

Dynamic Selection Effects in Means-Tested, Urban School Voucher Programs

William G. Howell

Abstract

Much of the controversy surrounding school vouchers, and privatization schemes generally, stems from concerns about social stratification. This paper identifies the form and magnitude of selection effects in a means-tested New York City voucher program. It compares students who applied for vouchers, with the eligible population of public-school students; those who initially used vouchers, with those who declined them; and those who remained in private schools, with those who eventually returned to public schools. Differences along the lines of ethnicity, residential mobility, mother's education, and income are observed. In addition, specific aspects of a child's education—parental satisfaction, school uniform requirements, and larger class sizes—all increased the length of time voucher students remained in private schools. Throughout the program's life span, however, the largest and most consistent effects revolved around families' religious identity and practices. © 2004 by the Association for Public Policy Analysis and Management.

INTRODUCTION

As they currently operate in the United States, most school voucher programs offer modest private school tuition subsidies to poor families living in urban environments. To participate, families must locate an appropriate private school for their child, apply for admission, find transportation between school and home, and supplement the vouchers with private funds. Proponents regularly cast vouchers as an escape hatch for the least advantaged students stuck in the worst public schools—but whether vouchers actually reach this population and whether vouchers ultimately alleviate educational inequalities remain very much open questions.

There is cause for skepticism (Elmore and Fuller, 1996; Gewirtz, Ball, and Bowe, 1995). Parents, for one, are not equally adept at selecting an adequate private school for their child and advocating for admission. In voucher programs, Henry Levin expects that “choosers will be more advantaged both educationally and economically than non-choosers... thereby relegating [the latter] to their assigned schools” (1998, p. 379). Better connected families with greater resources may use vouchers to secure scarce spaces in private schools, and they may well benefit from doing so. But lacking quality information about private schooling options or the additional resources needed to act upon them, less advantaged families may remain consigned to their local public schools.

Manuscript received April 2002; review complete February 2003; revision complete April 2003; review complete May 2003; accepted August 2003

Journal of Policy Analysis and Management, Vol. 23, No. 2, 225–250 (2004)

© 2004 by the Association for Public Policy Analysis and Management

Published by Wiley Periodicals, Inc. Published online in Wiley InterScience (www.interscience.wiley.com)

DOI: 10.1002/pam.20002

Within the private sector, furthermore, choices belong as much to schools as to families. As they attract increasing numbers of applications, elite schools may cull their lists and select the most talented voucher students, thereby further enhancing their academic reputation. Lower performing schools, meanwhile, may continue down a spiral of decline. “The incentives are clear,” notes Harry Brighthouse. When schools have a choice, they pursue “able, well-motivated and middle class students” (2000, p. 169). When initially screening applicants and then monitoring their progress over time, private schools may systematically weed out less attractive students—foremost among them being lower performers, the learning disabled, the physically handicapped, racial and ethnic minorities, and the poor (Hochschild and Scovronick, 2003, pp. 125–126). Given that public schools presumptively accept and serve all students, vouchers may exacerbate existing inequalities along the lines of student ability, ethnicity, and income.

In practice, it is difficult to distinguish the free choices of parents from the selective admissions of private schools. As social scientists, all we observe is that some families attend private schools and others return to public schools. And unfortunately, post hoc explanations for these decisions by parents and school administrators—something scholars typically have relied upon as evidence¹—probably do not tell a complete story: parents may mistakenly attribute their inability to find an acceptable private school to their own failings, and school administrators may conceal their true reasons for refusing to admit a child.

Nonetheless, it is possible to assess how parents and schools jointly determine who takes advantage of new schooling options in a voucher program, and who remains in their local public schools. This paper compares public school students who applied to a means-tested New York City voucher program, with the larger population of eligible recipients. It then compares students who initially accepted vouchers, with those students who refused them. It tracks the length of time different kinds of students, coming from different kinds of families and receiving different kinds of education, attended private schools. Doing so, this paper presents new evidence on the magnitude and character of selection effects in targeted school voucher programs.

THE LITERATURE

Numerous scholars have examined how public and private school students differ from one another (Betts and Fairlie, 2001; Buddin, Cordes, and Kirby, 1998; Figlio and Stone, 2001; Lankford and Wyckoff, 1992; Long and Toma, 1988). For the most part, these studies show that private school families have especially strong religious commitments, have higher incomes, and live in districts whose public schools score relatively low on standardized tests and have higher student-to-teacher ratios. The data that inform these conclusions, however, are clearly limited by the fact that they reflect parental and school choices made in an existing system where public schools are (nominally) free and private schools are not. By eliminating, or at least decreasing, the cost of a private education, vouchers effectively alter an ongoing choice process—and doing so, they may appeal to parents who differ markedly from those who already have opted out of the public sector.

To date, most evaluations of means-tested programs suggest that selection effects are not especially alarming.² Consider, for example, one study of the Horizon Schol-

¹ See, for example, Beales and Wahl, 1996; Heise, Colburn, and Lamberti, 1995; Martinez et al., 1995; Peterson and Howell, 2000; Peterson et al., 1999.

² In addition to the evaluations of operating voucher programs listed below, several scholars have estimated the levels of social stratification that emerge in simulated educational markets (Epple and Romano, 1998; Manski, 1992; Moe and Shotts, 1995; Nechyba, 2000). Others, meanwhile, have relied upon surveys to gauge levels of interest in vouchers in different populations (see, e.g., Moe, 2001).

arship Program, which offered vouchers to every student who qualified for the free or reduced lunch in the Edgewood School District (Peterson, Myers, and Howell, 1999). Among those families offered vouchers, students who used them (takers) tended to score slightly higher on the reading portions of standardized tests than those who refused them (decliners). In addition, takers were less likely to have learning disabilities than decliners, and their mothers completed, on average, one more year of education. The analysts concluded that the Horizon program “hardly skimmed the cream of the Edgewood public schools, but, on the other hand, neither are the initial participants the poorest of the poor. Instead, participants . . . might be roughly classified as the children of the working poor” (p. 35).

Paul Peterson, David Campbell, and Martin West wrote the first study of enrollment patterns in a privately financed, means-tested national voucher program (2002). They found that African Americans were more likely to apply for a voucher, but less likely to use one offered to them. In addition, Catholics, “born again” Christians, families that attended church frequently, and families that had resided at their homes for long periods of time were especially likely to take advantage of new opportunities to send their children to private schools. Peterson, Campbell, and West concluded that “with the notable exceptions of religious attendance and residential stability, the entry of voucher families into the private school market would serve to diminish the gap in the social composition of the public and private educational sectors” (p. 84).

In his evaluation of the publicly financed Milwaukee voucher program, John Witte claimed that evidence of a “creaming selection process” was mixed (2000, p. 71).³ Comparing the characteristics of qualified applicants who used vouchers to attend a private school to those of applicants who returned to the public sector, Witte observed that African Americans and Latinos were less likely to use vouchers offered to them, just as parents who used vouchers tended to place more importance on their child’s education than those whose children returned to public school. The parents of students who used vouchers, however, were less likely to be married and tended to have a smaller income.⁴

Some of the best data on selection effects in larger private education markets come from choice initiatives conducted abroad—and there, selection effects appear more pronounced. Edward Fiske and Helen Ladd recently examined a national open-enrollment program in New Zealand and documented a dramatic population shift from “low-decile” schools (with high concentrations of minorities and economically disadvantaged students) to “high-decile” schools (Fiske and Ladd, 2000; Ladd and Fiske, 2001). Parents, Fiske and Ladd (2000) argue, use the socioeconomic status and racial composition of a student body as a proxy for the school’s quality. Knowing this, participating schools have strong incentives to select more “attractive” students, and thus “improve their competitive position” in the education marketplace. The result? “The basic forces unleashed by parental choice—including the tendency to judge school quality by the mix of a school’s student body—are likely to push systems toward greater ethnic and socioeconomic polarization under almost any circumstance” (p. 305).

³ Witte’s analysis focuses exclusively on the first four years of the Milwaukee voucher program, when only 1–1.5 percent of students in the district were allowed to use a voucher to attend a parochial school. In 1996, the cap was lifted to 15 percent of students, and secular private schools were allowed to participate in the program. After the Wisconsin Supreme Court upheld the program’s constitutionality in 1998, the program dramatically increased in size. In 2002, 11,163 students in Milwaukee used vouchers to attend 107 private schools (data compiled by the Public Policy Forum: see <<http://www.publicpolicyforum.org/josh/BeyondAnExperiment.pdf>>). It is not known whether Witte’s observations about selection effects in Milwaukee from 1991 to 1995 apply to the larger version.

⁴ Vouchers in Milwaukee covered the full amount of tuition at area private schools.

Chile, which instituted nationwide school choice in 1981, has provided additional findings on the sorting of students in a privatized education marketplace. While nationally, private school enrollments in Chile jumped from roughly 20 to 40 percent between 1981 and 1996, Chang-Tai Hsieh and Miguel Urquiola (2002) document considerable variations in take-up rates by region, family income, and parental education (see also McEwan, 2000; McEwan and Carnoy, 1999). Parents with a high school education, for instance, were 15 percentage points more likely to send their child to a private school than parents with only a primary school education. Wealthier families living in larger cities also were much more likely to use vouchers than poorer families in rural environments.

Conventional wisdom suggests that selection effects intensify as voucher programs increase in size and scope. However, an important gap persists in the scholarly literature that supports this understanding. No one has used student-level data to study selection effects throughout the duration of a voucher program. This omission has two consequences. First, as Lankford and Wyckoff (1992) note, without individual-level data it is extremely difficult to evaluate the capacity of families and students to actually use the vouchers offered to them. Second, by limiting the analysis to initial take-up rates, much of the existing work overlooks the fact that possibilities for skimming are not isolated to the instance when parents select schools, and schools decide whether to admit students. Students may enter private schools and subsequently discover that they cannot keep up, that they do not feel welcome, that their academic needs are not met, that they lack peers from their own ethnic group, and subsequently they may leave the program. To the extent that attrition is a non-random occurrence, significant selection effects may emerge over the course of a voucher program's life span that, at baseline, go undetected.

THE ISSUE OF SCALE

While they have attracted considerable controversy, vouchers, in practice, inhabit a miniscule plot on the landscape of domestic education reforms. As they currently operate, programs offer only a small number of vouchers to targeted populations, usually ones defined by residency and income. The 68 private programs in existence in 2000 helped fund the private education of roughly 50,000 students nationwide; the three public voucher programs in Cleveland, Milwaukee, and the state of Florida served an additional 13,000 students. The private programs awarded only modest vouchers, typically between \$1000 and \$2000. While public programs offered larger vouchers, even the largest (in Milwaukee) still lagged considerably behind public school per-pupil funding. Finally, as court challenges cast a shadow on public programs, and philanthropists debated whether to continue private programs, voucher students and private schools had few assurances of ongoing funding—a fact dramatically illustrated in 1999, when U.S. District Court Judge Solomon Oliver issued a preliminary injunction against the Cleveland voucher program just days before the new school year.⁵

Given the modest size, funding levels, and duration of existing voucher programs in the United States, it is extremely important to differentiate the selection effects observed now from the kinds of social, economic, and religious stratification that

⁵ The injunction prompted widespread criticism in the media, and Oliver quickly backtracked, allowing students already in the voucher program to continue attending private school but forbidding any new enrollments. Two months later, the U.S. Supreme Court intervened, allowing the continuation of all aspects of the program until constitutional questions were resolved. *Zelman v. Simmons-Harris*, 528 U.S. 983 (November 5, 1999).

might emerge in a universal privatized market for schools of the sort imagined by Milton Friedman (1955). For starters, as larger vouchers are offered to increasing numbers of families, private entrepreneurs may begin to invest the considerable monies required to open new schools, thereby altering the landscape of educational options in the private sector. Similarly, as enrollees increase, existing private schools may begin to accommodate the specific needs of voucher students. Indeed, one of the promises of a bona fide education marketplace is that competitive pressures will encourage innovation and differentiation, which, in turn, should route out the sorts of discrimination and inequities that currently pervade public and private education (Chubb and Moe, 1990).

Rather than mitigating selection effects, however, one can imagine large-scale voucher programs making them worse. Private schools may freely admit a handful of low-income students. But when choosing among hundreds of applicants, admissions requirements may become increasingly discriminating—especially when selectivity and the makeup of a student body crucially define a school's reputation (Fiske and Ladd, 2000; Ladd, 2002). Rather than empowering parents and ushering in new schooling options, a universal voucher program might only further marginalize a community's least advantaged members.

In ways that are not immediately obvious, a large-scale voucher program could also affect the demand side of the equation. On the one hand, as growing numbers of families penetrate the private sector, less advantaged parents may begin to conceive of new rights to exercise choice on behalf of their children. On the other, the experience of being denied admission to a private school may only reinforce these families' sense of frustration, alienation, and neglect.

When searching for evidence of selection effects in existing voucher programs, conclusions must be drawn with considerable care. Broad voucher schemes may induce such dramatic developments that no extrapolation from more modest voucher interventions is possible. But as the evidence presented below indicates, selection effects may be quite pronounced even in small-scale voucher initiatives. Policymakers are well advised not to presume that the families they target will be the same ones who apply for vouchers, take them, and then remain in private schools for extended periods of time.

NEW YORK CITY

In 1997, the School Choice Scholarships Foundation (SCSF) announced its intention to offer scholarships worth up to \$1400 annually toward tuition at a private school for at least 3 years. To qualify for a voucher, children had to be in grades kindergarten through 4,⁶ live in New York City, attend a public school at the time of application, and come from a family whose income is low enough to qualify for the U.S. government's free or reduced-price school-lunch program.

Mathematica Policy Research (MPR), in conjunction with the Program on Education Policy and Governance at Harvard University, evaluated the program. MPR collected baseline test-score and demographic information on all students who were offered vouchers. During each spring of the program's first 3 years, evaluators re-surveyed parents about their children's school experiences. At baseline, MPR collected survey information from 100 percent of parents who were offered vouchers.

⁶ Because test scores are not available for kindergartners, this paper focuses on the attendance patterns of students in grades 1–4. Except where noted, all findings hold regardless of whether kindergartners are added to the analysis.

One year later, MPR contacted 88 percent of first-year takers. Subsequently, MPR contacted 93 percent of families who continued to use vouchers for the second year, and 94 percent of families who used vouchers for the third year.⁷

Because vouchers were awarded by lottery, the conditions for a randomized field trial applied. As a consequence, families offered vouchers represent a random draw of applicants. Elsewhere, the programmatic impacts of switching from a public to a private school are presented in detail (Barnard et al., 2003 and responses; Howell and Peterson with Wolf and Campbell, 2002; Howell et al., 2002). Here, the focus is slightly different. Rather than looking at the effect of changing school sectors on education outcomes, this study compares the families and students who used vouchers to attend private schools to those who remained in or later returned to public schools. As a consequence, the traditional control group (i.e., students who were not offered vouchers) does not enter into the main analyses that follow, and the conditions for a randomized field trial no longer hold. Indeed, the central aim of this paper is to identify how voucher applicants and non-applicants, and takers and decliners, systematically differ from one another.⁸

WHO APPLIES FOR VOUCHERS?

More than 20,000 students initially applied to the SCSF program. Given the motivation required to learn about a small program, figure out where and how to apply, and then attend various income verification and testing sessions, we might expect SCSF to have reached a particularly privileged selection of families within the population it intended to serve.

Table 1 presents demographic information on the population that would have been eligible had vouchers been offered in 1990.⁹ Important differences between those who applied for SCSF vouchers and those who remained in their public schools are observed. The applicant population was 10 percentage points less likely to be non-Hispanic white and 13 percentage points more likely to be African American. The income level of the eligible population exceeded that of applicants by \$466. Applicants were roughly 12 percentage points more likely to receive government welfare assistance than were members of the eligible population. In addition, applicant mothers were slightly more likely to be foreign born than was the eligible population. If these differences suggest that the applicant population was particularly disadvantaged, other findings point in the opposite direction. Mothers who applied for vouchers were considerably more likely to have attended college and to be employed,

⁷ Voucher renewals were conditional upon participation in the study. Note that the pool of students using vouchers shrinks over time so that by the third year only those families who were most committed to a private education remained in the sample—explaining why response rates among takers increase in each successive year. Response rates for families who were offered vouchers, meanwhile, were considerably lower and followed a different trajectory (88, 69, and 60 percent for the 3 years, respectively). The duration models that follow focus explicitly on those families and students who used vouchers offered to them. As a consequence, the higher response rates apply.

⁸ The analyses below focus exclusively on the enrollment patterns of voucher applicants and recipients. No data are presented on how the voucher program altered the educational choices made by families already enrolled in private schools. If appreciable, enrollment shifts of private-school students could either offset or exacerbate the selection effects induced by voucher students and families.

⁹ Characteristics of the eligible population were drawn from the Integrated Public Use Microdata Series dataset of the U.S. Census, created by the University of Minnesota (Ruggles and Sobek, 1997). New York City parents whose children attended a public school and who qualified for the federal free lunch program (their incomes placing them at or below 130 percent of the poverty line) were extracted for analysis from the 1990 Census. At the time of this writing, comparable data were not available for the 2000 Census.

Table 1. Who applies for vouchers?

	Eligible Population (1)	Applicants (2)
Household income (1996 dollars)		
\$0–\$4,999	29.1%	29.6%
\$5,000–\$10,999	36.1	35.8
\$11,000–\$24,999	29.7	31.1
\$25,000–\$39,999	4.7	3.3
More than \$40,000	0.4	0.2
Total	100.0%	100.0%
Average income	\$10,049	\$9,673
Percentage receiving welfare	46.8%	58.8%
Mother's education		
Grade 1–12, no HS Grad	57.7%	22.2%
High school grad (or GED)	23.3	25.9
Some college	14.7	41.4
Bachelor's degree or above	2.2	10.6
Total	100.0%	100.0%
Mother's employment		
Employed	20.8%	36.3%
Unemployed or not in labor force	79.2	63.7
Total	100.0%	100.0%
Mother's race/ethnicity ^(a)		
African American (non-Hispanic)	31.2%	43.6%
Hispanic	48.4	46.9
White (non-Hispanic)	14.8	4.6
Asian	5.4	1.0
Other	0.2	3.9
Total	100.0%	100.0%
Percentage foreign-born mothers	35.7%	38.9%
Number of dependent children	2.6	2.6

"Eligible population" consists of all parents living in New York City who qualified with children who attended public schools and who qualified for the federal free lunch program. "Applicants" consist of all students who applied to SCSF. Data on eligible population come from the 1990 Census.

^a To obtain an average, responses on parental surveys of "over \$50,000" were arbitrarily set at \$60,000.

^b The census asks separate questions for race and ethnicity. In column one, therefore, "African American" refers the percentage of mothers who claimed to be "Black/Negro" on the race question and "Not Hispanic" on the ethnicity question. Comparable methods were used to determine the percentage "white" and "Asian." Percentage Hispanic was calculated directly from the ethnicity question.

either full- or part-time. Whereas 21 percent of the eligible population was employed and 17 percent had attended at least some college, 36 percent of applicants were employed and 54 percent had attended college.¹⁰

¹⁰ Two cautionary notes concern these particular findings. First, information on the eligible population in New York City comes from the 1990 U.S. Census, while that for applicants comes from parental surveys administered by SCSF officials in 1996. As such, issues of data comparability may apply. Second, studies that compare voucher applicants and eligible populations using equivalent data collection procedures do not report such striking differences between applicants and eligible populations. Peterson, Campbell, and West (2002), for instance, administered surveys to applicants to a national voucher program and a random sample of qualifying public-school parents. While many of their findings are consistent with those observed here, reported differences between the mothers' education of applicants and the eligible population are negligible (p. 60). (Peterson, Campbell, and West do not report any information on mothers' employment status.)

WHO INITIALLY TAKES VOUCHERS?

During the summer of 1997, SCSF offered vouchers to 11,041 students in grades 1–4 to help defray the costs of a private education. Not all students, however, succeeded in gaining admission to a private school. Indeed, only 74 percent of students used the vouchers to attend area private schools, while the rest returned to public schools.

If motivated parents did a better job of advocating for their children during the admissions process, and if school administrators recruited the “best and brightest” among the voucher population, then voucher takers should look quite different from decliners. Table 2 reports estimates from a logistic regression that tests this proposition. The dependent variable indicates whether a student used a voucher offered to her in the program’s first year. The explanatory variables, all of which have been rescaled to range from zero to one, consist primarily of family and student characteristics. To correct for heteroskedasticity, robust standard errors are estimated.¹¹

Consistent with other scholars’ findings, income is positively correlated with the likelihood that families used vouchers. Setting all other regressors at their means, moving from one standard deviation below the mean of family income to one standard deviation above—roughly a \$14,000 swing—translates into an 11 percentage point increase in the likelihood that parents initially took a voucher offered to them. Given the modest monetary value of the vouchers, this finding is hardly surprising.

Confirming previous work on private school enrollments, religion in New York influences families’ initial decisions to use vouchers (Lankford and Wyckoff, 1992; Long and Toma, 1988). Moving from one standard deviation below the mean of religious observance to one standard deviation above translates into a 6 percentage-point increase in the likelihood that a family accepted a voucher. Catholics and Protestants, what is more, were 15 and 9 percentage points more likely to use vouchers than Jews, Muslims, or non-religious individuals (the base category), reflecting, perhaps, the greater availability of private schooling options for Christians. Mothers’ employment status, education, family size, and residential stability consistently register null effects on outcomes.

When examining a national voucher program, Peterson, Campbell, and West (2002) observed whites enrolling in private schools with greater frequency than members of other ethnic groups. In the SCSF program in New York City, however, just the opposite occurred. African Americans were, on average, 15 percentage points more likely to use the vouchers offered to them than were either whites or Asians.

Academic traits of children influenced take-up rates as well. As the second column of Table 2 reports, the program primarily benefited students who did not require special accommodations in the classroom. Children with learning disabilities were, on average, 8 percentage points less likely to use vouchers. Children iden-

¹¹ All of these data come from baseline surveys. For those items that clearly are not affected by treatment (ethnicity, income, mother’s education, employment status, family size, and religious affiliation), missing values are backfilled using survey responses collected after one, two, or three years. One noteworthy item is excluded from these analyses (mother born outside U.S.) because of a large number of missing values; models that include this item generate null effects, while the estimated coefficients for all other coefficients remain comparable to those presented here.

Table 2. Predicting who initially accepts vouchers offered to them.

	Model 1		Model 2		Model 3	
Family characteristics:						
African American (non-Hispanic)	0.97***	(0.29)	0.91***	(0.31)	0.79**	(0.32)
Hispanic	0.24	(0.29)	0.14	(0.32)	0.03	(0.32)
Income	1.88***	(0.62)	2.14***	(0.71)	2.18***	(0.72)
Mother employed full time	-0.13	(0.19)	-0.15	(0.22)	-0.14	(0.22)
Mother's education	0.13	(0.34)	0.48	(0.36)	0.59	(0.37)
Residential stability	0.17	(0.25)	0.05	(0.27)	0.04	(0.27)
Family size	-0.15	(0.44)	-0.14	(0.50)	-0.23	(0.51)
Freq. attend religious services	0.57**	(0.29)	0.57*	(0.32)	0.56*	(0.32)
Catholic	0.78***	(0.28)	0.86***	(0.31)	0.85***	(0.30)
Protestant	0.44	(0.27)	0.62**	(0.31)	0.59**	(0.30)
Student characteristics:						
Physically handicapped ^(a)	—	—	-0.37	(0.45)	-0.39	(0.46)
Gifted	—	—	-0.65**	(0.27)	-0.63**	(0.26)
Learning disabled	—	—	-0.45*	(0.25)	-0.42*	(0.25)
Baseline test scores	—	—	0.57	(0.49)	0.66	(0.49)
Grade 1 in 1996-97	—	—	-0.28	(0.26)	-0.26	(0.26)
Grade 2 in 1996-97	—	—	-0.20	(0.26)	-0.20	(0.26)
Grade 3 in 1996-97	—	—	-0.33	(0.26)	-0.31	(0.26)
Student coming from a "low-performing" public school	—	—	—	—	0.58**	(0.24)
Constant	-0.66	(0.49)	-0.38	(0.55)	-0.78	(0.59)
(N)	907		797		797	
Pseudo R ²	.05		.06		.07	
Log likelihood	-481.93		-400.66		-397.90	

Logit regressions performed. Robust standard errors reported in parentheses. * significant at .10 level, two-tailed test; ** significant at 0.05 level; *** significant at 0.01 level. All covariates rescaled to range from 0 to 1. The dependent variable is coded 1 if the student accepted the voucher offered, and 0 otherwise.

^a "Physically handicapped" is the only variable that was not included in the baseline surveys.

tified as "gifted," meanwhile, were 11 percentage points less likely to use vouchers offered to them.¹²

Surely, part of a family's decision about whether to use a voucher rests upon the quality of the public-school alternative. At baseline, MPR identified whether each child, prior to applying for a voucher, attended a public school with average test scores below the district mean. As one might expect, the vast majority (85 percent) did. Column three shows that children attending these schools were, on average,

¹² Test scores did not affect take-up rates. Test scores register null effects whether or not one assumes a linear relationship between a student's performance and the likelihood of her using a voucher to attend a private school.

10 percentage points more likely to use a voucher than were students who came from public schools with higher-performing student bodies. Private schools, as such, apparently represented a more attractive option for students attending lower-performing public schools. This finding is consistent with other scholars' analyses of private school enrollments in California (Buddin, Cordes, and Kirby, 1998).

At this phase in the program, it still is not clear whether those who used vouchers in New York came from more advantaged social backgrounds than those who opted to remain in public schools. On the one hand, takers generally had higher incomes, they attended religious services more often, and their children were less likely to have learning disabilities. On the other hand, takers were more likely to be African American or Latino, and their children were less likely to be gifted learners and more likely to come from lower-performing public schools.

WHO REMAINS IN PRIVATE SCHOOL?

Selection mechanisms do not automatically halt once a student enrolls in a private school—the vast majority of which, in New York, were parochial.¹³ Students who feel socially alienated and families who cannot continue to pay the extra costs of a private-school education may opt to return to their old public schools. Private schools, meanwhile, may ask students to leave if they cannot keep up academically or if they present behavioral problems. The sorting of (and by) students and schools is a dynamic process. To glean insight into its properties, policy analysts must look beyond the initial admissions process. And given the school mobility rates in the New York City voucher program, there is good reason for doing so. Fully 40 percent of students who initially took a voucher returned to public schools within 3 years. During this period, another 7 percent of takers dropped out of the program for at least one quarter, only to subsequently rejoin a private school.

Figure 1 graphs the Nelson-Aalen cumulative hazard estimates during the first 12 quarters (or 3 years) of the New York City voucher program.¹⁴ (Dotted lines denote 95 percent confidence intervals.) The cumulative hazard indicates the average number of times that a private-school student can be expected to have left the voucher program and returned, if only temporarily, to the public sector.¹⁵ The cumulative hazard steadily increases over time, topping out at 0.6 after 12 quarters, or 3 years.¹⁶ If these trends continue, within 5 years the average student who initially took a voucher in the New York program can be expected to have dropped out of private school and returned to the public sector at least once.

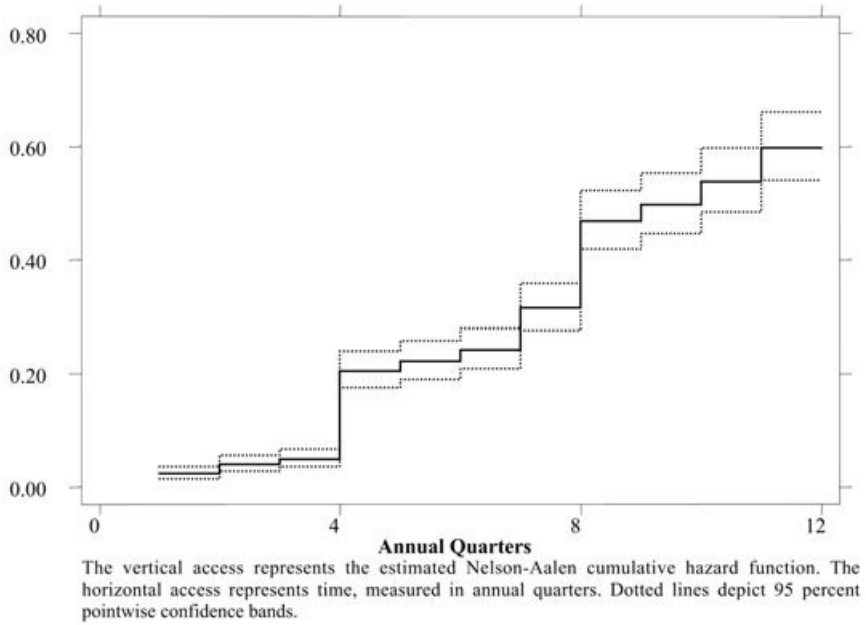
¹³ Approximately 85 percent of the voucher recipients attended a Catholic school, roughly 13 percent attended Lutheran, Baptist, and other Protestant schools, and a handful of students attended Muslim, Jewish, and secular private schools. For more information on the types of private schools attended by voucher students, see Howell and Peterson (2002, p. 37).

¹⁴ Each quarter, these data only indicate whether SCSF sent a check to a private school. Data are not available, however, on which school received the check. As such, there is no way to differentiate those students who remained at the same private school for a specified period of time from those who attended multiple private schools. These data therefore represent a lower-bound on student mobility rates among voucher recipients within the private sector.

¹⁵ Most students who left the program never returned. Thus, the average number of “failures” is roughly equivalent to the probability that a family dropped out of the program. Because some students who initially used vouchers dropped out of a private school only to return later, however, the cumulative hazard exceeds the probability of exit.

¹⁶ Most voucher students who returned to the public sector did not enroll in the same school they attended at baseline. According to parental reports (see below), 66.4 percent of students who were offered a voucher but who were not enrolled in a private school after 3 years attended a public school different from the one they had attended at baseline.

Figure 1. Attrition rates from private schools over time.



Several features of the graph are worth highlighting. First, as one might expect, the cumulative hazard jumps at quarters four and eight, indicating that most students who leave private schools do so at the end of an academic calendar. Nonetheless, mid-year attrition rates are non-trivial. Indeed, over the first 3 years of the New York City voucher program, a rising proportion of families withdrew from the private sector during the course of a school year. Finally, the cumulative hazard estimates for each year, taken as a whole, steadily increase. At least during the program’s first 3 years, there is no evidence that attrition rates tapered off over time.

This section calculates the effects of different family background characteristics on the likelihood that voucher recipients dropped out of private school during the program’s first 3 years. To do so, I estimate a series of semi-parametric event history models where the dependent variable represents the length of time that each student remained enrolled in a private school. Specifically, I estimate Cox regressions, which take the following form:

$$h(t, X, B) = h_0(t)e^{BX} \tag{Eq. 1}$$

where t is measured in annual quarters; X is a vector of covariates; and B is the estimated regression coefficients.

Cox regressions have the advantage of not imposing any restrictions on the form of the baseline hazard function, $h_0(t)$. These regressions do assume that hazard ratios are proportional, but in the analyses to follow, the assumption is inconsequential; findings appear robust when corrections are made to the functional form of the covariates to allow for added flexibility in estimating impacts over time. Cox models also introduce some loss of efficiency, though again, none of the results

change substantially when alternative models (e.g., regressions that assume the hazard follows a Weibull distribution) are estimated instead.

Typically, event history models are estimated with one observation for each subject, where each variable assumes values taken at the beginning of the time series. In this context, baseline data would be used to predict the length of time students remained in private schools. This approach, however, has an obvious limitation: it provides no leverage for the analyst to identify how a student's experiences in a private school affect the duration of time she spends there. Fortunately, because MPR surveyed parents each year, we can estimate time-varying covariate models that incorporate the changing social and educational experiences of each child when predicting the length of time she attends private schools. Whereas the logistic regressions presented in Table 2 drew entirely from information collected at baseline, the data used in the event history models also draw from surveys administered after 1, 2, and 3 years. As a result, the number of observations (or spells) exceeds the number of actual subjects included in the study.

While their sign and significance are readily discernible, the substantive meaning of the coefficients reported in Table 3 is not. By exponentiating its coefficient and thereby generating a hazard ratio, we can estimate how a change in each covariate affects the likelihood that a student at any point in time will drop out of private school, given that she has not done so already.

Table 3 reports how students' family backgrounds, academic profiles, and prior public schools influenced the duration of time that students remained in private schools. As in Table 2, the mother's education and employment status and the student's grade level registered null effects. Some of the factors that increased the probability a family accepted a voucher, meanwhile, also improved the chances that the child remained in private school. Just as religiously observant families were more likely to use vouchers, so too did they stay in private schools for longer periods of time (the negative sign on the coefficient indicates that attending religious services once or twice a month was, at any given point during the program's first 3 years, 17 percent less likely to drop out of private school than an individual who never attended religious services).

In other ways, selection effects changed form once a child enrolled in private school. While Catholics, Protestants, and families with a higher income accepted vouchers with greater frequency, they were not especially likely to settle into private schools. And though family size and residential stability had negligible impacts on the likelihood a family initially accepted a voucher, they did affect the amount of time students attended private schools. At any point during the program's first 3 years, families with four children were, on average, 25 percent more likely than families with just one child to withdraw from the voucher program (given that they have not already done so) and return to public school. Families who had lived at the same residence for two or more years were, at any given instance, 31 percent less likely to leave their new private school than were families who had lived at their residence for less than three months.

Perhaps the most striking difference between the results presented in Tables 2 and 3 concerns the impact of ethnicity. While African Americans appeared much more likely to accept a voucher offered to them, they also left private schools after shorter periods of time. During each of the first 3 years of the voucher program, African Americans were more than three times as likely as whites to leave their private school and return to public school. Some of the initial enthusiasm

Table 3. Predicting who leaves private schools over time.

	Model 1		Model 2		Model 3	
Family characteristics:						
African American (non-Hispanic)	1.09***	(0.33)	1.18***	(0.35)	1.20***	(0.35)
Hispanic	0.56	(0.35)	0.63*	(0.36)	0.67*	(0.36)
Income	-0.54	(0.39)	-0.55	(0.41)	-0.61	(0.41)
Mother employed full time	-0.03	(0.13)	-0.07	(0.14)	-0.08	(0.14)
Mother's education	0.19	(0.25)	0.19	(0.26)	0.16	(0.26)
Residential stability	-0.38**	(0.18)	-0.36*	(0.19)	-0.37*	(0.19)
Family Size	0.66**	(0.32)	0.52	(0.33)	0.53	(0.32)
Freq. attend religious services	-0.46**	(0.19)	-0.60***	(0.19)	-0.58***	(0.19)
Catholic	0.07	(0.20)	0.04	(0.20)	0.03	(0.20)
Protestant	0.13	(0.18)	0.04	(0.19)	0.05	(0.19)
Student characteristics:						
Physically handicapped	—	—	0.50	(0.38)	0.51	(0.37)
Gifted	—	—	0.07	(0.19)	0.08	(0.19)
Learning disabled	—	—	-0.29	(0.28)	-0.29	(0.28)
Baseline test scores	—	—	-0.63*	(0.36)	-0.63*	(0.36)
Grade 1 in 1996-97	—	—	-0.03	(0.19)	-0.04	(0.19)
Grade 2 in 1996-97	—	—	0.05	(0.18)	0.05	(0.18)
Grade 3 in 1996-97	—	—	-0.04	(0.18)	-0.04	(0.18)
Student coming from a "low-performing" public school	—	—	—	—	-0.24	(0.18)
(N)	1,706		1,569		1,569	
Chi-square	.00		.00		.00	
Log likelihood	-1,736.33		-1,581.47		-1,580.71	

Cox duration regressions performed; Breslow method for ties implemented. Robust standard errors reported in parentheses. * significant at .10 level, two-tailed test; ** significant at .05 level; *** significant at .01 level. All covariates rescaled to range from zero to one.

expressed by African American families for vouchers appeared to wane once their children enrolled in New York City private schools.

Students' academic profiles, for the most part, did not have an appreciable effect on the hazard. While students with learning disabilities and gifted students were less likely to use vouchers initially, having gained admission to a private school, they stayed there just as long as other students.¹⁷ Baseline test scores, however, did affect the length of time students remained in private schools. Though achievement effects were not observed when families initially decided whether to take a voucher offered to them, students with higher scores did tend to stay in the private sector for longer periods of time. A one standard deviation increase in student test scores

¹⁷ After offering admission to some gifted and learning disabled students, private schools may have done everything possible to retain their new paying customers; and having found a suitable private school, parents of the gifted and learning disabled may have been reticent to further disrupt their child's education. Alternatively, it may be that because so few gifted and learning-disabled students accepted vouchers at baseline, there simply is not be enough variance to detect further selection effects downstream.

translates into a 12 percent decrease in the probability that a student dropped out of private school, given that she had not already done so.¹⁸

How Characteristics of Private Schools Affect Dropout Rates

Table 3 shows how the characteristics of families and students affect attendance patterns in private schools over time. Surely, though, when deciding whether to continue using a voucher, parents reflect upon the education that their children are receiving in private schools. The quality of treatment, in this sense, determines the length of time that parents and children are exposed to it. The more a student benefits from a private education, and the more attractive a private school appears to parents, the longer a family should remain in the private sector.

Table 4 shows how parents' observations about their children's education influence the hazard. The first and third columns report the results from Cox duration models that include as covariates private-school descriptors, parents' evaluations of their children's school, and indicators of difficulties children confronted during each academic year. The second and fourth columns re-estimate the models with controls for relevant background variables.¹⁹

Students whose private schools required them to wear a uniform were, on average, 61 percent more likely to remain in the voucher program each year than students whose private schools did not. Class size also had a statistically significant effect on outcome, though in the opposite direction one might expect. Children in classrooms with 18 students were, on average, 11 percent more likely to withdraw from private school each year than children in classrooms with 23 students.²⁰ Caution, however, is warranted here. Without additional information on the quality of teachers in larger classes or the ways in which private schools assign students to classrooms, this finding should not be interpreted as parental endorsement of big classes.

Religion again emerges as an important determinant of student sorting. Families who sent their children to schools with their own religious affiliation were significantly more likely to remain in the private sector. During the program's first 3 years, Catholics enrolled in Catholic schools and Protestants enrolled in Protestant private schools were, on average, 26 percent more likely to continue to use their vouchers than Catholics in non-Catholic private schools or Protestants in non-Protestant schools. Unfortunately, we cannot discern whether Catholic schools encouraged students from non-Catholic families to leave, or whether the non-Catholic families themselves objected to the kind of education their child received. All that these data

¹⁸ When kindergartners are added and baseline test scores are dropped from the models in Table 3, the effects of income and physical handicaps retains their signs and appear significant, while those for Hispanic and residential stability become insignificant.

¹⁹ Given that parents choose both the type of school their child attends and the duration of the time she remains there, endogeneity issues may arise. If parents who select schools with certain characteristics have prior dispositions to keep their child in school for specific lengths of time, then the estimated relationships reported in this section may be biased. To correct for this type of bias, instrumental variables techniques are typically employed. Unfortunately, theory is not particularly helpful in identifying which explanatory variable (or variables) is endogenous, or what other variable might be used as an appropriate instrument. Further, even if these issues could be resolved, standard methods are not yet available for estimating two-stage models that utilize in the second equation a hazard model with time-varying covariates.

²⁰ In the evaluation of the New York City program, Howell and Peterson also found that class size had a perverse relationship with student achievement. Students who attended larger classrooms on average scored higher on the Iowa Test of Basic Skills than students in smaller classrooms (2002, pp. 99–100).

Table 4. How school characteristics and experiences impact likelihood that families leave private schools.

	Model 1A		Model 1B		Model 2A		Model 2B	
School characteristics								
School uniforms required	-1.03***	(0.40)	-1.15***	(0.41)	-0.95**	(0.39)	-1.01**	(0.43)
Amount of homework	-0.42	(0.28)	-0.39	(0.32)	-0.30	(0.28)	-0.30	(0.33)
Class size	-0.93***	(0.27)	-0.76***	(0.30)	-1.05***	(0.28)	-0.86***	(0.30)
Resources	-0.18	(0.32)	0.04	(0.35)	0.13	(0.36)	0.35	(0.38)
Pct class same ethnicity as child	0.03	(0.21)	-0.13	(0.24)	0.04	(0.21)	-0.07	(0.24)
Religious affiliation of school and family match	-0.46***	(0.12)	-0.30*	(0.17)	-0.39***	(0.13)	-0.30*	(0.17)
Parental evaluations of school								
Give school an "A"	—	—	—	—	-0.34**	(0.14)	-0.27*	(0.15)
Perceived problems at school	—	—	—	—	0.05	(0.15)	-0.03	(0.17)
Difficulties at school								
Child missing school	—	—	—	—	0.49**	(0.21)	0.47***	(0.23)
Child suspended from school	—	—	—	—	0.62***	(0.21)	0.48***	(0.24)
(N)	1,541		1,399		1,535		1,398	
Chi-square	.00		.00		.00		.00	
Log likelihood	-1,582.66		-1,265.35		-1,552.39		-1,253.63	

Cox duration regressions performed; Breslow method for ties implemented. Robust standard errors reported in parentheses. * significant at 0.10 level, two-tailed test; ** significant at 0.05 level; *** significant at .01 level. All covariates rescaled to range from zero to one. Models 1B and 2B include controls for the following family background characteristics: African American, Hispanic, income, residential stability, family size, and frequency attend religious services.

show is that successfully matching the religious affiliation of school and family significantly increased the length of time that a child remained in the private sector.²¹

Just as interesting are some of the null findings. Neither the amount of homework assigned to students nor the number of school resources (such as computer laboratories, counselors, and nurses) entered into parents' calculations about whether to keep their child in a private school. Curiously, the ethnic composition of a student's class also did not affect the hazard. Students from different ethnic backgrounds in classes with different racial compositions were equally likely to remain in private school.²²

Each year, parents were asked to evaluate the overall quality of their school on an A to F basis. As one would expect, parents who gave their private school an "A" were

²¹ Duration models that include indicator variables for different types of private schools show that students in Catholic and Protestant schools used their vouchers for significantly longer periods of time than students attending either secular or other-religious private schools.

²² Null findings on this variable were observed for African Americans, whites, and Latinos.

24 percent more likely to keep their children in the voucher program, given that they had not already dropped out.²³ In parental surveys, MPR also inquired into the seriousness of school problems such as tardiness, fighting, truancy, and racial conflict. Parents' responses to these questions, however, did not affect the hazard. Controlling for other characteristics and assessments of private schools, parents who claimed that fighting and racial conflict were serious problems used vouchers for roughly the same amount of time as parents of children in safer, saner educational settings.²⁴

Surveys also asked parents about the number of days their children missed school and whether or not their children had been suspended during the past academic year. Answers to both of these questions proved to be strong predictors of the length of time children remained in private schools. Either because parents pulled them from private schools or because private schools encouraged them to leave, children who regularly missed school were, on average, 60 percent more likely to withdraw from the voucher program each year than were children with perfect attendance rates. Similarly, suspensions increased the marginal probability that a child returned to public school by fully 62 percent.²⁵

Deciphering Parental Satisfaction Effects on Dropout Rates

In a comprehensive study of consumer choice in education systems, Mark Schneider, Paul Teske, and Melissa Marschall (2000) asked a sample of parents from four school districts in New York and New Jersey to rank the relative importance of 11 school attributes. Confirming other research on the topic (see, e.g., Moe, 2001, pp. 50–54), Schneider and colleagues found that academics stood at the forefront of parents' educational priorities. They found that when choosing schools, parents considered, in the following order of importance, the quality of teachers, students' academic achievement, safety, values, discipline, class size, school resources, diversity, location, economic background, and ethnic composition (pp. 93–95). Whereas 39 percent of parents identified teacher quality as the most important consideration when selecting a school, less than 5 percent mentioned a school's location or resources.

When evaluating the SCSF program, MPR asked parents whether they were “very satisfied,” “somewhat satisfied,” “somewhat dissatisfied,” or “very dissatisfied” with a variety of school attributes, many of which replicate items in the Schneider and colleagues' study. Given the salience of religion in previous statistical models, we add to this list one item on parental satisfaction with their child's freedom to observe religious traditions. These data provide a unique opportunity to test whether Schneider and colleague's observation that “most parents believe academic conditions are the most important attributes of school” extends to early participants in a means-tested, urban voucher program (2000, p. 94–95). Doing so, we can

²³ Given that private school attrition rates were highest during the summer, and parental surveys were administered during the fall, impacts of parental satisfaction probably do not reflect (at least entirely) ex post rationalizations on the part of parents. Nonetheless, it is possible that some parents who know that they cannot continue to cover the costs of a private education (or who anticipate having to withdraw their child from a private school for some related reason), might depress their evaluation of the quality of a private school. The magnitude of parental satisfaction's impact on attrition rates, as such, should be interpreted with caution.

²⁴ This null finding holds whether or not the statistical models include measures of school satisfaction.

²⁵ When kindergartners are added to the models in Table 4, all estimations remain unchanged with the exception of children suspended from school, which just crosses standard thresholds for statistical significance.

also evaluate the relationship between survey responses and individual behavior, effectively addressing Teske and Schneider’s concern that “more work is needed in connecting what parents say in surveys to what really happens in school selection” (2001, pp. 625).

When estimating the effect of each parental satisfaction measure on attrition rates, one at a time, significant effects uniformly are observed—each item, clearly, contributes to a parent’s willingness to keep her child in a private school.²⁶ When including all measures of parental satisfaction in the same model, however, the single most important item—and the only one to log significant effects—concerns religion (see Table 5).²⁷ Parents who expressed higher levels of satisfaction on “how much students can observe religious traditions” were much more likely to continue using vouchers. Meanwhile, the estimated impacts of every other item, very much including academic quality, remain insignificant.

These findings are robust to alternative specifications. They hold regardless of whether background controls are included in the model (see column 2 of Table 5). When estimating duration models that include indices of multiple school satisfaction items, the only index to register significant effects consists of parental evaluations of teaching moral values and the allowance of religions traditions. Finally, models that only include parental evaluations of religion and academic quality, as

Table 5. How different dimensions of parental satisfaction impact likelihood that families drop out of private schools.

	Model 1A		Model 1B	
Subject of parental satisfaction				
Observe religious traditions	-0.23**	(0.11)	-0.23*	(0.14)
Teaching values	-0.05	(0.14)	-0.12	(0.15)
Academic quality	-0.07	(0.13)	0.00	(0.15)
Teacher quality	-0.03	(0.12)	0.00	(0.13)
Discipline	-0.03	(0.11)	-0.03	(0.12)
Safety	-0.05	(0.12)	0.01	(0.13)
Resources	-0.04	(0.10)	-0.04	(0.11)
Location	-0.11	(0.10)	-0.17	(0.11)
Class size	0.01	(0.09)	0.01	(0.15)
(N)	1,549		1,412	
Chi-square	0.00		0.00	
Log likelihood	-1,725.66		-1,407.19	

Cox duration regressions performed; Breslow method for ties implemented. * significant at 0.10 level, two-tailed test; ** significant at 0.05 level; *** significant at 0.01 level. All covariates rescaled to range from 0 to 1. Model 1B includes controls for the following family background characteristics: African American, Hispanic, income, residential stability, family size, and frequency attend religious services.

²⁶ Given that we are ranking the relative importance of different measures of parental satisfaction, rather than trying to estimate the magnitude of the effect of parental satisfaction on attrition rates, concerns about reverse causation are less relevant.

²⁷ As one might expect, the satisfaction measures correlate highly with one another—simple bivariate correlations range from 0.26 to 0.85. For in addition to capturing parents’ satisfaction with each aspect of their child’s education, these questions also measure parents’ general enthusiasm (or lack thereof) for their new schools.

well as background demographic controls, affirm the importance of religious considerations for participants in the SCSF program: the estimated coefficient for religion is highly statistically significant ($-0.33, p < 0.01$), while that for academic quality is not ($-0.15, p < 0.16$).²⁸

These particular findings speak to some of the arguments laid out in *Zelman v. Simmons Harris*, the 2002 Supreme Court case upholding the constitutionality of the Cleveland voucher program.²⁹ For instance, in his concurring opinion, Justice Clarence Thomas claimed that “while the romanticized ideal of universal public education resonates with the cognoscenti who oppose vouchers, poor urban families just want the best education for their children, who will certainly need it to function in our high-tech and advanced society.” The findings presented here, at a minimum, suggest that religion prominently informs parental views about what constitutes the “best education for their children.” As a matter of constitutional interpretation, the Court may rightfully have concluded that the state can disseminate vouchers that allow students to attend parochial private schools and still remain neutral with respect to religion. As a practical matter, however, the parents participating in the New York City voucher program assuredly were not religiously neutral. Indeed, freedom to observe religious traditions stands out as a vitally important determinant of student enrollments in private schools.

CUMULATIVE SELECTION EFFECTS

At various stages of the New York City voucher program, different sorting mechanisms emerged. Students who applied for vouchers had higher incomes and were more likely to be African American than the eligible population of New York City residents; then, along the lines of ethnicity, income, religious engagement, and academic achievement, students who used vouchers looked quite different from those who turned them down; and with regard to ethnicity, residential stability, family size, and religious engagement, those families that stuck it out in private school distinguished themselves from those who returned to public schools.

How did these various selection effects accumulate over time? Table 6 shows that voucher recipients who remained in private schools after 3 years (column 4) look quite different from the overall population of New York City residents who qualified for a voucher (column 1). For starters, the average income levels of families who applied for, took, and then continued to use vouchers are 10 percentage points higher than the eligible population of New York City residents. Mothers who remained in the voucher program were twice as likely to have been employed as the eligible population. The most dramatic differences, however, concern mother’s education. The mothers of children who remained in the voucher program for 3 years were fully three times as likely to have attended some college, and five times more likely to have graduated college, as parents in the eligible population.

Income, employment status, and education, however, appear salient at different points of the voucher program. Education and employment status distinguish

²⁸ When kindergartners are added to the sample, the estimated impact of academic quality becomes statistically significant ($p < 0.09$) in models that only include parental evaluations of religion, academic quality, and background demographic controls. All other results reported in this section, however, remain unchanged.

²⁹ Case number 00-1751, June 27, 2002.

Table 6. The cumulative effects of sorting mechanisms.

	Eligible Population (1)	Applicants (2)	Takers (3)	Long-Term Takers (4)
Household income (1996 dollars)				
\$0-\$4,999	29.1%	29.6%	23.7%	22.7%
\$5,000-\$10,999	36.1	35.8	36.0	33.2
\$11,000-\$24,999	29.7	31.1	36.5	39.6
\$25,000-\$39,999	4.7	3.3	3.8	4.5
More than \$40,000	0.4	0.2	0.0	0.0
Total	100.0%	100.0%	100.0%	100.0%
Average income	\$10,049	\$9,673	\$10,664	\$11,196
Percentage receiving welfare	46.8%	58.8%	53.7%	50.9%
Mother's education				
Grade 1-12, no HS Grad	57.7%	22.2%	22.8%	23.2%
High school grad (or GED)	23.3	25.9	22.8	24.6
Some college	14.7	41.4	45.1	43.7
Bachelor's degree or above	2.2	10.6	9.4	8.6
Total	100.0%	100.0%	100.0%	100.0%
Mother's employment				
Employed	20.8%	36.3%	39.0%	40.1%
Unemployed or not in labor force	79.2	63.7	61.0	59.9
Total	100.0%	100.0%	100.0%	100.0%
Mother's race/ethnicity ^(a)				
African American (non-Hispanic)	31.2%	43.6%	47.7%	39.1%
Hispanic	48.4	46.9	44.4	51.2
White (non-Hispanic)	14.8	4.6	2.7	3.6
Asian	5.4	1.0	0.5	0.9
Other	0.2	3.9	4.7	5.2
Total	100.0%	100.0%	100.0%	100.0%
Percentage foreign-born mothers	35.7%	38.9%	40.1%	44.7%
Frequency attend relig. services				
Never	NA	5.4%	5.0%	4.6%
Only on major holidays	NA	19.5	16.5	14.4
Once a month	NA	16.0	14.9	14.6
Once a week	NA	40.5	41.6	45.3
More than once a week	NA	18.7	21.9	21.1
Total	NA	100.0%	100.0%	100.0%
Religious identity				
Catholic	NA	50.5%	52.7%	60.1%
Protestant	NA	36.8	38.8	33.6
Other	NA	9.3	6.8	5.6
No religion	NA	3.4	1.7	0.7
Total	NA	100.0%	100.0%	100.0%
Number of dependent children	2.6	2.6	2.6	2.6
Time at current address				
Less than 3 months	NA	2.0	1.5	2.2
3-11 months	NA	7.1	6.7	4.8
1-2 years	NA	9.9	8.2	6.8

(continued)

Table 6. Continued.

	Eligible Population (1)	Applicants (2)	Takers (3)	Long-Term Takers (4)
More than 2 years	NA	81.0%	83.6%	86.2%
Total	NA	100.0%	100.0%	100.0%
Ave student test score (nat'l pct'l)	NA	21.8	20.0	20.4
Student learning disabled	NA	11.1%	11.2%	11.3%
Student gifted	NA	13.7%	12.4%	12.2%
Student coming from "underperforming" public school	NA	74.4%	76.9%	78.9%

"Eligible population" consists of all parents living in New York City who qualified with children who attended public schools and who qualified the federal free lunch program. "Applicants" consist of all students who applied to SCSF. "Takers" consist of families who initially accepted vouchers offered to them. "Long-term takers" consist of families who remained in private schools after 3.

^(a) The Census asks separate questions for race and ethnicity. In column one, therefore, "African American" refers the percentage of mothers who claimed to be "Black/Negro" on the race question and "Not Hispanic" on the ethnicity question. Comparable methods used to determine the percentage "white" and "Asian." Percentage Hispanic was calculated directly from the ethnicity question.

applicants from the eligible population, but not takers from decliners, or long-term takers from takers. Meanwhile, with regard to income, applicants and the eligible population look much alike; differences in income arose only after vouchers were awarded and parents investigated a private school of their choice.

Not all of the evidence, however, supports the contention that vouchers reached a predominantly white and socially advantaged population. Families who remained in private schools for three years were much more likely to be African American than the population of eligible families in public schools. A higher percentage was born outside of the United States. And a greater percentage of those who stayed in private schools received Social Security benefits than those who returned to (or never left) public schools.

Unfortunately, data on the religious affiliations and practices of New York City residents who qualified for the SCSF program are not available. But among those families offered vouchers, religious identification and practice consistently affected enrollment patterns. Catholics and Protestants were more likely to attend private schools than Muslims, Jews, or non-religious families. And parents who regularly attended religious services were more likely to accept vouchers offered to them, just as they remained in private schools for longer periods of time.

DETERMINANTS OF SCHOOL MOBILITY AMONG STUDENTS DENIED VOUCHERS

Up until now we have exclusively considered the enrollment patterns of students who were offered vouchers. What happened, though, to those students who were not selected in the voucher lotteries? Who, among them, returned to their prior public school? And who left? Having been denied a voucher, students could have returned to their old public school, switched to a different public school, or raised the money required to attend a private school. To model these choices

simultaneously, I estimated a weighted multinomial logit model that specifies the i^{th} individual's utility of choice j as follows:³⁰

$$U_{ij} = B_j X_i + u_{ij} \tag{Eq. 2}$$

where X_i is a vector of student and family characteristics of individual i . (Recall that because students were offered vouchers via a lottery, the demographic profile of students in the control group mirrors that of the treatment group.) B_j is subscripted because separate sets of coefficients are estimated for each of the choice alternatives. The probabilities that the i^{th} individual will choose alternative j , then, are given by:

$$P_{ij} = \frac{e^{B_j X_i}}{1 + \sum_{l=1}^{J-1} e^{B_l X_i}} \tag{Eq. 3}$$

Table 7 presents the results.³¹ Column 1 reports the estimated effects of family and student characteristics on the probability that students switched to a new public school the year after applying for a voucher; column 2 focuses on students who opted to switch to a private school. In both instances, students who returned to their old public school represent the base category.³²

Many of the demographic characteristics that impacted students' use of vouchers exerted little influence over the enrollment patterns of students denied vouchers. Ethnicity, income, residential mobility rates, and family size did not affect families' decisions about whether to return to their old public school, switch to a different public school, or pay the unsubsidized costs of attending a private school. Mothers who sent their child to a private school, however, tended to have higher levels of education than mothers who returned to the public school their child had attended the year before. In addition, mothers who switched to a different public school were less likely to be employed full time than mothers who returned to their old public school. Students who came from a "low-performing" public school were less likely to switch to another public school, but more likely to attend a private school. Finally, with the exception of learning disabilities, none of the student characteristics registered significant effects.

One dimension of families' lives, again, stood out among all others: religion. Upon learning that they would not be offered a voucher, families who regularly attended religious services were significantly more likely to switch to a different public school or to a private school. Moving from one standard deviation below the mean of religious observance to one standard deviation above translates into a 14 percentage point increase in the probability that a student switched to a different public school and a 3 percentage point increase that she switched to a new private

³⁰ Weights are used to adjust for non-response from baseline to year one. See Howell and Peterson (2002).

³¹ The available data on school attendance patterns among members of the control group come exclusively from parental surveys. As a consequence, these data unavoidably are less reliable and less complete than the administrative data examined above. The analysis presented in this section focuses exclusively on school moves that occurred between baseline to year one. Analyses of school mobility rates between years one and two, or years two and three, involve an extraordinary depletion of cases, and hence are not reported.

³² Of control group families, 77 percent remained at the same public school after one year, 20 percent switched to another public school, and 3 percent switched to a private school.

Table 7. Enrollment patterns of students not offered vouchers.

	Switch to New Public School		Switch to Private School	
Family characteristics				
African American (non-Hispanic)	-0.28	(0.74)	-0.77	(0.88)
Hispanic	-0.24	(0.77)	0.50	(1.07)
Income	-0.43	(0.89)	1.78	(1.22)
Mother employed full-time	-0.73*	(0.43)	0.17	(0.60)
Mother's education	-0.60	(0.66)	3.37***	(1.11)
Residential stability	-0.38	(0.77)	0.80	(0.97)
Family size	1.38	(1.23)	-3.29	(3.01)
Freq. attend religious services	1.95***	(0.73)	4.30***	(1.55)
Catholic	-0.36	(0.73)	0.05	(1.04)
Protestant	0.44	(0.75)	-0.59	(0.89)
Student characteristics				
Physically handicapped	1.09	(0.73)	1.28	(1.09)
Gifted	0.40	(0.47)	-1.20	(0.92)
Learning disabled	1.03**	(0.47)	-0.35	(0.88)
Baseline test scores	-0.26	(1.08)	0.55	(1.13)
Grade 1 in 1996-97	-1.58**	(0.63)	0.21	(0.72)
Grade 2 in 1996-97	-0.42	(0.43)	0.03	(0.67)
Grade 3 in 1996-97	-0.16	(0.40)	-0.06	(0.65)
Student coming from a "low-performing" public school				
Constant	-0.77*	(0.41)	1.41*	(0.80)
(N)	-1.61*	(0.87)	-9.03***	(2.07)
Pseudo R ²		476		
Log likelihood		0.17		
		-244.62		

Multinomial logit regressions estimated. Robust standard errors reported in parentheses. * significant at 0.10 level, two-tailed test; ** significant at 0.05 level; *** significant at 0.01 level. All covariates rescaled to range from zero to one. Column 1 reports the estimated effects of family and student characteristics on the probability that a student switched to a new public school the year after applying for a voucher; column 2 examines students who opted to switch to a private school. Students who return to their old public school represent the base category.

school.³³ The sheer magnitude of these findings, along with the consistently significant impacts observed in other models, recommends religion as one of the most important determinants in the education decisions made by parents who applied to the SCSF program.

DISCUSSION

When anticipating widespread selection effects and social stratification, scholars often have in mind large-scale voucher programs (see, e.g., Ladd, 2002). In the context of a genuine market for education, where families choose among a wide array

³³ When baseline test scores are dropped from the analysis and kindergartners are added, effects of religious attendance are only significant for students switching to a different public school. All effects associated with employment status also become insignificant. Kindergartners also appear more likely to switch to different public and private schools than students in grades 1 through 4.

of public and private schools, just as public and private schools try to attract a common lot of families, selection effects may intensify. Depending upon how the program is administered and what kinds of restrictions are placed on school admissions procedures, selection effects may also attenuate. Unfortunately, given the modest size of the New York program, as well as the possibility of wholesale changes in the supply of private schools as vouchers increase in number and value, this paper is ill equipped to identify the likely selection effects in a universal voucher program.

Attrition rates in the New York City voucher program, nonetheless, are nontrivial. Only 74 percent of students whose parents learned about the voucher program, applied for a voucher, and attended the baseline data-collection sessions actually used a voucher offered to them. Among initial takers, what is more, only 60 percent of students were enrolled in a private school after just 3 years. That private philanthropists or the state is willing to offer vouchers does not ensure their successful, and ongoing, delivery to targeted populations—and consequently, selection effects are not restricted to universal, privatized markets. Indeed, as the New York program clearly demonstrates, significant student sorting arises even in relatively small, means-tested urban voucher programs.

While not all of the evidence from New York suggests that the beneficiaries of choice are more advantaged than their public-school peers, much does. With regard to income, mothers' education, employment, language, and residential stability, those who use vouchers over time distinguish themselves from those who qualify for vouchers but remain in public school. By increasing the monetary value of voucher awards, future programs may be able to guard against some of these sources of student attrition. While the maximum voucher awarded in New York City was \$1400, participating private schools charged, on average, \$2100 in tuition. Voucher takers also had to pay, on average, an additional \$624 to cover such expenses as uniforms, books, supplies, and school activities.³⁴ Were these additional financial burdens lifted, greater proportions of the urban poor might have used the vouchers offered to them.

While much of the public debate over selection effects centers on income, race, and student achievement, the largest and most consistent types of student differentiation in the New York City program concerned religion. The frequency with which families attend religious services, their satisfaction with a student's ability to observe religious traditions in school, their ability to find a parochial school whose denomination matches their own, and their religious identity all strongly influence their interest in and commitment to a private education. Given that the vast majority of private schools are parochial, it is hardly surprising that families interested in a religious education are among the first to seek vouchers. Such families, what is more, will continue to constitute a disproportionate share of private school enrollees—at least until program administrators advertise vouchers to a wider array of parents, and until new secular schools open to address a rising demand for private education.

Demographic and religious profiles, however, were not the only factors that determined who used vouchers and who remained in public school. Students' station in life did not place them, irrevocably and irretrievably, on a public or private school track. Rather, parents regularly evaluated the quality and character of public school alternatives when deciding whether to continue using vouchers. While

³⁴ These data come from year-3 parental surveys.

the ethnic composition of private schools, the amount of homework they assigned, and the resources they provided did not inform parents' decisions about whether to renew their vouchers each quarter; other factors appeared critical. Students who attended private schools that required school uniforms used vouchers for significantly longer periods of time. The larger the classes that students attended, the longer parents kept their child enrolled in the private school. When students missed classes or were suspended during the school year, they often left the program.

Unless parents perceive some advantage associated with a private education, they probably will not act upon the new educational options that vouchers present. It is little wonder, then, that parental satisfaction proves to be an important predictor of whether a child remains in private school. Dissatisfied parents withdrew their children in greater numbers, and after shorter periods of time, than those who reported higher levels of satisfaction. With each passing year, the pool of students who continued using vouchers was reduced further to those individuals who most valued a private education. And among SCSF applicants, religion stood out as the most important component of their school evaluations.

Whether all consumers will be as savvy as the voucher applicants in the New York City program, and whether they will care about the same school characteristics, is unknown. The evidence from New York, at a minimum, suggests that systematic differences will emerge. Notions of accessibility, fairness, and equity require that policymakers not ignore them and, when possible, make appropriate accommodations.

Earlier versions of this paper were presented at the University of Wisconsin, Vanderbilt University, the Hoover Institution, and annual meetings of the Association of Public Policy and Management and the American Political Science Association. The author thanks Dale Ballou, David Campbell, Rick Hess, Caroline Minter Hoxby, Erik Hanushek, Jens Ludwig, Paul Peterson, Steven Rivkin, Martin West, and Ludgar Woessmann for their suggestions. John Homrighauser and Daniel Meyer provided data on attendance patterns. Two anonymous reviewers at *JPAM* were especially helpful. Standard disclaimers apply.

WILLIAM G. HOWELL is Assistant Professor of Government at Harvard University.

REFERENCES

- Barnard, J., Frangakis, C., Hill, J., & Rubin, D. (2003). Principal stratification approach to broken randomized experiments: A case study of school choice vouchers in New York City. *Journal of the American Statistical Association*, 98(June), 299–311.
- Beales, J., & Wahl, M. (1996). Private vouchers in Milwaukee: The PAVE Program. In T. Moe (Ed.), *Private vouchers* (pp. 41–73). Stanford, CA: Hoover Institution Press.
- Betts, J., & Fairlie, R. (2001). Explaining ethnic, racial, and immigrant differences in private school attendance. *Journal of Urban Economics*, 50, 26–51.
- Brighthouse, H. (2000). *School choice and social justice*. New York: Oxford University Press.
- Buddin, R., Cordes, J., & Kirby, S. (1998). School choice in California: Who chooses private schools? *Journal of Urban Economics*, 44, 110–134.
- Chubb, J., & Moe, T. (1990). *Politics, markets, and America's schools*. Washington, DC: Brookings Institution Press.
- Elmore, R., & Fuller, B. (1996). Empirical research on educational choice: What are the implications for policy-makers? In B. Fuller & R.F. Elmore (Eds.), *Who chooses? Who loses? Cul-*

- ture, institutions and the unequal effects of school choice. New York: Columbia Teachers College Press.
- Epple, D., & Romano, R. (1998). Competition between private and public schools, vouchers, and peer-group effects. *American Economic Review*, 88, 33–62.
- Figlio, D., & Stone, J. (2001). Can public policy affect private school cream skimming? *Journal of Urban Economics*, 49, 240–266.
- Fiske, E., & Ladd, H. (2000). *When schools compete: A cautionary tale*. Washington, DC: Brookings Institution Press.
- Friedman, M. (1955). The role of government in education. In R. Solo (Ed.), *Economics and the public interest* (pp. 123–144). New York: Rutgers University Press.
- Gewirtz, S., Ball, S., & Bowe, R. (1995). *Markets, choice and equity in education*. Berkeley, CA: Open University Press.
- Heise, M., Colburn, K., & Lamberti, J. (1995). Private vouchers in Indianapolis: The Golden Rule Program. In T. Moe (Ed.), *Private vouchers* (pp. 100–119). Stanford, CA: Hoover Institution Press.
- Hochschild, J., & Scovronick, N. (2003). *The American dream and the public schools*. New York: Oxford University Press.
- Howell, W., & Peterson, P., with Wolf, P., & Campbell, D. (2002). *The education gap: Vouchers and urban schools*. Washington, DC: Brookings Institution Press.
- Howell, W., Wolf, P., Campbell, D., & Peterson, P. (2002). School vouchers and academic performance: Results from three randomized field trials. *Journal of Policy Analysis and Management*, 21(2), 191–218.
- Hsieh, C., & Urquiola, M. (2002). When schools compete, how do they compete? An assessment of Chile's nationwide school voucher program. National Center for the Study of Privatization in Education, Occasional Paper No. 43. New York: Teachers College, Columbia University.
- Ladd, H. (2002). School vouchers: A critical view. *Journal of Economic Perspectives*, 16, 3–24.
- Ladd, H., & Fiske, E. (2001). The Uneven Playing Field of School Choice: Evidence from New Zealand. *Journal of Policy Analysis and Management*, 20(Winter): 43–63.
- Lankford, R., & Wyckoff, J. (1992). Primary and secondary school choice among public and religious alternatives. *Economics of Education Review*, 11, 317–337.
- Levin, H. (1998). Educational vouchers: Effectiveness, choice, and costs. *Journal of Policy Analysis and Management*, 17(June), 373–392.
- Long, J., & Toma, E. (1988). The determinant of private school attendance, 1970–1980. *Review of Economics and Statistics*, 70, 351–356.
- Manski, C. (1992). Educational choice (vouchers) and social mobility. *Economics of Education Review*, 11, 351–369.
- Martinez, V., Godwin, K., Kemerer, F., & Perna, L. (1995). The consequences of school choice: Who leaves and who stays in the inner-city. *Social Science Quarterly*, 73(3), 485–501.
- McEwan, P. (2000). The effectiveness of public, catholic, and non-religious private schools in Chile's voucher system. *Education Economics*, 9, 103–128.
- McEwan, P., & Carnoy, M. (1999). The impact of competition on public school quality: Longitudinal evidence from Chile's voucher system. Stanford University, Mimeo.
- Moe, T.M. (2001). *Schools, vouchers, and the American public*. Washington, DC: Brookings Institution Press.
- Moe, T., & Shotts, K. (1995). Computer models of educational institutions: The case of vouchers and social equity. In R. Crowson, W. Boyd, & H. Mawhinney (Eds.), *The politics of education and the new institutionalism: Reinventing the American school* (pp. 69–91). London: New Falmer Press.

- Nechyba, T. (2000). Mobility, targeting, and private school vouchers. *American Economic Review*, 90, 210–244.
- Peterson, P., Campbell, D., & West, M. (2002). Who chooses? Who uses? Participation in a national school voucher program. In P. Hill (Ed.), *Choice with equity* (pp. 51–84). Stanford, CA: Hoover Institution Press.
- Peterson, P., & Howell, W. (2000). What happens to low-income New York students when they switch from public to private schools. In D. Ravitch & J. Viteritti (Eds.), *City schools: Lessons from New York*. Baltimore: Johns Hopkins University Press.
- Peterson, P., Myers, D., & Howell, W. (1999). An evaluation of the Horizon Scholarship Program in the Edgewood Independent School District, San Antonio, Texas: The first year. Program on Education Policy and Governance Research Paper 99-03. Cambridge, MA.
- Peterson, P., Myers, D., Howell, W., & Mayer, D. (1999). Effect of vouchers on student test scores in New York City. In S. Mayer & P. E. Peterson (Eds.), *Earning and learning: How schools matter* (pp. 317–340). Washington, DC: Brookings Institution Press.
- Ruggles, S., & Sobek, M. (1997). Integrated public use microdata series: Version 2.0 Minneapolis: Historical Census Projects, University of Minnesota
- Schneider, M., Teske, P., & Marschall, M. (2000). *Choosing schools: Consumer choice and the quality of American schools*. Princeton, NJ: Princeton University Press.
- Teske, P., & Schneider, M. (2001). What research can tell policymakers about school choice. *Journal of Policy Analysis and Management*, 20(Winter), 609–631.
- Witte, J. (2000). *The market approach to education: An analysis of America's first voucher program*. Princeton, NJ: Princeton University Press.