School Choice Policy: Estimates of Supply and Demand Response in Private Education

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Executive Summary

Policies that would facilitate households' switching to private schools have been proposed in response to a perceived crisis in public education. Proponents argue that vouchers or tuition tax credits would encourage competition that would serve as a catalyst in improving public education. However, necessary conditions for effective competition are (a) that private schools have sufficient excess capacity to absorb new students and (b) that students exit public schools in adequate numbers to cause teacher layoffs and school closure. Research results for the state of Georgia indicate that private schools' current excess capacity is about 4,650 vacancies. A demand model indicates that a $1,000 income tax credit would encourage nearly 2,000 students to switch to private schools. In other words, the proportion of school-aged children in private schools would increase from 4.4 percent to 4.58, for an increase of 0.18 percent. Thus, it is concluded that while the private schools can take on additional students, the demand response by-households will probably fall far short of fostering effective competition between private and public schools. Finally, the demand model indicates that parents are sensitive to indicators of public school quality in making their schooling decisions. This means that public school administrators can decrease the loss of pupils by improving their school's performance.
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Introduction

The United States spends a greater share of its gross national product (7.5 percent) on education than any other country except Israel (Wallis). Despite this fact, students in the U.S. are outperformed in math and science by students in more than 10 nations. From 1950 to 1990 the proportion of school spending that went to classroom instruction decreased from two-thirds to less than one-half. Meanwhile, administrative outlays have doubled from 4 to 8 percent (Wallis). Many believe that statistics such as these illustrate that an educational crisis exists and that the U.S. is falling behind the rest of the industrialized world in both academic achievement and labor productivity.

Frustration with the quality of American schools has increased since the 1983 release of A Nation at Risk. That report, produced by the National Commission on Educational Excellence, emphasized the plight of the educational system. Education reform became a top priority for many states and spurred such actions as increasing graduation requirements, lengthening the school year and day, requiring more science and math for graduation, and mandating more testing of students (Uchitelle). Many observers view school choice as the catalyst that will bring change and reform needed to improve education. Proponents argue that school choice would become a powerful force for improving public schools. For this reason, a voucher or tuition tax credit that would give students more access to private schools has been a popular policy proposal.

The effect of any tax credit is to give a dollar-for-dollar tax reduction that is linked to any approved activity. In the case of education, a tax credit for tuition effectively reduces the price of private schooling by a dollar-for-dollar amount. The amount of the credit can vary, depending on the policy proposed. A tuition voucher may be used to purchase educational services from a school of the family’s choosing. This policy would allow parents to use tax dollars, in the form of vouchers, to pay for tuition at private schools. If the amount of the voucher is below the total cost of tuition, the parents would make up the difference.

Proponents believe that an effective voucher or tax credit policy will inject competition into the market for educational services that will increase pressure for all schools to improve in response to new market forces. School choice would enable parents and students to choose the school they believe best fits their needs. Schools would be placed in the position of competing for student enrollments in the open market through the quality of education they provide, or face the prospect of losing students and essentially be forced to close their doors.

Opponents of school choice policy question how many private schools would actually participate in a choice program. They argue that many private schools are already filled to capacity and they would not have the additional space and staff needed to accommodate any enrollment increases. If this were the case, then the use of public monies to support private schools would amount to a subsidy to families that are currently in private school. Others argue that private schools would take the "best and brightest" public school students and not be receptive to public school children who are more academically challenged. This would result, they argue, in public schools that may suffer further deficiencies if parents switch better students to private schools. Also, the loss of pupils to private schools may reduce the average voter’s commitment to high quality public education. Perhaps one of the most controversial questions is whether encouraging private school enrollments would increase educational diversity or would instead possibly increase segregation along racial, wealth, and
religious lines (Sandy). Further, higher income families would be better able than low-income families to make choices where additional tuition and transportation necessities are required. In summary, opponents do not believe that market competition alone will increase student achievement nor accomplish necessary school reform.

Central to the school choice policy debate is the question of how many pupils would switch to private school. If an empirical analysis indicated that large numbers of households would leave public schools (and if private schools could absorb them), then a school choice policy would have the potential to be an effective instrument in improving education. This outcome could also have potentially devastating fiscal effects on public schools. On the other hand, if few households responded, then a school choice policy would not be effective, simply because public schools would still face little competition, and the policy may have the side effect of acting as a subsidy to households that currently use private schools.

Given these research questions, the first objective of this research is to estimate empirically how many additional pupils private schools in Georgia can absorb. The second objective is to estimate a demand model of private education and perform simulations of how many households would leave the public schools. These objectives are met by analyzing primary survey data from private schools as well Census tract-level data for households and additional data that describe public school conditions in Georgia.

The results indicate that private schools' current excess capacity is about 4,650 vacancies. The demand model indicates that a $1,000 income tax credit would encourage nearly 2,000 students to switch to private schools. In other words, the proportion of school-aged children in private schools would increase from 4.4 percent to 4.58, for an increase of 0.18 percent. Thus, it is concluded that while the private schools can take on additional students, the demand response by households will probably fall far short of fostering the kind of competition between private and public schools that might lead to improvements in education. Finally, the demand model indicates that parents are sensitive to indicators of public school quality in making their schooling decisions. This means that public school administrators can decrease the loss of pupils by improving their school's performance.

**Review of Previous Research**

Much of the theoretical research on this topic has focused on the ways that taxpayer/voter preferences about school finance map into choices about educational expenditure and quality. Expenditure on education has been used as a proxy for school quality (Stiglitz); he hypothesized that private schools are better than public schools because per-pupil expenditure is higher. Flowers focused on the relationship of private and public school quality—lowering the cost of private education decreases the number of children in the public schools but also decreases the willingness of the average resident to fund public education. She found that while a tax credit would tend to increase enrollment in private schools, it could conceivably increase the quality of public education. This would happen if the marginal cost of educational quality increased with the number of students enrolled while the tax credit decreased enrollment. Although higher expenditures cause higher educational quality in Flowers' work, she recognized that private and public education had different cost functions.
Given this emphasis on the relationship of cost differences and school choice in the literature, the actual behavior of parents when confronted with differing circumstances is an essential input for public debate. There have been five empirical studies on this topic. Frey (1983) performed a national analysis, with states as the units of observation. Using six independent variables, he found that all variables had their hypothesized signs and estimated the price elasticity of demand to be between -0.4 and -2.1. Frey's work is based on statewide data with the explanatory variables associated with private schools averaged to obtain state-level data; thus, his work is unavoidably limited to highly aggregated variables and thus loses some of the flavor of local choice. West and Palsson also estimated a model with state-level variables. Using eight independent variables, they estimated the price elasticity to be from -1.5 to -3.0.

Hamilton and Macauley used school district-level data from New Jersey and applied the log transformation to the dependent variable, so it is not bounded at zero. They did not use a price variable in their study because they selected homogeneous school districts where the variance of private tuition was very low. They focussed special attention on the standard deviation of household income because, they argued, the variable is a proxy for the effect of student peer groups on achievement. Lankford and Wyckoff applied a logit analysis to a unique data set for 28,000 individual students in New York State. The decision to attend a religious school was modeled as a function of income and tuition, plus five school characteristics, five environmental factors, and five demographic indicators.

A study by Keeler and Kriesel is similar to Hamilton and Macauley's, but their data set represents 105 school districts in rural Georgia. Their demand model explains the proportion of children in private schools as a function of tuition (adjusted for travel costs) income, percent minority population, and three variables that describe the district's public schools: test scores, pupil-teacher ratio and per-pupil expenditures. Their regression results imply a demand elasticity of -1.07. However, the interpretation of this elasticity (as well as those from the other studies) is awkward because the dependent variable is a proportion. Therefore, they emphasize the importance of running a simulation on effect of new school choice policies. In particular, they found that a $1,000 tuition tax credit would increase the proportion of children in private school from 5.5 percent to 6.82 percent for an increase of 1.32 percent.

This research extends the work performed by Keeler and Kriesel by disaggregating the data from the school district level to the census tract/BNA level. In doing so it will more closely approach decision-making at the individual household level. Also, Frey (1991) and Martinello and West introduce two important considerations for this analysis. First, in situations where the supply of private education is not perfectly elastic a tuition tax credit might be expected to (a) increase the tuition charged by private schools or (b) result in more queuing by prospective students. If supply is not perfectly elastic then the results of a single equation demand analysis may be affected by simultaneity bias. Therefore, this study reports the results of a survey quantifies the supply response by private schools to changes in school choice policy.

A second consideration is that a tax credit of the magnitude offered in policy proposals might be of such large magnitude it might cause out-of-sample changes in private school enrollment. This study avoids the problem by applying a micro-level analysis that has substantial variation in both enrollment and in the explanatory variables, providing a wider range of latitude for policy simulation before running into out-of-sample problems.
Private School Survey

We are concerned with determining how school choice policies may encourage more parents to send their children to private school or, alternatively, what enrollment declines the public schools may expect. Previous studies have estimated a demand response by parents, but in doing so they explicitly assumed that the supply of private education is perfectly elastic. Perfect elasticity means that, subsequent to a school choice policy, private schools could expand their enrollment without increasing tuition. If supply is not perfectly elastic, then in order to take more students private schools would either have to raise tuition or put prospective students on a waiting list. Either of these two outcomes would mean that previous studies have overestimated the number of students who would leave the public school system.

The condition of perfect elasticity could be met if it can be demonstrated that private schools are currently operating below their maximum student capacity. Furthermore, they should be sufficiently below capacity so they could accept all of the additional students that a school choice policy would encourage to leave the public school system. This research makes this determination by comparing private school excess capacity estimated from the survey results (reported below) with the number of additional private school pupils estimated from the demand analysis that is reported in a subsequent section. Our conclusions are reported in the final section.

Survey Results

The private school survey was conducted through an interview process targeting the entire state of Georgia. For a sampling frame, a list containing all private schools in Georgia was obtained from the Georgia Department of Education that detailed the location of schools by county and provided enrollment figures. From that list the state was divided into six target areas: Albany, Savannah, Macon, Augusta, Athens, and Atlanta. The number of schools to be used for the survey was taken from a percentage of the total number of private schools located in that area. To obtain an accurate representation of each target area, they were further divided between metropolitan and rural schools. The schools in each target area were notified by telephone to schedule a time and date for an interview.

Forty-five schools were eventually interviewed. Analysis reveals that the average total enrollment for all schools was 519 students with a standard deviation of 302 (Table 1). Average school capacity was approximately 93.4 percent. Average high school enrollment was 199 students and the average high school capacity was approximately 90.5 percent. The average SAT score of the previous year’s graduating class was 1015. Out of the 45 schools surveyed, two schools located in Atlanta did not report SAT scores. One of the schools stated it did not release SAT information for fear that they are used for the wrong purpose. The other school was about to graduate its first senior class and did not yet possess any SAT information.

Two variables more difficult to quantify were the acceptance rate and the student/teacher ratio. The accuracy of the acceptance rate is questioned because of reporting in consistencies by the schools surveyed. The smaller, rural schools do not keep records of acceptance rates. In addition, many schools will discourage or encourage a student to apply based on either the initial phone conversation or interview. Many larger schools have very detailed numbers on inquiries, applications, and on the number of students admitted, for accreditation purposes, but they still acknowledge acceptance rates may suffer from inaccurate reporting. Because of these differences in accuracy these results may be
biased. According to this analysis, the average acceptance rate was 59.4 percent with a 33 percent standard deviation. Fifteen schools (33 percent of those surveyed) reported an acceptance rate of 90 percent or above, and 15 schools reported an acceptance rate below 50 percent.

To estimate the supply response by private schools to a school choice policy, administrators were asked to quantify what effect a tuition-tax credit would have on the tuition they charged and on the number of new students admitted. For many administrators, these questions were quite abstract and difficult to answer. They responded that many factors affect such decisions and all would need to be considered with such a question. Not only do physical and economic limitations exist, but also, limitations placed by school boards, school philosophies, teachers, parents, and students.

Of the 45 schools in the survey sample, only three administrators said that they would increase their tuition in response to a tuition tax credit. Interestingly, one replied that if a $1,000 tax credit were introduced then he would increase tuition by $1,000, but this was the only evidence of monopolistic pricing. The vast majority replied that their tuition increases would keep pace with expected inflation only.

The administrators’ ability to estimate the number of new students admitted was quite limited. They were very uncertain about their future admissions because significant increases would entail new construction programs, and these decisions were out of their hands. Therefore, to estimate the schools’ supply response, their estimates of current excess capacity is relied upon. As reported in Table 1, the schools are currently at 93.5 percent of full capacity. From the sampling frame, the 465 private schools in Georgia enroll an average of 150 students. This implies that the average school’s full capacity is 150/0.935 = 160 students, or that it can take on 10 additional students. Extrapolating this to all private schools implies there are currently 4,650 vacancies that could be filled by students who may leave public schools following implementation of a school choice policy. This figure of 4,650 vacancies is compared with an estimate of increased private school demand presented in the next section.

**Private Education Demand Model**

The purpose of this section is to analyze how economic incentives, school choice policies in particular, affect the demand for private education. Parents who select a private school for their children must pay the required tuition plus continue to pay the property taxes also provide for public school operation. In essence, they are foregoing the subsidy already available to them to send their children to public schools. The desire for a private school education by a household is influenced by the school’s attributes, by financial considerations, and by the tastes and preferences of individual families (Lankford and Wycoff). A wide range of private schools exist to serve a wide variety of needs and interests. For example, parochial schools are sponsored by local churches, college preparatory academies stress academic excellence, and Montessori schools apply their own philosophy of education.

By selecting a private school, the family will have less income to allocate to other goods and services. Parents who are willing to incur the cost of a private school education, presumably, believe the attributes that characterize the quality of education in the private school exceed the attributes provided for by the local public school. The decision between public and private schools, therefore,
involves a tradeoff between the attributes that characterize the quality of education received by the family and the family's consumption of other goods.

The household's decision to switch to private education can be modeled within a random utility framework (Keeler and Kriesel). The utility of the ith household if private education is selected (subscripted by v) is given by \( U_v(q_v, c_v, e_v) \) where \( q_v \) is a vector consisting of private school characteristics, \( c_v \) is a composite of all other goods consumed, and \( e_v \) is an error term. The utility associated with public education (subscripted by p) for the ith household is given by \( U_p(q_p, c_p, e_p) \). Parents evaluate whether the characteristics associated with private education \( (q_v, c_v) \) provide higher utility than the relevant public school alternative. The probability of any individual's attending a particular educational alternative (for example, a private school) is the expected value of a random variable \( P \) that takes on the value of 1 if \( U_v > U_p \) and 0 if \( U_v < U_p \). The presence of the error term dictates that \( U_v \) and \( U_p \) are random variables. The dependent variable in this demand analysis is the proportion of children enrolled in private school, which is given by \( \pi_j = (\sum P_{ij})/N_j \), where \( N \) is the number of school age children and the subscript \( j \) denotes the census unit of observation. This random utility specification has been found to be generally appropriate for explaining individual school choice decisions.

The dependent variable in the following regression is the proportion of children who attend a private school. This variable is obtained from the 1990 Census estimate of children aged three and over who attended a private elementary or high school and dividing that number by the total number of school aged children in the census tract.

There are 2,733 individual census tract/BNA's located within the state of Georgia. Out of this number approximately 299 are invalid observations because they do not report any population. Therefore, the demand model contains 2,434 observations. The average tract/BNA had a mean private school attendance for school aged children of 4.4 percent with a standard deviation of 11.88 percent (see Table 2).

Selection of the variables in \( q \), the vector of school attributes, depends on the context of the study and the available data. The variables and their summary statistics are listed in Table 2. School quality is obviously an important characteristic - higher quality public schools or lower quality private schools can be expected to decrease \( P \). In this study we restrict ourselves to the former because of data limitations. As noted by Monk, there is no single best measure of school quality. One measure is students' test scores; the hypothesis is that better scores reflect higher school quality. Test scores can also reflect a student's household characteristics and other influences as well as school quality; nonetheless it remains a favored explanatory variable of educational researchers. The school district's average score for the tenth-grade criterion reference test of reading ability is used to measure the educational quality of public schools. We expect that higher test scores will make public schools more attractive and thus decrease private school enrollment.

Expenditure on education has also been used as a proxy for school quality; the hypothesis is that higher expenditures result in better education. Although Monk has pointed out the difficulties of equating expenditure with quality, many studies have used expenditure measures. Therefore, we use the school district's total per-pupil expenditures. The student/teacher ratio is another commonly accepted indicator of quality; lower ratios might be expected to indicate more individual attention and thus better education.
Recent literature has proposed that low teacher pay has resulted in a decline in the number of young people seriously considering teaching as a career alternative. Therefore, this study incorporates the average teacher salary as a proxy for school quality. This variable is expected to have a negative effect on the demand for private education. Higher teacher salaries are hypothesized to attract higher quality teachers and result in higher quality public schools. The data for these four public school district variables were for 1990 and were obtained from the Georgia Department of Education (see Table 2).

Another characteristic we examine is the percentage of African-American school aged population by school district. In much of the South, including rural areas, private education boomed in the 1960’s as the integration of public schools mandated by Brown versus Topeka Board of Education was implemented. We include the racial composition variable to investigate the effects of racial composition on school choice. The final variable that describes school district conditions is the percentage of adults, older than 25 years, without a high school diploma. Lankford and Wycoff state that past studies on school choice have consistently shown poorly educated parents tend to have lower expectations of school quality for their own children, and therefore they are less likely to become dissatisfied with the public schools. Therefore, this variable is hypothesized to negatively impact private school attendance.

The variables that indirectly determine the household’s non-public education consumption are family income and the cost of private education. Higher levels of income can be expected to increase the probability of sending a child to private school, and this variable was quantified as the Census tract’s average household income. On the other hand, higher private school tuition charges should decrease the probability of sending a child to private school. Since the financing of public education is separate from individual choices to send children to public or private schools, the individual’s marginal cost of sending a child to public school is zero and the cost of public schooling can be ignored.

Each tract/BNA is assigned an adjusted tuition variable that takes into account the tuition of surrounding private schools and associated travel costs. Information was obtained through a telephone survey that produced a data set containing the price variable of interest, tuition. A total of 128 private schools were telephoned. Additional tuition information was also obtained for Chattanooga, Tallahassee, and Jacksonville as these are metropolitan areas located near the state borders that also influence the decision of where one may choose to attend a private school. Therefore, the tuition sample contains 131 observations. The information compiled from the survey produced a data set that included tuition, student enrollment, and the school’s zip code. The average tuition in the data set was approximately $3,287 with a standard deviation of $1,904. The average enrollment of those schools surveyed was 317 with a standard deviation of 318.

Two location variables obtained from the 1990 census were the latitudinal and longitudinal internal points of each tract/BNA. This information facilitated the measurement of a distance variable between the internal point of each tract/BNA to the location of the private school. A separate data set that contained the latitudinal and longitudinal internal points for each zip code in the state allowed a program to be executed which then assigned that point measurement for each private school’s zip code. The distance measured between each tract/BNA and private school was calculated by applying the Pythagorean theorem.

The adjusted tuition variable was estimated by determining which private schools are located within a 40-mile radius of each tract/BNA. The travel cost is obtained by multiplying the distance
between the tract and private school by 35 cents per mile, times 180 school days, times 2 trips per day. Tracts that had several schools located within a 40-mile radius were assigned an adjusted tuition variable equal to the weighted average travel-cost adjusted tuition of all the schools. Tracts that were located more than 40 miles from the nearest school were simply assigned the closest, least-expensive private school plus travel cost. Therefore, the adjusted tuition variable is the weighted average tuition plus the average travel cost. The average adjusted tuition was found to be $6,833 with a standard deviation of $1,587.

Statistical Methods

For this regression model, the dependent variable is a proportion bounded between 0 and 1. If ordinary least squares is applied, the model will yield inefficient estimates due to problems of heteroskedasticity that are caused by the bounding (Gujarati). Therefore, to correct for heteroskedasticity, a log transformation is applied to the dependent variable. This transformation causes the dependent variable to be bounded between zero and negative infinity.

Further examination of the dependent variable reveals that out of 2,434 total observations available, 653 observations, nearly 27 percent, do not report any children that attend private school. This is referred to as censoring of the dependent variable, and the disturbance term’s distribution is a mixture of discrete and continuous parts. Conventional regression methods fail to account for the qualitative difference that exist between the limit (zero) and nonlimit (continuous) observations. The total probability is still one, as required, but instead of scaling the continuous observations, the censored region is simply assigned the full probability at the censoring point, which in this case is zero (Greene). Therefore, a tobit log-linear model is appropriate for this research.

The results of the tobit log-linear model are presented in Table 3 (Model 1). All explanatory variables had their expected signs except expenditures per pupil. The coefficient for per capita income is positive as expected and significant at the one percent level. This supports the hypothesis that wealthier populations are more likely to send a higher percentage of their children to private schools. The racial composition variable was also positive and significant at the one percent level. As racial heterogeneity increases so does the demand for private education. The educational attainment variable was negative and significant at the one percent level. This supports the hypothesis that as the percentage of adults who have less than a twelfth grade education increases, the demand for private education decreases.

Regarding the proxy variables for public school quality, the student/teacher ratio was positive as expected, and the student test score variable was negative as hypothesized. However, neither of these explanatory variables was statistically significant. The variable that measured the average teacher salary for public school districts was negative as expected, and it was the only variable that proxied public school quality, which was statistically significant. Average teacher salaries are significant at the one percent level and support the hypothesis that as salaries for public school teachers increase, private school enrollments decrease. This indicates higher quality teachers are associated with higher quality public schools. The adjusted tuition variable was negative as hypothesized and significant at the 5 percent level. This supports the claim that higher tuition results in decreased enrollments.

The prevalence of insignificant coefficients with wrong signs raises the possibility that model 1 may be affected by damaging collinearity. Collinearity occurs when two or more explanatory variables
are linearly related. An examination between expenditures per pupil and the average teacher salary reveals that they have a correlation coefficient of 0.81. A correlation coefficient above 0.70 is evidence that collinearity may exist among the variables. Expenditures are also negatively related with student test scores and the student/teacher ratio.

Since expenditures is a questionable proxy for school quality, model 2 is the demand model without the expenditures variable. The magnitude of the beta coefficients is relatively identical to Model 1; however, the standard errors are lower in Model 2. The following variables were positive and significant: per capita income and the percentage of African-American school aged children. The following variables were negative and significant: percent educational attainment, tuition, and the average teacher salary. As in Model 1, the variables for student test scores and the student/teacher ratio were negative and significant as hypothesized respectively; however, neither was statistically significant. An examination of possible multicollinearity that may exist among the variables revealed the highest correlation existed between income and the educational attainment variable of 0.61. Therefore, these results are probably not affected by damaging collinearity.

The price elasticity describes how changes in prices for educational services will affect the household’s decision of attending a private school. Whereas past studies estimated price elasticities of anywhere between -0.5 to -3.3, Keeler and Kriesel’s price elasticity, with Georgia school districts as the unit of observation, was on the lower end of the scale at -1.07. The following formula approximates demand elasticity:

\[ E_p = \left( \frac{\Delta Y}{\Delta X} \right) \times \left( \frac{X}{Y} \right) \]

where \( \Delta Y \) and \( \Delta X \) refers to the change in Y divided by the change in X multiplied by the mean value of X divided by the mean value of Y. The change in Y divided by the change in X refers to the slope coefficient for the tuition variable which is multiplied by the mean adjusted tuition to obtain an elasticity of demand approximation of -0.18, quite a bit lower than previous studies. This elasticity is interpreted as follows: a one percent increase in tuition will decrease the proportion of children in private schools by 0.18 percent. The low magnitude of this elasticity indicates that the demand for private education is relatively unresponsive to price.

Of these existing studies, only Lankford and Wyckoff and Keeler and Kriesel use the estimated model to simulate the effects of public interventions that change the effective price of private education. Lankford and Wyckoff present an experiment that predicts the change in private school enrollment if tuition were effectively reduced to zero. They find that such a policy would double the proportion of their sample from 12 percent to 25 percent. Keeler and Kriesel examine the effect of more modest public subsidies to private education. They calculate that a $1,000 tuition tax credit would cause demand for private education in Georgia to rise by 1.32 percent of the total number of children. According to the 1990 Census, there are about 1,040,000 school aged children in Georgia and 1.32 percent of 1,040,000 represents 13,728 more private school students.

The estimated parameters of model 2 are used to simulate the effect of vouchers or tax credits for private education. If people view these policies as a dollar-for-dollar private school tuition reduction, then a credit’s effect can be projected by substituting a new tuition value reflecting the subsidy and then calculating the resulting \( \hat{y} \). The average private school tuition in this sample is $6,833 per year. A $500 tuition tax credit (or voucher) would increase the proportion of children in private education by 0.092 percent of the total student population of 1,040,000, or 957 children.
A $1,000 credit would cause demand for private education to rise by 0.19 percent of the total enrollment, or 1,976 new private school students. A $2,000 credit would increase demand by 0.38 percent of the total student population, or 3,952 new private school students. A $2,600 voucher – the amount contained in California’s Proposition 174, which was narrowly defeated in November, 1993 – would increase private school enrollment by 0.499 percent of the total student population, or 5,190 new private school students.

Finally, attention is turned to the question that was raised in the last section: If a school choice policy were implemented, would the current excess supply of private school places be sufficient to absorb the estimated number of students who would leave the public school system? In the last section it was calculated that private schools' current excess capacity equals 4,650 vacancies. Comparing this estimate of vacancies with this study's projections of new private school students indicates that the effective tuition reduction would have to be quite large, above $2,000, before there would be a shortage of places for the new students. This is an important finding because it means that this school choice policy would have its desired effect without causing higher tuition and/or longer waiting lists for school admission. Thus, it is concluded that while the private schools can take on additional students, the demand response by households (i.e., only 2,000 to 5,000 students statewide) will probably fall far short of fostering the kind of competition between private and public schools that might lead to improvements in education.

We recognize the possibility that this study's estimates of new private school pupils may be underestimated. Again, Keeler and Kriese's results for Georgia, using a very similar model but with school districts as the unit of observation, indicate that the $1,000 tuition tax credit would result in 13,728 new private school pupils. It is felt that additional research into the construction of the tuition variable should be performed before more definite answers can be obtained.

Summary and Conclusions

Many fear that an educational crisis exists in U.S. public schools as evidenced by falling test scores, lack of discipline, violence, and other indications that the public educational system is not delivering the level of service parents and pupils demand. Policies that would make it easier for households to switch to private schooling have been advocated as a way to inject competition into the market for educational services. Proponents of school choice argue that if households could freely choose which school to patronize, unattractive schools would either improve themselves or lose students and face the prospect of closing their doors. However, a precondition for competition is that households must respond to a choice policy in numbers large enough to place pressure on the public school system, and private schools must be able to absorb additional students. This research attempts to answer these empirical questions.

This study analyzes primary survey data from private schools as well Census tract-level data for households and additional data that describe public school conditions. Statewide data from Georgia are used. Two features make this study unique. The first is the incorporation of a private school survey to analyze private school supply. The second is the level of aggregation employed in the data set that is at the tract/BNA level.

The results indicate that private schools' current excess capacity is about 4,650 vacancies. The demand model indicates that a $1,000 income tax credit would encourage nearly 2,000 students to
switch to private schools. In other words, the proportion of school-aged children in private schools would increase from 4.4 percent to 4.58, for an increase of 0.18 percent. Therefore, private schools would be able to absorb all of the additional students who would take advantage of this school choice policy, and there would be no increase in tuition or queuing by prospective students.

However, these estimates of additional students and vacancies represent extremely small proportions of the 1,040,000 school age population. These are proportions that, if accurate, mean the school choice policies we have simulated cannot lead to effective competition between public and private schools. Our intuition says that public schools would have to experience enrollment declines that would lead to teacher layoffs and building closures before administrators would experience competitive pressure. This pressure may be felt when enrollment declines are in the range of five to ten percent. Further research could review the literature in school consolidation to obtain better estimates of how enrollment decline causes school closure.

Finally, the demand model indicates that parents are sensitive to indicators of public school quality in making their schooling decisions. The model indicates that improvements in the local school district’s student/teacher ratio, standardized test scores and teacher salaries lead to fewer students switching to private schools. Public school administrators should recognize that their clientele indeed pay attention to these and other measures of school performance.
References


Table 1. Means and standard deviations for selected variables from the survey of 45 private schools in Georgia, 1995.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total enrollment</td>
<td>518</td>
<td>302</td>
</tr>
<tr>
<td>High school enrollment</td>
<td>199</td>
<td>182</td>
</tr>
<tr>
<td>Total operating capacity</td>
<td>93.5%</td>
<td>10</td>
</tr>
<tr>
<td>High school operating capacity</td>
<td>90.5%</td>
<td>14</td>
</tr>
<tr>
<td>Average SAT score</td>
<td>1015</td>
<td>108</td>
</tr>
<tr>
<td>Tuition</td>
<td>$4,141</td>
<td>1968</td>
</tr>
<tr>
<td>Student/teacher ratio</td>
<td>11.28</td>
<td>2.83</td>
</tr>
<tr>
<td>Acceptance rate for new students</td>
<td>59.4%</td>
<td>33</td>
</tr>
</tbody>
</table>

Table 2. Means and standard deviations for dependent and explanatory variables in the private education demand model.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Expected Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of children attending private school</td>
<td>7.41</td>
<td>11.88</td>
<td></td>
</tr>
<tr>
<td>Adjusted tuition</td>
<td>$6,833</td>
<td>$1,587</td>
<td>Negative</td>
</tr>
<tr>
<td>Household income</td>
<td>$11,640</td>
<td>$7,988</td>
<td>Positive</td>
</tr>
<tr>
<td>Percent African-American</td>
<td>29.44</td>
<td>18.02</td>
<td>Positive</td>
</tr>
<tr>
<td>Percent adults without diploma</td>
<td>35.98</td>
<td>18.54</td>
<td>Negative</td>
</tr>
<tr>
<td>Expenditures per pupil</td>
<td>$3,162</td>
<td>$521.76</td>
<td>Negative</td>
</tr>
<tr>
<td>Student/teacher ratio</td>
<td>18.18</td>
<td>1.25</td>
<td>Positive</td>
</tr>
<tr>
<td>Criterion Reference Test</td>
<td>325.29</td>
<td>36.13</td>
<td>Negative</td>
</tr>
<tr>
<td>Average teacher salary</td>
<td>$22,040</td>
<td>$1,908</td>
<td>Negative</td>
</tr>
</tbody>
</table>
Table 3. Tobit regression results for the private education demand mode (Dependent variable is the log of the proportion of children within a Census tract that are enrolled in private school).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Coefficient (std. error)</th>
<th>Model 2 Coefficient (std. error)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-1.8404 0.3881</td>
<td>-1.6425 0.3680</td>
</tr>
<tr>
<td>Household income</td>
<td>0.000052 0.000003*</td>
<td>0.000053 0.000003*</td>
</tr>
<tr>
<td>Percent African-American</td>
<td>0.0112 0.0013*</td>
<td>0.0119 0.0012*</td>
</tr>
<tr>
<td>Percent adults without diploma</td>
<td>-0.0088 0.00009*</td>
<td>-0.0087 0.0014*</td>
</tr>
<tr>
<td>Adjusted tuition</td>
<td>-0.0000278 0.0192*</td>
<td>-0.000027 0.000013*</td>
</tr>
<tr>
<td>Student/teacher ratio</td>
<td>0.0205 0.0005</td>
<td>0.00277 0.0157</td>
</tr>
<tr>
<td>Criterion Reference Test</td>
<td>-0.000207 0.0002</td>
<td>-0.00058 0.00045</td>
</tr>
<tr>
<td>Average teacher salary</td>
<td>-0.00093 0.0014*</td>
<td>-0.00063 0.00011*</td>
</tr>
<tr>
<td>Expenditures per pupil</td>
<td>0.000014 0.0109</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Number of observations = 2,433

* Significant at alpha < 0.05

Model 1 Log Likelihood = -1824.01

Model 2 Log Likelihood = -1825.29
The SRDC is one of four regional rural development centers in the nation. It coordinates cooperation between the Research (Experiment Station) and Extension (Cooperative Extension Service) staffs at land-grant institutions in the South to provide technical consultation, research, training, and evaluation services for rural development. For more information about SRDC activities and publications, write to the Director.

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