School Choice, Universal Vouchers and Native Flight from Local Schools*

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Using data from Copenhagen school registers and other sources, I test the hypothesis that Danes are more likely to opt out of their local public school if it has a large concentration of immigrant pupils. The results suggest that, when a rich set of covariates at student, school, and neighbourhood levels is controlled for, up to an immigrant concentration of about 35 per cent in the local school, opting out decisions of Danes are not affected. But, Danes are far more likely to opt out as soon as the concentration exceeds 35 per cent. However, only the 20 per cent of the immigrant population who speak Danish at home respond to higher immigrant concentrations by opting out. These results lend support to the native-flight-from-immigrants hypothesis and suggest that ethnic segregation across schools is increased by Danes' and immigrants' differing behaviour.

Introduction

Segregation based on socio-economic status or ethnicity is challenging school systems and policy makers in cities in high-income countries. Children with similar backgrounds are clustering in schools, creating polarized school systems, with some schools enrolling mainly advantaged, native pupils, and other schools enrolling large numbers from disadvantaged and immigrant backgrounds. In the debate over school choice, one of the main concerns about universal vouchers is that increased choice will isolate the most disadvantaged children in the worst schools and that parents may not be sufficiently informed to make choices in the best interests of their children. This is a concern because of the link between the composition of the school population and achievement and also because of stigmatization. Researchers have been discussing the link between the ethnic and socio-economic composition of schools and the academic results achieved for over 40 years (Coleman *et al.*,

1966) and have suggested various channels through which this link may arise. In the specific context of immigrant education, frequent contact with native speakers is crucial for gaining language competence. More generally, it has been shown that a high concentration of immigrants and children from disadvantaged backgrounds has a negative impact on academic achievement through its influence on all kinds of children's behaviour, including study habits and personal academic development. Another argument is that—due to the increasing homogenization of low-level schools in Europe—the school a child attends may be perceived as a signal of his or her skills when applying for admission to further education or for a job. Since which school their child attends is a variable of choice for parents—either by residential choice or choice of school—the school the child attends conveys information on his or her background and abilities to future decision-makers in the educational system and the labour market. In particular, children attending schools with many pupils from low

*In this article, *public school* means a school run by the local authority.

socioeconomic status (SES) or immigrant backgrounds may be perceived as being 'negatively selected', a perception leading to the stigmatization of all children attending such schools (Solga, 2002). Lastly, ethnic cohesion may be hampered by ethnic segregation. Burgess and Wilson (2005) find evidence that areas with high segregation levels coincided with the locations plagued by rioting in the summer of 2001 in England.

There is a growing literature that presents a mixed picture of the net impact of various forms of choice. Several recent US studies examine whether the choice between private and public school is influenced by the racial composition of the local population (e.g. Lankford and Wyckoff, 1997; Figlio and Stone, 2001). Interestingly, there is only one study in the literature examining the related hypothesis of native flight from immigrant schoolchildren (Betts and Fairlie, 2003), in spite of the fact that the basics of the two phenomena are probably quite similar.

This study examines whether a high concentration of schoolchildren of non-Western origin is a factor behind the decision to opt out of local public schools in Copenhagen, Denmark.[1] In the past 15 years, Copenhagen has experienced a substantial increase in schoolchildren with an immigrant background (from 16 per cent to almost 30 per cent), and major changes in their regions of origin. A recent study (Rangvid, 2007a) examines the extent and patterns of ethnic segregation across schools in Copenhagen. This study takes the previous analysis a step further by considering a possible factor behind families' choice of school: the percentage of immigrant children in the school. I ask whether the decision to opt out of the local public school is related to the concentration of immigrant pupils in that school, and if so, whether there is evidence of a threshold or 'tipping point' in response to the percentage of immigrant pupils (e.g. Clotfelter, 1976) after which families start opting for alternatives to the local school.

This study contributes to the existing literature in several ways. First, this is the first study to address the *joint* opting out effect from the local public school to alternative schools—both public and private.[2] This is possible, because unlike most other datasets used in the literature, the Copenhagen data allow me to identify the exact residential location for all children[3] (i.e. the school catchment area) and thus both the school assigned and the school actually attended. Secondly, since I have the full sample of schoolchildren with linked micro-level background characteristics from administrative registers, I can calculate the precise ethnic make-up of each local school. Such

precise school level data is not usually available in other studies. Thirdly, I also investigate the school choices of immigrants themselves. The existing 'white flight' literature typically estimates only the school choices of white/native families. However, school choices only contribute to ethnic segregation, if Danish families opt out of schools with many immigrants and opt for schools with fewer immigrants at *higher* rates than immigrant families do. Lastly, to my knowledge, this is the first study to consider native flight in a European context.

Background and Previous Research

Despite a growing literature on the influence of the concentration of ethnic minorities in schools on white flight, there seems to be no consensus in the literature on whether 'white flight' actually exists (Lankford and Wyckoff, 1992; Lankford, Lee and Wyckoff, 1995; Lankford and Wyckoff, 1997; Buddin, Cordes and Kirby, 1998; Figlio and Stone, 2001). Most of the white flight literature is concerned with the choice between public and private alternatives (e.g. Lankford, Lee and Wyckoff, 1995; Betts and Fairlie, 2003; Campbell, West and Peterson, 2005; Brunner, Imazeki and Ross, 2006), which is probably due to the fact that public school choice is restricted in the United States. However, in school systems with more choice, the decision of native children to opt out from local public schools with many immigrants into other public schools with fewer immigrants poses an additional, potentially serious, threat to integration at school. Thus, the impact of segregation not only stems from the choice of private school, but also that of public school. To my knowledge, there are no studies on the joint impact of high immigrant concentration in the local school on opting out in favour of private or other public schools.

Since the existing literature focuses on the US experience, the main issue there is white flight from minorities (one exception is Betts and Fairlie, 2003). However, for most European countries, the related issue of native flight from immigrant schoolchildren is probably more relevant. To my knowledge, there is no European study on native flight from schools with high immigrant levels. While many considerations are similar to the white flight perspective, additional considerations include the effects of immigrant schoolchildren on school resources and teaching methods due to their limited language proficiency. As Betts and Fairlie suggest, a substantial increase in a school

of children with limited proficiency in the language of the host country can take away teaching resources from native children, due to such factors as a need for special classes for pupils with limited language skills. Alternatively, if immigrant children are in regular classes, teachers may decide to spend additional time helping them at the expense of other pupils in the class. A recent study of Copenhagen schools suggests that high numbers of immigrants in schools are related to lower test scores for native Danes and immigrants alike (Rangvid, 2006).

The Copenhagen school system has a number of features that make it an interesting case for analysis. First, even though in principle a formal mechanism assigns children to specific public schools based on residence in the school catchment area, parents can apply for admission to other public schools or to about eighty private schools. In practice, 52 per cent of all children do not attend their local public school: 26 per cent attend an alternative public school, while the remaining 26 per cent attend private schools. Thus, while a great deal of attention in the literature is typically focused on the choice of a private school, the choice between public schools is equally important in Copenhagen. Secondly, in many previous analyses of school choice, only a few children in the district have typically been affected. In Copenhagen, however, more than half the school population is involved in some form of school choice. Thirdly, because immigrant and disadvantaged children are over-represented in Copenhagen, I was able to explore the impact of choice within an environment about which there is heightened concern.

School Choice in Copenhagen and Theoretical Framework

In Denmark there was, until recently, a well-established principle of neighbourhood schooling. Public schools were supposed to be rooted in the local community and to mirror the composition of the local population. Therefore choice within the public sector was traditionally limited and schools were assigned by residence in non-overlapping school districts. The major alternative to the local public school was a private school. The share of primary/lower secondary pupils in private schools increased from 6 per cent during the 1970s to 12 per cent since the end of the 1990s indicating a slowly increasing parental interest in an alternative choice of school. However, during the 1990s consecutive governments gradually allowed greater freedom of school choice. Today, children are still enrolled

in the school assigned to them, but they may also apply to other public schools within the same municipality and even across municipal boundaries. Schools are in principle required to accept children from other catchment areas up to their capacity limits (i.e. filling up existing classes). In 2003, about one in four children attended a different public school than their local school.

However, children may attend alternative public schools for other reasons than deliberately opting out. For example, children who move from one school catchment to another are not required to switch school, but are allowed to stay on.[4] Immigrants with special educational needs (most frequently language support) may be required to attend a particular public school that offers courses matching their needs, and newly arrived immigrants in special introductory classes (which are located at specific schools) are allowed to stay on at these schools after being mainstreamed into normal classes.

In addition to public school, education at a private school is a frequently exercised option in Copenhagen. With universal vouchers covering about 75–85 per cent of school fees, a private school is within reach for most families.[5] Twenty-eight per cent of Danish and 23 per cent of immigrant schoolchildren in our data attend private schools. There are several types of Danish private schools differentiated along educational approaches or (Christian) religious lines, but the fundamental difference is between traditional (Danish) private schools and immigrant (mainly Muslim) schools which have become increasingly popular among the immigrant community since the beginning of the 1990s. These schools are financed in the same manner as traditional Danish private schools and are recognized in the Danish school system as providers of formally acknowledged education. While almost all Danish private school pupils attend traditional private schools, one out of two immigrant children attend an immigrant private school. Substantial differences emerge in the choices made by immigrants who use Danish as the main language in their families and those who do not (I label them mono- and bilingual immigrants throughout this study). 61 per cent of the bilingual immigrants attend their local public school, 28 per cent attend another public school, while 5 per cent and 6 per cent attend Danish and immigrant private schools, respectively. For monolingual immigrants, private schools are by far the preferred choice with 37 per cent and 36 per cent being enrolled in Danish and immigrant private schools; another 19 per cent attending their local public school, while

the remaining 8 per cent are enrolled in an alternative public school.

A suitable theoretical framework for exploring why children opt out of their assigned school is the subjective expected utility approach (Breen and Goldthorpe, 1997; Becker, 2003). The model represents children and their families as acting in a subjectively rational way, i.e. choosing among different educational options available to them on the basis of evaluations of their costs and benefits and of the perceived probabilities of more or less successful outcomes. When choosing between different schools, parents consider the costs (both financial and opportunity costs) and the academic standards of a given school and then choose the school which maximizes their subjective expected utility. The number of immigrants at a particular school may enter the utility function since it may affect the perceived academic standard, since—as pointed out above—a high level of immigrants in a school is often linked to lower academic achievement by all its pupils. At the same time, low immigrant numbers up to a certain threshold may not influence academic standards and, in this case, only numbers above a certain level would be expected to influence the choice of school. Differences across subpopulations in costs, benefits and the prospect of academic success may lead to differences in school choices and opting out. Immigrant parents, particularly those not proficient in the Danish language, and poorly educated parents may have little knowledge of school quality and of the ways and means of gaining admission to good schools. But their perception of the probability of a more or less successful academic outcome for their children may be different from that of Danish well-educated parents. Based on the theory, I posit the following research questions:

(i) Are Danes more likely to opt out of schools with many immigrants than immigrants are?

(ii) Are well-educated parents more likely to opt out at a given immigrant ratio than poorly educated parents?

(iii) Are immigrant families who are proficient in Danish more likely to opt out than those who are less proficient?

(iv) What is the level of immigrant concentration tolerated by Danish parents, or put another way, at which level does opting out 'take off'?

(v) Are Danes more responsive to concentrations of poorer or less well-integrated immigrants or to immigrants from certain regions of origin?

Data

This study uses several sources of data. First, pupil-level information from the school administrative system showing the school catchment area for all schoolchildren living in central Copenhagen (in 2003) and the school actually attended are used in the main data set.[6] Individual data is necessary, since I need to link individual pupils to their assigned school and to the school they are actually enrolled in. Furthermore, in the regressions, micro-level data allow me to control directly for individual-level characteristics such as parental education and income. Secondly, information on school characteristics from a school-principal survey collected as part of the PISA Copenhagen study, a replicate study of the international PISA assessment, is linked to the micro-dataset (see Rangvid, 2007b, for a more detailed description of the PISA Copenhagen study design).

One attractive feature of this dataset is that I can precisely match each child in the sample to a unique (assigned) public school and to the school actually attended, and can thus link detailed and precise school characteristics to each child in the sample. This is an advantage compared to most other studies that can only identify the average characteristics of all public schools in the area. The main sample consists of about 35,000 Copenhagen schoolchildren in grades 0–9 (the last year of compulsory schooling). Children attending special education schools and immigrant children in special introductory classes are excluded from the analyses since these children might not be free to choose their local school. I exclude children attending the 2 per cent of schools with the lowest and the 2 per cent with the highest immigrant pupil share to ensure that no problems arise from the tautological relationship between immigrant levels and opting out at the extreme points of the scale.[7] Missing values are handled by including missing value flags for all variables in all regressions. The data set available for the empirical analysis includes detailed information on schoolchildren and their families, and on school and community characteristics. Table A1 shows summary statistics for all variables included in the regressions on the subsamples of Danish and immigrant schoolchildren. 75 per cent are of Danish origin (i.e. with one or two Danish parents, to use the definition of Statistics Denmark), 25 per cent have origins in non-Western countries (5 per cent of these are first generation and 20 per cent second generation immigrants[8]). Only 1 per cent of schoolchildren are immigrants from Western countries and they have been excluded from this analysis, since they tend to be

very similar to Danes regarding socio-economic status and academic performance. The five largest immigrant groups have roots in Turkey, Pakistan, Lebanon, Iraq, and Morocco, all of which are mainly Muslim countries. Together, they make up two thirds of the immigrant school population in Copenhagen. Other large groups come from former Yugoslavia and Somalia. Some groups have quite a long history of immigration to Denmark, e.g. Turks, Pakistani, and Yugoslavs, who began to come to Denmark as guest workers in the 1970s. Children from such countries have often lived in Denmark all their lives, while other groups—like Somalis and Iraqis—are mainly refugees and were born in their home countries. Generally, Danish children have better-educated parents earning higher wages and far more active on the labour market, the difference being particularly noticeable for mothers (Table A1). Danish families also live on average in communities with a more advantaged population, but the differences are not substantial, which might be due to the absence of extensive ghetto-like areas in Copenhagen, and also possibly due to averaging across larger units. Danish families live in the catchment areas of schools with fewer immigrants, more families with high SES, and higher average grades in school leaving exams.

Copenhagen is divided into 15 residential districts, which I label 'communities' in this study. On average, each community has a population of 30,000 inhabitants. I include community characteristics of the 15 residential districts to accommodate the possibility that residential choice across districts is related to unobserved characteristics which are correlated with school preferences. These controls include average income, education, and the percentage of non-Western immigrants in the residential population. Preferably, I would include these characteristics at the lower level of school catchment, but this is not readily available.[9]

Estimates of the Immigrant Concentration in Assigned Schools on Opting Out Probabilities

To test the 'native flight' hypothesis, I use reduced-form equations to estimate the probability of opting out. The main objective of this study is to investigate the role played by the concentration of immigrants at school on opting out. However, this raises the question of whether it is ethnicity per se that is driving families away, since it is a well-established fact

that ethnicity is correlated with a number of other characteristics that may also factor into the decisions of families, most notably socio-economic background and the academic standards of the school. Therefore, I include two additional measures in the regressions: (i) a measure of the pupils' average socio-economic status and (ii) a measure of average achievement. Principal component analysis is used to create a continuous SES index (Filmer and Pritchett, 2001) using fathers' and mothers' level of education and income. The first principal component accounts for 50 per cent of the variance in the set of four variables and is used to derive weights for the SES index. The highest weights were given to mother's and father's level of education (0.55 and 0.53), while mother's and father's income were given slightly lower weights (0.46 and 0.44). For the second measure, the average marks in written Danish and maths tests from the national school leaving exams after the ninth year of education (15–16-year-olds) in the 4 years 2000–2003 (summer) are used. These are the years before our point of data (2003, autumn).[10]

I examine the relationship between the concentration of immigrants in schools and the likelihood of opting out using a linear probability model, where p_{ijk} is an indicator for whether student i in district k has opted out of his local school j. I model

$$p_{ijk} = \alpha\, SC_{jk} + \beta\, Q_{jk} + \delta\, D_k + \gamma\, X_{ijk} + \varepsilon_{ijk} \qquad (1)$$

where ε_{ijk} is normally distributed. SC_{jk} is the percentage of immigrants, the average SES-index and the average mark of school leaving exams in the local public school j, Q_{jk} are other characteristics of the local public school, D_k are community characteristics and X_{ijk} denotes child and family characteristics.

Based on the discussion above, we would expect the propensity of individuals to opt out of their local school to be positively related to the percentage of immigrants. Regressions are estimated separately for native and immigrant children to allow for differential effects in the decision-making process.[11] Parameter estimates for the samples of native Danes and immigrants are presented in Table 1 with standard errors below. The right-hand-side variables are set at three different levels of aggregation: the student, the school catchment area and the community. When working with clustered data, two different approaches are commonly used to address the special nature of the data and its implications for the correct calculation of standard errors for the estimates: either multilevel estimation methods or direct adjustment of standard errors, e.g. as suggested in Moulton (1990). In addition to producing correct standard errors, multilevel

Table 1 Estimating the relation between the immigrants concentration in the local public school and the probability to opt out

						Probit			
		I	II	III	IV	V	VI	VII	VIII
Danes									
Percentage of immigrants in local school	Coef.	0.0055*	0.0053*	0.007*	0.0069*	0.0059*	0.0063*		
	SE	0.0015	0.0015	0.0015	0.0014	0.0012	0.0007		
Average SES–index of parents	Coef.	0.1003	0.1216*	0.1115	0.0530	0.0001			
	SE	0.0607	0.0524	0.0653	0.0606	0.0524			
Average school exit exam grades	Coef.	−0.0884	−0.0464	−0.0516	−0.0407	−0.0204		−0.1797*	−0.1568*
	SE	0.0559	0.0614	0.0586	0.0551	0.0547		0.036	0.0148
School characteristics (F-stat. of joint sign)	F-stat.		45.24*	74.22*	85.65*	incl.	incl.	incl.	incl.
Community characteristics (F-stat. of joint sign)	F-stat.			5.79*	6.36*	incl.	incl.	incl.	incl.
Student and family characteristics (registers) (F-stat. of joint sign)	F-stat.				74.91*	incl.	incl.	incl.	incl.
No. of observations			25,820		25,820			25,820	
R^2 adj./Pseudo R^2 (for probit)		0.04	0.08	0.08	0.13	0.11	0.13	0.13	0.13
(Non-Western) Immigrants									
Percentage of immigrants in local school	Coef.	0.0032	0.004*	0.0007	0.0010	0.0012	−0.0005		
	SE	0.0021	0.0011	0.0011	0.0012	0.0013	0.0008		
Average SES–index of parents	Coef.	0.0879	0.1142*	0.0360	0.0451	0.0553			
	SE	0.1122	0.0463	0.0555	0.0582	0.0618			
Average school exit exam grades	Coef.	0.0306	0.0500	0.0491	0.0493	0.0508		0.0402	0.0489
	SE	0.0584	0.0520	0.0349	0.0371	0.0405		0.036	0.0310
School characteristics (F-stat. of joint significance)	F-stat.		30.16*	178.37*	96.98*	incl.	incl.	incl.	incl.
Community characteristics (F-stat. of joint significance)	F-stat.			44.86*	29.77*	incl.	incl.	incl.	incl.
Student and family characteristics (registers) (F-stat. of joint sign.)	F-stat.				591.41*	incl.	incl.	incl.	incl.
No. of observations						8,806		8,806	
R^2 adj./Pseudo R^2 (for probit)		<0.01	0.05	0.05	0.07	0.05	0.07	0.07	0.07

*$P<0.05$.

Note: The probit regression estimates marginal effects at the sample averages of the controls. Standard errors are adjusted for clustering at the school catchment level for Models I–II and at the community level for specifications III–IV. School, community and student and family characteristics include all variables in the respective categories in Table A1. Missing value indicators included in all regressions.

methods can be used to investigate a variety of other issues. However, for the present study, I only require the calculation of correct standard errors and I therefore opt for the direct correction of standard errors using the Moulton method. In models excluding community characteristics, the school catchment area is the unit with the highest level of aggregation, and standard errors are therefore adjusted for clustering at this level in these estimates. The main specification (model IV) includes community characteristics and, since this is a higher level of aggregation than the school catchment area, standard errors in this specification are adjusted for clustering at community level. To save space, I do not report results for the control variables here, but a full results table for the main specification (model IV) is shown in the appendix (Table A1).

Main Results

Results for the three key school variables in different model specifications are shown in Table 1. The point estimate on the variable of interest—the percentage of immigrants in the school—increases somewhat in the regressions for Danes (upper panel) as additional sets of controls are added (models I–IV), while R^2 increases from 0.04 in the simplest model to 0.13 in the full model. Thus, controls help to explain the decision to opt out, while not significantly altering the estimate. The point estimate of the SES-index is generally insignificant (except in model II) and the estimate of the average mark achieved in the school leaving exam is insignificant throughout. Since the estimates of the single sets of controls are jointly significant, I have chosen the full model (IV) as my preferred specification. The point estimate of the full model implies a nontrivial effect: the predicted increase in Danish opting out resulting from a 10 percentage point increase in the number of immigrants is 0.069. In these OLS subsample regressions, marginal effects are evaluated at the mean of the subsample, which are not the same in the Danish and immigrant subsamples. I therefore re-estimated model IV in a *probit* specification and calculated the marginal effects for the (pooled) sample average student. The results (Table 1, model V) are very similar.

Another source of concern could be that multi-collinearity between the three school composition variables (with correlation coefficients between 0.8 and 0.9) makes it impossible to distinguish which variable is the driving force behind the decision to opt out. Therefore, I also estimated the full model

including each of the three variables separately (models VI–VIII). As we would expect, when included separately, each variable is significant and with the expected sign (in the regressions for Danes). Yet, when all three variables are included jointly (model IV), the point estimates of the average SES-index and average marks are substantially reduced and insignificant, while the point estimate of the immigrant level coefficient is virtually unaffected. These results indicate that it is the number of immigrants which is the main driving force behind Danes' opting out of local schools.

In stark contrast to the results for Danes, the coefficient estimates for immigrant families for all three dimensions of school composition are generally much smaller and—except in model II—never differ significantly from zero at conventional levels. Thus, in the main specification (model IV) opting out by immigrant households is unresponsive to immigrant levels in schools.

Several preliminary conclusions emerge from these results. First, it is only Danes, but not immigrants, who seem to react to larger numbers of immigrant schoolchildren by opting out of their local school. Thus, since only Danes opt out, the pattern is consistent with the notion of 'native flight'—rather than 'universal flight' when schoolchildren of both Danish and immigrant backgrounds opt out of schools with large numbers of immigrant schoolchildren.

Sensitivity Analyses

In this section, I conduct a range of further sensitivity checks of the results. First, I examine whether the results hold across different subsamples. Secondly, I investigate whether the assumption is warranted that opting out is a linear function of immigrant concentration. Lastly, I analyse whether Danes flee from specific immigrant groups.

As laid out in the third section, according to the subjective predicted utility theory we would expect different groups to react with various degrees of strength to a rising immigrant percentage in schools (research questions 2 and 3). First, I examine whether the level of parental education interacts with the percentage of immigrants in the opting out regressions in order to find empirical evidence to support the hypothesis that better-educated parents are more responsive to variations in the number of immigrants in their local schools. Secondly, I run a regression on the immigrant sample, where the 'language spoken at home' variable is interacted with the

Table 2 Interactions of school composition with own parental education

Interaction with parental education		Danes	Immigrants
Percentage of immigrants in local school (cond. main effect)	Coef.	0.0043*	0.0004
	SE	0.0014	0.0013
- Interaction with: parents' max. education is upper sec. educ. (reference category: lower secondary education only)	Coef.	0.0032*	0.0003
	SE	0.0012	0.0007
- Interaction with: parents' max. education is tertiary educ. (reference category: lower secondary education only)	Coef.	0.0038*	0.0019*
	SE	0.0012	0.0006
Average SES-index of parents	Coef.	0.0723	0.0456
	SE	0.0620	0.0584
Average school exit exam grades	Coef.	−0.0429	0.0487
	SE	0.0552	0.038
No. of observations		25,820	8,806
R^2, adj.		0.14	0.07
Interaction with language at home			**Immigrants**
Percentage of immigrants in local school (cond. main effect)	Coef.		0.0051*
	SE		0.0018
- Interaction with: language spoken at home (reference category: mainly Danish spoken at home)	Coef.		−0.004*
	SE		0.0007
Average SES-index of parents	Coef.		0.0734
	SE		0.0619
Average school exit exam grades	Coef.		0.0381
	SE		0.0428
No. of observations			8,806
R^2, adj.			0.18

*$P < 0.05$.
Note: The conditional main effects for parental education (upper part of the table) and language spoken at home (lower parts), respectively, are included in the regressions. All controls and missing value indicators are included in all regressions (Model IV, Table 1).

number of immigrant children in the school to find out whether more language-proficient immigrant families are more responsive to larger numbers of immigrants at school. The results of these regressions are presented in Table 2.
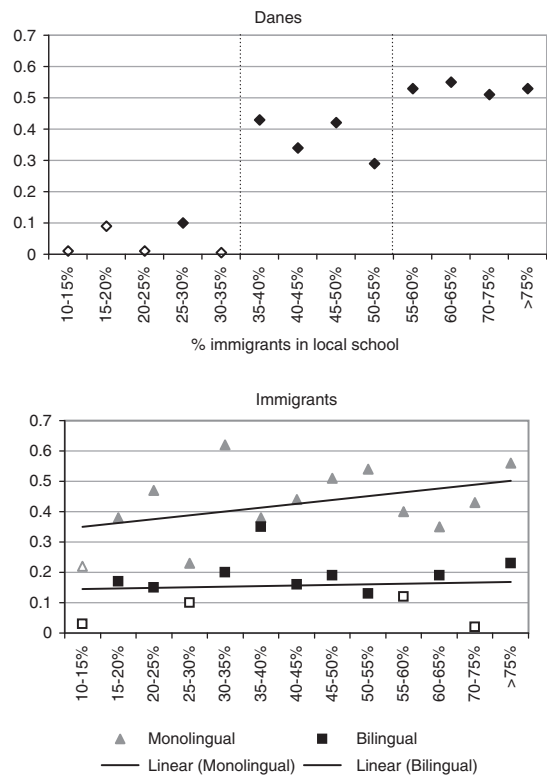
When a set of dummies indicating whether at least one parent has an upper secondary or tertiary education is interacted with the number of immigrants at the local school (with both parents having only lower secondary education as the reference category), the results suggest that, among Danish pupils, those with medium and well-educated parents respond more strongly to increases in the immigrant percentage in the local school than those with poorly educated parents (since the interaction effects are both significantly different from zero; Table 2, upper panel). For immigrants, only families with well-educated parents show a stronger response to rising immigrant

percentages when compared to those with poorly-educated parents (the reference category), while medium educated families do not. A test of the sum of the coefficients of the main effect (0.004) and the interaction effect for well-educated parents (0.019) shows that the effect of increasing immigrant percentages on opting out probabilities is weakly different from zero for well-educated immigrants (with a *p*-value of 0.09). Thus, Danes, no matter whether they come from poorly, medium or well-educated homes are responsive to the percentage of immigrants in their local school, but medium and well-educated families respond much more strongly than poorly educated families. Among immigrants, only the well-educated show evidence of similar behaviour, but the strength of their response and the statistical significance of the estimated coefficient is much weaker than that of Danes.

As explained in the third section, there were substantial differences in school choice patterns between immigrant groups delineated by whether they use Danish as their main family language or not. Therefore, it seems warranted to investigate whether opting out as a response to high immigrant levels varies as well. In the immigrant subsample, I interact the percentage of immigrants at the local school with a dummy for whether students speak Danish or another language at home. The results are shown in Table 2, lower panel. They indicate that opting out is significantly lower among bilingual immigrants than among their monolingual counterparts. The positive and significant estimate of the main effect implies that monolingual immigrants do opt out when immigrant percentages rise, while the fact that the sum of the main effect and the interaction effect (0.0051–0.0040) is not significantly different from zero implies that bilingual immigrants do not react to rising immigrant shares by opting out more. Yet, whether or not Danish is spoken in the home, is obviously also a choice variable of the individual family and is most certainly related to their degree of integration in the host society.

To sum up, for Danes of any educational family background, opting out is a response to the number of immigrants at the local school, but better educated families are more likely to opt out. For immigrants, it is the language dimension which divides them into two groups in their opting out behaviour: those who speak Danish at home tend to opt out from schools with many immigrant pupils, while children who speak another language than Danish at home are not responsive to the composition of the school. To conclude, the subsample analysis reveals that not only does opting out increase ethnic segregation, but also increases segregation between students with well and poorly educated parents (mostly in the case of Danes) and between more and less language-proficient immigrants.

In the following, I investigate question 4, i.e. is there a threshold above which students start to opt out as a response to increasing immigrant shares? To shed light on this, instead of entering the immigrant percentage as a continuous variable as in the previous section, I create a set of indicator variables (0–10 per cent, 10–15 per cent, 15–20 per cent, ..., >75 per cent) with '0–10 per cent' immigrants being the reference category. Figure 1 illustrates the coefficient estimates of the set of indicators from separate estimations for Danes and immigrants (see also Table A2). The pattern

Note: 0-10% immigrants is the reference category.

Figure 1 Nonlinear regression results: immigrant share at the local school included as a set of indicator-variables

for Danes in the upper panel of Figure 1 suggests that there are three distinct zones: up to an immigrant percentage of around 35, there is generally no significant difference in opting out compared to the reference group of schools with no or only very few immigrants (0–10 per cent). For immigrant concentrations above 35 per cent, opting out is far more likely and significantly different from the reference group. Yet, while at a higher level than before, opting out does not seem to increase over the 35–55 per cent range. Thereafter, opting out stabilizes at even higher levels. The size of the effect is substantial: for immigrant levels between 35–55 per cent, the probability of opting out increases by 0.30–0.45 compared to the reference category; and for even higher levels, the increase is between 0.50 and 0.55. These results show that Danes respond to higher immigrant levels in schools when more than one out of three pupils in the school are immigrants.

Figure 1, lower panel, and Table A2, show results for mono- and bilingual immigrants, estimated in the pooled sample of immigrants with interactions between the language at home indicator and the set of indicators for the percentage of immigrants in the school population. The estimates for monolingual immigrants are significant for immigrant concentrations above 15 per cent, but are somewhat volatile. Yet, a linear fitted curve through the indicator estimates suggests that the overall tendency to opt out increases for higher immigrant levels, unlike the general tendency for bilingual immigrants, which does not show an increased propensity to opt out in response to increasing immigrant levels. However, the strength and pattern of opting out by monolingual immigrants is difficult to interpret in more detail due to the volatility of the estimates.

Until now, we have considered immigrants in the local school as a homogenous group. In this section, I try to shed light on whether Danes differentiate between different types of immigrants, when they make their school choice (research question 5). Therefore, I have split immigrants into different groups delineated by parental income, immigrant generation, language spoken at home and region of origin. First, Fairlie and Resch (2002) find evidence of 'white flight' from poor, but not from non-poor, minority children. This finding suggests that white families react differently to economically disadvantaged and non-disadvantaged minorities. To examine whether 'native flight' in this study is from all immigrants or only from immigrant groups from low income homes, I estimate models specifying the percentage of immigrants from low-income homes (below the median for immigrants) and high-income homes (above median). Another consideration is the language factor, which is peculiar to the immigrant dimension. For US data, Betts and Fairlie (2003) find that natives respond mainly to immigrants who speak a language other than English at home. If the 'flight from immigrants' interpretation of my results is correct, then Danish parents should be more likely to opt out if immigrants in the local school are less acculturated into Danish society. Even though there are very few monolingual immigrant pupils from non-Western countries in public schools, since most of them attend private schools,[12] I divide the immigrants into mono- and bilingual groups and include these two measures in the regressions instead of the overall immigrant share. A third possibility is that Danes respond to the level of integration into Danish society in general. To check this, I split the immigrant share in the school into first and second generation immigrants. A final line of investigation is inspired by the theory of ethnocentrism. Ethnocentrism is the tendency to look at the world primarily from the perspective of one's own culture. Ethnocentrism often entails the belief that one's own race or ethnic group is the most important and/or that some or all aspects of its culture are superior to those of other groups. Within this ideology, individuals will judge other groups in relation to their own particular ethnic group or culture, especially with regard to language, behaviour, customs, and religion. According to this theory, we would expect Danes to react more strongly to concentrations of schoolchildren from ethnic groups whose cultural background is very distant from Danish culture. To investigate this hypothesis, I have computed school concentration variables for the four largest regions of origin: Non-Western Europe (including Turkey and ex-Yugoslavia), Africa, the Middle East (e.g. Lebanon, Iraq, and Iran) and South Asia (including Pakistan). The remaining non-Western countries are grouped in a residual group. I would have liked to include Western countries as the region of origin that is culturally closest to Denmark, but the sample is too small (less than 300 observations in total in Copenhagen public schools).

When the above-mentioned variables are included in four separate regressions in place of the total immigrant share, the differences in the estimates between the first three pairs (by income, language and generation) are not significant at conventional levels according to the F-test for the equality of coefficients (Table 3). This means that I cannot show that Danes do differentiate between these immigrant characteristics when opting out. When I introduce the variables assessing immigrants by region of origin, I find that Danes mainly react to Africans. The point estimate is large and is the only significant estimate. Thus, I conclude that Danes seem to react differently to immigrants from different regions of origin.

Do 'Schools of Choice' have Lower Immigrant Concentrations than the Assigned School?

In this article, I hypothesize that the percentage of immigrants is related to opting out. Whether this relationship is purely statistical or can be given a causal interpretation is disputable, since I have no exogenous variation to identify causal effects. Therefore, in this section, I seek to provide some suggestive evidence. A necessary (but not sufficient) pre-requisite for the

Table 3 Estimation results by different types of immigrants

		By income		By language		By generation		By region of origin				
		Low	High	Bilingual	Monolingual	1st gen	2nd gen	Non-W. Europe	Africa	Middle East	South Asia	Other
Percentage of immigrants in local school	Coef.	0.0026	0.0111*	0.0074*	0.0202*	0.0095	0.0062*	0.0054	0.0213*	−0.0001	−0.0033	0.0045
	SE	0.0034	0.0030	0.0014	0.0083	0.0045	0.0018	0.0029	0.0037	0.0025	0.0033	0.0040
Average SES-index of parents	Coef.	0.0727		0.07		0.0487				0.0076		
	SE	0.0646		0.059		0.0598				0.0482		
Average school exit exam grades	Coef.	−0.0771		−0.0463		−0.0442				−0.0514		
	SE	0.0499		0.0541		0.0543				0.0400		
No. of observations		25,820		25,820		25,820				25,820		
R^2 adj.		0.135		0.135		0.135				0.137		
F-test of equality of coefficients		Accepted ($P=0.16$)		Accepted ($P=0.13$)		Accepted ($P=0.55$)				Rejected ($P=0.001$)[a]		

* $P<0.05$.

[a]Equality of all coefficients except Africa accepted.

Note: Average SES-index of parents, average school exit exam grades and all school, community and student and family characteristics included.

All controls and missing value indicators are included in all regressions (Model IV, Table 1).

existence of a causal effect of immigrant concentration on native flight is that those groups for whom I found significant opting out (i.e. Danes and monolingual immigrants) actually choose schools with lower immigrant concentrations.

When calculating the average difference of the immigrant percentage in the local school and the school of choice for those who have opted out,[13] I find that Danes choose schools with substantially fewer immigrant peers than the local school: they reduce the immigrant concentration by 50 per cent on average from 29 per cent to 15 per cent by opting out of their assigned school. For immigrants, there seem to be two strategies of school choice: (i) choosing an alternative public or a Danish private school with fewer immigrants, or (ii) opting for an immigrant private school, which by definition has almost only immigrant pupils.[14] Clearly, those who choose immigrant private schools cannot be said to flee their local school due to the number of immigrant concentration *per se*. An auxiliary regression for monolingual pupils with a three-choice outcome variable (local school, other public/Danish private, immigrant private) suggests that more immigrants at the local school increases the probability of opting out to both alternative school types alike. Thus, I conclude that there is no evidence that immigrant parents in general flee schools with high concentrations of immigrants, but that they flee *public* schools with large immigrant concentrations. Apparently, not all immigrants shy away from being educated along with other immigrants. These results provide suggestive evidence that the link between opting out and the number of immigrants in local schools may be causal for Danes, but not necessarily for monolingual immigrants.

Conclusions

Using the full sample of students living in the municipality of Copenhagen in 2003, I investigated whether native and immigrant children who opted out of their local public schools did so in response to the school's population of immigrant pupils. The results show that, while Danes are more likely to opt out when the percentage of immigrant pupils increases, immigrants themselves are divided into two groups. Those who speak Danish at home show similar opting out behaviour to Danes; while other immigrants, who are the large majority, do not seem to respond to high numbers of immigrants in the local school. Estimates from the regressions imply that the tipping point, i.e.

where natives start opting out in response to rising immigrant shares, is around 35 per cent. Opting out increases by 0.30–0.45 for immigrant shares between 35 per cent and 55 per cent, and increases further for even higher shares. Ideally, I would like to identify the causal effect of the percentage of ethnic minority pupils on the school choices of households. Yet, unobserved preferences and characteristics make it difficult to identify causal effects in my cross-section data. I attempt to reduce this sort of bias by including a large set of controls at the individual, family, school and neighbourhood level.

A comparison of the immigrant population of the assigned school and the school of choice for opters out shows that, while Danes choose schools with fewer immigrants, immigrants themselves seem to have two strategies. One group opts for alternative public or Danish private schools with fewer immigrants, while another group opts for immigrant-run private schools, which are almost 100 per cent immigrant. How can we explain that immigrants opt out of local public schools in favour of schools with even higher immigrant percentages? A comparison of the average grades attained in the school leaving exam for the local public school and the school of choice for those who opted out reveals that schools of choice have higher academic performance no matter whether the school of choice is another public school, a Danish private school, or an immigrant private school. Thus, while the 'gain' in academic performance may be larger when choosing another public or Danish private school for some immigrants,[15] immigrant private schools may still be preferred to their local public school due to their better academic performance, if immigrants are precluded from choosing other public or Danish private schools.

A limitation on the interpretation of the results from this study is the fact that the school attendance patterns observed do not necessarily reflect immigrant parents' preferences, but are also a result of (informal) restrictions on school choice. In the year of data (2003), over-subscribed schools were free to choose among the applications from out of district pupils. While restrictions on enrolment do not only apply to immigrants, a report commissioned by the school authorities of Copenhagen (Megafon, 2005) suggests that, while many immigrant parents are eager to send their children to out of district schools with lower immigrant concentrations, they have been turned away at higher rates than Danes. To decrease segregation in schools, the Copenhagen school authorities initiated an integration programme in 2005, allocating slots in designated low-concentration schools for

immigrants living in school catchment areas with many immigrants. While it is questionable whether the programme is extensive enough to substantially reduce segregation, it is a step in the right direction.

Notes

1. Non-Western countries are defined as countries outside Western Europe, North America, Australia, New Zealand, and Japan.
2. Throughout this article, I use the term private schools meaning 'government-dependent private schools'. They are private in the sense that they are run, quite autonomously, by a board of parents. The public influence is mainly limited to financial support.
3. In this article, I use the terms local or state (public) school and assigned school interchangeably.
4. Nevertheless, the decision to stay on is also an implicit opting out decision, but probably mainly for reasons that are unrelated to the peer composition of the school.
5. Strictly speaking, the voucher is not given to individual families. Rather, it is a direct subsidy to the school. Though the physical mechanism of payment is different, the two policies are similar in directly linking the school budget to enrolment.
6. The term 'Copenhagen City' in this article includes the area of the Municipality of Copenhagen. All students living in Copenhagen are included in the sample, no matter whether they attend school in Copenhagen or in another municipality. Yet, students living in another municipality and attending a Copenhagen school are not included in the dataset.
7. This is discussed at length in the working paper version of this article (Rangvid, 2007c).
8. Third, fourth, etc. generation immigrants are in accordance with the practices of Statistics Denmark coded as Danes.
9. I could compute school catchment level characteristics from my student level dataset instead, but this would not include the entire population living in the catchment areas, but only families with school-age children.
10. Information on exam results is not available prior to 2000.

11. I repeated the analysis of the main model (IV) for the entire sample with an interaction term for immigrant status. The results were very similar.
12. Only 20 per cent of immigrant students speak Danish at home and of these, 77 per cent attend private schools (half of them Muslim private schools).
13. Results available from the author on request.
14. Since there are virtually no Danes enrolled in immigrant private schools, there is no basis for making the distinction between different opting out choices for Danes.
15. In my data, the gain when choosing an alternative state school or Danish private school as opposed to an immigrant private school is larger for monolingual immigrants only. For bilingual immigrants this pattern is reversed.

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Appendix

Table A1 Full results for main Model IV (Table 1) and descriptive statistics

Variable	Danes						Non-Western immigrants					
	Coef.[a]	SE	Mean	SD	Min	Max	Coef.[a]	SE	Mean	SD	Min	Max
Opting out (dependent variable)	–	–	0.534	0.499	0	1	–	–	0.467	0.499	0	1
Local public school characteristics												
Immigrant students (%)	0.0069*	0.001	25.398	20.873	3.400	80.634	0.001	0.001	48.451	23.448	3.400	80.634
Average SES-index of parents	0.053	0.061	−0.077	0.596	−1.183	1.230	0.045	0.058	−0.619	0.49	−1.183	1.23
Average grades in school leaving exam	−0.041	0.055	7.694	0.490	6.4	8.5	0.049	0.037	7.259	0.533	6.4	8.5
Student and family characteristics (registers)												
Grade level	0.0308*	0.004	4.201	2.883	0	9	0.0158*	0.003	3.994	2.805	0	9
Number of brothers and sisters	−0.0189*	0.006	0.943	0.763	0	6	0.002	0.006	1.872	1.295	0	10
Student is female	0.007	0.014	0.503	0.500	0	1	−0.005	0.015	0.491	0.500	0	1
Student lives with both natural parents	−0.008	0.011	0.598	0.490	0	1	0.006	0.025	0.707	0.455	0	1
Mother: years of education	0.0062*	0.002	12.513	2.834	7	20	0.017	0.002	10.705	2.171	7	20
Father: years of education	0.004	0.003	12.293	3.016	7	20	0.008	0.004	11.103	2.483	7	20
Father: income	0.0002*	<0.0001	301	223	0	7,552	0.000	0.000	145	105	0	1,195
Mother: income	0.000	<0.0001	228	117	0	3,420	0.000	0.000	123	68	0	751
Father: employee	Reference						Reference					
Father: self-employed	0.1192*	0.019	0.092	0.289	0	1	0.066	0.030	0.160	0.366	0	1
Father: unemployed	0.1434*	0.044	0.032	0.177	0	1	0.009	0.032	0.071	0.257	0	1
Father: enrolled in formal education	0.045	0.031	0.009	0.095	0	1	0.050	0.060	0.012	0.109	0	1
Father: receives permanent social transfer payments	0.004	0.015	0.020	0.140	0	1	0.001	0.020	0.078	0.267	0	1
Father: not active in labour market	0.030	0.018	0.066	0.248	0	1	0.0458*	0.018	0.299	0.458	0	1
Mother: employee	Reference						Reference					
Mother: self-employed	0.0982*	0.033	0.038	0.191	0	1	0.047	0.052	0.032	0.175	0	1
Mother: unemployed	0.016	0.022	0.029	0.169	0	1	−0.017	0.045	0.047	0.211	0	1
Mother: enrolled in formal education	0.0783*	0.034	0.042	0.201	0	1	0.049	0.059	0.019	0.135	0	1
Mother: receives permanent social transfer payments	0.018	0.033	0.012	0.109	0	1	−0.015	0.056	0.012	0.107	0	1
Mother: not active in labour market	0.0535*	0.027	0.101	0.301	0	1	−0.019	0.033	0.619	0.486	0	1
Community characteristics												
Average income	0.003*	0.001	314.093	33.988	238	388	0.000	0.001	293.232	28.291	238	388
Percentage of residents with max. lower secondary education	Reference		29.943	5.898	19.1	39.7	Reference		32.505	4.422	19.1	39.7
Percentage of residents with upper secondary education	0.034	0.030	17.220	3.689	11.2	23.2	0.041	0.023	17.561	3.879	11.2	23.2

Percentage of residents with vocational education	0.009	0.012	25.032	5.001	17	29.6	0.005	0.010	24.831	4.672	17	29.6
Percentage of residents with short tertiary education	0.067	0.067	4.175	0.511	3.5	5.3	−0.166*	0.031	3.924	0.354	3.5	5.3
Percentage of residents with medium tertiary education	−0.013	0.012	11.300	2.262	7	14.4	0.017	0.009	10.514	2.172	7	14.4
Percentage of residents with bachelor-level tertiary education	−0.024	0.096	3.174	1.332	1.2	5.3	−0.092	0.080	3.167	1.337	1.2	5.3
Percentage of residents with long tertiary education	0.000	0.011	9.166	3.936	3.6	17.1	0.027	0.014	7.489	2.534	3.6	17.1
Percentage of immigrants from non-Western countries	0.012	0.007	12.357	5.389	3.7	24.5	0.008	0.004	16.160	4.589	3.7	24.5
School controls (for local public school; available only for PISA schools)												
Teacher–student ratio	0.105	0.821	0.077	0.017	0.012	0.129	−1.232	1.019	0.087	0.022	0.012	0.129
School enrolment (100 students)	−0.013	0.014	5.400	1.494	2.170	8.090	−0.0448*	0.009	4.941	1.504	2.170	8.090
In your school, how much is the learning of 15-year-old students hindered by… (1–4; not at all–a lot)												
Physical infrastructure												
Poor condition of buildings?	0.035	0.027	2.342	0.860	1	4	−0.032	0.015	2.170	0.913	1	4
Poor heating, cooling/lighting?	−0.006	0.034	1.970	0.853	1	4	0.032	0.016	1.938	0.835	1	4
Lack of educational space?	−0.005	0.016	2.376	1.048	1	4	0.034	0.016	2.019	0.970	1	4
Educational resources												
Lack of instructional material?	−0.016	0.020	2.410	0.995	1	4	−0.0629*	0.017	2.306	1.025	1	4
Not enough computers for instruction?	−0.003	0.020	2.434	0.949	1	4	−0.013	0.010	2.198	1.007	1	4
Lack of instructional material in the library?	−0.023	0.020	2.147	0.822	1	4	0.026	0.016	2.096	0.984	1	4
Lack of multi-media resources for instruction?	0.000	0.017	2.098	0.893	1	4	0.007	0.017	2.020	0.912	1	4
Inadequate science laboratory equipment?	−0.006	0.011	2.194	1.029	1	4	−0.003	0.011	2.329	1.050	1	4
Inadequate facilities for the fine arts?	0.012	0.011	2.420	0.939	1	4	0.023	0.018	2.314	0.952	1	4
How often do you have access to a computer at your school? (1–5; almost every day–never)												
PC access at school	−0.033*	0.016	2.143	0.929	1	5	0.05*	0.016	2.257	0.851	1	5
Teacher education												
Full-time Danish teachers with a major in Danish (%)	−0.012	0.016	0.802	0.183	0.372	1.000	−0.010	0.067	0.806	0.196	0.372	1.000
Full-time math teachers with a major in math (%)	−0.058	0.060	0.665	0.248	0.030	1.000	−0.061	0.055	0.622	0.250	0.030	1.000
Full-time science teachers with a major in science (%)	0.180	0.100	0.898	0.182	0.333	1.000	0.126	0.107	0.870	0.210	0.333	1.000
No. of observations			25,820						8,806			

*P<0.05.

[a]Full estimation results for model IV, Table 1.

Table A2 Non-linear regressions results

		Danes		Immigrants (non-Western)			
				Monolingual		Bilingual	
		Coef.	SE	Coef.	SE	Coef.[a]	F-stat.[b]
Percentage of immigrants in local school (%)	0–10	Reference		Reference			
	10–15	0.014	0.051	0.218	0.114	0.026	0.14
	15–20	0.087	0.087	0.384	0.059	0.173*	12.38
	20–25	0.008	0.058	0.471*	0.077	0.149*	16.21
	25–30	0.099*	0.034	0.229*	0.091	0.098	2.22
	30–35	0.005	0.075	0.622*	0.1	0.201*	22.89
	35–40	0.425*	0.053	0.384*	0.111	0.358*	40.16
	40–45	0.337*	0.072	0.438*	0.114	0.154*	6.95
	45–50	0.420*	0.071	0.508*	0.089	0.192*	8.14
	50–55	0.286*	0.053	0.538*	0.081	0.133*	5.79
	55–60	0.535*	0.087	0.397*	0.104	0.118	2.14
	60–65	0.548*	0.082	0.349	0.204	0.185*	5.41
	65–70[c]	–	–	–	–	–	–
	70–75	0.515*	0.057	0.430*	0.122	0.015	0.02
	>75	0.534*	0.056	0.563*	0.089	0.232*	12.38
Average SES-index of parents		0.110	0.048	0.071 (0.057)			
Average school exit exam grades		−0.027	0.031	−0.004 (0.037)			
No. of observations		25,820		8,806			
R^2 adj.		0.141		0.191			

Note: All controls and missing value indicators are included in all regressions (Model IV, Table 1).
[a]*Sum of estimates of main effect and interaction.*
[b]*F-statistic of test of significance of the sum of the estimates of the main effect and the interaction [F(1,13)].*
[c]*No schools in this range.*
**P < 0.05.*