



# Experimentally estimated impacts of school vouchers on college enrollment and degree attainment

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## ABSTRACT

We provide the first experimental estimates of the long-term impacts of a voucher to attend private school by linking data from a privately sponsored voucher initiative in New York City, which awarded the scholarships by lottery to low-income families, to administrative records on college enrollment and degree attainment. We find no significant effects on college enrollment or four-year degree attainment of the offer of a voucher. However, we find substantial, marginally significant impacts for minority students and large, significant impacts for the children of women born in the United States. Negative point estimates for the children of non-minority and foreign-born mothers are not statistically significant at conventional levels. The information needed to match students to administrative data on postsecondary outcomes was available for 99% of the sample. We find evidence of substantial bias due to attrition in the original evaluation, which relied on data collected at follow-up sessions.

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## 1. Introduction

“One of the limitations of experiments for the study of longer-term impacts... is that one may have to wait a long time for evidence to accumulate” (Almond and Currie, 2010, 48). The observation, though obvious, helps explain the paucity of experimentally generated estimates of long-term impacts of K-12 education interventions in the United States. There are nonetheless studies of the long-term impacts of pre-school programs (Almond and Currie, 2010; Heckman and Krueger, 2002), the Job Corps (Burghardt et al., 2001), public school choice (Deming, 2011; Deming et al., 2011), and class-size reduction (Dynarski et al., 2011; Chetty et al., 2011a). The latter two sets of studies examine interventions during the regular years of schooling, but there are no previous experimental evaluations of school voucher programs in the U.S. that examine outcomes beyond high school graduation.

In this paper, we report experimentally generated estimates of the effects of a school voucher intervention directed toward elementary-school children from low-income families in New York City on college enrollment and bachelor's degree attainment.<sup>1</sup> Particularly noteworthy is the availability of outcome information for 99% of those participating in the experiment, greatly reducing the potential for bias caused by

attrition from the evaluation. The completeness of the data provides an unusual opportunity to estimate long-term impacts with a data set that suffers from hardly any attrition.

The use of administrative data also allows us to estimate possible attrition bias that occurred as the result of non-participation in follow-up testing sessions administered during the course of the original evaluation. That evaluation used weights to adjust for the substantial attrition from the study during the three years that test-score information was collected, raising the concern that bias may have been introduced by factors that that could not be controlled by reweighting based on observables. We find evidence of substantial bias, which is not mitigated by the reweighting strategies used in the original evaluation.

Substantively, we find no significant impacts of the voucher offer on college enrollment or degree attainment. However, we find evidence of disparate impacts by race/ethnicity and immigrant status. Negative point estimates for the children of non-minority and foreign-born mothers are not statistically significant at conventional levels (p-values are about 0.20) but we find substantial, marginally significant impacts on students born of mothers of minority (African American and Hispanic) background and large, significant impacts for the children of women born in the United States.

## 2. Prior research

Short-term outcomes of voucher interventions have been studied using quasi-experimental and high-quality observational research designs. In general, these studies tend to describe larger private sector benefits for disadvantaged minority students than for others. As Ladd

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<sup>1</sup> The vouchers took the form of a scholarship offer from a private foundation. We use the two words interchangeably, as students were given financial assistance that helped them exercise choice among private schools, a policy design identified as a voucher in the theoretical literature (Friedman, 1955).

(2002, 9) says in an extended literature review, “the benefits seem to be the largest for urban minorities.” Similarly, Neal (2002, 31) concludes that “the most compelling evidence that private schools yield real benefits comes from data on the experiences of minority students in cities, especially African American students, who gain access to Catholic schools.” When positive impacts are identified, they tend to be larger on educational attainment than on achievement (see, e.g., Evans and Schwab, 1995; Wolf et al., 2013).

A few government-funded voucher interventions in the United States have been evaluated experimentally.<sup>2</sup> Two studies of a small voucher intervention in Milwaukee, established by the state of Wisconsin during the early 1990s, identified some positive impacts on the test-score performance of a largely minority population three to four years after the intervention began (Greene et al., 1998; Rouse, 1998). However, the lotteries generating the experimental data were not administered by the investigators but by administrators at the schools.

A congressionally mandated evaluation of a federally funded voucher initiative in the District of Columbia estimated voucher impacts on high school graduation rates as well as test-score performance. Scholarships were available for children from low-income families, which they could use to attend any D.C. private school of their choice, religious or secular. A lottery was held to choose among applicants when the number exceeded the number of available scholarships (Wolf et al., 2010). The evaluation of the D.C. program found no impacts in math and only marginally significant effects on reading achievement after five years. However, the impact of the offer of a voucher on high school graduation rates was a statistically significant 12 percentage points on a control-group baseline of 70% (Wolf et al., 2013).<sup>3</sup>

### 3. New York School Choice Scholarships Foundation evaluation

#### 3.1. Intervention

Our data come from an experimental evaluation of the New York School Choice Scholarships Foundation (SCSF) Program, which in the spring of 1997 offered three-year scholarships worth up to a maximum of \$1400 annually (\$2080 in 2014 dollars) to as many as 1000 low-income families with children who were either entering first grade or were public school students about to enter grades two through five.<sup>4</sup> A recipient could attend any one of the hundreds of private schools, religious or secular, within the city of New York. According to the New York Catholic archdiocese, average tuition in the city's Catholic schools, the city's largest private provider, was (in 2014 dollars) about \$2500, which was 72% of the total per pupil cost of \$3500 at these schools (Howell et al., 2006, 92).

SCSF, a foundation formed by a group of private philanthropists, asked an independent research team to conduct an experimental evaluation of the impact of the intervention on student achievement and other outcomes (Howell et al., 2006). To participate in the lottery, students other than those who had yet to begin first grade were required to take a standardized test. While students were taking the test, the

adults accompanying the child to the testing session, hereinafter referred to as the parents, provided information verifying eligibility and filled out detailed questionnaires that posed questions about the child's family background and the current public school the child attended. All families were asked to supply identifying information for each child applying for a scholarship, including name and date of birth.

#### 3.2. Evaluation procedures

Over 20,000 students applied for the scholarships. A random sample of applicants was invited to participate in the first verification and testing session. When the high cost of administering baseline surveys and tests to all 20,000 applicants became apparent, the evaluation team introduced a two-stage lottery procedure for the remaining applications. At the first stage, a random sample of students were invited to attend one of the remaining verification and testing sessions (Hill et al., 2000).<sup>5</sup> A second lottery held after the verification and testing sessions allocated students to treatment and control groups.

SCSF allocated 85% of scholarships for applicants from schools that had an average test score below the median for the city, but only about 75% of applicants attended such a school. Consequently, students from below-median schools were assigned a higher probability of winning the lottery.<sup>6</sup> Throughout our analyses we adjust for the differential probabilities of winning the lottery by controlling for the group within which each applicant family was randomly assigned. We also apply weights assigned by the original research team so that all results are representative of the population of students that applied for the scholarship. These weights also capture the fact that there are many more lottery losers than winners among the entire applicant pool, even though the two groups are roughly equal in the evaluation sample (Mayer et al., 2002).

There were more lottery participants than it was feasible for the evaluation team to track over time, especially in the control group. The original research team used propensity score matching to select a subset of families from the first verification and testing session to be invited to three years of follow-up sessions. The exact procedure used to select these families is described by Hill et al. (2000). The families from the other four sessions were selected at random for inclusion in the evaluation sample, subject to target numbers of families in cells defined by treatment group and family size (Hill et al., 2000).

Families who won the lottery and were selected for inclusion in the evaluation were told that scholarship renewal was dependent upon participation in annual testing at a designated site other than the child's school. Families whose children lost the lottery were compensated for the cost of participation in subsequent testing sessions and their children were given additional chances to win the lottery. The research team ran the subsequent lotteries prior to constructing the evaluation sample and thus was able to exclude the winners from possible inclusion in the evaluation sample. The families who won the lottery but who did not make use of the scholarship were also compensated for the costs of participation in subsequent testing sessions.

For a subset of those students tested prior to assignment to the treatment or control group, the original evaluation estimated impacts on test score performance in the three outcome years. Seventy-eight percent of those included in the evaluation attended the first outcome session in Spring 1998, 66% attended the second session in Spring 1999, and 67% attended the third session in Spring 2000 (Mayer et al., 2002, Table 1, p. 42). In other words, attrition rates varied between 22% and 34%, giving rise to concerns about potential bias that received significant attention after the original results from the evaluation were released

<sup>2</sup> In addition to the New York City experiment upon which this paper depends, experimental evaluations of foundation-funded voucher interventions have been conducted in Washington, D.C.; Dayton, Ohio; and Charlotte, North Carolina. After two years in Dayton, marginally significant positive impacts on test scores were observed for African American students but not for others. No such impacts were observed after three years in Washington, D.C. (Howell et al., 2006). Cowen (2007) finds positive impacts on test score performance in Charlotte, North Carolina.

<sup>3</sup> The impacts on graduation rates were estimated from parental reports, not administrative records, so it is possible that parents of scholarship users were more inclined than parents in the control group to report (or invent) good news to program evaluators. However, another evaluation of a voucher intervention in Milwaukee suggests otherwise, as it found parental reports of high school graduation rates to be quite consistent with rates given by administrative records (Cowen et al., 2011, 5).

<sup>4</sup> Although the initial voucher offer was for three years, scholarships continued through the end of eighth grade to students who remained continuously in the private sector.

<sup>5</sup> For more detailed discussions of the original study design, see Barnard et al., 2003; Peterson et al., 1997; Mayer et al., 2002; Myers et al., 2000.

<sup>6</sup> This was accomplished through the lottery for the first verification and testing sessions, but largely through the initial screening (the first of the two lotteries) for the second through fifth sessions (Hill et al., 2000).

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