



ELSEVIER

Journal of Public Economics 87 (2003) 987–1012

JOURNAL OF
PUBLIC
ECONOMICS

www.elsevier.com/locate/econbase

Does immigration induce ‘native flight’ from public schools into private schools?

Julian R. Betts^{a,b,*}, Robert W. Fairlie^{c,d}

^aDepartment of Economics, University of California–San Diego, La Jolla, CA 92093-0508, USA

^bPublic Policy Institute of California, San Francisco, CA, USA

^cDepartment of Economics, University of California, Santa Cruz, CA 95064, USA

^dJoint Center for Poverty Research, Northwestern University and University of Chicago, Chicago, IL, USA

Received 13 August 2000; received in revised form 10 July 2001; accepted 18 July 2001

Abstract

The paper tests whether native-born American families respond to inflows of immigrants by sending their children to private school. The analysis uses 1980 and 1990 Census data from 132 metropolitan areas. For primary school students, no significant relation between immigration and private school enrolment is found. For secondary schools, a significant link emerges. For every four immigrants who arrive in public high schools, it is estimated that one native student switches to a private school. White students account for most of this flight. Natives appear to respond mainly to immigrant children who speak a language other than English at home.

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Keywords: Immigrants; Private schools; Public schools; ‘Native flight’

1. Introduction

In the past three decades, the United States has experienced a fundamental shift in immigration policy, with a rise in the number of new immigrants, and major changes in their countries of origin. These immigrants, primarily from Asian and Latin American countries, have had a profound impact on the ethnic, racial and immigrant composition of public schools in many major US cities. For example, Census microdata indicate that native-born, non-Hispanic whites represented

*Corresponding author. Tel.: +1-858-534-3369; fax: +1-858-534-7040.

E-mail address: jbetts@ucsd.edu (J.R. Betts).

slightly fewer than 50% of all public school students in the Los Angeles metropolitan area in 1980. By 1990, this share dropped to 34%. The decline in Los Angeles and other major metropolitan areas was mainly due to the large inflows of immigrant schoolchildren over the decade, but part of the decline may have also been due to an increase in the rate at which native white schoolchildren attended private schools. In particular, immigration may have induced ‘native flight’, especially among white natives, from public schools into private schools, thus further altering the ethnic, racial and immigrant composition of public schools.

Several recent studies examine whether the choice between private and public school is influenced by the racial composition of the local population (see, for example, Conlon and Kimenyi, 1991; Fairlie and Resch, 2001; Figlio and Stone, 1997; Lankford and Wyckoff, 1997). These studies generally find evidence of ‘white flight’ from public schools into private schools when the public schools have large concentrations of blacks or minorities. The authors of these studies speculate that ‘white flight’ is due to a distaste of white families for their children being in the same schools as blacks or minorities, and due to families using the racial composition of the school as a signal of academic quality in response to a lack of other measures of quality.¹ Another factor may be the concerns of white families about the peer group effects of less advantaged minority students. Surprisingly, none of the studies in this literature examine the related hypothesis of ‘native flight’ from immigrant schoolchildren, even though it may be driven by many of the same factors and possibly some additional ones.

The additional factors that may cause ‘native flight’ are related to the effects that immigrant schoolchildren have on school resources and teaching methods. An influx of children with limited English proficiency to a school can strain the school’s finances, due to the need to hire bilingual teachers and to devote additional resources to children who are not yet ready to learn in English.² This

¹See for instance Conlon and Kimenyi (1991, p. 16), who find evidence that white families are more likely to send their children to private schools if they live in a county with a relatively high proportion of poor blacks. They conclude that the list of possible explanations ‘... include (1) irrational prejudice, (2) characteristics of poor black children which white parents fear or dislike, and (3) poor management of schools with poor black students, either because of the attitudes of administrators, or greater political passivity of low-income parents. This list, of course, is not exhaustive’.

²Federal legislation reflects the notion that immigrant schoolchildren place burdens on schools’ resources. The Emergency Immigrant Education Act of 1984 provides supplemental funding to affected school districts. However, the funding disbursed under the law is modest. In the 1989–1990 school year, average spending was only \$62 per eligible immigrant student (General Accounting Office, 1991). Federal funding for bilingual education is also limited. In 1990–1991 spending under Title VII funding for bilingual education amounted to \$158.5 million, or about \$70 per Limited English Proficiency student in the country. In addition, federal funding failed to keep pace with the influx of immigrant schoolchildren during the 1980s. Even though the number of LEP students rose by 51.8% between 1985 and 1990, between 1980 and 1990 total Title VII spending on bilingual education fell by 47.8% after accounting for inflation. Most of this 47.8% drop (42.0%) occurred between 1980 and 1985. (Authors’ calculations based on Tables 3.2 and 3.3 of Fix and Zimmerman (1993, pp. 22–23).) Congressional testimony by Morra (1994) confirms that funding from the Federal government has not adequately accounted for increases in the numbers of immigrant schoolchildren.

resource diversion may occur through the allocation of teachers to special classes for students with Limited English Proficiency (LEP). Alternatively, if immigrant children are ‘mainstreamed’ with native children, teachers may decide to spend additional time helping LEP students at the expense of other students in the classroom.³ Thirdly, the presence of LEP students in public schools may lead to wholesale changes in teaching methods used for all students.⁴

The findings from a few recent studies that examine the impact of immigration on the educational outcomes of native-born Americans provide evidence that is consistent with these concerns. Betts (1998) and Hoxby (1998) find evidence that immigrants significantly reduce high school completion rates and university attendance of American native minorities, respectively. Betts and Lofstrom (2000) use Census data from 1970, 1980 and 1990 to model the years of education obtained, and find supporting evidence that increases in immigrant share in a state are related to decreases in years of schooling for natives, but especially minority natives, in that state. These studies hypothesize that the presence of large numbers of students with Limited English Proficiency (LEP) in local schools and colleges may shift resources away from natives, thus reducing their probability of attending and completing school or college.

Why should we be concerned about whether native-born or white native-born schoolchildren are increasingly opting to attend private instead of public schools in response to immigration? There are several reasons. Firstly, suppose that it is primarily students with high levels of parental resources, both educational and financial, who switch to private schools. Such flight could hurt students remaining in public schools because their peer group is changed. (See Summers and Wolfe (1977) and Henderson et al. (1978) for two well-known studies which document the existence of peer-group effects.) Secondly, changes in the ethnic, racial and immigrant composition of public schools could affect voter support for public schools. Education and to a lesser extent income are key predictors of who votes.⁵ If parents with relatively high socioeconomic status decide to enrol their children in private schools as a result of immigration, voter support for public schools may erode. In this way, immigration may lead to a reduction in the financial resources

³It is certainly the case that in some school districts immigration has led to substantially more heterogeneous classes, possibly making these classes more difficult to teach. Fix and Zimmerman (1993, p. 19) report that in the Washington, DC public school system 127 different languages are spoken.

⁴For instance, Anderson and Pyle (1998) report: ‘Consider how would-be teachers were being trained recently in a ‘methods’ class at Cal State Long Beach. The exercise explored how students might create ‘me’ books, mini-autobiographies. Many of the teachers-in-training came up with elaborate posters, some with no words at all. They were praised for seeking such a ‘total physical response’, meaning that students would mostly cut, color and paste. Why? Because the teachers-to-be will probably wind up in classrooms with a large number of students not fluent in English. So they were encouraged to find ways to avoid writing, instead of emphasizing it’.

⁵See Wolfinger and Rosenstone (1980) for detailed evidence, and Squire et al. (1995) for an update.

available to public schools.⁶ Thirdly, past research indicates that attending Catholic secondary school results in a substantial increase in both the probability of finishing high school and the probability of attending a 4-year college relative to students who attend public school, at least for minorities.⁷ These findings suggest that private/public school choices are likely to have a large impact on future labor market outcomes. Fourthly, the combination of these three reasons suggests that variations across groups in private/public school choices may provide a mechanism through which income inequalities across racial/immigrant groups are passed to the next generation. Finally, the decision by native parents to send their children to private school can be a costly one. There are two such costs: the tuition fees charged by private schools and the transportation costs.

In this paper, we use 1980 and 1990 Census microdata to investigate the impact of immigration on the private/public school choices of native children (US Bureau of the Census, 1983; US Bureau of the Census, 1994). This study is the first to address the question of whether native children are fleeing public schools in response to inflows of immigrant children. We examine the relationship between changes in immigration and changes in native private school attendance rates across 132 metropolitan areas in the United States.^{8,9}

2. Data

The data used in this study are from the Public Use Microdata 5-Percent Samples of the 1980 and 1990 Censuses of Population. These datasets are the only sources of national microdata that are large enough to allow comparisons of native private school rates across a large number of metropolitan areas. In addition, they are preferable to published aggregate data because they provide more flexibility in creating sample restrictions and definitions of key variables, and because in our

⁶There is considerable disagreement in the literature regarding the strength of the relationship between school resources and student performance. See Betts (1996), Hanushek (1996) and Card and Krueger (1996) for recent discussions of the evidence on both sides.

⁷See Evans and Schwab (1995), Neal (1997), and Sander and Krautmann (1995). It is unclear as to whether nonreligious private schools are as effective as Catholic schools. However, Catholic schools represent a large share of all private schools. For instance, in 1987, Catholic schools accounted for 53% of all private school enrolment in the country, with non-sectarian schools accounting for only 16% (National Center for Education Statistics, 1991, p. 66).

⁸Previous studies of 'white flight' from black schoolchildren essentially use the cross-sectional correlation between the racial composition and the percent of all students who are in private schools across geographical areas to identify the effect. Our method improves on this approach because it controls for unobserved fixed traits of each area that might confound the relationship between immigration and school choice.

⁹As is traditional in the school-choice literature, we implicitly assume that the supply of private schooling is highly price-elastic, so that demand shocks lead to changes in private school enrolment rather than changes in private school fees. Downes and Greenstein (1996) provide evidence that private schools locate themselves in a manner that is highly responsive to the demographic traits of the area, implying a high elasticity of supply. We thank Rob Porter for providing this insight.

regressions they allow us to control directly for individual-level characteristics, such as parental education and household income. Finally, the geographical information in the Census makes it possible to create consistent metropolitan area definitions across the decade.

Our sample of native children includes only children ages 7 to 16 who are currently enrolled in primary or secondary school and who do not live in group quarters. We do not distinguish between religious and non-religious private schools because these categories were collapsed into one category in the question on school enrolment on the 1990 Census.¹⁰

Our analysis focuses on Consolidated Metropolitan Statistical Areas. The metropolitan area (MA) definitions we use follow Jaeger (1996) and Bound and Holzer (1996).¹¹ These definitions combine detailed geographical areas identified in the Censuses to provide consistent or nearly consistent definitions of 132 metropolitan areas in 1980 and 1990. These metropolitan areas represent 66.3 and 71.0% of all native children (ages 7–16) in the United States and 87.9 and 93.6% of all immigrant children (ages 7–16) in 1980 and 1990, respectively.

3. Results

3.1. *Private school rates among natives and immigrants*

It is useful to examine first the propensity for native and immigrant children to attend private school. In Table 1, we report the number of private school students and the private school rate by school level and immigrant status using data from our sample of 132 metropolitan areas.¹² We define the private school rate as the fraction of all schoolchildren enrolled in private school. We report private school rates separately by primary and secondary school because it is likely that the measured relationship between immigration and native private school rates differs by school level. We exclude students over 16 years of age so that differential

¹⁰In the 1980 Census, 85.1% of children enrolled in private schools are enrolled in religious schools.

¹¹See Loeb et al. (1996) for a description of the geographic matching process. We thank these authors for providing their geographic codes.

¹²For convenience, below we will refer to students aged 7–13 as ‘primary school’ students, and students aged 15–16 as ‘high school’ or ‘secondary school’ students. We found that in 1980 almost identical proportions of students aged 14 were enrolled in Grade 8 or below on the one hand or Grade 9 or above on the other. In 1990 it is not possible to divide students into these two grades. Because only about half of students aged 14 are enrolled in high school we do not include them in our primary or secondary enrolment groups. Similarly, we do not include students aged 6 because in 1980 40.4% of these students were in kindergarten or nursery school rather than grade school. An alternative procedure for grouping students into secondary and primary school would be to take a wider age group, 5–20, and to use grade enrolled and grade completed in 1980 and 1990, respectively, to allocate students into primary and secondary schools. None of the results in this paper are sensitive to changing to this alternative categorization. Using age is the only entirely consistent way of defining primary and secondary school students across the two Census years because of changes in the education question between 1980 and 1990.

Table 1
Private school rates by immigrant status; 1980 and 1990 Census

	1980	1990	Change
Primary school (ages 7–13)			
Natives			
Private school rate	13.21%	12.19%	–1.02%
Private school students	109,915	95,640	–14,275
Immigrants			
Private school rate	11.39%	7.78%	–3.61%
Private school students	3726	2970	–756
Secondary school (ages 15–16)			
Natives			
Private school rate	10.29%	10.17%	–0.12%
Private school students	26,613	20,294	–6319
Immigrants			
Private school rate	10.42%	6.23%	–4.19%
Private school students	1264	969	–295

The sample consists of children who are currently enrolled in school, do not live in group quarters, and live in one of the 132 MAs.

The private school rate is the fraction of children enrolled in school that is enrolled in private school.

dropout (or early graduation) rates among demographic groups do not contaminate the results.

It is crucial to analyze the impact of immigrants on natives' school choice separately for elementary and secondary schools. The most important reason is that native students' level of contact with immigrant students will rise in high school, for reasons to be discussed below. Another reason for separate analyses by school level is that a larger fraction of schoolchildren are enrolled in private primary schools than in private high schools. Table 1 shows that private primary school rates are notably higher than private secondary school rates among both natives and immigrants.

Native students are likely to have greater contact with immigrants in secondary than in primary schools for three reasons. Firstly, in most school districts in the United States, several elementary and middle schools serve as 'feeders' into one much larger high school. Consequently, the extent of mixing of students from different neighborhoods within high schools is likely to be much larger than in smaller neighborhood elementary and middle schools. For many native students, particularly more affluent ones, the transition to high school from the lower grades may lead to substantially increased interaction with immigrant students. Secondly, the extent to which Limited English Proficient (LEP) students are channeled into separate bilingual classrooms drops in the higher grade levels. Rossell and Baker (1996) report that because 'teachers have to be certified in both a subject matter and in a foreign language to teach in a bilingual program in junior high or high school, few school districts are able to staff bilingual programs at these grade levels. Thus, the typical LEP child enters a regular English program at junior high

school'.¹³ Further, as immigrant students proceed through school, each grade makes it more likely that they will be switched out of bilingual programs and redesignated as Fluent English Proficient (FEP). Many of these FEP students, who now will be mainstreamed with native students, will still fall far short of total fluency. This represents a separate channel whereby contact between immigrants and natives will increase in the higher grades.

For these reasons, we expect to find far stronger evidence of 'native flight' from immigrants at the secondary than primary levels. Moreover, residential patterns of natives are likely to respond to the traits of local schools especially at the primary level, because it is at this stage of the lifecycle that families typically buy houses. Later in the lifecycle, and facing the much larger attendance areas for high schools, native parents may find it more attractive to respond to immigration by sending their children to private school than by moving again.

Table 1 indicates that in both 1980 and 1990, native-born children were more likely than immigrant children to attend private primary schools. Among high school students, natives were more likely than immigrants to choose private school in 1990, but not in 1980. The lower private school rates among immigrants than among natives imply that the immigrant to native ratios of children in private schools will be lower than they are in public schools. Therefore, the most likely direction of 'native flight', if it occurs, is from public schools to private schools. A higher immigrant to native ratio in public schools than in private schools, however, is not a necessary condition for 'native flight'. Families of native-born children may view private schools as being more capable of meeting their needs even with large numbers of immigrants in private schools.

Table 1 indicates that private schools' shares of attendance declined from 1980 to 1990 for each group. The average probability of attending primary and secondary private school decreased by about 3.5–4 percentage points for immigrant children, whereas for natives the probability decreased by slightly more than 1 percentage point in primary school and by 0.1 percentage points in high school. Thus at the national level natives were no more likely to attend a private high school in 1990 than in 1980. During this same period of time the immigrant share of the population in the 132 metropolitan areas in our sample, ages 7–13 and 15–16, increased from 4.0 to 5.1%.

The national trends in the immigrant share and native private school rates do not provide support for the hypothesis of 'native flight' in response to immigration. There is, however, the possibility that private school rates increased substantially in areas of the country receiving large inflows of immigrants, while decreasing in other areas of the country. Further, a simple analysis of trends ignores the possibility that other factors have affected the school-choice decision.

¹³Evidence from California certainly supports the contention of Rossell and Baker. According to data from the California Department of Education, in 1993 only 14% of LEP students in elementary schools were completely mainstreamed with native English-speaking students, whereas at the high school level fully 40% of LEP students were mainstreamed with native English speakers throughout the school day. We thank Mark Lopez for supplying these calculations.

3.2. Measurement at the level of metropolitan areas

To investigate further, we econometrically model the relationship between immigration and private school enrolment among natives across metropolitan areas in the United States. We essentially treat these metropolitan areas as a set of ‘natural’ experiments for the effect of immigration on the private/public choices of natives.¹⁴ If we find large increases in private school rates in metropolitan areas with large inflows of immigrants, holding all else equal, then we can infer that immigration causes ‘native flight’ from public schools. It is very unlikely that there is reverse causation as the average propensity of natives to go to private school in a metropolitan area should not play an important role in the residential location decisions of immigrants.¹⁵

We examine immigration and private/public school patterns across Consolidated Metropolitan Statistical Areas (CMSAs, henceforth ‘metropolitan areas’ or MAs) instead of smaller geographical areas, such as counties or school districts, primarily because of data limitations. (For an example of the data limitations facing this sort of research, it is not possible to disaggregate 1980 and 1990 Census data to the level of individual central cities.) However, the use of metropolitan areas as the unit of analysis confers three advantages.

The first of these is particularly important. Suppose that urban natives respond to immigration not by enrolling their children in private school, but instead by moving to the suburbs, where presumably the public schools have fewer immigrant students. This would cause selection bias and upward bias on the coefficient for the immigrant proportion of the population if we focused on narrower geographic areas such as school districts or counties. Specifically, any movement from high-immigrant school districts to low-immigrant school districts increases the private school rate in the sending district and decreases the private school rate in the receiving district, thus implying a larger positive correlation between the private school rate and the immigrant share. In contrast, by using entire CMSAs, we greatly reduce this problem because these areas typically encompass both central cities, suburbs and surrounding satellite cities.¹⁶

A second but related advantage of using broadly defined MAs concerns the endogeneity of households’ location more generally. Families are more likely to move between districts or counties within a metropolitan area as a result of variations in school quality than they are to move between metropolitan areas.

¹⁴This is the standard approach taken in the empirical literature on the effects of immigration on the labor market outcomes of natives. These studies assume that labor markets are approximated by metropolitan areas. See Borjas (1994) and Friedberg and Hunt (1995) for reviews of this literature.

¹⁵In addition, Bartel (1989) finds that recent immigrants tend to locate in SMSAs that have large numbers of previous immigrants from the same country, and that economic factors have a relatively small effect on locational decisions.

¹⁶One could also examine this type of ‘native flight’ to the suburbs using an alternative data source. However, there would be substantial difficulties in determining exact neighborhood location and the share of immigrants in more localized areas.

Moves between metropolitan areas are likely to be influenced mainly by factors apart from schooling, such as the availability of jobs. This suggests that the simultaneity of location decisions and school sector choices poses less of a problem when the unit of analysis is the metropolitan area than when it is a smaller geographical area. At the same time, we acknowledge that we are measuring only one type of ‘flight’, and in this important sense may be underestimating the extent to which immigration influences natives’ school choice.

The third advantage of using MAs as the unit of analysis is that they more accurately represent markets for private schools than do counties or school districts. Certainly, many families send their children across county lines to private schools.

Before discussing the results from our probit regressions, it is useful to examine the relationship between 1980 and 1990 changes in native private school rates and changes in the immigrant share (ages 7–16) across our sample of MAs. In Figs. 1 and 2, we plot the relationship between these variables for secondary and primary school students, respectively. Here, and in the ensuing regressions, we use the share of immigrants in the overall school-age population rather than in the specific ranges (7–13 and 15–16). We choose this broader measure because even if immigration mainly affects enrolment in a narrow range of ages, the impact on resource allocation is likely to spill over from one tier of schools to another. For instance, increased demands for teachers to help with an inflow of immigrants to the primary schools are likely to diminish the financial resources available to high schools in the same district.

The area of each circle representing an MA is proportional to the inverse of the estimated standard error of the corresponding private school rate. The fitted line shows the results of a simple bivariate weighted least squares regression of changes in the private school rate on changes in immigrant share. In neither case is the slope coefficient statistically significant, with t -statistics of 1.62 and -1.42 for the secondary and primary regressions, respectively. (The coefficients are 0.157 and -0.133 , respectively.) Both figures indicate that there exists substantial variation in changes in immigrant shares and native private school rates across MAs in the United States. Clearly, a large number of MAs experienced sizeable increases in primary and secondary private school rates from 1980 to 1990, which contrasts with the downward trend for primary school and the flat trend for secondary school at the national level.

The results in Fig. 1 indicate a positive relationship between changes in the immigrant share and changes in the private school rate at the secondary level. In addition, most of the MAs with positive changes in immigrant shares experienced increases in private school rates for secondary school. In contrast, however, the results in Fig. 2 do not indicate a strong positive relationship between changes in the immigrant share and changes in the private school rate for primary school. If anything, there appears to be a slight negative relationship between the two variables. As discussed earlier, the difference between these two relationships might be expected given that primary schools serve much smaller, and possibly

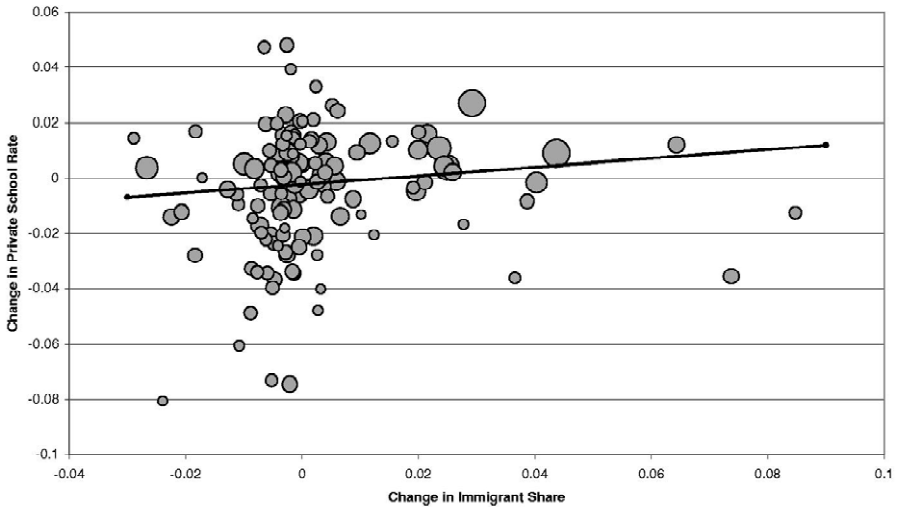


Fig. 1. Change in private school rate versus change in immigrant share (1980 to 1990); native-born secondary school students.

more racially homogenous, geographical areas than secondary schools. Thus, a large immigrant share in an MA is more likely to affect natives in secondary school than those in primary school.

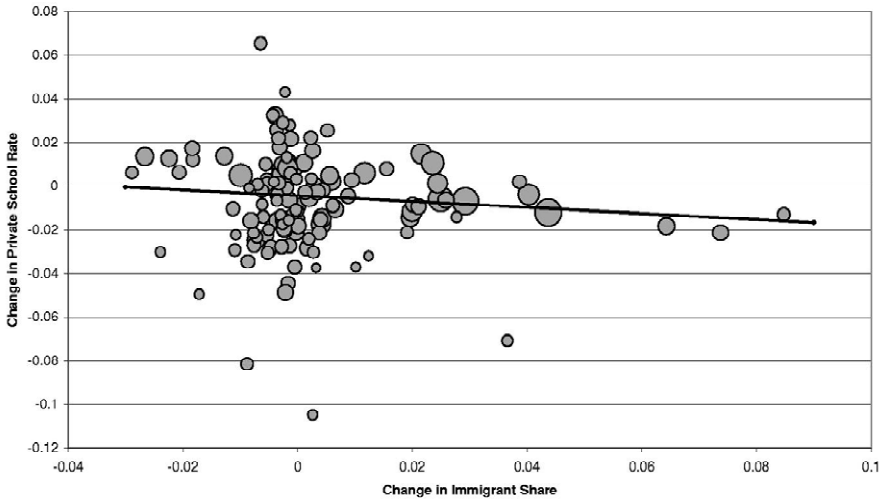


Fig. 2. Change in private school rate versus change in immigrant share (1980 to 1990); native-born primary school students.

3.3. Estimates of the effect of immigration on the private/public school choices of natives

More formally, we now estimate equations for the probability of attending private school using our sample of native children currently enrolled in school who reside in one of the 132 MAs. In addition, these equations allow us to control for individual-level, as well as MA-level, characteristics that affect the private/public school decision.

Because we have many observations for each MA, we risk making incorrect inferences if we do not correct for correlated errors across individuals within a given MA in a Census year. We therefore estimate a random effects probit model to obtain efficient estimates in two stages. See Borjas and Sueyoshi (1994) for a thorough discussion of the technique, and for proof that the estimation technique provides asymptotically unbiased inferences if the number of observations per group (in our case, MA/year combination) is sufficiently large.

We first pool the 1980 and 1990 Census coefficient estimates in the presence of a group-level (metropolitan area level) error component. Our first-stage probit regression for the probability of attending private school ($Y_{imt} = 1$) for individual i in Census year t and in metropolitan area m can be written as:

$$\text{Prob}(Y_{imt} = 1) = \Phi(X'_{imt}\beta_1 + \alpha_m + \alpha_{m90}), \quad (3.1)$$

where Φ is the cumulative normal distribution function, X_{imt} is a vector of individual-level characteristics (including parental income and education), α_m is a vector of metropolitan area fixed effects, and α_{m90} is equal to α_m multiplied by a dummy variable indicating whether the observation is from 1990. The vector of fixed effects, α_m , removes the effect of constant unobserved metropolitan area characteristics that may be correlated with immigration.

In (3.1), α_{m90} represents the change from 1980 to 1990 in the metropolitan area level determinants of private school choice for metropolitan area m . The estimates of these first-difference fixed effects become the dependent variable in a second-stage regression:

$$\hat{\alpha}_{m90} = (Z_{m90} - Z_{m80})' \gamma + \eta_m \quad (3.2)$$

where Z_{mt} is a vector of metropolitan area variables, including our measure of the share of immigrants in the school-age population, and η_m is an error term.

The first-stage probit regression controls for changes from 1980 to 1990 in individual-level characteristics and for unobserved metropolitan-area characteristics that do not change. The second-stage regression controls for changes from 1980 to 1990 in the included metropolitan-area variables. The coefficient estimates from this regression are in the same metric as probit coefficients and their standard errors account for the group-level component in the error term.

As suggested in Borjas and Sueyoshi (1994), we estimate the second-stage regression using generalized least squares (GLS). Specifically, we use the weighting matrix $\Omega = \sigma_u^2 I_M + V_{\alpha\alpha}$, where σ_u^2 is the variance of the first-difference, MA-specific error term in the random effects probit regression, and $V_{\alpha\alpha}$ is the $M \times M$ block of the covariance matrix from (3.1) that is associated with the first-difference fixed effects, α_{m90} .¹⁷ The use of Ω essentially places different weights on each MA in the second-stage regression. The weights are related to the precision of the fixed effects in the first-stage probit regression. We also use ordinary least squares (OLS) to estimate our second-stage regressions as a sensitivity check.

This estimation technique combined with the use of 1980 and 1990 Census microdata improves on the methodology used in the studies of the effect of the racial composition of the local population on the choice between private and public school. These studies essentially use the cross-sectional correlation between the racial composition and the percent of all students who are in private schools across geographical areas to identify the effect. If there exist unobserved factors that are correlated with both the racial composition and the private school attendance rate then previous estimates of the extent of ‘white flight’ may be biased. Our two-stage probit addresses this potential problem by essentially identifying the effect from the correlation between changes over time in immigration and private school rates across metropolitan areas in the United States. We thus control for unobserved fixed traits of each area that might confound the relationship between immigration and school choice.

We estimate several regressions of the form (3.1) and (3.2). These regressions are estimated separately for our samples of native-born children enrolled in primary and secondary schools in the 132 MAs. To conserve space we do not report coefficient estimates and standard errors for the first-stage probits (3.1).¹⁸ We include a set of individual-level controls that is comparable to that used in previous studies of the determinants of school-sector choice. As expected, parental education and per person household income are positively related to the probability of attending private school. In addition, black natives have a lower probability and Hispanic natives have a higher probability of attending private school than white, non-Hispanic natives. Finally, we find that girls are generally more likely to attend private schools than boys.

In Table 2 we report second-stage regressions for native-born students in public high schools. In addition to the immigrant share, defined as the fraction of the population ages 7 to 16 that is immigrants, we include measures of school quality, the crime rate, and a number of demographic characteristics of the MA. We include the native black share of the population ages 7 to 16, as a test for flight

¹⁷We estimate σ_u^2 following Borjas (1987).

¹⁸The results can be found in Betts and Fairlie (2001) along with a more detailed data appendix. In the probit models we used the entire sample of 452,294 secondary school students available. For primary school students, we used a 50% random sample of primary school students, or 796,709 students, in order to make estimation tractable.

that is not related to immigration. We condition on the log of native adult employment (ages 16 to 64), to control for the possibility that MAs with booming economies attract immigrants at the same time that greater affluence increases the demand for private schools. Conversely, we include the log of the native population aged 5 to 18 to accommodate the possibility that in cities with rapidly growing school-age populations, districts build many new schools. If in part natives who choose private schools are fleeing decrepit school buildings, and if this is correlated with inflows of immigrants, we could obtain overstatements of the impact of immigration on native flight without a proxy for growth in public schools. We also include the rate at which natives receive public assistance in the MA. The overall demand for private schooling, and hence the quantity supplied, could be lower in areas with high poverty.

As measures of school quality we include expenditures per pupil in public schools at the MA level and pupil to teacher ratios for private and public schools, both measured at the state level. We expect that the public school pupil–teacher ratio is positively correlated with the probability of attending private school and that public school expenditures per pupil and the private school pupil–teacher ratio are negatively correlated with the probability.

The crime rate that we include is defined as the annual number of serious crimes per 1000 residents in each county, aggregated to the MA level. A recent national survey suggests that the perceived quality of public schools and fears about crime could both influence parents' choice between public and private schools.¹⁹ Appendix A reports means of these second-stage controls.

Specification 1 of Table 2 presents GLS estimates for high school choice. These estimates provide evidence of 'native flight' from public high schools in response to immigration. The coefficient on the immigrant share in this equation is positive and statistically significant.²⁰ We also find a positive coefficient on the crime rate suggesting that perhaps native families choose the tighter restrictions or more homogenous population of students in private schools when high levels of crime exist in the area. However, this coefficient is not significant at standard levels. In contrast, all of the coefficients on the school quality measures are small and statistically insignificant and the coefficient on the native black share is positive, but statistically insignificant.

The finding of a positive coefficient on the immigrant share in the equation

¹⁹When asked to state their top concerns about their children, 66% listed fear over their children being a victim of crime, and 55% listed the quality of public schools. (Parents' top concern, listed by 71%, was the use of illegal drugs by their children; Archibold, 1998.) Surveys of students themselves suggest that private schools are relatively safer. Chandler et al. (1998) report that in a 1989 survey of students aged 12 through 19, the following percentages reported the stated problems in (public/private) schools: street gangs present at school (16.4%/4.4%), availability of illegal drugs (64.8%/47.2%), student was a victim of any crime (14.7%/12.8%), student was a victim of violent crime (3.5%/2.9%).

²⁰The coefficient estimate on the immigrant share is slightly smaller using the 1990 cross-sectional sample and much smaller using the 1980 sample. The 1990 and 1980 coefficients (standard errors) are 1.6071 (0.6638) and 0.5170 (0.8759), respectively.

Table 2
 Second-stage probit regressions for probability of attending private school; native-born children —
 1980 and 1990 Census; secondary school

Explanatory variables (1980 to 1990 change)	(1)	(2)	(3)
Estimation technique	GLS	OLS	IV
Immigrant share	1.7766 (0.8514)	1.5394 (0.9267)	3.9049 (2.3059)
Scaled derivative	0.2594	0.2248	0.5702
Public school expenditures per pupil (000s)	-0.0276 (0.0255)	-0.0348 (0.0271)	-0.0314 (0.0258)
Public school pupil/teacher ratio	-0.0024 (0.0107)	-0.0006 (0.0115)	-0.0093 (0.0127)
Private school pupil/teacher ratio	-0.0017 (0.0156)	0.0023 (0.0167)	0.0057 (0.0173)
Crime rate (per 1000 residents)	0.0145 (0.0111)	0.0164 (0.0119)	0.0152 (0.0111)
Native black share	0.3900 (0.7068)	0.4075 (0.7750)	0.5581 (0.7268)
Log native employment (ages 16 to 64)	0.0664 (0.2031)	0.2027 (0.2241)	0.1191 (0.2099)
Log native population (ages 5 to 18)	-0.2082 (0.1891)	-0.3251 (0.2096)	-0.2630 (0.1970)
Native public assistance rate	-1.8119 (2.0958)	-1.3795 (2.2492)	-1.2679 (2.1662)
Derivative adjustment factor	0.1785	0.1785	0.1785
Sample size	132	132	132

(1) The sample consists of native-born children in the 1980 and 1990 Census who are currently enrolled in school and who are not living in group quarters. The table presents coefficients from a second-stage estimate based on the method of Borjas and Sueyoshi (1994). In the first stage a probit for student's enrolment in private vs. public school is run, including dummies for each MA and for each MA interacted with a dummy indicating whether the observation is from 1990. In the second stage, we model the coefficient on the latter dummy from the first stage, which represents the change in the MA fixed effect between 1980 and 1990. In this second stage, independent variables are the changes between 1980 and 1990 in the variables listed in the above table.

(2) Standard errors are reported in parentheses.

(3) The scaled derivative approximates the number of natives switching to private schools when the number of immigrants in the public schools is increased by one.

(4) See text for details on the estimation technique used in each column.

(5) Means of all variables are reported in Appendix A.

(6) The effect of a 1 unit increase in an independent variable on the private school probability can be calculated by multiplying the coefficient on that variable by the derivative adjustment factor.

determining the probability of attending private high school for native children is consistent with the 'native flight' hypothesis. It is important, however, to determine if this coefficient estimate implies a large or small effect of immigration on private school attendance. As noted above, our second-stage coefficients are in the same metric as the probit coefficients, making them difficult to interpret.

Accordingly, we calculate the implied change in the number of native children who switch from the public school system to the private school system in an MA

when one more immigrant child is added to the public school system. This rescaling provides a direct measure of the magnitude of ‘native flight’ from the public school system in response to immigration. To calculate this ‘scaled derivative’ we first find the \hat{w} that solves the following equation:

$$P_N^S = \Phi(\hat{w}), \tag{3.3}$$

where P_N^S is the native private secondary school enrolment rate. This will allow us to examine the response of the native-born child who has the average probability of attending private school.

The derivative of the number of natives who enter private secondary school with respect to the number of immigrants who enter public secondary schools is then equal to:

$$\frac{dN_N^{Pr,S}}{dN_I^{Pb,S}} = N_N^S \frac{d\text{Prob}(Y_{imr} = 1)}{dN_I^{Pb,S}} = \gamma_I \phi(\hat{w}) N_N^S \frac{N_N}{(N_N + N_I)^2} \frac{N_I}{N_I^{Pb,S}} \tag{3.4}$$

where $N_N^{Pr,S}$ is the number of natives in private secondary school, $N_I^{Pb,S}$ is the number of immigrants enrolled in public secondary school, γ_I is the coefficient on the immigrant share, ϕ is the normal probability density function, N_N^S is the number of natives enrolled in secondary school, and N_N and N_I are the total number of natives and immigrants (ages 7 to 16), respectively.²¹ In Table 2, we report these ‘scaled derivatives’ below the standard errors for the coefficients on the immigrant share.

Our estimate of the ‘scaled derivative’ implies a large effect. Each immigrant added to the public schools in an MA results in a predicted decrease of 0.26 native students in public schools and a corresponding increase in native enrolment in private schools. Another way of viewing the size of the effect is to note that for every four immigrants added to the public schools in an MA, just over one additional native is predicted to switch to private school from public school. Clearly, the estimates imply a high level of ‘native flight’ in response to immigration.

We estimate the second-stage regression using two alternative techniques to check the robustness of this coefficient estimate. We first estimate the second-stage regression using ordinary least squares (OLS). We are concerned that our positive coefficient estimate on the immigrant share is simply due to a positive correlation between immigration and private school rates in a few large US MAs. The use of GLS in specification 1 generally places more weight on larger MAs. In contrast, OLS places an equal weight on all of the 132 MAs. The results from this

²¹This formula assumes that the number of immigrants who are enrolled in public school is proportional to the number of immigrants (ages 7–16). This assumption explains the presence of the final ratio in (3.4). While ‘immigrant flight’ and returns to scale in teaching immigrants in public schools (which work in opposite directions) would make this assumption not strictly correct, it is unlikely to be far from the truth.

regression are reported in specification 2.²² The coefficient estimate on the immigrant share is slightly smaller, but overall, similar in magnitude to the one reported in specification 1.

Our first-difference estimates eliminate the bias due to MA fixed effects that are correlated with native private school rates and the immigrant share. These estimates, however, do not eliminate potential biases due to MA-specific transitory effects that are correlated with changes in native private school rates and changes in the immigrant share. In particular, immigrants may choose to live in MAs that are experiencing fast local economic growth. The MAs that are experiencing fast local economic growth may also have increasing native private schools rates, thus causing a spurious correlation between changes in native private school rates and immigration. We have already attempted to solve this issue by controlling for household income per capita in the first-stage probit and at the MA level log native employment and the native public assistance rate in the second-stage models. To address this problem in a different way, we apply the instrumental variables (IV) approach taken in Altonji and Card (1991), using the 1980 value of our immigration measure as an instrument for the change in its value from 1980 to 1990.²³

We report IV results for native secondary school students in specification 3.²⁴ The coefficient estimate on the immigrant share is much larger (although its 95% confidence interval captures both the GLS and OLS coefficient estimates and the null hypothesis of no effect at all). The IV model is thus not at all conclusive.

Coefficients on the other second-stage variables are also of interest. As before, the other regressor that comes closest to being statistically significant is the crime rate.²⁵ Nonetheless, the signs on the other regressors typically conform with the theoretical reasons mentioned earlier for including them. For instance, cities that experienced rapid growth in the native school population, *ceteris paribus*, experienced declines in the probability of native flight, perhaps due to the construction of new schools. But none of the effects are significant.

Interestingly, the coefficients on native black share are positive but are much smaller than those on the immigrant share and are not statistically significant. We retain the hypothesis that a rise in the black native share is not related to natives'

²²We report heteroscedasticity consistent standard errors.

²³The use of this instrument is supported by Bartel's (1989) finding that recent immigrants tend to locate in SMSAs that have large numbers of previous immigrants from the same country.

²⁴The formula for the vector of second-stage coefficient estimates is: $(Z' \Omega^{-1} W(W' \Omega^{-1} W)^{-1} W' \Omega^{-1} Z)^{-1} Z' \Omega^{-1} W(W' \Omega^{-1} W)^{-1} W' \Omega^{-1} \hat{\alpha}_{m90}$, where Z , Ω , $\hat{\alpha}_{m90}$ are as defined above, and W includes the 1980 immigration measure and first differences of the MA-level controls.

²⁵Even though the crime rate variable is insignificant, we note that in robustness tests that use not 15–16 year olds but all enrollees aged 5–20 in secondary schools the main difference from Table 2 is that the crime rate coefficient becomes highly significant. This accords with cross-sectional models of public–private school choice recently estimated by Figlio and Stone (1997). It also squares with results from a 1995 survey showing that 41% of teachers in Grades 7–12 reported that 'violence in and around school' was a serious or somewhat serious problem (National Center for Education Statistics, 1996, p. 141).

school choice, but this may be due to a lack of variation in this variable between 1980 and 1990.²⁶ Certainly, it is noteworthy that we find stronger evidence of a flight effect from immigrants than from native blacks. We also estimate additional regressions that remove this variable. The coefficients and standard errors on the immigrant share do not change appreciably.

We now examine results for our sample of native children enrolled in primary school. Second-stage estimates are reported in Table 3.²⁷ Again, we supplement our preferred GLS model with an OLS model in specification 2 and an IV model in specification 3. The results are quite similar across specifications. We find negative, although statistically insignificant, coefficients on the immigrant share.²⁸ (The sign reverses in the IV model but the model is extremely imprecise.) The coefficients on other variables are not statistically significant at the 0.05 level, although there is weak evidence that higher spending per pupil in public schools lowers the probability that natives send their children to private school. We conclude that there is no evidence of a statistically significant link between immigration inflows and changes in native parents' decisions about whether to send their children to private schools at the primary level. The contrast between the results for primary and secondary schools fits in with our hypothesis that the impact of immigrants on natives' school choice should be larger in high schools than in lower grades. Many elementary and middle schools typically act as feeders into an area's high school, thus leading to greater mixing among groups at the high school level.

3.4. Estimated responses to different types of immigrants

If the 'flight from immigrants' interpretation of the secondary-school results is correct, then native parents should be more likely to switch their children into private schools if immigrants in the local area are less acculturated to American schools. Accordingly, we divide immigrants into those who speak only English at home and those who speak another language at home. We then calculate English- and non-English-speaking immigrant shares of the total population (ages 7 to 16) and include these two measures in our second-stage regressions.²⁹ Table 4 shows the results. For secondary school students, we find positive and statistically significant coefficient estimates on the non-English-speaking immigrant share, and a much smaller and statistically insignificant coefficient on the English-speaking immigrant share. The positive coefficient estimate on the non-English-speaking immigrant share is 13% larger than the original coefficient estimates reported in

²⁶For our sample of 132 MAs, the native black share increased by only 0.5 percentage points from 1980 to 1990. See Appendix A.

²⁷In the reported scale derivatives we use private primary school rates and counts for native and immigrant primary schoolchildren.

²⁸We find small, statistically insignificant coefficients on the immigrant share using the 1990 and 1980 cross-sectional samples.

²⁹In 1980 and 1990, 23.9 and 13.1% of immigrant children spoke only English at home, respectively.

Table 3

Second-stage probit regressions for probability of attending private school; native-born children — 1980 and 1990 Census; primary school

Explanatory variables (1980 to 1990 change)	(1)	(2)	(3)
Estimation technique	GLS	OLS	IV
Immigrant share	−0.7940 (0.8375)	−1.1932 (0.8550)	1.4422 (2.8519)
Scaled derivative	−0.1889	−0.2838	0.3431
Public school expenditures per pupil (000s)	−0.0404 (0.0251)	−0.0390 (0.0255)	−0.0420 (0.0252)
Public school pupil/teacher ratio	0.0083 (0.0105)	0.0072 (0.0107)	0.0004 (0.0142)
Private school pupil/teacher ratio	0.0233 (0.0154)	0.0224 (0.0157)	0.0309 (0.0180)
Crime rate	0.0022 (0.0106)	0.0018 (0.0108)	0.0033 (0.0107)
Native black share	0.6762 (0.6784)	0.7814 (0.6926)	0.8947 (0.7288)
Log native employment (ages 16 to 64)	−0.1995 (0.1930)	−0.2315 (0.1981)	−0.1705 (0.1962)
Log native population (ages 5 to 18)	0.0731 (0.1774)	0.1171 (0.1824)	0.0457 (0.1805)
Native public assistance rate	−0.7368 (2.0351)	−0.3660 (2.0779)	−0.2734 (2.1120)
Derivative adjustment factor	0.2082	0.2082	0.2082
Sample size	132	132	132

See notes to Table 2. All specifications include controls listed in Table 2.

Table 2, suggesting that ‘native flight’ is almost purely from non-English-speaking immigrants.

Although we suspect that difficulties related to language barriers between immigrants and natives may be the main factor related to shifts in native attendance toward private schools, another possibility is that natives react to the degree of acculturation of immigrants more broadly. To check this, we replaced the immigrant share in the age group 7 to 16 with the share of this age group consisting of immigrants who arrived in the United States within the last 5 years and the share consisting of immigrants who arrived earlier. These variables were quite collinear, so that neither was significant. This test therefore sheds little light on the acculturation hypothesis.

Finally, we repeated the GLS model for high school students after adding the share of native-born Hispanics in the population aged 7 to 16. As specification 3 in Table 4 shows, the coefficient on immigrant share fell by 14%, leaving the *t*-statistic at 1.69. Thus the immigrant share remains statistically significant at 9%. In contrast, the share of native-born Hispanics had a coefficient barely over half as large, with a very low *t*-statistic of 0.122. It seems clear that the drop in the level of the immigration effect is largely due to collinearity between our immigration measure and the share of the population that was native-born Hispanic. The

Table 4

Second-stage probit regressions for probability of attending private school; native-born children — 1980 and 1990 Census; additional regressions — secondary school

Explanatory variables (1980 to 1990 change)	(1)	(2)	(3)
Estimation technique	GLS	GLS	GLS
Non-English-speaking immigrant share (language spoken at home)	2.0044 (1.0718)		
English-speaking immigrant share (language spoken at home)	0.0722 (4.9049)		
Recent immigrant share (within past 5 years)		1.5735 (1.9424)	
Non-recent immigrant share (prior to 5 years ago)		2.0174 (2.2564)	
Immigrant share			1.4860 (0.8796)
Native Hispanic share			0.8369 (0.6881)
Derivative adjustment factor	0.1785	0.1785	0.1785
Sample size	132	132	132

See notes to Table 2. All specifications include controls listed in Table 2, except that the immigrant share is replaced by the variables listed above.

population-weighted correlation between this variable and immigrant share was 0.6. This high correlation is not surprising as the parents of many native-Hispanic children are themselves immigrants.

Furthermore, many native-born Hispanic children are LEP students. In 1980 and 1990, 63.1 and 63.8% of native-born Hispanic children (in the age group 7 to 16) spoke a language other than English at home. These figures are quite similar to those for immigrant children, of whom 76.1 and 86.9% spoke a language other than English at home in the two Census years. Thus, if natives choose private schools in reaction to the financial strains placed on public schools by children with limited ability in English, it is not surprising to find that both the coefficient and the *t*-statistic on the immigrant share fall when we add the native Hispanic share to the model. Parents are likely to react similarly to either type of LEP student. Still, it is remarkable that we find that it is the share of immigrants in the school-age population, and not the share of Hispanics, that is the variable far more strongly related to school choice among natives.

3.5. Estimates of 'native white flight' and 'native minority flight'

If it is true that an influx of immigrant children causes some natives to switch to private schools, it becomes important to know who switches. Native minorities might experience greater contact with immigrants in public schools, if they are more likely to live in the same neighborhoods. On the other hand, native whites, being wealthier on average, may be more likely to have the money necessary to react by sending their children to private school. Finally, these groups may differ

Table 5

Second-stage probit regressions for probability of attending private school; white and minority native-born children — 1980 and 1990 Census

Explanatory variables Estimation technique	White natives		Minority natives	
	Secondary school (1) GLS	Primary school (2) GLS	Secondary school (3) GLS	Primary school (4) GLS
Immigrant share	2.3737 (0.8754)	-0.5391 (1.0439)	0.9636 (0.9078)	-0.8616 (1.0923)
Scaled derivative	0.2775	-0.0980	0.0267	-0.0464
Sample size	132	132	58	107

See notes 1, 2, 4, and 5 from Table 2.

The scaled derivative approximates the number of white or minority natives switching to private schools when the number of immigrants in the public schools is increased by one.

Other second-stage regressors are as in Table 2.

in their tastes. To this end, we repeated the analysis separately for non-Hispanic, white native-born children and for all other native-born children. We estimate two-stage probit regressions for primary and secondary schools. For brevity, we only report the results from the second-stage regressions.

The GLS results appear in Table 5. In specification 1, we report the results for white natives attending secondary schools. The coefficient estimate on the immigrant share is positive and statistically significant. It implies that the addition of one immigrant to the public school system leads 0.28 white natives to switch from public to private schools. Therefore, we find evidence that inflows of immigrants into the public school system are having a large effect on the private/public school choices of white natives. Furthermore, the similarity between this derivative estimate and the one reported in specification 1 of Table 2 suggests that the behavior of white native families is primarily responsible for our overall finding of 'native flight' in response to immigration.³⁰

Specification 2 reports the results for primary school. The coefficient on the immigrant share in this equation is very small and is statistically insignificant. It does not appear as though white natives are fleeing public primary schools.

Specifications 3 and 4 report the corresponding estimates for minority native students. These estimates are based on a much smaller number of students than was available for the white non-Hispanic sample.³¹ In several of the MAs, very few or no minority students in the sample attended private school in one or both Census years, making it difficult or impossible to identify the coefficient on the MA dummy variables. We therefore restricted our sample to metropolitan areas for which we had at least 200 observations in both 1980 and 1990. As shown in Table

³⁰We calculate the scaled derivative using the white native private school rate and the number of white natives enrolled in school.

³¹We do not exclude a random sample from the minority primary-school sample.

5, our second stage sample drops by 25 MAs in the primary school sample, and by 74 MAs in the secondary school sample. We find no evidence that the immigrant share influences primary school choice, but at the secondary level some very weak evidence of native minority flight emerges. However, the scaled derivative for this group is very small compared to that for white natives. As mentioned above, the results for whites appear to confirm that almost all of the observed ‘flight’ is accounted for by the sample of white natives.

As a check on the strong result for white natives in secondary schools, we estimate the second-stage regressions using OLS and IV. The coefficients closely match the results for all natives reported in Table 2. In the OLS model the implied derivative is 0.24; in the IV model, the derivative estimate implies that 0.59 native white children leave public high schools in response to each additional immigrant. The coefficients are significant at 5% and 0.5%, respectively.³²

3.6. Implications for public and private schools

In an absolute sense, the impact of immigration on natives’ choice between public and private schools is rather large. Our GLS estimates imply that roughly one native-born high school student switches to private schools for every four immigrant schoolchildren who enrol in the public high schools.

It is equally important, however, to assess the overall impact on enrolment by natives in public and private schools. Using the coefficient on the immigrant share reported in Table 2 and the change in the weighted immigrant share reported in Appendix A, we can estimate the predicted change in the average probability that a native high school student enrolls in private school. For our sample of 132 MAs, the private secondary school rate was 10.29% in 1980. If nothing else had changed between 1980 and 1990, the percentage of secondary school natives attending private schools is predicted to have risen to 10.64% by 1990, an increase of 0.34 percentage points or 3.3%.³³

This simulation leads to another measure of the size of the effect: the arc elasticity of the secondary private school share with respect to the immigrant to population ratio is 0.143.

This is a fairly hefty increase seen from the point of view of private school administrators. But of course, the corresponding drop is fairly modest from the point of view of public high school administrators. Our estimates predict that whereas in 1980, 89.71% of high school students attended public schools, increases in the immigrant share should have lowered this to 89.36% in 1990. The rise in the immigrant to population ratio during the 1980s may have nevertheless

³²We also did some tests for outliers, manually removing outliers and testing whether one major region of the country was driving the results. Little changed in these tests.

³³The 1990 predicted private school rate equals $\Phi(\hat{w}_{80} + \gamma(I_{90} - I_{80}))$, where \hat{w}_{80} is defined as in (3.3), but uses the native private school rate for 1980, and $I_{90} - I_{80}$ is the change in the immigrant share.

led to a slight decrease in the level of public support for public high schools, because 0.34% of native parents apparently switched their children from public high schools to private high schools in response.

Clearly, at the national level trends in the immigrant share are unlikely to have led to major swings in the enrolment shares of public high schools. We note, however, that the impact of immigration is likely to have varied dramatically across regions, due to the fact that certain cities witnessed large increases in the share of immigrants in the school-age population. In our sample of 132 MAs, several major MAs experienced increases in the immigrant share substantially above the weighted average. For example, the immigrant share increased from 1980 to 1990 by 0.0437 in Los Angeles, 0.0403 in San Francisco, and 0.0643 in Miami. These changes are predicted, *ceteris paribus*, to have led to increases in the native private high school rate by 1.34 percentage points (14.7%) in Los Angeles, 1.42 percentage points (12.7%) in San Francisco, and 2.51 percentage points (20.0%) in Miami.³⁴ Estimates using the IV model in Table 2 suggest changes that were just over twice as large, but of course, they are estimated imprecisely.

4. Conclusions

Using 1980 and 1990 Census microdata, we investigated whether native children are leaving public schools in response to inflows of immigrant children. Estimates from our probit regressions provide evidence of ‘native flight’ into private schools from public secondary schools, but not from public primary schools. We might expect stronger flight at the secondary level for a number of reasons. Firstly, high schools draw from a number of feeder schools, so that as a native student progresses through public school, his or her contact with immigrants should increase. This is especially likely among affluent natives. Secondly, channeling of Limited English Proficient (LEP) students into separate bilingual or immersion classes occurs mainly in elementary schools. Thus the degree of contact between immigrant and native students may rise in high schools because of the mainstreaming of LEP students into classes with native speakers.

The effect of immigration on the secondary school choices of native-born children appears to be quite large. Each immigrant added to the public high schools in a metropolitan area is predicted to result in a decrease of about 0.25 native-born children in the schools.

We also find that white natives account for almost all of the observed shifts into private schools. We disaggregated immigrants of school age into those who speak a language other than English at home and those who speak English at home. We

³⁴To make these calculations we use the same formula as that used to calculate the 1990 predicted private school rate, but we now use MA-specific 1980 private school rates and changes in the immigrant share.

found evidence that natives are reacting to immigrants who speak another language at home. Overall, these results suggest that immigration has an important secondary effect on the ethnic, racial and immigrant composition of public high schools in the United States.

What is the underlying reason for the observed shifts toward private schooling when the immigrant share of the young population rises? Our analysis, because it does not condition on the types of programs in place for LEP students in each city, cannot shed any direct light on this question. We stated a hypothesis in the Introduction that LEP students place additional stress on a school's resources, which in turn induces 'flight'. Hoxby (1998), Betts (1998) and Betts and Lofstrom (2000) provide evidence that immigration is associated with a slight decline in educational attainment of natives. This finding points to resource reallocation within schools and universities as a potential consequence of immigration. We also acknowledged that a second possibility that some readers will find more realistic is what Conlon and Kimenyi (1991) in their analysis of whites' school choice as a function of race labeled 'irrational prejudice'. The finding that the overall immigrant share affects private school choice at the secondary level, where greater socioeconomic mixing occurs, but not at the primary level, is consistent with the idea of flight related to prejudice. We cannot distinguish between these two hypotheses.

Regardless of the mechanism, native parents appear to respond to immigration by sometimes enrolling their children in private high schools. These results imply that support among native voters for public schools might have decreased moderately during the 1980s, to the extent that parents who enrol their children in private schools have reduced willingness to pay for public schools through their taxes. This attempt at 'separation' may also provide important clues about how a full-scale voucher system would change the distribution of students by race and immigration status across schools.

Our results should be regarded as suggestive, but further work on this important question, at the school or district level, is urgently needed. Our analysis has proceeded using nationally representative data, which is both the strength and weakness of our approach. Our analysis, by proceeding at the level of CMSAs, and over 2 years a decade apart, has potentially missed some other patterns. Our use of fairly wide metropolitan areas, dictated by a lack of consistent definitions in Census data, may have understated the total amount of native flight. In particular, some native families may have reacted to immigrant inflows not by choosing to send their children to private schools, but instead by moving to areas within the CMSA that have schools with relatively few LEP students. Similarly, our use of quasi-difference-in-difference methods is subject to potential biases caused by unobserved factors that changed over time, and which are correlated with changes in both immigrant shares and private school rates. Future research that uses a longer time-series and higher frequency data, perhaps with more narrowly defined geographical areas, may shed light on these issues.

Acknowledgements

This research was funded by the Extramural Research Program at the Public Policy Institute of California. The authors would like to thank two anonymous referees, Julie Cullen, Eric Fong, Jeff Grogger, Hans Johnson, Hamilton Lankford, Derek Neal, James Poterba, Steve Rivkin, Debbie Reed, and participants at the 1998 Population Association of America Meetings, the 1998 Summer Meetings of the Western Economic Association and the 1998 Association for Public Policy Analysis and Management Meetings, and seminars at the Public Policy Institute of California and UC Berkeley for helpful comments and suggestions. Cynthia Bansak, Alessandra Cassar, Sun Kim, Magnus Lofstrom, Bill Koch and Steve Anderson provided research assistance.

Appendix A

Means of variables used in second-stage regressions

	1980	1990	Change
Weighted means			
Immigrant share	0.0401	0.0508	0.0106
Public school expenditures per pupil (000s)	3.4819	4.9196	1.4377
Public school pupil/teacher ratio	19.2941	17.4667	-1.8274
Private school pupil/teacher ratio	18.8652	14.6535	-4.2117
Crime rate (per 1000 residents)	6.6789	6.4748	-0.2040
Native black share	0.1618	0.1655	0.0038
Log native employment (ages 16 to 64)	10.6658	10.8189	0.1531
log native population (ages 5 to 18)	10.0764	10.0054	-0.0710
Native public assistance rate	0.0369	0.0361	-0.0007
Unweighted means			
Immigrant share	0.0266	0.0291	0.0025
Public school expenditures per pupil (000s)	3.1910	4.4342	1.2432
Public school pupil/teacher ratio	19.5271	17.4787	-2.0484
Private school pupil/teacher ratio	18.4594	14.4365	-4.0229
Crime rate (per 1000 residents)	6.3693	6.2220	-0.1473
Native black share	0.1400	0.1450	0.0050
Log native employment (ages 16 to 64)	9.5430	9.7329	0.1899
Log native population (ages 5 to 18)	8.9739	8.9486	-0.0253

Native public assistance rate	0.0337	0.0354	0.0017
Sample size	132	132	132

Average native-born student populations ages 7–16 in 1980 and 1990 are used as weights in the first panel.

The immigrant share is the fraction of the population ages 7 to 16 that is immigrants and is calculated using Census microdata.

Public school expenditures per pupil in average daily attendance in public elementary and secondary schools are taken from National Center for Education Statistics (1996) and are measured in 1990 dollars.

Public school and private school pupil/teacher ratios are taken from National Center for Education Statistics (1991).

The crime rate is the annual number of serious crimes per 1000 residents and is taken from USA Counties 1996.

The native black share of the population is the fraction of the population ages 7 to 16 that is native-born blacks and is calculated using Census microdata.

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