An Analysis of Private School Closings

Lakshmi Pandey
Senior Research Associate
lpandey@gsu.edu

David L. Sjoquist
Professor of Economics
sjoquist@gsu.edu

Mary Beth Walker
Associate Professor of Economics
mbwalker@gsu.edu

Mailing Address:
Fiscal Research Center
Andrew Young School of Policy Studies
PO Box 3992
Georgia State University
Atlanta, Georgia 30302-3992

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Abstract

We add to the small literature on private school supply by exploring exits of K-12 private schools. We find that the closure of private schools is not an infrequent event, and use national survey data from the National Center for Education Statistics to study closures of private schools. We assume that the probability of an exit is a function of excess supply of private schools over the demand, as well as the school's characteristics such as age, size, and religious affiliation. Our empirical results generally support the implications of the model.

I. Introduction

Research on private schools has largely focused on the effectiveness of private schools vis-à-vis public schools,[1] the effect of private school competition on public school performance,[2] and the demand for private schools.[3] Little attention has been paid to issues associated with the supply of K-12 private schools.[4]

In this paper we add to the small literature on private school supply by exploring exits of private schools. We find that the closure of private schools is not an infrequent event, and thus explore factors associated with the exit of private schools. Specifically, we use national survey data from the National Center for Education Statistics (NCES) to study closures of private schools.

Interest in the exit of private schools is part of a larger agenda of generating a better understanding of the supply side of the private school market, and of the nonprofit market more generally. There appears to be an implicit assumption made in the literature on school choice that the supply of private schools will expand to meet the increased demand brought about from a voucher program. However, there is little empirical work on which to base that assumption; Downes and Greenstein (2002) and Barrow (2006) are the only papers we are aware of that consider the supply response to market conditions.

Beyond the more general interest in the market behavior of private nonprofit schools, the failure of such schools has policy relevance. The sustainability of private schools is relevant for at least two reasons. First, even if private schools are established, they cannot

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[1] See Gill, et al (2001) for a review.
[2] See Geller, Sjoquist, and Walker (2006).
[3] See below for a discussion of studies focused on the determinants of the number of private school students.

provide an effective alternative to or competition for public schools unless they remain in operation. Second, students in private schools that close could experience negative education outcomes.[5] Furthermore, more knowledge of the entry and exit process for private schools will be important to policy makers and analysts concerned with the impacts of the expansion of vouchers programs.

In the next section we draw on the existing literature to develop a framework in which to consider private school closures and to identify factors related to the probability that a nonprofit elementary and secondary private school will close. In Section III the data are described, followed in Section IV by our empirical results. A summary section concludes the paper.

II. Background

There are no existing theoretical models of the entry and exit of private schools. However, since most private K-12 schools are nonprofits, we rely on the nonprofit literature to motivate our empirical analysis. There are many theories or models of the behavior of nonprofit organizations.[6] These models provide little help in addressing exits from the private school market, and research on exits of for-profit firms provide little relevant insight beyond the findings that exits depend on market forces, including demand, cost structure, and

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[4] Hotz and Xiao (2005) and others have explored the effect of minimum quality standards on entry and exit of child care organizations.

[5] We are unaware of any empirical evidence on this possibility, but student mobility has generally been associated with lower achievement (Mehana and Reynolds 2004; Alexander, Entwisle, and Dauber 1996).

[6] Dollery and Wallis (2004) provide an extensive review; also see Salamon and Anheier (1998) and Malani, Philipson and David (2003).

competition.[7] The only model we are aware of that explicitly considers entry and exit of

nonprofits is Schiff (1986). Schiff presents a general model of the response of nonprofit

organizations to changes in demand and supply conditions. Although the model is relatively

simple, it implies that the nonprofits will respond to changes in demand and cost conditions

via entry or exit in much the same way as in the proprietary sector. This is consistent with

Weisbrod's (1988) observation that economic and political factors help explain why the

average age of nonprofits differs across sub-sectors.

We adopt a model that allows us to explore whether private schools should be

considered economic organizations responding to demand factors, costs, and market

structure, paying particular attention to the factors associated with the closure of private

schools. We thus hypothesize that the probability of an exit by a private school is an

increasing function of the difference between the supply of and the demand for private

schools in the market, as well as a function of school-specific factors. If an excess supply of

private school capacity arises, some of the private schools will face pressure to close, either

because they cannot generate adequate enrollment or have to reduce tuition and thus have

inadequate revenue. Given the level of market competition, the probability of failure will

depend on school-specific factors and characteristics, such as input prices, size, financial

conditions, etc.

We specify the model as

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[7] Research on the exit of for-profit firms, for example, Mayer and Chappell (1992) and Bernard and Jensen (2002), focus on manufacturing firms. Mayer and Chappell (1992) model exits as a function of profits, industry size, industry growth, and sunk costs. Bernard and Jensen (2002) examine the deaths of manufacturing plants and focus their analysis on four factors: imports from low wage countries; firm structure and ownership; product market characteristics (in particular, whether the firm sells abroad and whether it produces multiple products); and plant attributes such as age, size and capital intensity, wage rate. There are several studies (e.g., Audretch and Fritsch 1994; Kangasharju 2000; Keeble and Walker 1994) that consider regional determinants of

$$(1) \quad \Pr(e_i) = f\left(\left(s_i - d_i(x_i)\right), c_i, \varepsilon_i\right)$$

where $\Pr(e_i)$ is the probability that private school i exits the market, s_i represents the existing capacity in private schools in the market in which school i is located, d_i presents the demand for private schools in that market, specified as a function of a set of variables x_i. The vector c_i represents school-specific characteristics and ε_i denotes the unobservable factors that influence exit probabilities. We are implicitly assuming that failure results from a market disequilibrium.

Consider the factors associated with the demand side of the market. Weisbrod (1975) argues that the demand for nonprofits arises when the government is unable to satisfy the demand for the public good for all residents. He assumes that the government can satisfy only the demand of the median voter. If there is substantial heterogeneity in the demand for public goods, then there will be unmet demand that provides a market segment that nonprofits can satisfy. For education, heterogeneity in demand could arise from variations in income, wealth, religion, ethnic background, educational level, etc.

Several papers address variations in private school enrollment. These papers, which include James (1993), Cohen-Zada (2002), Schmidt (1992), Sonstelie (1979), Long and Toma (1988), Hamilton and Macauley (1991), Husted and Kenny (2002), and Erickson (1986), generally consider only factors associated with the demand for private schools, implicitly assuming that supply will respond to demand.[8] While the specific motivation for

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firm births and deaths and find that the growth in local demand and the relative size of the small-firm sector are important factors. See Caves (1998) for a review of this literature.

[8] Downes and Greenstein (1996, 2002) and Barrow (2006) are the only authors we are aware of who have directly addressed the issue of the supply of private schools. While these papers are concerned with the number

each paper differs, all of the studies include one or more measures of heterogeneity, including the racial, ethnic, immigrant, or religious composition of the population. The motivation for including such variables is that there is a commonality of interests among the families attending a private school, unlike public schools where the commonality is usually residential location.[9] Religious affiliation is probably the most common factor uniting students in private school, but other uniting factors are possible, such as high scholastic ability, an interest in a special academic orientation (e.g., an interest in foreign languages or science), racial prejudice, etc. Thus, the size of the common interest group should be a factor in determining the survival of a private school. These measures of commonality are consistent with Weisbrod's "government failure" model.[10]

All of the studies of private school enrollment (see above) include at least one measure of heterogeneity, typically percent Catholic and percent nonwhite. We adopt these two measures and also follow these studies in selecting other variables for our demand expression. The existing studies include measures of income and measures of the quality of public schools, typically expenditures per student and the pupil-teacher ratio. We include the pupil-teacher ratio in our basic model. The existing studies include a variety of other variables, for example, adult education level, family size, density, employment rate, poverty

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of private schools, the analysis focuses on demand side variables, essentially assuming that private schools will arise as a result of demand conditions.

[9] We consider commonality and heterogeneity to be the same thing since heterogeneity implies that there is a group with common interests that differs from the majority. In an area where all families with school-age children share the same religion, one would not find the heterogeneity that might motivate the creation of a new school; there would be no common interest different from the majority.

[10] James (1993), for example, uses Weisbrod's framework, along with limitations on the availability of public education, to explore differences across countries in the percentage of student in private schools. Consistent with Weisbrod's theory, she finds that larger religious heterogeneity leads to a larger share of students in private schools.

rate, and crime rate, some of which we include in our basic model and others we employ in alternative specifications.

Downes and Greenstein (2002) and Barrow (2006) are closely related to the current paper in that it considers private school start ups, in particular the location of new private schools in California and Illinois, respectively. In addition to the standard set of demand variables such as income and public school quality, both papers include variables to measure the size of the market (i.e., number of students) and the existing supply (number) of private school. We also include these variables.

In addition to market conditions, we hypothesize that the probability of closure will depend on school-specific factors. Studies of nonprofit closures typically incorporate the characteristics of the organization; quantitative studies of the closure of nonprofit organizations have generally used simple bivariate tables to relate closure rates to such things as age and size of the organization (see for example, Bowen, Nygren, Turner, and Duffy (1994) and Bielefeld (1994)).[11] Twombly (2003) is an exception. He used logit analysis to investigate the closure of nonprofits in the human resource sector over the period 1992-1998, focusing particularly on the effect of changes in state welfare policies on closure. He finds that smaller nonprofits were more likely to fail, as were moderately aged nonprofits. His findings are consistent with most other studies, which find that smaller and newer nonprofits are more likely to fail.

Hager and Galaskiewicz (2002) summarize the arguments for why newer and smaller nonprofits should be more likely to close. New organizations must rely on skills from outside the organization, which may be less committed to the organization than an internal

staff. New organizations do not have established routines, so that a management problem becomes a major challenge. New nonprofits lack long-standing ties with customers, lack reputation, and have less loyalty, all of which mean a lower probability of surviving a funding problem or the rise of a competing organization. Smaller nonprofits have less financial flexibility to adapt to reduced financial support.

There are also qualitative studies based on interviews with stakeholders that attempt to identify supply-side factors associated with closure. Hager and Galaskiewicz (2002), for example, find that closure is associated with financial crisis, competition, burnout, program failure and loss of key personnel.

Based on this literature we expect that smaller and newer schools will have a greater risk of failure than larger and longer tenured schools, for the reasons suggested above. Of particular relevance for new private schools is the large initial financial investment required. At least initially, and probably permanently, operating expenditures will exceed tuition revenue. Because a new school might not be able to initially attract a sufficient number of students or might not have sufficient financial resources to see it through the start-up period, new private schools are expected to have a higher probability of failure than existing schools.

If a private school does not generate sufficient enrollment as quickly as planned, the school can continue to operate if it can find sufficient external financing. If the parents are wealthy, they can potentially raise the funds necessary to continue to operate the school. Religious congregations are a major source of such funds, so that a church-related school will likely have more access to external funding and thus will be less likely to exit than other

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[11] Twombly (2003) and Hager and Galaskiewicz (2002) provide references to these studies.

types of private schools.   Finally, schools that face higher factor prices, particularly teacher

salaries, should be more likely to fail.

III. Data

The data set we employ to measure private school failure is drawn from the biennial

private school surveys conducted by the National Center for Education Statistics (NCES);

these surveys began in 1989. The data include information on certain characteristics of the

schools such as grades served, number of students and teachers, religious or other affiliations,

and the age of the school.

Information from the most recent survey indicates that the number of private

elementary and secondary schools is increasing. According to Broughman and Pugh (2004),

there were 27,223 private schools estimated to exist in the fall of 1999; by the fall of 2001,

this number had increased to 29,273. Their overview of the survey data also stated that the

southern region of the U.S. has the greatest number of schools, with over 9000 schools,

whereas the West has just over 6000 schools.

Full information is not available for every school responding to the survey and

specific information regarding the closings of schools is not publicly available. We chose a

random subset of 2,000 of the over 15,000 schools that answered the survey in 1989-90.

Based on non responses to subsequent surveys, we identified about 650 schools that appeared

to have closed by 2004. We then did an extensive search for each of these schools to

determine which ones had, in fact, closed their doors. The final sample indicates that 432

schools out of 2000 closed between the academic years of 1980-90 and 2003-04.

Our sample is skewed towards survival relative to the universe of private schools. The 15,000 schools that returned sample surveys in 1989-90 are probably not a random subset of the population of the approximately 27,000 private schools in existence. Schools that return the survey could be somewhat more organized and better staffed than those that ignore the survey; these characteristics are probably correlated with survival.[12] Note also that we code schools as closing only after they have failed to return three or more consecutive surveys and then been individually identified as no longer in existence. Thus we are very conservative in coding schools as closing.

The private schools in our sample are of different types, including elementary-only schools, high schools only, and various combinations of grades. Schools that offered kindergarten or kindergarten and first grade only were excluded from the original sample. We also exclude schools that appear to be home schools, that is, that reported having only one student. The dependent variable is thus a dummy variable, denoted FAIL, which equals one if the private school closed during the period 1989-90 to 1999-00, regardless of the year it closed.

Two basic issues must be confronted for the empirical model; how to define the geographic area for the market of the private school and which census year (1990 or 2000) to use for the independent variables since failure can occur any time over the period. Following the approach of other researchers, we treat the county as the market area. Although this does not perfectly capture market area, it seems very reasonable for elementary schools. Of course some schools, e.g., boarding schools, draw students from well beyond the county in

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[12] For example, detailed data from the state of Georgia indicate that the failure rate of private schools is around 40 percent.

which they reside. The second issue is the date at which to measure the independent variables. We assume that school closing is the result of a disequilibrium in the market, which suggests that we measure market conditions at the beginning of the period, i.e., 1990, although there are some exceptions as noted below.

Following the framework specified in equation 1, we measure supply, or market saturation, by the number of private schools in the county in 1990, scaled by the school age population (from the 1990 Census). (Because demand is modeled as if we were trying to explain the percent of students attending private school, it is appropriate to measure supply in per student terms.) This variable, denoted SUPPLY, is an imperfect measure of the supply of private schools. A preferred measure of private school supply would be the number of private school seats that are available. That information, however, is not available.

The modeling framework and the previous literature discussed in Section II suggest several variables related to the demand for private schools and school-specific variables that are expected to be related to the survival of a private school. We include per capita income (from the Bureau of Economic Analysis), denoted PCI, and school age population as a percentage of the total county population (from the 1990 Census), denoted SCHAGE.

If private and public schools are substitutes, demand for private schools should depend on the performance of public schools. There is unfortunately no measure of school performance such as test scores that is both consistent across states and available at the county level that can be used to measure the quality of public schools. Therefore, we follow others and use the student-teacher ratio (obtained from the Common Core of Data from NCES), denoted STRATIO. This was computed as pupil weighted averages for all public schools districts located in the county, as reported by NCES.

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Heterogeneity of interests has been suggested as a primary driver for the demand for private schools. Although there is no direct measure of this, various measures of heterogeneity have been used in the literature. Cohen-Zada (2002) and most others uses percent Catholic to measure heterogeneity of tastes, while Clotfelter (1976) and others use percent black. We include the percent of the population that is Catholic (from the Glenmary Research Center 1992; 2002), denoted PCCATH, as a measure of religious commonality. To account for preferences based on race, we include the percent of the population that is non-white, denoted PCNW.

To reflect general economic conditions that might be associated with the financial condition of the private schools, we compute a measure of employment in the county, denoted EMP. This is the number of individuals employed (from County Business Patterns) divided by the size of the adult (16 years and over) population. We use the value of this ratio in the year prior to the exit of the school, or the value for 2000 if the school does not fail. Although this is not exactly an employment rate, increases in the value imply stronger economic conditions. (The unemployment rate is not available for all counties.) Our summary statistics show that EMP is higher, on average, in counties where surviving schools are located.

Additional demographic variables that we include are: population density, denoted DEN, whether the county is located in a metropolitan area, denoted METRO, and the poverty rate, denoted POV. The density of a county and whether a county is part of a metropolitan area could increase or decrease the level of competition among private schools. For example, for private schools that are in a metro county, the competition they face likely includes private schools in the other counties. On the other hand, the relevant school age population

(i.e., market size) could be larger than that of the home county. Thus, the coefficients on these variables could be positive or negative. Cohen-Zada (2002) suggests density is a measure of the cost of private education due to its relationship to transportation cost.

It is possible that charter schools may be seen as very close substitutes for private schools. Thus, as an additional measure of supply we include the number of charter schools in the county, as reported by the National Center for Education Statistics, scaled by the school age population, denoted CHARTER. While we include this variable, unfortunately the earliest year for which the number of charter schools is available is 2002.

We have several variables from the private school survey that pertain to characteristics of the private school. Our data indicate whether the school is a religious school and gives the religious affiliation of the school. To measure the potential for funding a school, beyond the income of the parents, we include measures of affiliation with religious groups of independent schools, denoted RELIG. RELIG equals one if the private school belongs to one of the Christian religious affiliations. We also include a dummy variable, denoted CATH, which equals one if the school is a Catholic school. We also use dummy variables to distinguish between private schools that serve elementary schools only (grades 1-8), denoted ELEM, or high school only (grades 9-12), denoted HS, and all other schools.[13] In addition, we measure the size of the school by the number of teachers, denoted TEACH, and by the size of the student body, denoted STSIZE. Since schools that are about to fail may have suffered declining enrollments prior to closing, we determine the maximum number of teachers and student body over the period before failure.

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[13] While most of the non-high school private schools are elementary only, there are a number of schools that serve all grades or some mix of high school and elementary grades.

We have no measure of the cost structure of the private school, so we use the average teacher salary for public schools in the county, denoted SALARY, on the assumption that higher public school salaries would force private schools to pay higher salaries. We calculate this by dividing total instructional salaries by the number of full time equivalent teachers (from the Common Core of Data from NCES). Finally, we consider the number of years the school has been in service, with the expectation that newer schools are more likely to exit than schools with longer histories. We define a dummy variable, SHORTTM, that takes the value one if the school has been in existence for less than 15 years.

Table 1 presents some descriptive statistics describing the characteristics of the private schools, statistics for public school and demographic variables are in Table 2. Beginning with the sample of 2,000 schools, we find that over the next twelve years, 432 schools ceased operations. The tables show statistics for the full sample and computed separately for the schools that failed and those that survived. There are some minor, but interesting differences in some of the demographic variables. For example, per capita income is somewhat higher in the counties where the surviving schools are located. Similarly, the percentage of the population that is nonwhite is higher in the counties of surviving schools.

There are more substantial differences in enrollment and faculty sizes, the failing schools had fewer students - an average of 168 compared to a mean of 326 for the surviving schools - and had fewer teachers – about 12 on average as opposed to just over 23. The sample contains about 28 percent Catholic schools and 7 percent Christian-affiliated

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schools.[14] Interestingly, none of the Catholic schools or Christian schools in our sample

exited the market.

Table 2 indicates that failing schools are on average located in counties with a lower

population density. Surviving private schools, on average, are located in counties with lower

poverty and slightly higher percentages of Catholics in the population.

IV.   Empirical Results

Because none of the Catholic schools or Christian-affiliated schools in our sample

failed during our sample period, it was not possible to estimate a probit model that used

Catholic school or Christian school dummy variables. Instead, we estimate a linear

probability model. Due to missing values on some variables, the number of observations used

in the most general model is 1924. Column 2 of Table 3 contains the results.

Most of the private school characteristics variables had the anticipated effects on the

probability of exit. Schools that had been in existence for fewer than fifteen years

(SHORTTM) were more likely to fail that those that had been around for a long time and

computing SHORTTM with even fewer years increases the size of the coefficient.   This is

consistent with our expectations and the literature on the failure of nonprofits.   High school

only private schools were somewhat more likely to fail than other private schools. We had

expected that failure would be higher among elementary schools; it is perceived to be easier

to start an elementary school, and thus we felt that these schools might be in a more

financially precarious position.

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[14] Schools are categorized as Catholic or Christian based on the school's membership in associations such as " American Association of Christian Schools", thus it is possible that some independent Christian or Catholic schools are not included.

There are two measures of school size, TEACH, which is the number of teachers, and STSIZE, which is total enrollment. We find that when both measures are included, larger numbers of teachers have a strong negative impact on failure probabilities whereas the enrollment variable has a very small, but significant positive effect on failures. This probably indicates that, given the size of the student body, higher numbers of teachers are a positive indicator of private school quality. If the number of teachers is excluded from the model, the enrollment variable has a negative coefficient, as expected.

The results for the economic variables were mixed. The quasi-employment rate, EMP, had a strong negative impact on failure. An increase of 0.1 in this variable (say, from 0.54 to 0.64) would imply about a 2.5 percentage point decrease in the probability of failure. The coefficient on per capita income, however, is very small with a large standard error. Our results suggest that parents' decisions to send children to private schools could be more responsive to perceived threats from an increase in unemployment than from a small decrease in income. If EMP is excluded from the regression, the coefficient on PCI is negative, although it still misses statistical significance. This result agrees with the descriptive statistics which indicate that counties where surviving schools are located have a slightly higher per capita income, on average, than do counties where failing schools are.

The poverty rate, POV, on the other hand, has a small positive effect on failure, although this result just misses being statistically significant. A one percentage point increase would increase the probability of failure by about 0.4 percentage points. We initially anticipated that POV could measure heterogeneity, in that the larger the poverty rate in a county, the more likely it is that non-poverty status parents will send their child to a

private school. Our results, however, have the opposite sign; increasing poverty increases the probability of failure.

The student-teacher ratio, STRATIO, measures public school quality; this variable consistently showed a strong negative relationship with the probability of private school failure, meaning that higher student-teacher ratios are associated with lower failure probabilities for private schools. This provides some support for the notion that parents respond to quality aspects of public schools.

The average salary of public school teachers in 1999, SALARY, was meant to approximate private school costs. The coefficient on SALARY, although positive, is very small and insignificant in all models. One explanation is that in areas where education is highly valued, parents support both public and private schools. School teacher salaries are high, but this is both a cost factor for private schools and an indication of preferences.

Two variables were included to measure competition from other schools. The market saturation variable, SUPPLY, was computed as the number of private schools in the county divided by school age population. This variable has a very small positive impact on the probability of failure, but the impact is not precisely measured. We also included the number of charter schools divided by the school age population as an additional measure of competition to the private schools. The coefficient on this variable was so close to zero that it was dropped in most specifications. There are some problems with the variable given that it is measured in 2002.

Other variables that gave surprising results were the percent Catholic in the population (PCCATH) and the percent nonwhite (PCNW). Models using these variables

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never yielded significant effects. This is a surprising result given that prior studies estimating private school demand have generally found an effect.

As noted above, no Catholic or Christian-affiliated school in our sample failed during this period. Because the market for religious schools may be different than for other private schools, we reran the regression reported in column two of Table 3 but excluded these religious schools. For this sample, we estimated both linear probability and probit models. The results, which are reported in columns 3 and 4 of Table 3 are similar in terms of sign and level of significance for both models and with the results in column 2.

Another alternative model that we estimated focused only on elementary schools; this is based on the assumption that the start up of elementary schools is easier than schools that offer all grades or high school grades. Thus it seems more likely that there could be an over supply of such schools and that they may start on weaker financial footings. Thus, we ran separate models for the elementary schools. The results for elementary only are presented in column 2 of Table 4; these results do not differ essentially from the results reported in Table 3.

The impact of competition from other private schools might be obscured to some extent due to many private schools in our sample operating in counties where there are either no other or few other private schools. In the original survey data on over 15,000 schools, there are 1500 schools operating in counties with three or fewer private schools. To see whether competition has a stronger impact in places where there actually could be competition, we limited the sample to counties located in metropolitan areas (column 3 of Table 4) and re-estimated the model. The results are basically the same as those in Table 2. (We also restricted the counties to those with four or more private schools. These counties

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are essentially just metropolitan counties and thus the results are nearly identical to those in column 3.)

We also estimated several regressions using alternative sets of the variables. Generally, these had no effect on the results presented in Tables 3 and 4. It is possible, perhaps even likely, that heterogeneity has a non-linear effect. For example, if a county is 100 percent Catholic, there is no heterogeneity. To explore this possibility, we included percent Catholic squared and percent nonwhite squared. Neither coefficient on the squared term was close to being statistically significant.

We considered alternative measures of public school competition, including expenditures per student and the drop out rate. The instructional expenditures per student never showed a substantive or statistically significant impact on exit probabilities. In some specifications, the high school dropout rate had a statistically significant positive impact on the probability of failure for private schools, which seems counter-intuitive.

We included other control variables, including percent with a college degree, the crime rate, and the proportion voting Republican in the 1988 election. None of these variables had any measurable impact on failure. Further when these other control variables were included, the impacts of the primary variables were very similar to the results reported in Tables 3 and 4.

V. Summary

This paper used national survey data from the National Center for Education Statistics (NCES) to study closures of private schools, events which occur with some frequency Our model assumed that the closure of a nonprofit private school is the result of market

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disequilibrium. In particular, we hypothesized that the probability of an exit by a private school is an increasing function of the difference between the supply of and the demand for private schools in the market, as well as a function of school-specific factors. We relied on the existing literature that attempts to explain the percent of students in private school to select variables related to the demand, and the literature on the closure of nonprofits to select the school specific variables. The empirical results are generally consistent with results from the previous demand side literature as well as with our conjectures on the effects of supply-side factors.

A broader purpose of the analysis is to explore the question of whether the behavior of nonprofit private schools is consistent with a market model of non profit firm behavior. Our empirical model yielded results that generally support the market model of private schools. However, the fact that none of the Catholic or Christian-affiliated schools in our sample failed suggests that market forces might not dominate for all private schools.

There is an implicit assumption in the literature on public school choice that nonprofit private school supply will respond to match any increase in demand generated for example, by a voucher system that allows parents to opt out of poorly performing public schools. Other than this paper, no one, to our knowledge, has tried to verify this empirically. Our work is the first step in examining this assumption and our results provide some indirect evidence that most nonprofit private schools are market driven.

An important issue that our research only begins to examine is the reaction of private schools to public school quality. Our results indicated that public school districts where student teacher ratios are high led to lower failure probabilities for private schools. This evidence is indirect at best; longitudinal data on public and private schools are needed to

analyze the impact of changing quality in the public schools on the private school market.

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Table 1: Descriptive statistics for private school characteristics

Variables	All Schools Mean (St. Deviation)	Exit=0 Mean (St. Deviation)	Exit=1 Mean (St. Deviation)
	n=2000	n=1568	n=432
Total enrollment STSIZE	292.382 (288.19)	326.637 (304.49)	168.049 (168.37)
Total Teachers TEACH	20.778 (20.42)	23.173 (21.75)	12.067 (10.81)
Years in service YEARS	35.096 (32.76)	36.929 (33.24)	28.440 (30.05)
Catholic school CATH	0.281 (0.45)	0.358 (0.48)	0.00 (0.00)
Christian school RELIG	0.073 (0.26)	0.092 (0.29)	0.00 (0.00)
Number private schools in county/ school age pop SUPPLY	47.544 (22.12)	47.583 (21.86)	47.402 (23.03)
Elementary only ELEM	0.640 (0.48)	0.652 (0.48)	0.595 (0.49)
High school only HS	0.064 (0.249)	0.067 (0.25)	0.051 (0.22)

These variables are found in: National Center for Education Statistics, Private School Survey, 1989-1990 through 2001-2002.

Table 2: Descriptive statistics, public school and demographic variables

Variables	All Schools Mean (St. Deviation)	Exit=0 Mean (St. Deviation)	Exit=1 Mean (St. Deviation)	Data Source
	n=2000	n=1568	n=432	
Student/teacher ratio public schools 1991 STRATIO	16.920 (2.57)	16.954 (2.58)	16.799 (2.57)	NCES, CCD
Number charter schools/school age pop CHARTER	3.740 (6.33)	3.765 (6.38)	3.651 (6.12)	NCES, CCD
High school dropout rate DROPOUT00	3.438 (3.12)	3.476 (3.16)	3.304 (2.96)	NCES, CCD
Mean Salary teachers, 2000 SALARY	52,506 (10302)	52,660 (11449)	51957 (9750)	NCES, CCD
School age pop 1990 (as percent) SCHAGE	17.990 (2.31)	17.975 (2.29)	18.045 (2.40)	U.S Census, 1990
School age pop 2000 (as percent) SCHAGE_2000	18.814 (2.01)	18.809 (1.99)	18.834 (2.07)	U.S. Census, 2000
Per capita income, 1990 PCI	14,998 (3.549)	15,069 (3,512)	14,739 (3,669)	U.S Census, 1990
Per capita income, 2000 PCI_2000	22,213 (5211)	22,297 (5185)	21.907 (5299)	U.S. Census, 2000
Nonwhite pop 1990 (as percent) PCNW	26.735 (19.818)	26.946 (19.90)	25.969 (19.518)	U.S Census, 1990
Nonwhite pop 2000 (as percent) PCNW_2000	33.965 (22.01)	34.229 (22.13)	33.006 (21.58)	U.S. Census, 2000
Percent Catholic Population 1990 PCCATH	26.315 (15.52)	26.405 (15.29)	25.986 (16.33)	Glenmary Institute
Percent Poverty 1990, POV	12.686 (5.74)	12.607 (5.61)	12.972 (5.95)	U.S Census, 1990
Population Density 1990 DEN	2903.11 (7422.6)	3091.60 (7819.2)	2218.95 (5713.74)	U.S Census, 1990
Employment Rate (one year lag) EMP	0.535 (0.202)	0.547 (0.205)	0.493 (0.185)	County Business Patterns
Metro Area METRO	0.867 (0.34)	0.872 (0.33)	0.845 (0.362)	U.S Census, 1990

Table 3: Results from linear probability model and probit marginal effects

	All schools	Excluding Catholic and Christian schools	Probit model marginal effects
	N=1924	N=1239	N=1239
Variable	Estimated Coefficient (St. Error)	Estimated Coefficient (St. Error)	Estimated Marginal effect (St. Error)
Private school characteristics			
SHORTTM	0.080*** (0.20)	0.1070** (0.029)	0.1003*** (0.029)
STSIZE	0.0121*** (0.004)	0.0094 (0.008)	0.0116 (0.015)
TEACH	-0.0053*** (0.0007)	-0.0061*** (0.0009)	-0.0109*** (0.002)
ELEM	-0.0411* (0.025)	-0.0425 (0.030)	-0.0472 (0.032)
HS	0.0626* (0.038)	0.044 (0.060)	0.1026 (0.075)
RELIG	-0.3335*** (0.0188)	-	-
CATH	-0.3056*** (0.016)	-	-
SUPPLY	58.119 (48.13)	80.550 (74.25)	82.641 (74.11)
Economic conditions			
EMP	-0.2448*** (0.060)	-0.3515*** (0.084)	-0.3619*** (0.091)
PCI	0.0035 (0.005)	0.0042 (0.007)	0.0050 (0.008)
POV	0.0035 (0.002)	0.0052 (0.004)	0.0054 (0.004)
Demographic characteristics			
PCCATH	0.0002 (0.0007)	0.0007 (0.001)	0.0009 (0.001)
METRO	0.0428 (0.031)	0.0561 (0.047)	0.0700* (0.043)
SCHAGE	-0.0079 (0.005)	-0.0108 (0.007)	-0.0114 (0.008)
DEN	-0.0068*** (0.002)	-0.0090*** (0.003)	-0.0110*** (0.004)
Public school variables			
STRATIO	-0.0109*** (0.004)	-0.0175*** (0.006)	-0.0201*** (0.001
SALARY	0.0006 (0.001)	0.0011 (0.002)	0.0012 (0.002)
Constant	0.6748*** (0.157)	0.8204*** (0.225)	-
R^2	.21	.09	

Notes: Estimated standard errors are robust. * indicates statistical significance at the 10% level, ** indicates statistical significance at the 5% level, and *** indicates statistical significance at the 1% level. Marginal effects for dummy variables are computed as the change in probability as the dummy variable changes from 0 to 1.

Table 4: Results from linear probability models, alternate specifications

Variable	Elementary schools N=1230 Estimated Coefficient (St. Error)	Schools in metro counties N=1658 Estimated Coefficient (St. Error)
SHORTTM	-0.0575*** (0.026)	0.0730*** (0.022)
STSIZE	-0.0044 (0.008)	0.0126*** (0.005)
TEACH	-0.0055*** (0.001)	-0.0053*** (0.0007)
ELEM	-	-0.0391 (0.027)
HS	-	0.0624 (0.039)
RELIG	-0.3063*** (0.027)	-0.3231*** (0.020)
CATH	-0.3021*** (0.019)	-0.3033*** (0.017)
SUPPLY	1.713 (57.28)	79.548 (63.15)
Economic conditions		
EMP	-0.2110*** (0.074)	-0.2290*** (0.066)
PCI	0.0000 (0.006)	0.0024 (0.006)
POV	0.0022 (0.003)	0.0019 (0.003)
Demographic characteristics		
PCCATH	0.0008 (0.001)	0.0001 (0.0008)
METRO	0.0622* (0.037)	-
SCHAGE	-0.0098 (0.007)	-0.0085 (0.005)
DENS	-0.0053* (0.003)	-0.0065*** (0.002)
Public school variables		
STRATIO	-0.0132*** (0.005)	-0.0106*** (0.004)
SALARY	0.0005 (0.002)	0.0006 (0.001)
Constant	0.8049 (0.198)	0.7394 (0.173)
R^2	.22	.21

Note: Estimated standard errors are robust. * indicates statistical significance at the 10% level, ** indicates statistical significance at the 5% level, and *** indicates statistical significance at the 1% level.