native and non-native speakers with regard to maths than for reading and writing. If there were positive spillover effects in any subject, it would be most plausible to find it here. The IV estimate is not directly comparable to the OLS estimate because a 'Local Average Treatment Effect' is estimated (i.e. the effect for native English speakers in Catholic schools who are exposed to white non-native speakers after 2005). However, a positive effect (for maths) is consistent with the possibility that OLS estimates are downward biased.

Although the question addressed in this paper is not the same as the effect of immigration on students from the home country, there are clear parallels to this literature. There is a vast literature on the effects of immigration on native labour market outcomes but there is relatively little work on whether immigration affects the educational outcomes of natives. Exceptions include Betts (1998) who examines whether immigration reduces the contemporaneous high school graduation rate of natives, and papers that look at whether immigrants crowd-out natives from slots in college and graduate programs (e.g. Borjas, 2004; Hoxby, 1998). These papers tend to find small effects. A number of recent papers in Europe have considered the closely related question as to whether the proportion of immigrants affects the test scores of students from the home country. Brunello and Rocco (2011) use cross-country data and suggest that effects are small. Ohinata and van Ours (2013) look at this issue for The Netherlands and find no strong evidence for spillover effects. However studies for Israel (Gould et al. 2008) and Denmark (Jensen and Rasmussen, 2011) find some evidence for negative spillovers. One would not expect the effects of immigration to be the same across countries because this will depend on the institutional context as well as the characteristics of immigrant communities.

Our paper is structured as follows. In Section 2, we describe the data and characteristics of pupils according to whether they are native or non-native speakers of English and ethnic origin. In Section 3, we describe our conceptual framework. In Section 4, we discuss our regression results and conclude in Section 5.

2. Data description

We use the National Pupil Database between 2003 and 2009. This contains detailed pupil-level information for all state schools in England (such as attainment at age 7 and 11; gender; ethnicity; whether English spoken as a first language; whether a pupil is eligible to receive Free School Meals). It can be matched with school-level data sets that contain information on the schools attended (Annual School Census). It can also be matched with school-level data on expenditure.

The English school system is organised around various 'key stages'. At the end of primary school, students get to the end of 'key stage 2' on the national curriculum and take tests in English, maths and science. The tests are undertaken by all pupils. They are set and marked externally to the school. The tests are fairly high stakes for the school because they form the basis of 'School Performance Tables' which are published and available to parents. There is no grade repetition in the English system. Thus, all pupils in a given year group are born within 12 months of each other.

The National Pupil Database identifies the year group of the pupil. They enter primary school in Year 1 and leave in Year 6 (i.e. the year for which our outcomes are measured – tests at age 11). Within a year group, pupils can be allocated into different classes. We do not observe the class of the pupil. However, year groups are relatively small (the median is 39

pupils). Furthermore, many primary schools use 'setting' in the later years of primary school (i.e. teach pupils by ability group for core subjects like English and Maths). Therefore, it is the percentage of non-native speakers in the year group (and not the class) which is the more appropriate peer group measure since it cannot be manipulated by the school.

Among the pupil-level characteristics contained in the National Pupil Database is the ethnicity of the pupil and whether he/she speaks English as a first language. The 'first language' is defined as 'the language to which the child was exposed during early development and continues to use this language in the home or in the community. If a child acquires English subsequently to early development, then English is not their first language no matter how proficient in it they become'[5]. In this paper 'native English speaker' is defined by whether the person speaks English as a first language according to this definition.

The number of pupils who do not speak English as a first language has increased fairly markedly over the short time in which we can observe this in administrative data (2003-2009). There is an acceleration from 2005 onwards, reflecting the effect of European enlargement and the subsequent immigration of people from Eastern European countries to the UK (at the same time as lower birth rates for English cohorts). The net effect is an increase in the proportion of pupils who do not speak English as a first language from 8.7% in 2003 to 12.4% in 2009 (measured for pupils at the end of primary school). In 2003, about 15% of non-native speakers were from a white ethnic origin. This increased to 19% in 2009. Figures 1 and 2 illustrate the smooth rise in the percentage of pupils from a non-white ethnic origin and the more step-wise change in the percentage of pupils from a white ethnic origin (after 2005).

[5] National Pupil Database data description.

The majority of native English speakers are 'White British' (92% in 2003; 90% in 2009). In Table 1, we show the proportion of various ethnic minorities in the 'native English speaker' category and the proportion in the 'non-white, non-native' speaker category. Although the two groups have a very different ethnic composition, the Table shows that ethnic minorities are well represented among those classified as 'native English speakers' and those who do not speak English as their first language.

In Table 2, we show the average characteristics of pupils in each group and the schools to which they attend (computed separately for the three different categories of pupil) for the last year of our data (2009). Non-native English speakers are more likely to be economically disadvantaged.[6] About 18% of white non-native speakers and 28% of non-white non-native speakers are eligible to receive free school meals whereas this is the case for 15% of native speakers. They also perform more poorly at the end of primary school. The percentile reading, writing and Maths score is close to 50 among the population of native English speakers. For white and non-white non-native speakers, the percentile score for reading is about 41 while for Maths the relative score is better (around 47 in both cases). Non-white non-native speakers do better in writing – 46 percentile points; relative to 42 percentile points for white non-native speakers. All this translates into a lower probability of meeting a key indicator used at the end of primary school (i.e. whether the pupil has achieved at least 'level 4').[7] For native English speakers, over 80% met the target for English and Maths. For non-native English speakers, about 65% of those from a white ethnic origin met the target for English where 76% of those from a non-white ethnic origin met this target.

[6] This will be underestimated to the extent that some non-native speakers may not be eligible to receive benefits due to their immigration status and length of time working in England.
[7] The significance of this indicator is that 'level 4' is deemed to be the expected level to be achieved for children of this age, according to the National Curriculum. It is the indicator used in the School Performance Tables.

With regard to Maths, the numbers were 73% and 76% for those from a white and non-white ethnic origin respectively.

In terms of schools attended, white and non-white non-native speakers attend larger schools than native speakers although there is not a big difference in terms of the average pupil-teacher ratio. They go to schools with a higher percentage of economically disadvantaged pupils (about 18% of children eligible to receive free school meals; compared to about 15%, which is the average in schools attended by native speakers). In terms of average pupil attainment, schools attended by native speakers are only a little higher performing than those attended by non-native speakers. Non-native speakers are more likely to be in a school that is located in London or an urban area. They are more likely to attend Catholic schools (particularly those of white ethnic origin) but less likely to attend a Church of England school than native speakers.

Thus, non-native speakers are more likely to attend some school types than others (e.g. in London; Catholic schools). We make use of this in the empirical analysis when we consider whether effects of having 'non-native speakers' as peers are different across contexts. It is notable than many schools do not have any 'non-native speakers' at all (63% of schools at the beginning of our sample period in 2003; and 49% by 2009). Among schools where there are some 'non-native' speakers, they are very unevenly spread across schools. In 2003, the median school (with some non-native speakers) had 8% of the year group classified as 'non-native English speakers'. However, the percentage rose to 55% at the 90th percentile. We consider potential effects across the distribution of schools by investigating whether effects are different for schools that had above (and below) 8% of the year group classified as a 'non-native English speaker' in 2003. We have also estimated quantile regressions.

In Table 3, we consider whether the probability of moving school for native speakers (between Year Groups 2 and 6) is related to the future proportion of non-native speakers in the year group of the original school attended (in Year Group 6). In columns 1-5, we show how the association changes after including progressively more detailed controls. However, the coefficient is fairly insensitive to the inclusion of controls. The regressions show that an increase in the proportion of non-native speakers by 0.10 is associated with an increase in the probability of moving schools by about 2.8 percentage points for native speakers.[8] The association is not sensitive to whether the non-native speakers are of white or non-white ethnic origin.

One might interpret these regressions as suggesting that native speakers deliberately leave the school if there is a rise in non-native speakers in the school (or neighbourhood of the school). However, the association could potentially reflect other unobserved time-varying features of schools or neighbourhoods that are correlated with compositional change of the school along this dimension. The important point is that a contemporaneous association between the proportion of non-native English speakers in the year group and the outcome of the 'native speaking' pupil might be misleading because the composition of native speakers has been changing on account of (or because of something related to) the proportion of non-native speakers in the school. To avoid this problem, we consider a pupil's school to be that which they attended at age 7 (irrespective of whether or not they moved). We relate his/her pupil attainment at the end of Year 6 to the percentage of non-native speakers in his/her original school (in Year 6). In Appendix 1, we replicate our basic table (Table 4) using the actual school attended at the end of Year 6. [9]

[8] The average proportion of native English speakers who move school between Year Groups 2 and 6 is 0.14.
[9] The raw association does not change. However, the coefficient on the percentage of non-native speakers is somewhat sensitive to the inclusion of other controls (although not so much that it would change our conclusions if we proceeded using the school actually attended in Year 6 rather than that attended in Year 2).

3. Conceptual framework

Initially, we are interested in looking at the association between the proportion of non-native speakers in the year group and the educational attainment of native speakers at the end of primary school. We are interested in observing how the association changes when progressively controlling for characteristics of native English speakers and schools attended. The question is what happens to the negative association (observed in the raw data) after taking account of non-random sorting of non-native speakers across schools and neighbourhoods. We initially include simple controls for the demographics of native speakers: their month of birth; whether they are eligible to receive free school meals (an indicator of economic disadvantage); their gender and whether they have statement of special educational needs. In the next specification, we control for school fixed effects. We then add controls for prior attainment (i.e outcomes of age 7 tests in reading, writing and maths). Then we include time-varying characteristics of schools (the pupil-teacher ratio; the size of the year group; per pupil expenditure; the percentage of disadvantaged students in the school) – with the proviso that some of these characteristics could themselves be influenced by the percentage of non-native speakers in the school. We then add a control for the number of non-native speakers at school-level. This follows Gould et al. (2009) and is intended to capture changes occurring within the school as a whole rather than the peer group of interest (i.e. non-native speakers in the same year group as native speakers). In the most detailed specification, we control for school-specific time trends.[10]

The most detailed estimation can be represented as follows:

$$Y_{igst} = \beta_0 + \beta_1 \text{Non-native}_{gst} + \beta_2 D_t + \beta_3 X_{igst} + \beta_4 N_{sgt} + \beta_5 Z_{st} + \mu_{st} + \varepsilon_{igst} \quad (1)$$

where the outcome Y (the percentile score in reading, writing or maths) for pupil i in Year Group 6 of School s is related to the percentage of non-native speakers in Year Group 6 in

[10] School specific time trends are computed by regressing each characteristic against a trend variable (within school) and then estimating the residual. The newly created variables (i.e. the residuals of these regressions) are used in the regression analysis instead of the original variables. Further details are available on request.

School *s* in a given year (*t*). Controls are included for year dummies (D_t), a vector of student characteristics (*X*); the number of pupils in the year group *N*; a vector of time-varying school-level characteristics (*Z*); school fixed effects (μ) which are allowed to vary with a time trend.

We will see in the empirical section that after controlling for even a few of these variables, the coefficient of interest (on non-native speakers) generally goes to zero within the full sample or sub-samples of the data. However, the coefficient is always precisely determined; standard errors do not explode as more and more detailed controls are added. It is plausible that only idiosyncratic variation in the percentage of non-native speakers over successive year groups is allowing for the coefficient to be estimated at all. If this hypothesis were true, then the coefficient on the percentage of non-native speakers could be given a causal interpretation. Following Hoxby (2000), there is now a number of studies in the educational literature using this type of approach (e.g. Ammermuller and Pischke, 2009; Bifulco et al. 2011; Black et al. 2010; Brunello and Rocco, 2011; Gould et al. 2009; Lavy and Schlosser, 2011, Ohinata and van Ours, 2013).

To investigate this hypothesis, we look at how key control variables are related to the percentage of non-native speakers as controls are added. The hypothesis that only idiosyncratic variation in the data is driving the results is more plausible in the case of non-white non-native speakers than in the case of white native speakers. Indications are that any bias is downward – which would rule out negative effects in both cases.

Another approach is to look specifically at the shock to the demand for Catholic schooling following the enlargement of Eastern Europe. In May 2004, ten Central and Eastern European countries joined the European Union. The UK, Ireland and Sweden were

the only countries to initially grant full free movement to accession nationals.[11] Eastern European enlargement had a disproportionate effect on the demand for Catholic schools because many Polish families are of that faith. In Figure 3, one can see that the percentage of non-native students of white ethnic origin more than doubled between 2005 and 2009 (from about 2% of nearly 4.5% of all students) where is the rate of increase was lower in other school types (defined here as 'Church of England' and schools that are not affiliated to a particular religion).[12] The empirical strategy is to use the interaction between school type and the time trend following Eastern European enlargement as an instrument to predict the percentage of non-native white speakers in a given year group.

Specifically, we estimate a first-stage regression as follows:

$$\text{Non-native-white}_{gst} = \alpha_0 + \alpha_1 C_s + \alpha_2 \theta_{1t} + \alpha_3 \theta_{2t} + \alpha_4[\theta_{1t} \times C_s] + \alpha_5[\theta_{2t} \times C_s] + \nu_{gst} \quad (2)$$

where non-native speakers (of white ethnic origin) in Year Group 6 of school *s* in time *t* is influenced by whether or not the school is Catholic *C*, a time trend which is made up of a continuous component θ_{1t} and a component that reflects the effects of Eastern European enlargement θ_{2t}. This second component is constructed as follows: $\theta_{2t} = (t - 2005)$ if $t>2005$; $t=0$ otherwise. It is the interaction term between whether the school is Catholic and this second component of the time trend that is used as the exclusion restriction for the second stage regression. The second stage regression is similar to equation (1) except that variables for school type *C*, and the time trend are reformulated in accordance with the first stage regression in (2). As before, we consider different specifications – increasing the controls used in successive specifications. However, in this case, one would not expect there to be so

[11] In the UK, the impact on the labour market has been analysed by Blanchflower and Shadforth (2009) and Lemos and Portes (2008). It has been used to analyse the effects on crime by Bell et al. (2010). Of these countries, Poland has been the most prominent in terms of the number of migrants.

[12] In England, 'faith schools' represent a high percentage of state schools (about 30% of primary schools). Of these about two-thirds are affiliated with the Church of England and one-third with the Catholic church. There are a very small number of other faith schools such as Jewish and Muslim

much difference between specifications since the variation being used to identify the effect of 'non-native' is orthogonal to all other regressors.

We exclude non-native speakers of non-white ethnic origin from these regressions because we have no instrument in this case. However, we show the robustness of our approach by showing that while our instrument does influence the percentage of non-native speakers of white ethnic origin, it does not influence the percentage of non-native speakers of non-white ethnic origin. Furthermore, it does not influence any of our key control variables (i.e. the prior attainment of native English speakers; the free school meal status of native English speakers). The IV approach identifies the causal impact of an increase in the percentage of non-native speakers provided that the instrument is not correlated with any other variable. It is not necessarily comparable with the OLS estimate because it identifies the Local Average Treatment Effect. If the assumptions of the IV hold (i.e the instrument is not correlated with any other variable), it identifies the causal effect for native English speakers who attend Catholic schools with the group of people who have been affected by the instrument – A8 immigrants with parents who have a preference for Catholic education. These parents might be more religious; more aware of the positive reputation of faith schools; or find it easier to exploit the system in some way.[13] More generally, immigrants coming from A8 countries are known to be highly educated and display strong labour market attachment (Dustmann, Frattini and Halls, 2010). Thus, the group for which the effect is identified are not necessarily representative.

[13] Faith schools are permitted to prioritise students who are members of the relevant faith in the event of over-subscription. Catholic schools are 'voluntary aided' – an advantage of which is that they control their own admissions. There is an admissions code, which precludes selection by ability. There are allegations – some proven - that some schools have broken the admissions code. The scale and extent of such breaches is not clear. The admissions code has been tightened up in recent years. In other respects, faith schools are similar to other state schools.

4. Regression results

4.1. *Examining association*

Table 4 shows regression results where we progressively include more detailed controls. The specifications are as follows: (1) controlling for year effects only; (2) also controlling for a vector of student demographics: gender, month of birth, whether the student is eligible to receive free school meals, whether the student receive a statement for 'Special Educational Needs'; (3) including school fixed effects; (4) controlling for prior student attainment at age 7; (5) including the number of pupils in the year group and other school-level characteristics: the pupil-teacher ratio; the percentage of students eligible to receive free school meals; and (log) expenditure per pupil; (6) controlling for the total number of non-native English speakers in the school; and (7) including school specific time trends.

The raw association (including only year dummies) between the percentage of non-native speakers in Year Group 6 and educational outcomes of native speakers is relatively modest. The first column suggests that an increase in non-native speakers of ten percentage points is associated with a decrease in the score of reading, writing and maths by 1.2, 0.9 and 1.4 percentile points respectively. Results are similar if we take account of the percentage of non-natives in earlier years of each cohort's schooling.[14] Also, if we do run quantile regressions (not reported), the point estimate is similar at the 25th, 50th, and 75th percentile.

In Table 4, the association is (at least) halved only by including some basic demographics of native speakers of English (column 2). The association is close to zero if one includes school fixed effects (column 3) and is little changed by controlling for prior

[14] We can look at the percentage of non-native speakers when the pupil was in each year of primary school. The number of observations is reduced because we only have this information for cohorts who were at school from 2002 onwards. When we specify regressions where the coefficient of interest is on the percentage of non-native speakers in the (native-speaking) person's school when he/she was in grades 3-6, 4-6 and 2-6, we get very similar results to those obtained when only looking at the percentage of non-native speakers when he/she is in grade 6. The correlation in the percentage of non-native speakers (over grades for the same cohort) is very high.

attainment (column 4). The inclusion of other time-varying school characteristics or school specific time trends makes no difference to this. This suggests that the raw (negative) association between the percentage of non-native speakers and the educational attainment of native speakers is driven by the sorting of non-native speakers into schools with poorer characteristics. One might wonder if results would be different if we looked at students when they are younger (at age 7), before they have a chance to catch up. Appendix A2 shows results when teacher assessment at age 7 is used as the dependent variable. The pattern of results is very similar (i.e. associations are halved once demographics are added; they fall to zero when school fixed effects are included).

In Table 5 we repeat the specifications for 11 year olds where we separate non-native speakers according to ethnic origin. In this case, all specifications for white non-native speakers either show a zero or positive coefficient. Specifications for non-white non-native speakers are negative in the early specifications but the association falls notably when including simple controls for native English speakers. Again, the coefficients (for both white and non-white) non-native speakers becomes zero as soon as school fixed effects are included. There is little change in more detailed specifications.

In Table 6, we consider whether there might be non-linearities in the effect of the percentage of non-native speakers on the attainment of native speakers. The raw association is considerably higher for schools where the percentage of non-native speakers in the year group is over 8 per cent (i.e. the median for schools with a positive number of non-native speakers in 2003). However, again this falls away as soon as other controls are added.

Another possibility is that the number of languages spoken might matter more than the percentage of non-native speakers of English. For example, it might be easier for schools to employ a language assistant who speaks the language of the majority of non-native

speakers (thus helping their integration). But this might be more difficult if many different languages are spoken. We know the language spoken in the last three years of the data (2007-2009) and the number of languages spoken is highly correlated with the percentage of non-native speakers (ρ=0.75 in 2009). In Table 7, we replicate the first four specifications of the regression when we include 'number of languages spoken in the year group' rather than the percentage of non-native speakers of English. The pattern of results is very similar to when the percentage of non-native speakers is included as a control. The initial negative association in the raw data is greatly reduced by controlling for a few demographics of native speakers. The association is close to zero when school fixed effects are included. While the standard errors are larger in this case (we only have three years of data where 'number of languages' is recorded), it is important to note that they do not explode after including school fixed effects. There is still enough variation in the data for meaningful analysis. While estimates in the most detailed specifications are not precisely estimated, the confidence intervals suggest that effects below about -0.05 can be ruled out.[15] We have also tried similar specifications using a measure of 'language concentration' (an application of the Herfindahl-Hirschman index). Results are qualitatively similar using this index and are available upon request.

4.2. *Heterogeneity*

We first consider effects for native speakers who might potentially be more negatively affected by an increase in the percentage of non-native speakers: economically disadvantaged[16]; those who performed poorly in tests at age 7[17]; going to school in London

[15] For example, the most detailed specification for reading (Table 7, column 4, gives an estimated effect of 0.056 (0.043). The confidence interval is -0.028 to 0.14.
[16] Economically disadvantaged pupils might be more vulnerable if they are competing for teacher attention with pupils who have special needs because they are less fluent in English.
[17] This is defined as pupils who did not achieve the expected level in tests of reading, writing or maths at the age of 7 (level 2). This is about 20% of the sample.

(which has a high percentage of non-native speakers: about 38% in 2009, compared to 12% nationally). In Table 8, we show regressions for these three sub-groups. We show two specifications: the simple specification (columns 1, 3 and 5) and the most detailed specification including school fixed effects, time-varying school characteristics and school specific time trends[18] (columns 2, 4 and 6).

'Native-speaking' pupils who are eligible to receive free school meals are even less affected (even in the simple specification) by the percentage of non-native speakers in their year group than the population as a whole. In the simple specification, there is a positive association between the percentage of white non-native speakers and the educational attainment of native speakers (with regard to reading and writing). All coefficients go to zero in the most detailed specification. The sub-sample of pupils who achieved poorly at age 7 (i.e. the bottom quintile) show similar results in the simple specification. When all controls are added, there is a negative and statistically significant association with regard to the percentage of non-white non-native speakers for reading and writing. The interpretation is that a 10 percentage point increase in the percentage of non-white non-native speakers is associated with a reduction in the percentile score in reading and writing of about half of a percentile point. This is extremely small. With regard to pupils going to schools in London, the raw association with percentage of non-native speakers is more strongly negative in the case of non-white non-native speakers (and close to zero for white non-native speakers) in the simple specification but this association goes to zero when controls are included.

We next consider a specification where we distinguish between non-native speakers who first appear in the data in the last two years of primary school (Years 5 and 6) and non-native speakers who were in the census before that time. One might think that non-native

[18] In most cases, regression results are unchanged from the fourth specification onwards (i.e. when school fixed effects are included). An exception is regressions estimated on the sub-sample of low-achievers.

speakers who appear in the census fairly late (most likely reflecting recent migration) are less good at English than those who have been longer in the English school system. In addition, newcomers at this stage might be potentially disruptive for the other students if they make more demands on the teacher. In Table 9, we distinguish between these categories (as well as by ethnic background). We can only use years between 2005 and 2009 to run these regressions. In 2005 about 18% of white non-native speakers were new arrivals in the last two years of primary school. This number was 30% in 2008 (25% in 2009). A small proportion of non-white non-native speakers were new arrivals – and the proportion has not varied so much over time, being about 9.6% in 2005 and 8.2% in 2009.

The results in Table 9 show the pattern we might expect. The association between the percentage of non-native speakers and the educational attainment of native speakers is more strongly negative with regard to those entering the census in the last two years. With regard to those in the census for over two years, the association is negative for non-white non-native speakers and positive for white non-native speakers. However irrespective of length of time in the census and ethnicity, the coefficients all reduce markedly when controls are added and become either zero (or very weakly positive) when including school fixed effects.

4.3. Interpretation

These results suggest that even the raw association between the percentage of non-native speakers in the year group and the educational attainment of native speakers is usually modest (except where the percentage of non-native speakers is large and also in the case of students who enter the schools' census in the last two years). The association becomes close to zero once a few controls for the characteristics of native speakers are added and then becomes more definitively zero after including school fixed effects in the regressions. The

regressions also suggest that the negative association in the raw data really reflects the fact that non-native speakers of English are sorted into schools with less favourable characteristics (e.g. more native speakers from economically disadvantaged backgrounds).

The coefficient on 'non-native speakers' could be given a causal interpretation if it is estimated only using idiosyncratic variation in this variable. In other words, after controlling for all observable student and school controls and unobserved school effects (as well as school specific time trends), any remaining variation in the percentage of non-native speakers only reflects random fluctuation in the relative size of the group of non-native speakers within the year group (and school) from one year to another. To consider whether this is plausible, we regress the percentage of non-native speakers (distinguishing by ethnicity) on key control variables. The coefficient should go to zero after including all other controls if variation in the percentage of non-natives is truly random. The pupil-level characteristics are predetermined and cannot be causally influenced by the percentage of non-native speakers (bearing in mind that we have dealt with the issue of pupil mobility as a potential reaction to the increase in non-native speakers – as discussed in Section 2). The school-level characteristics might potentially be causally influenced by an increase in non-native speakers (although they could be driven by other things as well).

The results from regressing the percentage of non-native speakers on these variables is shown in Table 10. This shows that while including additional controls does a good job of removing the association between each specific control and the percentage of non-white non-native speakers, it is not completely eliminated with regard to white non-native speakers. The results suggest that even in the most detailed specification (i.e. including school specific time trends), there is still a significant positive association between the percentage of white non-

native speakers and disadvantage (measured by whether the student is eligible to receive free school meals) and a significant negative association between the percentage of white non-native speakers and the prior attainment of native English speakers. Although the coefficients are extremely small, they are nonetheless suggestive that white non-native speakers might be attending schools that are declining in quality. This could be, for instance, because of lack of affordable housing close to good schools or lack of information on how to find out what schools are good (particularly for new arrivals). If 'declining school quality' is the omitted variable, the sign of the bias on the percentage of white non-native speakers should be negative (i.e. it is positively correlated with the percentage of white non-native speakers but negatively related to the educational attainment of native speakers). Thus, if there is really a positive peer group effect, the bias might lead us to believe the effect is zero. While such a problem precludes giving a causal interpretation to the coefficient, the direction of bias suggests that the 'true effect' is highly unlikely to be negative.

These issues do not arise with regard to the coefficient on non-white non-native speakers. While this is not proof that idiosyncratic variation in the data is the only remaining variation after including detailed controls (as there could still be an association with a variable that we do not measure), the hypothesis of causality is more plausible in this case.

4.4. A shock in the demand for Catholic schooling

We now consider how the percentage of white non-native speakers is affected by the shock in the demand to Catholic schooling and what consequences (if any) the influx might have had for native English speakers in these schools. As the instrument is measured at school-level we aggregate the data to school-level for these regressions.[19]

[19] Results are weighted by the number of pupils in the year group. The results are identical using individual-level data.

In Table 11, we show the results of the first stage regression with regard to the coefficient of interest (i.e. on the Catholic school dummy interacted with the spline function discussed above). As Figure 2 would suggest, the estimated coefficient is strong and positive. The F-statistic (of 26) suggests that the first stage is strong enough to be useful in an IV context. The first stage is insensitive to the inclusion of controls for school or pupil characteristics. In Table 12, we show the results of some falsification tests. For the instrument to be credible, it should not predict the percentage of non-white non-native speakers. Also, it should not be correlated with the characteristics of native English speakers. In Table 11, we show the basic specification where the dependent variables in columns 1 to 4 are respectively, the percentage of non-white non-native speakers in the year group; average attainment of native English speakers (within the year group) in national tests of reading, writing and maths at age 7. The instrument is not related to any of these variables. This suggests that the validity of the instrument is plausible.

Table 13 shows the reduced form regressions where the dependent variable is average attainment for native speakers in reading, writing and maths respectively.[20] The point estimates for reading are close to zero, whereas they are negative for writing. However, the effects are very imprecisely estimated for both reading and writing outcomes. They are not informative about the size and magnitude of any effect. However, the estimated effect for maths is positive and significant at the 5 per cent level in the first three columns (at the 10% level in more detailed specifications). The coefficient is fairly stable across specifications. The second stage effect is 1.27 (se: 0.69).[21] This suggests that a 10 percentage point increase in the percentage of white non-native speakers would increase the average attainment of native English speakers by about 1 percentile point (although this effect is only significant at

[20] The OLS regressions are similar to those in the previous analysis. There is a negative association in the raw data, which disappears when controls are added.
[21] This estimate comes from the simple specification (column 1 of Tables 10 and 12).

the 10 per cent level). As discussed above, this effect is a Local Average Treatment Effect and not necessarily generalizable to students outside the complier group (who are students attending Catholic schools with new entrants that appear to have entered their school on account of the immigration decision of their parents, combined with a preference for Catholic schooling). If we restrict the sample only to Catholic and Church of England schools, the effect for maths is larger 2.22 (se=0.73).

If the positive estimate on maths genuinely reflects a causal impact, we can only speculate about the mechanism. The instrument is not correlated with observable school inputs (per pupil expenditure and the pupil-teacher ratio), nor is it correlated with cohort size.[22] It might be because children from these Eastern European families have (unobserved) characteristics that influence other children or the classroom environment in a positive way. For example, this could be better behaviour or a stronger work ethos. It is certainly clear from other studies that the A8 immigrants are very positively selected on education and labour market attachment. Also, given that white non-natives are closer to native English speakers in terms of their own maths attainment at age 11 (shown in Table 2), it makes sense to find a positive peer effect for this subject but not necessarily for reading and writing where they are a lot weaker than their native English-speaking peers. It is also relevant to note that other papers investigating peer group effects in English primary schools have found no evidence of an average effect (Gibbons and Telhaj, 2008) although there does seem to an effect at more extreme parts of the ability distribution (Lavy et al. 2012).

5. Conclusion

[22] Estimating the basic specification with the dependent variables as the pupil-teacher ratio, per pupil expenditure and log cohort size gives rise (respectively) to estimates on the coefficient of interest (Catholic*spline) of -0.076(0.05), 0.000(0.001) and 0.005(0.004).

This investigation suggests that the negative association in the raw data between the percentage of non-native speakers and the educational attainment of native English speakers is easily removed – even by controlling for very limited characteristics of native English speakers. The negative correlation can be explained by sorting of non-native speakers into schools with less desirable characteristics. Under certain assumptions, the strategies used in this paper can be used to make an inference about causal effects. Both strategies suggest that negative effects can be ruled out. This is not surprising in the light of positive selection of first and second immigrants to the UK in terms of their educational attainment, although it does refute perceptions (in the media) that the increase in students who do not speak English as a first language is detrimental to the education of native English speakers.

The result also makes sense in the context of other research about ethnic minorities in England. Dustmann, Machin and Schonberg (2008) show that most ethnic minority groups progress through primary school at a faster rate than white British students (as measured by the increase in attainment between age 7 and 11) and that improvements in the proficiency of the English language is likely to be the most important contributing factor. Thus it seems likely that most primary-aged students catch up in English proficiency at a rate such that they do not impede the progress of their native-speaking peers.

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Fig. 1: *Percentage of Children (Year 6) who speak 'English as an additional language' and are of white ethnic origin*

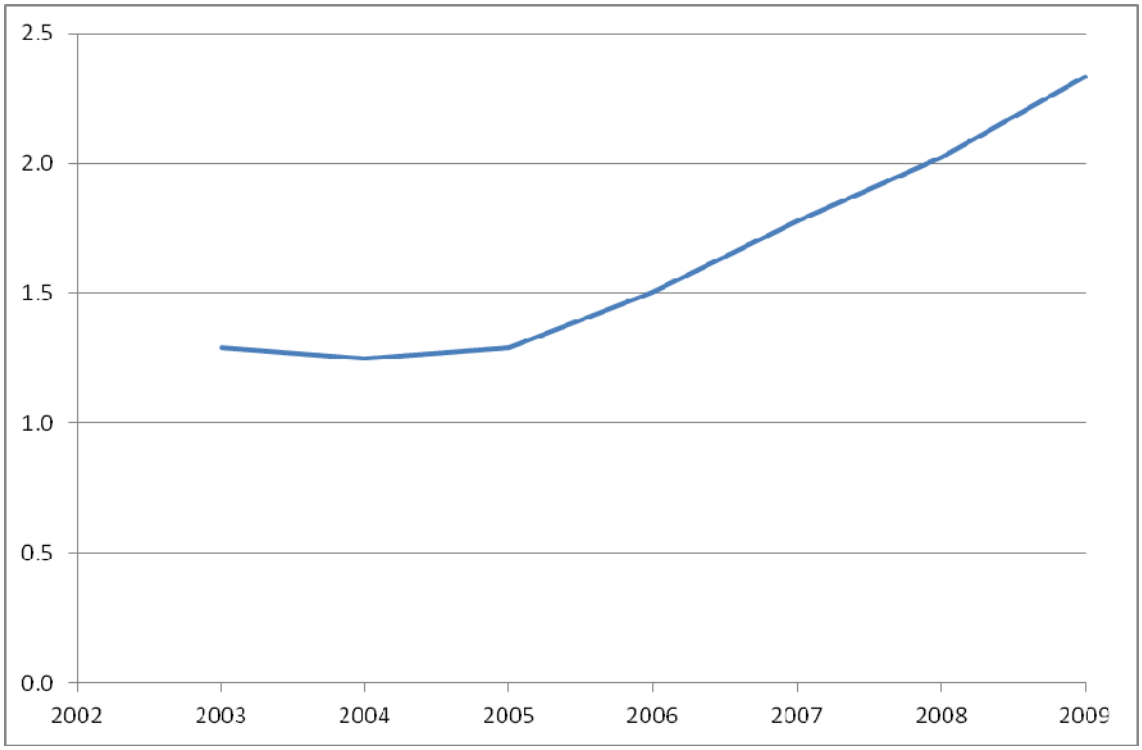

Fig. 2: *Percentage of Children (Year 6) who speak 'English as an additional language' and are of non-white ethnic origin*

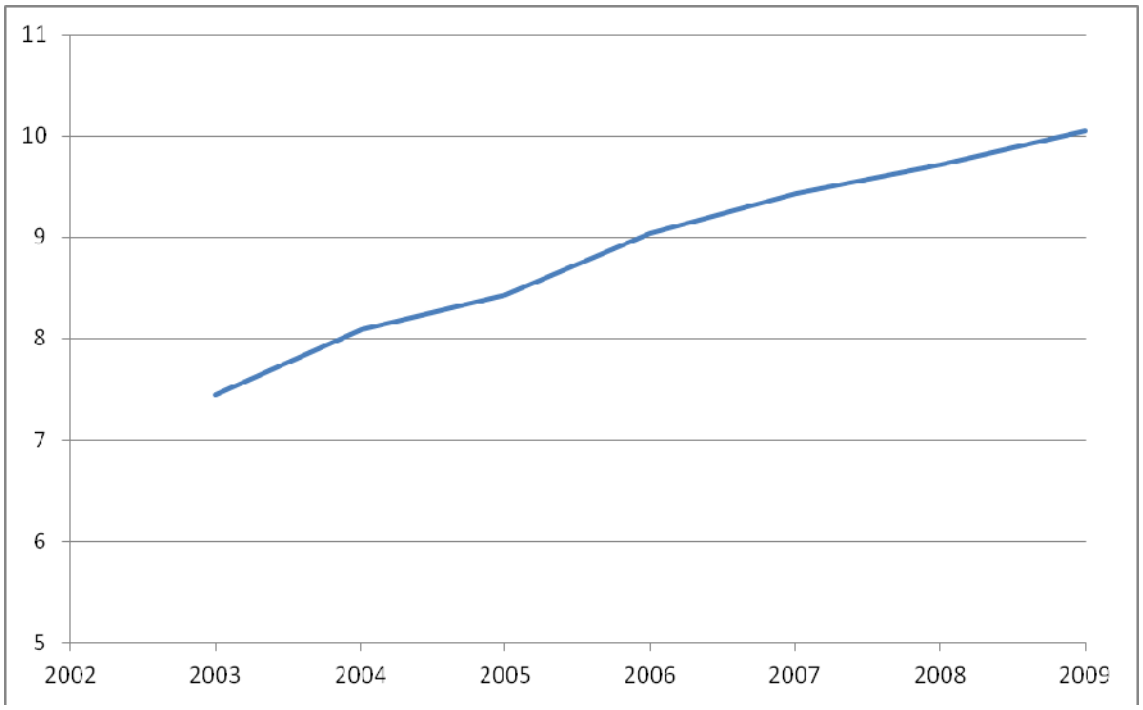

Fig. 3. *Percentage of Children (Year 6) who speak 'English as an additional language' and are of white ethnic origin; by school type*

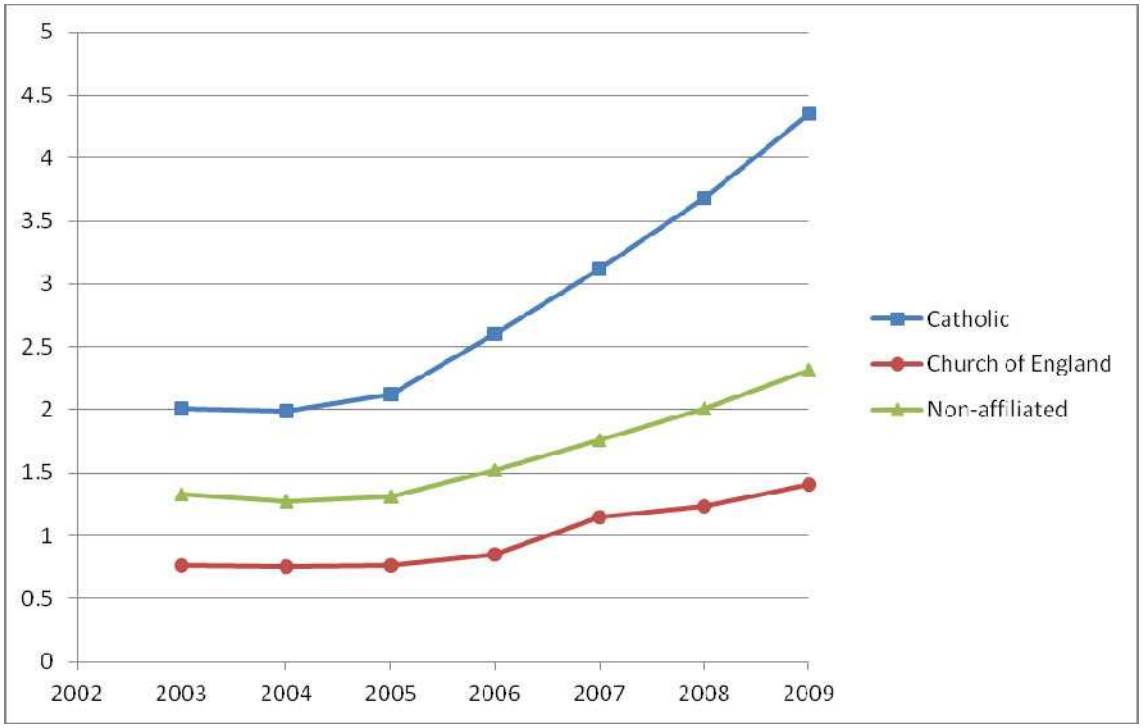

Table 1: *Minority ethnic origin of 'Native English speakers' and non-white speakers of English as an 'additional language'. Year 6 students in 2003 and 2009*

	2003			2009		
	Number	Native English speakers	Speak English 'as an additional language'	Number	Native English speakers	Speak English 'as an additional language'
Bangladeshi	5,919	1.82	98.19	8,372	3.07	96.93
Black Caribbean	8,684	92.58	7.42	8,010	95.37	4.63
Black (Other)	11,365	37.50	62.50	17,989	34.04	5.96
Chinese	1,770	18.70	81.30	1,900	19.11	80.89
Indian	12,742	14.17	85.83	13,062	19.05	80.95
Pakistani	15,398	5.28	94.72	18,983	8.53	91.47
Other	18,927	85.36	14.64	26,211	79.53	20.47

Table 2: *Average characteristics of pupils in each group (Year 6 students, 2009)*

	Native English speakers	Non-native English speakers, white origin	Non-native English speakers, non-white origin
Individual-level characteristics			
% Free School Meals	14.57	17.87	28.31
% Special Ed. Needs (with statement)	2.34	1.25	1.68
% Female	49.04	48.70	48.82
Reading score	49.75 (28.44)	40.71 (29.21)	41.47 (27.89)
Writing Score	49.29 (28.87)	41.80 (29.04)	46.44 (28.16)
Maths score	50.12 (28.56)	47.05 (29.19)	47.66 (29.35)
% Level4+ English	82.07	65.15	76.11
% Level4+ Maths	80.27	72.95	76.43
Average characteristics of schools attended by pupils in each category (computed for all individuals within each category)			
Nb. of pupils in the schools where there is at least 1 student of the category	547,454	224,539	302,145
Average School size	323 (149)	370 (151)	371 (148)
Average % Free School Meals	15.47 (13.24)	17.81 (13.53)	18.15 (13.82)
Average Per pupil expenditure	£ 3,652 (723)	£ 3,731 (738)	£ 3,700 (737)
Average Pupil teacher ratio	21.71 (3.09)	21.76 (2.99)	21.80 (2.95)
% Catholic schools	9.71	12.63	10.01
% Church of England	19.65	14.14	13.99
% Non-faith	69.91	72.52	75.48

Average Reading score	48.78 (28.53)	47.72 (28.68)	47.63 (28.62)
Average Writing Score	48.88 (28.83)	48.10 (28.85)	48.24 (28.73)
Average Maths Score	49.84 (28.66)	48.98 (28.93)	49.13 (28.88)
Average % Level4+ English	81.12 (39.13)	79.63 (40.27)	80.03 (39.97)
Average % Level4+ Maths	79.75 (40.19)	78.31 (41.21)	78.63 (41.00)
% Urban schools	81.16	91.15	94.31
% London schools	13.37	28.60	23.02

Table 3: *Pupil mobility and non-native English speakers*

Probability of changing primary school (between Year 2 and Year 6) for children who speak English as a first language conditional on the proportion of 'non-native English speakers' in future year group (i.e. Year 6) of original school attended

	(1)	(2)	(3)	(4)	(5)
(a) All non-native English speakers considered together					
Proportion non-native English speakers	0.288*	0.259*	0.289*	0.289*	0.284*
	(0.005)	(0.005)	(0.010)	(0.010)	(0.009)
(b) Non-native speakers considered separately by whether white or non-white ethnic origin					
Proportion non-native English speakers (white ethnic origin)	0.286*	0.267*	0.305*	0.304*	0.306*
	(0.021)	(0.020)	(0.019)	(0.019)	(0.018)
Proportion non-native English speakers (non-white ethnic origin)	0.289*	0.258*	0.283*	0.283*	0.276*
	(0.006)	(0.006)	(0.010)	(0.010)	(0.010)
Year dummies	x	x	x	x	x
Demographics		x	x	x	x
School fixed effects			x	x	x
Prior attainment age 7				x	x
Time-varying school characteristics					x

Notes:

Number of observations: 2,192,151.

The average proportion of children who speak English as a first language who move school between Year 2 and Year 6 is 0.14.

Demographics include gender, month of birth, whether the pupil is eligible to receive free school meals, whether the child has a statement for 'Special Educational Needs' Time-varying school characteristics include log(per pupil school expenditure); pupil-teacher ratio; % children eligible to receive free school meals; log(number of pupils in year group).

Table 4: *The relationship between the percentage of non-native English speakers and age 11 test results of native English speakers*

Coefficient on percentage of non-native English speakers in the year group (regardless of ethnic background)

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Reading percentile	-0.120*	-0.051*	0.004	0.004	0.003	0.000	0.002
	(0.005)	(0.005)	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)
	2,138,746	2,138,746	2,138,746	2,138,746	2,138,746	2,137,808	2,137,808
Writing percentile	-0.094*	-0.029*	-0.000	-0.000	0.000	-0.000	0.000
	(0.005)	(0.004)	(0.008)	(0.008)	(0.008)	(0.010)	(0.010)
	2,139,231	2,139,231	2,139,231	2,139,231	2,139,231	2,138,293	2,138,293
Math percentile	-0.138*	-0.072*	0.014*	0.012	0.012	0.011	0.013
	(0.005)	(0.005)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
	2,148,771	2,148,771	2,148,771	2,148,771	2,148,771	2,147,829	2,147,829
Year dummies	x	x	x	x	x	x	x
Demographics of native speakers		x	x	x	x	x	x
School fixed effects			x	x	x	x	x
Prior attainment age 7 of native speakers				x	x	x	x
Time-varying school characteristics					x	x	x
Total number of non-native English speakers in the school						x	x
School specific time trends							x

Notes: Standard errors adjusted for clustering on 11,879 schools.
Demographics include gender, month of birth, whether the pupil is eligible to receive free school meals, whether the child has a statement for 'Special Educational Needs' Time-varying school characteristics include log(per pupil school expenditure); pupil-teacher ratio; % children eligible to receive free school meals; log(number of pupils in year group). Standard errors clustered at school-level.

Table 5: *The relationship between the percentage of non-native English speakers (by ethnic background) and age 11 test results of native speakers*

Coefficient on percentage of non-native English speakers in the year group (distinguishing by ethnic background)

Dependent variable		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Reading percentile	%white non-native speaker	0.072*	0.120*	-0.001	0.002	0.003	-0.000	-0.002
		(0.022)	(0.020)	(0.012)	(0.012)	(0.012)	(0.013)	(0.013)
	% non-white non-native speaker	-0.154*	-0.081*	0.006	0.004	0.004	0.001	0.004
		(0.006)	(0.005)	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
Writing percentile	%white non-native speaker	0.081*	0.125*	-0.010	-0.006	-0.005	-0.005	-0.004
		(0.021)	(0.018)	(0.015)	(0.015)	(0.015)	(0.016)	(0.017)
	% non-white non-native speaker	-0.125*	-0.057*	0.004	0.002	0.002	0.002	0.002
		(0.006)	(0.005)	(0.010)	(0.010)	(0.010)	(1.001)	(0.012)
Math percentile	%white non-native speaker	-0.004	0.044*	0.003	0.005	0.005	0.005	0.005
		(0.021)	(0.019)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
	% non-white non-native speaker	-0.162*	-0.093*	0.018*	0.015	0.014	0.014	0.016
		(0.006)	(0.005)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Year dummies		x	x	X	x	x	x	x
Demographics, native speakers			x	X	x	x	x	x
School fixed effects				X	x	x	x	x
Prior attainment age 7, native speakers					x	x	x	x
Time-varying school characteristics						x	x	x
Total number of non-							x	x

native English speakers in the school							
School specific time trends							x

Notes: demographics include gender, month of birth, whether the pupil is eligible to receive free school meals, whether the child has a statement for 'Special Educational Needs' Time-varying school characteristics include log(per pupil school expenditure); pupil-teacher ratio; % children eligible to receive free school meals; log(number of pupils in year group). Number of observations when the dependent variable is reading score, writing score and maths score are 2,138,746; 2,139,231; and 2,148, 771 respectively. Standard errors clustered at school-level.

Table 6: *The relationship between the percentage of non-native English speakers and age 11 test results of native speakers: non-linearities?*

Coefficient on percentage of non-native English speakers in the year group (regardless of ethnic background)

Dependent variable		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Reading percentile	<=median : (<=8%, non-native speakers)	-0.294*	-0.130	-0.036	-0.043	-0.018	-0.022	0.026
		(0.150)	(0.130)	(0.081)	(0.079)	(0.079)	(0.079)	(0.126)
	>median : (>=8% non-native speakers)	-2.682*	-0.879*	0.031	-0.036	-0.033	-0.068	0.117
		(0.222)	(0.188)	(0.138)	(0.136)	(0.136)	(0.139)	(0.220)
Writing percentile	<=median	-0.206	-0.055	-0.029	-0.030	0.000	0.001	-0.031
		(0.151)	(0.134)	(0.115)	(0.114)	(0.114)	(0.114)	(0.086)
	>median	-2.141*	-0.453*	0.141	0.085	0.089	0.089	-0.204
		(0.204)	(0.176)	(0.191)	(0.192)	(0.192)	(0.196)	(0.150)
Math percentile	<=median	-0.513*	-0.342*	0.011	0.003	0.055	0.050	0.090
		(0.149)	(0.131)	(0.080)	(0.079)	(0.079)	(0.079)	(0.081)
	>median	-3.537*	-1.793*	-0.079	-0.183	-0.166	-0.213	-0.167
		(0.216)	(0.186)	(0.139)	(0.138)	(0.138)	(0.140)	(0.144)
Year dummies		x	x	x	x	x	x	x
Demographics of native speakers			x	x	x	x	x	x
School fixed effects				x	x	x	x	x
Prior attainment age 7, native speakers					x	x	x	x
Time-varying school characteristics						x	x	x
Total number of non-native English speakers in school							x	x
School specific time trends								x

Notes: demographics include gender, month of birth, whether the pupil is eligible to receive free school meals, whether the child has a statement for 'Special Educational Needs' Time-varying school characteristics include log(per pupil school expenditure); pupil-teacher ratio; % children eligible to receive free school meals; log(number of pupils in year group). Standard errors clustered at school-level. Number of observations when the

dependent variable is reading score, writing score and maths score are 2,138,747; 2,139,232; and 2,148, 772 respectively. In 2003, the proportion of schools with no non-native English speakers, 0-8% non-native speakers and >8% non-native speakers was 63%, 19% and 18% respectively. By 2009, this had changed to 51%, 23% and 27% respectively.

Table 7: *The relationship between the number of languages spoken in the year group and age 11 test results of native speakers (years 2007-2009)*

Coefficient on the number of languages spoken in the year group (regardless of ethnic background)

Dependent variable	(1)	(2)	(3)	(4)
Reading percentile	-0.412*	-0.173*	0.024	0.056
	(0.034)	(0.029)	(0.042)	(0.043)
	907,362	907,362	907,362	907,362
Writing percentile	-0.326*	-0.097*	0.042	0.078
	(0.033)	(0.029)	(0.056)	(0.057)
	907,666	907,666	907,666	907,666
Math percentile	-0.495*	-0.263*	0.036	0.062
	(0.033)	(0.029)	(0.039)	(0.039)
	911,781	911,781	911,781	911,781
Year dummies	x	x	x	x
Demographics, native speakers		x	x	x
School fixed effects			x	x
Prior attainment age 7, native speakers				x

Notes: Standard errors adjusted for clustering on 11,873 schools.
Demographics include gender, month of birth, whether the pupil is eligible to receive free school meals, whether the child has a statement for 'Special Educational Needs'. Standard errors clustered at school-level.

Table 8: *The relationship between the percentage of non-native English speakers (by ethnic background) and age 11 test results of native speakers: Heterogeneity*

Coefficient on percentage of non-native English speakers in the year group (distinguishing by ethnic background)

		Pupils eligible to receive free school meals		Pupils who achieved poorly in tests at age 7.		Pupils in London schools	
Dependent variable		(1)	(2)	(3)	(4)	(5)	(6)
Reading percentile	%white non-native speaker	0.098*	0.001	0.115*	-0.003	-0.034	-0.023
		(0.019)	(0.021)	(0.016)	(0.020)	(0.011)	(0.021)

	% non-white non-native speaker	-0.016*	0.006	-0.020*	-0.042*	-0.235*	0.003
		(0.005)	(0.014)	(0.004)	(0.013)	(0.013)	(0.014)
		291,670	291,588	381,642	381,456	231,807	231,798
Writing percentile	%white non-native speaker	0.123*	-0.002	0.105*	-0.002	-0.008	-0.026
		(0.020)	(0.024)	(0.014)	(0.022)	(0.029)	(0.027)
	% non-white non-native speaker	-0.003	-0.006	-0.015*	-0.052*	-0.196*	0.004
		(0.005)	(0.016)	(0.004)	(0.014)	(0.012)	(0.019)
		291,779	291,679	382,005	381,818	231,881	231,872
Math percentile	%white non-native speaker	0.025	0.028	0.031	0.020	-0.053*	-0.004
		(0.019)	(0.023)	(0.014)	(0.020)	(0.031)	(0.019)
	% non-white non-native speaker	-0.027*	0.019	-0.036	-0.022	-0.232*	-0.007
		(0.005)	(0.014)	(0.004)	(0.013)	(0.013)	(0.014)
		295,384	295,302	390,957	390,767	233,102	233,093
Year dummies		x	x	x	x	x	x
Demographics, native speakers			x		x		x
School fixed effects			x		x		x
Prior attainment age 7, native speakers			x		x		x
Time-varying school characteristics			x		x		x
Total number of non-native English speakers in school			x		x		x
School specific time trends			x		x		x

Notes: demographics include gender, month of birth, whether the pupil is eligible to receive free school meals, whether the child has a statement for 'Special Educational Needs' Standard errors clustered at school-level. Time-varying school characteristics include log(per pupil school expenditure); pupil-teacher ratio; % children eligible to receive free school meals; log(number of pupils in year group). Standard errors clustered at school-level. Pupils who 'achieved poorly in tests at age 7' are those who failed to attain the expected level (level 2) in tests of reading, writing or maths. This is about 20% of the sample of native speakers

Table 9: *The relationship between the percentage of non-native English speakers (by ethnic background) and age 11 test results of native speakers: distinguishing between 'late comers' and others*

Coefficient on percentage of non-native English speakers in the year group (distinguishing by ethnic background)

		(1)	(2)	(3)	(4)	(5)	(6)
Reading percentile	% white non-native speaker; arrived in last 2 years of primary school	-0.469*	-0.383*	-0.002	0.018	0.017	0.012
		(0.043)	(0.038)	(0.025)	(0.025)	(0.025)	(0.021)
	% white non-native speaker: all others	0.233*	0.260*	0.014	0.020	0.020	-0.010

		(0.027)	(0.024)	(0.017)	(0.017)	(0.017)	(0.017)
	% non-white non-native speaker: arrived in last 2 years of primary school	-0.719*	-0.507*	-0.010	0.006	0.006	0.061*
		(0.067)	(0.030)	(0.023)	(0.023)	(0.023)	(0.012)
	% non-white non-native speaker: all others	-0.108*	-0.051*	0.015	0.017	0.016	-0.007
		(0.007)	(0.006)	(0.010)	(0.010)	(0.010)	(0.010)
Writing percentile	% white non-native speaker; arrived in last 2 years of primary school	-0.463*	-0.383*	-0.033	-0.011	-0.006	-0.020
		(0.044)	(0.039)	(0.033)	(0.033)	(0.033)	(0.026)
	% white non-native speaker: all others	0.243*	0.268*	-0.009	-0.002	-0.001	-0.000
		(0.025)	(0.022)	(0.022)	(0.022)	(0.022)	(0.023)
	% non-white non-native speaker: arrived in last 2 years of primary school	-0.583*	-0.382*	0.017	0.034	0.034	0.028
		(0.038)	(0.032)	(0.031)	(0.031)	(0.031)	(0.016)
	% non-white non-native speaker: all others	-0.084*	-0.030*	-0.002	-0.000	-0.001	0.007
		(0.007)	(0.006)	(0.012)	(0.012)	(0.012)	(0.013)
Math percentile	% white non-native speaker; arrived in last 2 years of primary school	-0.526*	-0.441*	-0.024	-0.006	-0.006	0.010
		(0.042)	(0.037)	(0.025)	(0.025)	(0.025)	(0.020)
	% white non-native speaker: all others	0.148*	0.179*	0.025	0.031	0.031	-0.002
		(0.025)	(0.023)	(0.016)	(0.016)	(0.016)	(0.016)
	% non-white non-native speaker: arrived in last 2 years of primary school	-0.734*	-0.534*	-0.028	-0.014	-0.012	0.058*
		(0.036)	(0.030)	(0.023)	(0.023)	(0.023)	(0.012)
	% non-white non-native speaker: all others	-0.109*	-0.055*	0.028*	0.029*	0.028*	0.006
		(0.007)	(0.006)	(0.009)	(0.009)	(0.009)	(0.010)
Year dummies		x	x	x	x	x	x
Demographics, native speakers			x	x	x	x	x
School fixed effects				x	x	x	x
Prior attainment age 7, native speakers					x	x	x
Time-varying school characteristics						x	x
School-specific time trends							x

Notes: Number of observations in regressions where the dependent variable is reading percentile, writing percentile and maths percentile are 1,520,328; 1,520,685 and 1,527, 764 respectively. Standard errors are clustered on school. Years 2005-2009. 'white EAL' arriving in last 2 years of primary school were about 18% of all white EAL in 2005 and 30% in 2008 (26% in 2009). For non-white EAL there is much less change: 9.6% in 2005 and 8.2% in 2009. Demographics include gender, month of birth, whether the pupil is eligible to receive free school meals, whether the child has a statement for 'Special Educational Needs' Time-varying school characteristics include log(per pupil school expenditure); pupil-teacher ratio; % children eligible to receive free school meals; log(number of pupils in year group).

Table 10: *Balancing tests for key covariates*

Coefficient on percentage of non-native English speakers in the year group

		Coefficient: white non-native speakers			Coefficient: non-white non-native speakers		
		(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Mean (standard deviation)	No controls (apart from year dummies)	Individual-level controls and school fixed effects	Full controls including school-specific time trends	No controls (apart from year dummies)	Individual-level controls and school fixed effects	Full controls including school-specific time trends
Characteristics of native English speakers							
Eligible to receive free school meals	0.17	0.0043* (0.0003)	0.0003* (0.0001)	0.0003* (0.0001)	0.0035* (0.0001)	0.0002* (0.0001)	0.0002 (0.0001)
Achieves Level 2 or above in age 7 reading test	0.85	-0.0019* (0.0000)	-0.0001* (0.0001)	-0.0005* (0.0001)	-0.0015* (0.0001)	-0.0000 (0.000)	0.0001 (0.000)
Achieves Level 2 or above in age 7 writing test	0.83	-0.0020* (0.0002)	-0.0006* (0.0002)	-0.0004* (0.0002)	-0.0017* (0.0001)	-0.0002* (0.0001)	-0.0005 (0.0001)
Achieves Level 2 or above in age 7 maths test	0.89	-0.0013* (0.0000)	-0.0002 (0.0001)	-0.0001 (0.0001)	-0.0012* (0.0000)	-0.0001 (0.0001)	-0.0001 (0.0001)
School-level characteristics							
Log per pupil expenditure	8.09 (0.20	0.0080* (0.0004)	-0.0003*	0.0002 (0.0010	0.0021*	-0.0001	-0.0001 (0.0006

	8)		(0.0001)	)	(0.0001)	(0.0001)	)
Pupil-teacher ratio	22.49 (3.31)	-0.0029 (0.0054)	-0.0004 (0.0042)	-0.0040 (0.0048)	-0.0088* (0.0014)	-0.0079* (0.0030)	-0.0050 (0.0033)
% students eligible to receive free school meals	16.88 (14.94)	0.4765* (0.0031)	-0.0338* (0.0007)	-0.0084 (0.0061)	0.2936* (0.0079)	-0.0104* (0.0049)	0.0069 (0.0042)

Notes: number of observations for the dependent variables are around 2.4 million (varying slightly according to the number of missing observations on variables). Standard errors are adjusted for clustering on 11,885 schools. Stars are shown to indicate statistical significant at 0.05 or below. Results for individual-level characteristics are almost identical when estimated using a Probit (in specification 1).

Table 11: *First stage*
Dependent variable: percentage of children (Year 6) who speak 'English as an additional language' and are of white ethnic origin

	(1)	(2)	(3)	(4)	(5)
Catholic*spline	0.263*	0.254*	0.267*	0.268*	0.265*
	(0.057)	(0.057)	(0.063)	(0.063)	(0.063)
F-stat	21.61	19.88	17.89	17.97	17.58
R-squared	0.020	0.048	0.678	0.678	0.678
IV basic specification	x	X	x	x	x
Demographics		X	x	x	x
School fixed effects			x	x	x
Prior attainment, age 7				x	x
Time-varying school characteristics					x

Notes: Number of observations is 81,715 schools. The standard error is clustered on school. The basic specification includes a control for whether the school is Catholic; a time trend; spline (zero to 2005); Catholic School * time trend.

Table 12: *Falsification test*

	% non-white, non-native speakers	Whether native speaker is eligible to receive free school meals	Whether native speaker achieves above Level 2 in age 7 reading test	Whether native speaker achieves above Level 2 in age 7 writing test	Whether native speaker achieves above Level 2 in age 7 maths test
	(1)	(2)	(3)	(4)	(5)
Catholic*spline	0.048	0.046	0.046	0.057	0.053
	(0.078)	(0.078)	(0.078)	(0.079)	(0.079)

Notes: Number of observations is 81,715 schools. The standard error is clustered on school. Controls are included as for the basic IV specification. See notes to Table 10.

Table 13: *Reduced form: coefficient on Catholic school * spline*

Dependent variable	(1)	(2)	(3)	(4)	(5)
Reading percentile	0.043	0.110	0.038	-0.014	-0.007
	(0.162)	(0.167)	(0.171)	(0.168)	(0.168)
Writing percentile	-0.107	-0.062	-0.116	-0.170	-0.153
	(0.234)	(0.236)	(0.250)	(0.249)	(0.249)
Math percentile	0.334*	0.427*	0.328*	0.283	0.291
	(0.165)	(0.165)	(0.171)	(0.168)	(0.167)
IV basic specification	x	x	x	x	x
Demographics, native speakers		x	x	x	x
School fixed effects			x	x	x
Prior attainment, age 7: native speakers				x	x
Time-varying school characteristics					x

Notes: See notes for Table. 10. Demographics include gender, month of birth, whether the pupil is eligible to receive free school meals, whether the child has a statement for 'Special Educational Needs' Time-varying school characteristics include log(per pupil school expenditure); pupil-teacher ratio; % children eligible to receive free school meals; log(number of pupils in year group). Standard errors clustered at school-level.

Appendix 1

Table A1: *Basic regressions (estimated for schools actually attended – i.e. not taking account of mobility issues).*

Coefficient on proportion of non-native English speakers in the year group (regardless of ethnic background)

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Reading percentile	-0.121*	-0.044*	0.018*	0.016*	0.015*	0.012	0.005
	(0.006)	(0.005)	(0.007)	(0.016)	(0.007)	(0.008)	(0.008)
	2,138,746	2,138,746	2,138,746	2,138,746	2,138,746	2,071,988	2,138,742
Writing percentile	-0.095*	-0.022*	0.011	0.010	0.010	0.009	0.006
	(0.006)	(0.005)	(0.010)	(0.010)	(0.010)	(0.011)	(0.011)
	2,139,231	2,139,231	2,139,231	2,139,231	2,139,231	2,072,451	2,139,227
Math percentile	-0.138*	-0.064*	0.030*	0.028*	0.027*	0.026*	0.018*
	(0.006)	(0.005)	(0.008)	(0.007)	(0.007)	(0.008)	(0.007)
	2,148,771	2,148,771	2,148,771	2,148,771	2,148,771	2,081,446	2,148,767
Year dummies	x	x	x	x	x	x	x
Demographics		x	x	x	x	x	x

School fixed effects			x	x	x	x	x
Prior attainment age 7				x	x	x	x
Time-varying school characteristics					x	x	x
Total number of non native English speakers in the school						x	
School specific time trends							x

Notes: demographics include gender, month of birth, whether the pupil is eligible to receive free school meals, whether the child has a statement for 'Special Educational Needs' Time-varying school characteristics include log(per pupil school expenditure); pupil-teacher ratio; % children eligible to receive free school meals; log(number of pupils in year group). Standard errors clustered at school-level.

Table A2: *The relationship between the percentage of non-native English speakers and age 7 teacher assessment*

Coefficient on percentage of non-native English speakers in the year group (regardless of ethnic background)

Dependent variable	(1)	(2)	(3)	(4)
Reading percentile	-0.154*	-0.069*	0.004	0.005
	(0.005)	(0.004)	(0.006)	(0.006)
	3,348,391	3,348,391	3,348,391	3,348,391
Writing percentile	-0.182*	-0.091*	-0.006	-0.004
	(0.006)	(0.005)	(0.008)	(0.008)
	3,348,389	3,348,389	3,348,389	3,348,389
Math percentile	-0.112*	-0.053*	0.004	0.005
	(0.004)	(0.003)	(0.006)	(0.006)
	3,348,388	3,348,388	3,348,388	3,348,388
Year dummies	x	x	x	x
Demographics		x	x	x
School fixed effects			x	x
Time-varying school characteristics				x

Notes: The dependent variable is whether or not the student achieves Level 2 or above for teacher assessment at age 7 (i.e. the end of Key Stage 1). A continuous score is not available. Demographics include gender, month of birth, whether the pupil is eligible to receive free school meals, whether the child has a statement for 'Special Educational Needs' Time-varying school characteristics include log(per pupil school expenditure); pupil-teacher ratio; % children eligible to receive free school meals; log(number of pupils in year group). Standard errors clustered at school-level.