
THE PRIVATE SCHOOL LANDSCAPE

The Effects of School Choice on Student
Capacity and Composition

Dick M. Carpenter, Ph.D.
Rebecca S. Keith
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ABOUT EDCHOICE

EdChoice is a nonprofit, nonpartisan organization dedicated to advancing full and unencumbered educational choice as the best pathway to successful lives and a stronger society. EdChoice believes that families, not bureaucrats, are best equipped to make K–12 schooling decisions for their children. The organization works at the state level to educate diverse audiences, train advocates and engage policymakers on the benefits of high-quality school choice programs. EdChoice is the intellectual legacy of Milton and Rose D. Friedman, who founded the organization in 1996 as the Friedman Foundation for Educational Choice.

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EXECUTIVE SUMMARY

In this research, we examined longitudinal trends in private school enrollment, grade offerings, and student demographics over a 22-year period to determine the nature of the relationship between school choice program adoption and private school student populations.

We drew our data from the U.S. Department of Education’s Private School Universe Survey (PSS), which has been gathering data biennially on private schools in the United States since the 1989–90 school year. The PSS database collects information from private schools spanning prekindergarten through 12th grade, including ungraded and some post-secondary, but our focus was on the schools serving only K–12 students.

- **Is there a significant difference in private school enrollment after the introduction of private school choice programs?**

Across all analyses, the enrollment trends of private schools in states with private school choice programs either did not differ significantly or differed only trivially from schools operating without the presence of choice. This was the case whether choice was measured broadly or for each different type of school choice program—vouchers, individual tax credits, individual tax deductions, or tax-credit scholarships.

- **Is there a significant difference in the percentage of racial/ethnic minority students in private schools after the introduction of private school choice programs?**

Private schools in choice states did not grow “whiter,” contrary to charges by critics that private schools would grow less diverse as a result of choice. Results show the average

percentage of non-white students in private schools grew over time in choice states similar to schools in non-choice states. Moreover, the percentage of minority students enrolled in private schools as compared to the surrounding school-aged populations did not appear to change as a function of choice programs. As with the other analyses, this suggests private schools under circumstances of choice did not grow whiter, and the student body composition appeared consistent with the populations surrounding their schools.

- **Is there a significant difference in the number of grades offered (i.e., capacity) in private schools after the introduction of private school choice programs?**¹

Results indicate the number of grade levels offered by private schools in choice and non-choice states changed very little over time. And the trends showed little or no divergence based on the introduction of choice. Thus, school capacity trends in private schools under conditions of choice look substantively the same as conditions without choice, both broadly measured and disaggregated by different types of school choice programs.

Although the impulse among some may be to ascribe such results to a failure of school choice to increase enrollment in or the capacity of private schools, other reasons—working in concert—are more likely.

First, private school leaders appear cautious to respond to changes in their environments. New private school choice programs have often been limited in their scope, meaning the number of new students any given private school may see after policy adoption may be small, so small, in fact, as to limit the ability of schools to significantly increase their capacity. Adding a grade, for example, requires hiring at least a new teacher plus

¹Note that this differs from the number of classrooms in a given school. Instead, it measures whether a school adds new grade levels to those already existing, such as when a K–5 school adds middle school grades.

curricular material and other related resources, all of which demand enough student growth to cover the increased costs. The prudent school leader would naturally be reluctant to take on the additional costs absent clear and present demand. Such reluctance would be even more pronounced among private school entrepreneurs, who would need to see sufficient demand before committing to opening and operating a new school.

From a broad perspective, the competition driven by school choice, particularly at scale, depends on a critical mass of families exiting their neighborhood schools, but without viable alternatives—i.e., private school capacity—the critical mass is unlikely. Of course, private schools or private school entrepreneurs are unlikely to blindly subscribe to a “build it and they will come” fantasy. Like anyone else, private school leaders see the regulatory limitations imposed on choice programs, such as participation caps, tuition caps, or student eligibility restrictions, and recognize the resulting demand likely will not justify significant expansion. Moreover, for leaders of religious schools, the very real possibility of regulations forcing them to significantly alter the content of their teaching and even their facilities (i.e., removing religious iconography) provides a serious disincentive to participate in choice programs. Indeed, making such changes undermines the very missions that motivate such schools.

Caution to participate may also stem from a fear that even constitutionally “safe” private school choice programs can disappear if funding is eliminated in the state budget. Some programs often depend on annual appropriations in state budgets, and a change in the legislature’s makeup could result in insufficient funding. Anticipating this possibility, private school leaders might hesitate to expand the number of seats made available to school choice program students out of fear their schools would be vulnerable in the event

that program funding were taken away.

Second, limitations in choice programs themselves may depress demand and growth in enrollment and capacity. Historically, most choice programs have been targeted in nature, designed to serve only low-income students or those with special needs. Until recently, many programs operated on a small scale, some as trial programs with firm caps on participation, limits on a private school’s choice-using student population, income limitations on the parents to qualify for the program, geographic limitations, grade limitations, and limitations based on where the student last attended school.

If legislators are sincere in their intent to see school choice work at scale to improve K–12 education, the issue of capacity can no longer be ignored. More than 25 years ago, John Chubb and Terry Moe predicted the capacity problem when they warned against policies that focused exclusively on creating demand and ignored mechanisms to encourage and promote the emergence of new and different types of schools. Their warning was prescient. As Foundation for Excellence in Education’s Matthew Ladner observed of current programs,

“Existing school voucher and tax-credit programs have been designed, in essence, to allow students to transfer from public schools into a preexisting stock of nonprofit private schools....Few state lawmakers have created choice programs robust enough to spur the creation of new private schools.”ⁱⁱ

Consequently, others have recently begun referring to capacity as one of the most significant limitations on the choice movement. Results from this report confirm such observations.

Increasing private school supply will likely mean:

ⁱⁱ Matthew Ladner, “Liberty, Efficiency, and Equity: Reforming Parental Choice for the Challenges of the Twenty-First Century,” in *New and Better Schools: The Supply Side of School Choice*, ed. Michael Q. McShane (Lanham, MD: Rowman and Littlefield, 2015), p. 154.

- adopting programs with more universal student eligibility to produce enough demand for private school leaders to expand and/or replicate their schools;
- finding a balance between light regulatory restrictions/burdens and accountability to avoid disincentivizing high-quality providers who value autonomy;
- establishing reliable program funding streams to assure private school leaders choice programs are more than a flash in the pan; and
- securing strong per-pupil funding for school choice programs, whether in the form of vouchers, tax-credit scholarships or education savings accounts, to incentivize greater private school involvement and put a greater number of schools within reach of more children.

We recognize such recommendations are rather general, but because this issue has seen surprisingly little attention, we position these results and recommendations as an initial catalyst to begin creative and productive discussion and undoubtedly debate about the role of capacity in school choice and recommendations for its expansion.

INTRODUCTION

Since the advent of large-scale private school choice programs in recent decades, policymakers, researchers, school choice opponents and proponents, and media members have paid great attention to, among others, the outcomes of these programs,¹ the effects of private choice on public school performance,² and issues of equity in program participation.³ By private school choice, we mean programs that enable students to leave their neighborhood public schools and attend, instead, private schools. Such programmatic mechanisms include vouchers, tax-credit scholarships, and education savings accounts.⁴

Policymakers, researchers, and others have paid comparably less attention, however, to potentially important and revealing trends within the private school population since the adoption of private school choice programs. This report tackles those trends: private school enrollment, the infrastructure growth of the private school sector, and changes in the demographics of private school populations over time—all of which we measure with a nationally representative sample.

An examination of such trends is particularly revealing because it provides insight into the mechanics of choice. As school choice researcher Huriya Jabbar noted, “Although existing research has considered whether competition improves student achievement, it is also important to study how that might occur and what the consequences of such policies are.”⁵ More specifically, examination of such trends sheds light on one of the most important issues in the efficacy of choice that has only recently begun to receive the attention it deserves: the capacity or supply of private schools.⁶ As described later in this report, for choice to be an efficacious reform policy, certain changes must occur at scale. Without an increase in the capacity or supply of private schools, the reform potential for school choice, in particular, will largely remain unrealized.⁷ Indeed, as Gregory Elacqua, Matias Martinez, and Humberto Santos wrote,

“[T]his issue is critical to understanding if and how educational markets work. How private schools actually respond to the competitive marketplace created by school choice will greatly affect the future success of [choice] reforms.”⁸

The first of the trends studied herein is private school enrollments, which signals the degree of competition actually experienced by a given public school. One of the central tenets of school choice is that competition can lead to educational reform by spurring public schools to become more effective.⁹ The mechanics of such competition are manifest in families that use a voucher, for example, to “exit”¹⁰ their catchment schools in favor of private schools, thereby applying pressure on public schools to improve their offerings in order to keep and/or regain constituents.¹¹ Setting aside mixed findings about competitive effects from the threats of vouchers,¹² it stands to reason that for competition through exit to work, there has to be a credible threat of exit or actual exit, or at least enough exit to compel change.¹³

To date, these mechanics have gone unexamined.¹⁴ Many of the studies on the competitive effects driven by school choice programs largely assume or acknowledge only descriptively that as a result of the introduction of a school choice program,¹⁵ significant numbers of students are exiting public schools in favor of private institutions.¹⁶ When predicting estimates of the effects of school choice programs, others explicitly assume growth in the private school sector is a result of choice programs.¹⁷

Given the centrality of the assumed progression from choice to competition to systemic impact, empirically evaluating the first linkage in that chain is particularly important.¹⁸ Accordingly, this study tests this by asking: Is there a significant difference in private school enrollment following the introduction of school choice programs?

The second trend studied here is infrastructure growth in the private school sector. The exit option is real only to the extent that families have private

schools to enter after exiting their catchment schools. In part, this is an issue of capacity. We ask: Is there increased capacity in the private sector to accommodate the students who wish to avail themselves of school choice programs? Does choice, in fact, create new options for students?¹⁹

The capacity question is the infrastructure companion to the prior question on enrollment. Similar to enrollment, economists Thomas Downes and Shane Greenstein succinctly describe the assumption in their study on the locations of private schools,

“[T]he argument in favor of school choice implicitly assumes that once school choice programs go into effect, private schools will enter and locate near low-quality public schools, resulting in a more competitive environment and widespread improvement in public schools.”²⁰

Indeed, others posit that if choice programs are to succeed in compelling change in public schools, an expansion of private school capacity is required in order to accommodate the critical mass of students that would need to exit their neighborhood schools.²¹

Significant data limitations are likely to blame for the scarce attention researchers, pundits, and others have paid to this important issue thus far.²² Constructing a longitudinal census of private schools in the United States has proven exceptionally difficult, and as discussed in greater detail later in this report, even the data source used for this study—the Private School Universe Survey (PSS)—does not allow for a reliable analysis of changes in the number of schools over time. However, one alternative measure available in the PSS provides at least some approximation, specifically grade levels private schools offer. The logic applied to grade levels mirrors that of schools. As demand for private schooling increases throughout the K–12 span, the assumption is that private schools—many of which may not serve all grades—will increase the number of grades they

offer to meet demand.²³ Thus, to examine this trend we ask: Is there a significant difference in the number of grades offered in private schools before and after the adoption of school choice programs?

The third trend considers a persistent issue that follows the adoption of school choice programs: the racial/ethnic composition of private schools.²⁴ Critics’ assertion is, by now, well-known. They claim school choice programs will result in greater segregation as white students use vouchers and other choice mechanisms at disproportionate rates to leave public schools in favor of private schools.²⁵ This is not necessarily an implication of the enrollment practices of private schools but of (a) inequitable access on the part of some parents to resources and information necessary to navigate a complicated landscape created by choice programs²⁶ and/or (b) the desire of parents to send their children to schools populated with other children “like them.”²⁷ Significant opportunity and monetary costs must be borne by parents in the process of visiting different schools, learning and completing different application procedures, and monitoring the various options if assigned to a waiting list. Such circumstances typically favor parents with strong social networks and resources to understand and navigate the many different enrollment processes. The fact that some parents lack the resources necessary to undergo this process may lead to inequitable access to schools and enrollment patterns segregated by race/ethnicity, socio-economic status, and other indicators. Similarly, inequitable access to information may be as basic as not understanding a choice even exists, let alone possessing the information necessary to utilize the choice provided.

As for choosing based on school demographics, studies are mixed in their findings. Studies such as those reviewed in EdChoice’s reports *A Win-Win Solution* and *The Integration Anomaly* find private schools are more racially/ethnically integrated than public schools.²⁸ Other research, however, suggests parents seek schools with student

populations that reflect their own racial backgrounds,²⁹ particularly white parents.³⁰ Such findings have been generated by surveys, analysis of datasets such as the National Education Longitudinal Study, or through tracking Internet search patterns of parents in their school choice decision-making processes.

Yet, such findings are far from definitive,³⁴ and few examine longitudinal trends at a particularly robust scale. We do so here by postulating that if, through inequitable access or the choices made by parents, the mechanics of choice produce schools with less diverse populations, we should expect to see the percentage of white students increasing in private schools following the adoption of school choice programs.

WHAT PRIOR RESEARCH SAYS

Enrollment

Two recent reports have examined general trends in private school enrollment over time. Using PSS data, Chief of the U.S. Census Bureau's Foreign-Born Population Branch Stephanie Ewert tracked private school enrollments from 1990 to 2010 and found that the number of students enrolled in private school grew steadily from 1990 to about 2001.³⁵ After 2002, the number of students enrolled in private school declined. Ewert's analysis was confirmed by a National Center for Education Statistics (NCES) report that showed enrollments in the 2011–12 school year represented a low point in private school enrollment during the past few decades. During the high point in 2001–02, 6.3 million students attended private schools in the United States. By 2011–12, the number decreased to 4.5 million students.³⁶

Both reports provided important descriptive information about general enrollment trends, but neither examined how enrollment trends may

have changed based on the adoption of school choice programs. Three others have, but they focus specifically on tax credit programs.

In the first report, researchers studied enrollment trends before and after tax credit program adoption, then compared those trends to neighboring states that had not adopted such programs.³⁷ None of the tax credit program states saw enrollment increases after program adoption, and some saw decreases. Comparisons to other states showed no significant differences in trends based on program adoption.

The second report analyzed the relationship between the use of tax credits in Iowa and private school enrollment.³⁸ Results indicated that as the number and amount of tax credit claims increased over time, private school enrollment declined. In fact, private school enrollment declined in every single year in the study, save for one. During the same years studied, public school enrollment increased for a six-year period, then also declined. The authors opined that the tax credit did not appear to increase private school enrollment and the decreasing trend was likely a consequence of a general decrease in the school-aged population in the state.

The third study reported findings similar to those in Iowa using data from Minnesota. It compared tax adjustment increases allowed as part of the state's tax credit program during 1976, 1984, and 1997 to enrollment figures in private schools under the logic that greater tax adjustments would allow for more families to opt for private schools.³⁹ Results indicated between 1975 and 1978, there was a 1 percent decrease in private school enrollment following a \$300 increase in the adjustment, and between 1983 and 1987, there was a 2 percent decrease in private school enrollment in Minnesota. Only after the adjustment amount was nearly tripled, did private school enrollment increase, albeit modestly, in 1997.

In contrast, World Bank Economist Maria Marta Ferreyra assessed the relationship between private school enrollment and two different types of school

vouchers—universal vouchers and those that could be used only at nonsectarian schools.⁴⁰ Her simulation results suggested that both programs increased private school enrollment, but under nonsectarian vouchers, private school enrollment expanded less than under universal vouchers, and religious school enrollment declined for large nonsectarian vouchers. In general, fewer households benefit from nonsectarian vouchers.

Capacity

Infrastructure growth in the private school sector indicates an increase in its capacity to take on more students. Some have studied the location patterns of private schools, but few authors have examined the number of new private schools entering the marketplace over time, let alone in the context of school choice policies.⁴¹

One study examined school creation in Milwaukee and found that the vast majority of Catholic and Lutheran schools existed prior to the city’s school voucher program, but two thirds of “other religious” schools and all of the non-religious schools formed after the program started.⁴² Moreover, 46 percent of the new schools’ principals said the Milwaukee voucher program was a major factor in decisions to open the schools.

Another study focused specifically on Florida and its tax-credit scholarship program. It used an interrupted time series analysis to examine whether the number of private schools increased following program adoption.⁴³ Results provided little evidence that the policy introduction was causally responsible for an expansion of private school supply in the state. Compared to other states, the formation of private schools in Florida increased at a greater rate after the tax-credit scholarship program’s implementation, but the state’s growth rate appeared to have been part of a trend that preceded the adoption of the tax-credit scholarship program.

Composition

Though a series of studies have examined the demographics of private school populations as a function of school choice programs,⁴⁴ most use a cross-sectional design. In fact, only a few have used any form of longitudinal design.

The first analyzed racial/ethnic enrollments in Milwaukee’s private schools by comparing enrollment figures from 1994–95 to 1998–99.⁴⁵ The authors found a noticeable increase in racial and ethnic balance in private schools—a finding in sharp contrast to school choice critics’ often hyperbolic predictions that more choice would worsen racial and ethnic segregation. The report’s authors concluded that the results were reflective of the fact that most low-income students using school vouchers in Milwaukee’s means-tested voucher program belonged to racial or ethnic minority groups. By using the school choice program, Milwaukee voucher students moved from racially isolated public schools, with low percentages of white students, to private schools with larger enrollments of white students.

Another analysis of two years of data from the Louisiana Scholarship Program found voucher students moved from schools in which their racial group was overrepresented relative to the surrounding communities, thereby improving integration in Louisiana public schools. At the same time, student transfers had, in general, no net negative impact on racial integration in their new private schools. The authors reported,

“Based on this evidence, we conclude that the LSP is unlikely to have harmed desegregation efforts in Louisiana. To the contrary, the statewide school voucher program appears to have brought greater integration to Louisiana’s public schools.”⁴⁶

A third study used two years of data from the Milwaukee Parental Choice Program (MPCP) to study how voucher student transfers affected the demographics of sending and receiving schools and how the public and private schools compared to the demographic profiles of surrounding

communities. Results indicated students who switched schools in Milwaukee tended to (a) improve racial integration at their originating school and (b) worsen integration at their receiving school, whether that receiving school was within Milwaukee Public Schools (MPS) or part of the voucher program. Furthermore, the differences between MPS-to-MPS and MPS-to-MPCP switches were negligible. They also found that MPCP and MPS schools were about equally representative of the racial composition of the broader community in which they were located; however, both sectors had racial compositions that deviate significantly from the Milwaukee metro area. The authors concluded, “Overall, our results show that the Milwaukee voucher program is currently neutral in its effect on racial integration.”⁴⁷

METHODS

In this section, we discuss the methods that are generally applied to all of our research questions. We provide additional details about the analyses of each question in the Results section, and findings for each question are discussed and in even greater detail in the Appendix.

Research Questions

One overarching question guides this analysis: Have the following three metrics experienced significant change after the introduction of modern private school choice programs?

1. Private school enrollment
2. The percentage of racial/ethnic minority students in private schools
3. The number of grades private schools offer/serve (i.e., student capacity)⁴⁸

Data and Sample

To study the question guiding this research, we examined longitudinal trends in enrollment, grades offered, and student demographics among private schools during a 22-year period. We drew our data from the PSS, which has been gathering data biennially on private schools in the United States since the 1989–90 school year.⁴⁹ The PSS database collects information from private schools spanning prekindergarten through 12th grade, including ungraded and some post-secondary, but our focus was on the schools serving only K–12 students.⁵⁰ For the purposes of this study, we excluded kindergarten-terminal, post-secondary, and ungraded schools, an approach consistent with other studies,⁵¹ but we retained schools that served only primary grades, since those were the types of schools that might be particularly inclined to expand their grade offerings in response to school choice programs.

Variables

The outcome (i.e., dependent) variables include total school enrollment, number of grades private schools offer/serve, and the percentage of the student body that are racial/ethnic minorities. Ideally, we would have used the number of schools in operation each year as a measure of capacity, but insight provided by the NCES prohibited us from doing so.⁵² The list of schools in the PSS changes each year, but the PSS does not track—and the NCES does not know—whether the appearance and disappearance of schools from one year to the next is a result of entering and exiting the market or simple non-response to the survey. The number of grades schools offer/serve, however, acts as a viable substitute. Indeed, based on her cross sectional study of private school market entry, Federal Reserve Bank Economist Lisa Barrow recommends the number of grades schools offer/serve as a worthy measure:

“In particular, there are other dimensions of private school supply, namely increasing enrollment and offering more grade levels, which are not captured by measures of entry. These are likely to be dimensions on which schools may respond more easily to changes in private school demand. Thus, future work might be helped by capturing several dimensions of increasing private school supply.”⁵³

The primary predictor (i.e., independent) variables of interest are private school choice program variables. These include vouchers, tax-credit scholarships, individual tax deductions, and individual tax credits.⁵⁴ Notably, education savings accounts are another form of educational choice, but Arizona adopted the first program of its kind just before the final year of data used in this study, precluding its inclusion.

More detailed information about each of these types of choice programs is available on EdChoice’s website,⁵⁵ but we review the essential elements below.

Vouchers

Vouchers give parents all or a portion of the public funding set aside for their children’s education to choose private schools that best fit their learning needs. State funds typically expended by a school district are allocated to families in the form of a voucher to pay partial or full tuition at a private school, including religious and non-religious options.

Tax-Credit Scholarships

Tax-credit scholarships allow taxpayers to receive full or partial tax credits for donating to nonprofits that provide K–12 private school scholarships. The amount of tax credits distributed is capped at an amount determined by the legislature, which, in turn, affects the availability and size of scholarships.

Individual Tax Deductions

Through individual tax deductions, parents can receive state income tax relief for approved educational expenses, which can include private school tuition, books, supplies, computers, tutors, and transportation. A tax deduction reduces a person’s total taxable income.

Individual Tax Credits

Through individual tax credits, parents can receive state income tax relief for approved educational expenses, which can include private school tuition, books, supplies, computers, tutors, and transportation. Tax credits lower the total taxes a person owes.

Table 1 on the next page lists the programs in effect during the study period. Between 1989–90 and 2011–12, 15 voucher programs operated in 10 states and Washington, D.C.

Figure 1 on page 13 illustrates the number of private school choice programs in effect by year and aggregates the number of programs and states by year. During the early years of the data included in this study, the number of programs and states remained basically static. Beginning in 1999–00, the rate of growth increased, with the sharpest increases evident starting in 2005–06. By 2011–12, 17 states offered a combined 31 programs of various types, the greatest number being school voucher programs.

RESULTS

Is there a significant difference in enrollment after the introduction of private school choice programs?

TABLE 1

Choice Programs in Effect During the Study Period

Program Type	Geographic Area	Program Name
Voucher	OH	Cleveland Scholarship Program
Voucher	OH	Autism Scholarship Program
Voucher	OH	Educational Choice Scholarship Program
Voucher	OK	Lindsey Nicole Henry Scholarships for Students with Disabilities
Voucher	UT	Carson Smith Special Needs Scholarship Program
Voucher	VT	Town Tuitioning Program
Voucher	WI	Milwaukee Parental Choice Program
Tax-Credit Scholarship	AZ	Original Individual Income Tax Credit Scholarship Program
Tax-Credit Scholarship	AZ	Low-Income Corporate Income Tax Credit Scholarship Program
Tax-Credit Scholarship	AZ	Lexie's Law for Disabled and Displaced Students Tax Credit Scholarship Program
Tax-Credit Scholarship	FL	Florida Tax Credit Scholarship Program
Tax-Credit Scholarship	GA	Qualified Education Expense Tax Credit
Tax-Credit Scholarship	IN	School Scholarship Tax Credit
Tax-Credit Scholarship	IA	School Tuition Organization Tax Credit
Tax-Credit Scholarship	PA	Educational Improvement Tax Credit Program
Tax-Credit Scholarship	RI	Tax Credits for Contributions to Scholarship Organizations
Individual Tax Credit	IL	Tax Credits for Educational Expenses
Individual Tax Credit	IA	Tuition and Textbook Tax Credit
Individual Tax Credit	MN	K–12 Education Credit
Individual Tax Deduction	IN	Private School/Homeschool Deduction
Individual Tax Deduction	LA	Elementary and Secondary School Tuition Deduction
Individual Tax Deduction	MN	Education Deduction

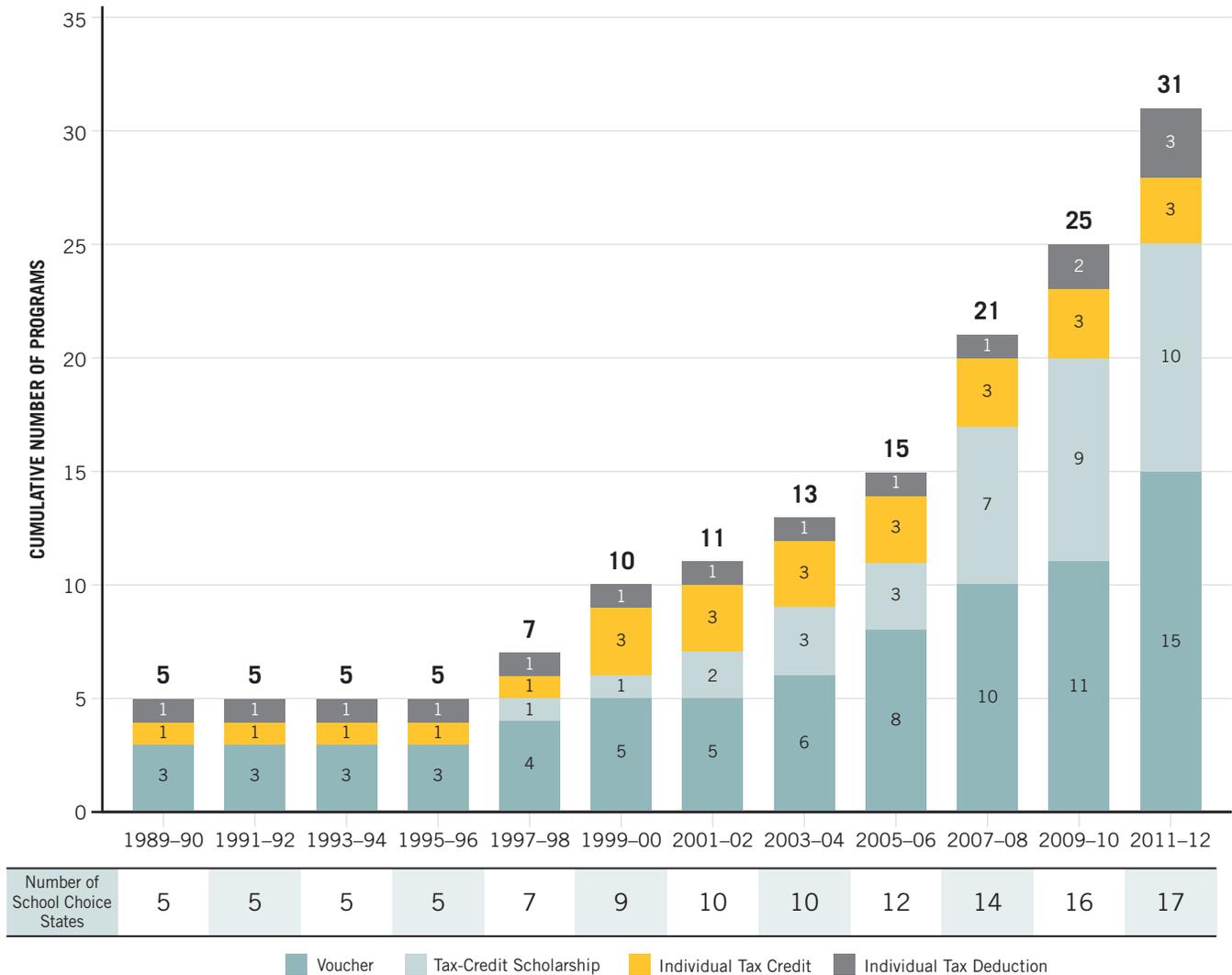
Sources: Authors' calculations; "School Choice in America," EdChoice, last modified Oct. 28, 2016, <http://www.edchoice.org/school-choice/school-choice-in-america>.

*Maximum amount

Year of Origin	Average Amount in Year 1	Average Amount in 2011–12	Average Amount % Change (Year 1 to 2011–12)	Participants Year 1	Participants 2011–12	Participants % Change (Year 1 to 2011–12)
1996	\$1,470	\$3,284	123%	1,994	5,030	152%
2004	\$9,211	\$16,537	80%	300	1,978	559%
2006	\$3,272	\$4,106	26%	3,169	16,136	409%
2010	\$6,381	\$7,436	17%	6	135	2150%
2005	\$5,648	\$5,374	-5%	107	679	535%
1869	unavailable	\$13,958	N/A	unavailable	2,501 (FTE)	N/A
1990	\$2,446	\$6,442	163%	341	23,198	6703%
1997	\$811	\$1,897	134%	128	23,828	18516%
2006	\$2,374	\$1,949	-18%	1,947	5,836	200%
2009	\$5,438	\$4,921	-10%	115	119	3%
2001	\$3,208	\$3,664	14%	15,585	40,248	158%
2008	unavailable	\$3,388	N/A	unavailable	13,285	N/A
2010	\$1,187	\$880	-26%	386	2,890	649%
2006	\$1,119	\$1,031	-8%	116	10,600	9038%
2001	\$1,099	\$1,013	-8%	17,350	45,100	160%
2007	\$3,757	\$2,759	-27%	278	382	37%
2000	\$369	\$274	-26%	165,781	293,813	77%
1987	unavailable	\$111	N/A	unavailable	138,198	N/A
1998	\$355	\$276	-22%	57,083	53,516	-6%
2011	\$1,735	\$1,732	0%	47,193	51,018	8%
2008	\$2,621	\$4,060	55%	92,707	106,549	15%
1955	unavailable	\$1,171	N/A	unavailable	222,021	N/A

FIGURE 1

Number of School Choice Programs by Year



Sources: Authors' calculations; "School Choice in America," EdChoice, last modified Oct. 28, 2016, <http://www.edchoice.org/school-choice/school-choice-in-america>.

Choice Measured Broadly

We begin by examining general trends in enrollment disaggregated by states that offer school choice (choice states) sometime during the 22-year period and those that do not (non-choice states). Figures 2A and 2B illustrate the total number of private school students by year in choice and non-choice states. Figure 2A shows the sums by year. Figure 2B shows the percentage change in total enrollment over time.

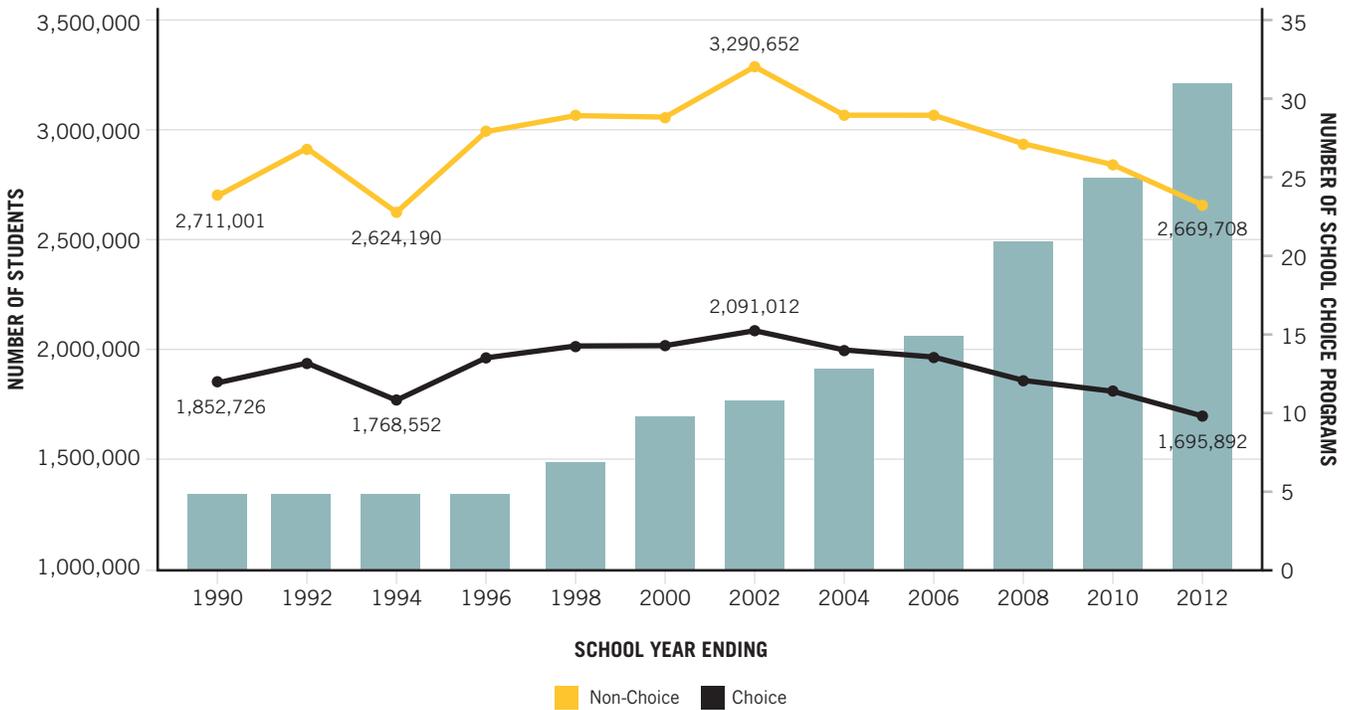
During the early years of the data, we should expect

to see the trend lines for the two groups of states move in essentially parallel fashion. If choice programs are compelling changes in enrollment, trend lines should diverge in later years when choice programs begin to proliferate. As evident in both figures, whether measured as the overall sums or percentage changes compared to 1990, both trends move in very similar trajectories. Thus, these general trends do not suggest choice states saw differential enrollment patterns compared to non-choice states.

Similar trends are evident when looking at average

FIGURE 2A

Biannual Enrollment in Choice and Non-Choice States—State Sums

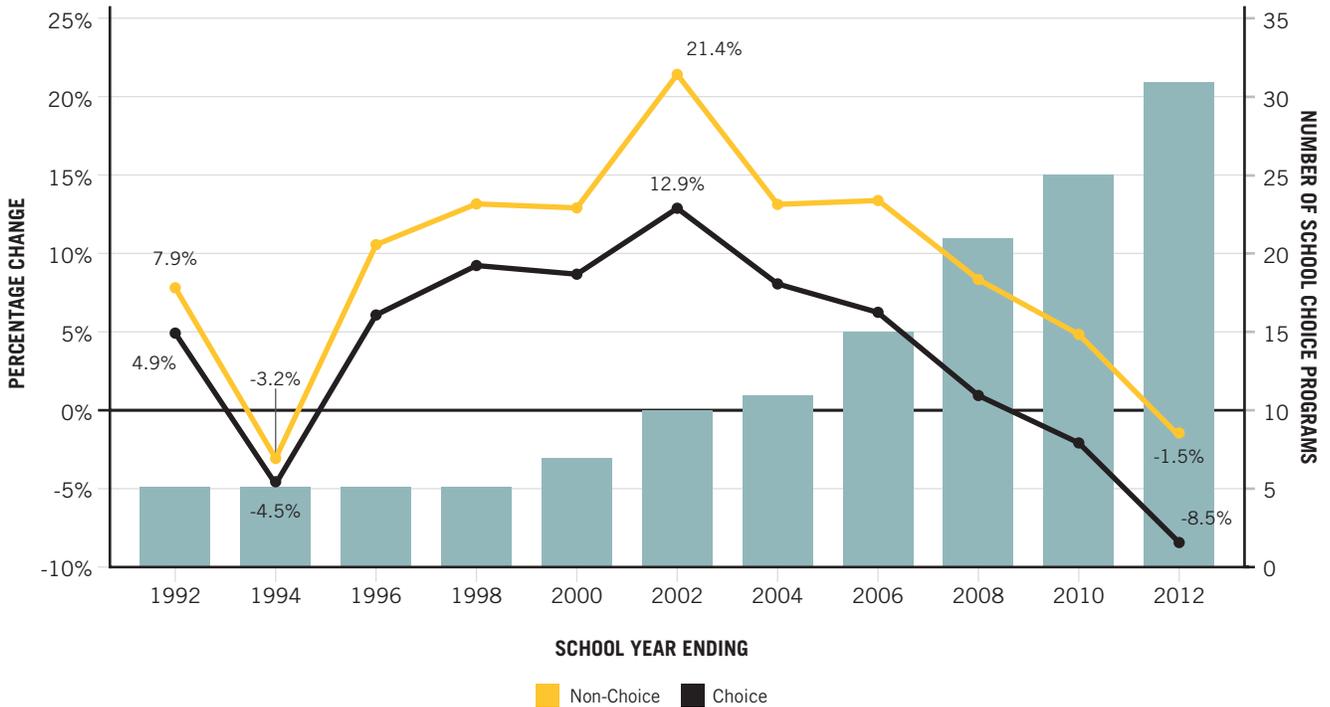


N = 13,809 Non-Choice; 9,009 Choice⁵⁶

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

FIGURE 2B

Biannual Percentage Change in Enrollment Over Year 1 in Choice and Non-Choice States—State Sums

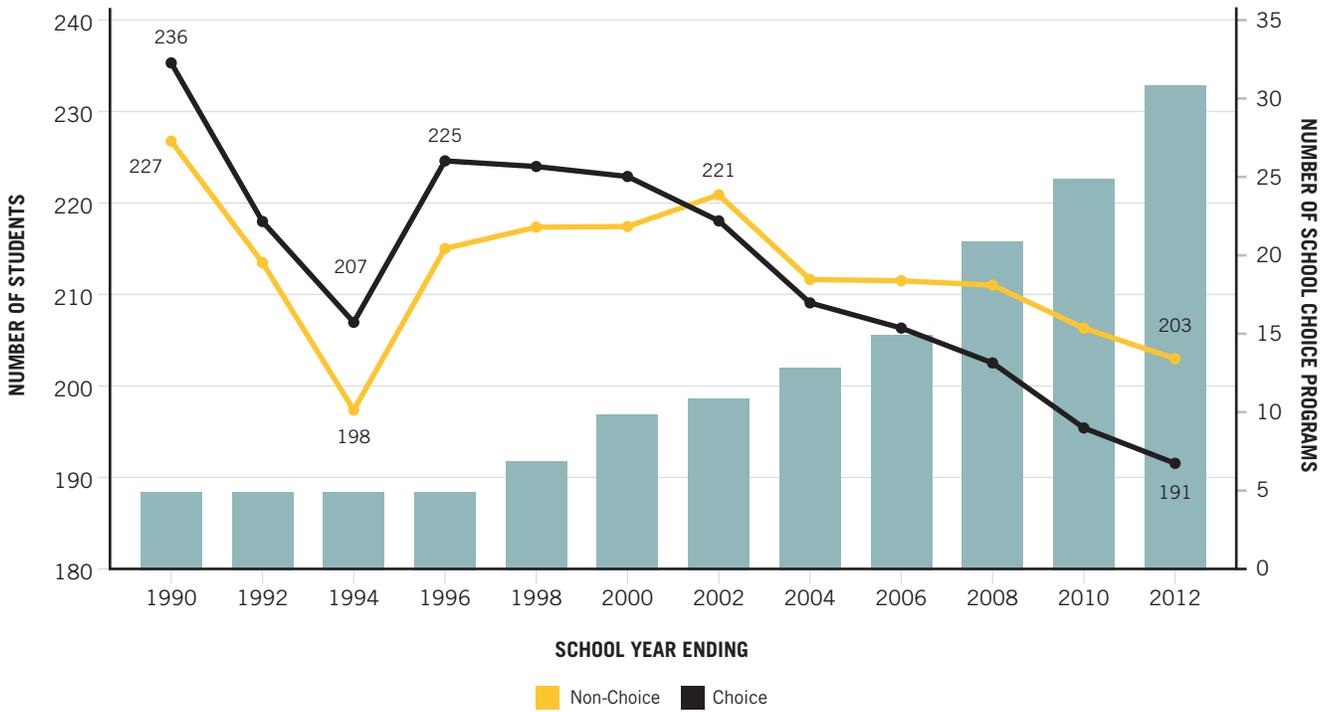


N = 13,809 Non-Choice; 9,009 Choice

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

FIGURE 3A

Biannual Enrollment in Choice and Non-Choice States—School Means

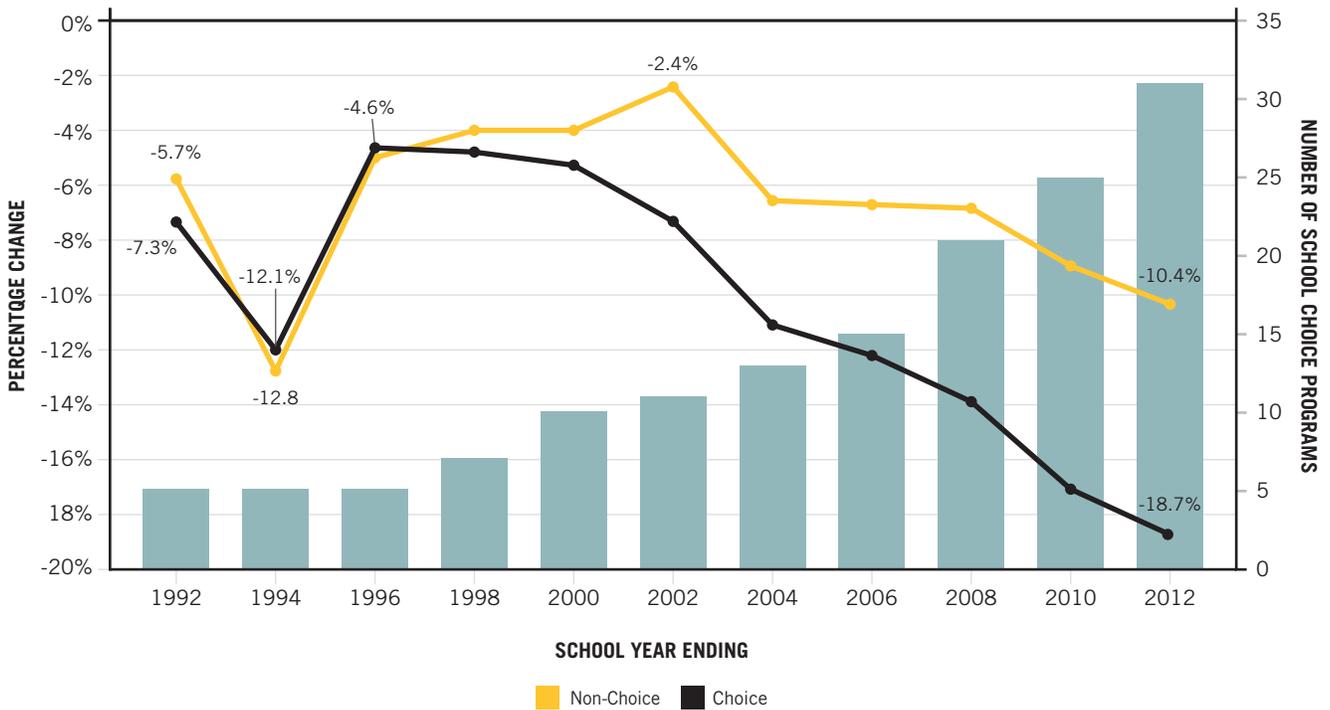


N = 13,809 Non-Choice; 9,009 Choice

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

FIGURE 3B

Biannual Percentage Change in Enrollment Over Year 1 in Choice and Non-Choice States—School Means



N = 13,809 Non-Choice; 9,009 Choice

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

school enrollments over time. Figures 3A and 3B on page 15 show average school size in choice and non-choice states, first with average trends over time and then with the percentage change. In both figures, average school enrollments moved in similar trajectories in choice and non-choice states, although the decrease in choice states appeared to be greater than in non-choice states (Figure 3B).

These are, of course, only descriptive trends. Though they are helpful for understanding general private school enrollment patterns and suggest enrollment trends in choice states differed little from non-choice states, we cannot draw statistical inferences about the relationship between enrollment and the adoption of school choice programs.

To help isolate the relationship between choice and average school enrollment (the outcome variable of interest in this question), we used a time series analysis with linear and curvilinear trends interacted with school choice program indicator variables and school and year fixed effects. The former—where time is measured as years (i.e., linear) and years squared (i.e., curvilinear)—allowed us to detect differences in enrollment trends between schools in choice states and those operating in non-choice states, which we describe in more detail later. The latter—school and year fixed effects—enabled us to control for factors within schools or within years that might confound the relationship between choice and enrollment.

A longitudinal approach to trends in private schools is particularly important because the effects of large-scale interventions often take time to manifest. As one study of vouchers and racial segregation noted,

“[I]t may take several years or possibly decades before a new long-run equilibrium is reached. Evaluations conducted only a few years after implementation may reveal very little about the long-run effects of [choice] because they will not fully account for, along with many other factors,

*the long-run supply responses of existing private schools, entry by new private schools, competitive responses by public schools, and long-run demand responses.”*⁵⁷

The analyses began with choice measured broadly as simply whether a state had any type of choice, as defined above. We also controlled for whether a state had a charter school law. The inclusion of a charter variable controlled for the possible effects of charter schools on the outcome measures. We say “possible” because prior research is mixed on the relationship between charter schools and private school enrollment,⁵⁸ but because the greater consensus of prior research findings seems to indicate a negative relationship between charter schools and private school enrollment, we included a measure in our analyses.

Setting aside all of the control variables, the primary variables of interest are average school enrollment—the outcome variable—years, years squared, and the interaction of the choice indicator variable with both time variables—the predictor variables. We included years squared given earlier research findings of a curvilinear trend in private school enrollment⁵⁹ and the trend lines displayed previously, which clearly show non-linear trends in enrollment over time in both choice and non-choice states. The interaction of the choice indicator variable with years and years squared captured possible differential trends in enrollment between those operating in choice environments and those that were not. To reiterate, if choice produces growth in average enrollment in private schools that differs from trends in non-choice states, we should expect to see the interaction variable in the tables below as statistically significant and with positive regression coefficients, indicating schools in choice states growing at rates different than schools in non-choice states.

As Table 2 indicates, there appears to be no meaningful difference in enrollment trends between those operating under choice and those that are not, thereby confirming the trends evident

TABLE 2

Enrollment Trends Between Choice and Non-Choice States (significant variables in bold)

	Coeff.	se	p
Charter	-0.597	0.909	0.511
Year	1.471	0.621	0.018
Year ²	-0.086	0.054	0.114
Choice State x Year	-1.622	0.562	0.004
Choice State x Year ²	0.010	0.044	0.826
Intercept	205.446	0.830	0.000

$R^2_{adj} = 0.90$; $N = 273,746$; dependent variable = average school enrollment

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

in Figures 3A and 3B. The interaction between choice and year is significant, and indicates a slight decrease in enrollment compared to non-choice states, but the magnitude of the difference is small (i.e., 1.6 fewer students per year). Moreover, the non-significant coefficient for the interaction of choice and year squared indicates the subsequent trend in choice states did not deviate from non-choice states.

Together, these results indicate no meaningful difference in enrollment trends between private schools operating under conditions of school choice and those that do not.

Choice Measured by Specific Programs

Of course, the prior analysis measures choice broadly by combining all types of choice programs into a single group. It could be that enrollment is sensitive to specific types of choice. To measure this possibility, we disaggregated choice into the different types of choice programs—voucher, tax-credit scholarship, individual tax credit, and individual tax deduction programs. Figures 4A through 4D on pages 19 and 20 illustrate trends over time—specifically the percentage of change—for states based on the different types of programs offered. Similar to Figures 2 and 3, the trends

in Figures 4A through 4D show average school enrollment trends move in similar trajectories in states with various types of choice programs as compared to states without such programs. Although the trend lines are not perfectly correlated, they nonetheless fail to show strongly divergent trends that would be consistent with the aforementioned school choice theories.

Subjecting these trends to similar statistical analyses described above confirms the descriptive trends in Figures 4A through 4D. As Table 3 indicates, only two of the interactions involving time and school choice programs were significant. This means the enrollment patterns of choice schools did not consistently diverge from the pattern of non-choice schools. Of the two significant interactions, schools in states with individual tax credits saw a small decrease in enrollment compared to states without such programs, and no change in enrollment in later years. Conversely, schools in individual tax deduction states saw a greater increase in enrollment as compared to non-individual tax deduction states; however, the effect was, again, small with no change in enrollment in later years.

TABLE 3

Enrollment Trends Based on Choice Programs (significant variables in bold)

	Coeff.	se	p
Charter	-1.043	0.910	0.251
Year	0.754	0.619	0.223
Year ²	-0.057	0.054	0.290
Individual Tax Credit State x Year	-2.851	0.992	0.004
Individual Tax Credit State x Year ²	-0.017	0.081	0.829
Individual Tax Deduction State x Year	2.620	1.169	0.025
Individual Tax Deduction State x Year ²	-0.087	0.091	0.340
Tax-Credit Scholarship State x Year	0.294	0.752	0.696
Tax-Credit Scholarship State x Year ²	-0.051	0.058	0.381
Voucher State x Year	0.848	0.712	0.234
Voucher State x Year ²	-0.057	0.057	0.315
Intercept	205.308	0.838	0.000

$R^2_{adj} = 0.90$; $N = 273,746$; dependent variable = average school enrollment

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

Enrollment Trends Compared to Population Trends

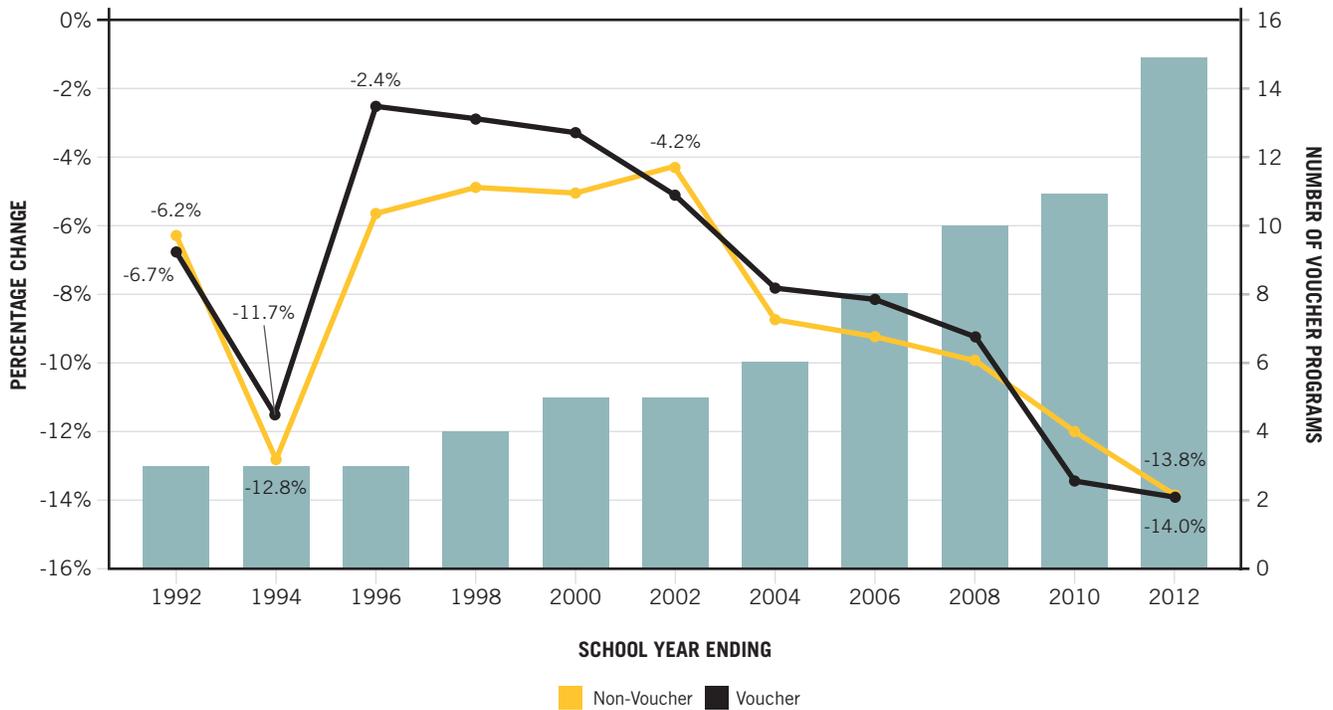
It is important to note that trends in enrollment or demographics may be influenced by changes in the communities in which schools operate.⁶⁰ In light of this, we compare private school enrollment trends to those in the larger population. To do so, we used geographic information system (GIS) or geocoding in comparing private schools to their surrounding communities and schools. To date, few school choice studies have used this growing technology,⁶¹ which is an unfortunate omission given the importance of the social, cultural, and economic landscapes that shape school choice.⁶² Using contemporary technology, GIS allows researchers to “layer” data with spatial characteristics on computer-generated maps in order to better understand contextual issues and spatial patterns and relationships.⁶³ It can also be used with traditional statistical analyses to improve

estimates such as those derived herein.⁶⁴ Of those who have used spatial analysis in school choice research, prior authors have examined how geography affects domains, such as parental choices, differences in achievement, housing markets, school efficiency, and racial segregation.⁶⁵ Thus, while our use of GIS is not entirely unique, it is one among a very small collection of studies in the school choice oeuvre.

We compared the enrollment trends of each private school to those of public schools⁶⁶ operating within five miles of the respective private school. This approach examines whether the enrollment trends in private schools mirror those of surrounding public schools—a measure of population changes—or whether conditions of choice alter the enrollment trends of private schools in relation to public schools.⁶⁷

FIGURE 4A

Biannual Percentage Change in Enrollment Over Year 1 in Voucher and Non-Voucher States—School Means

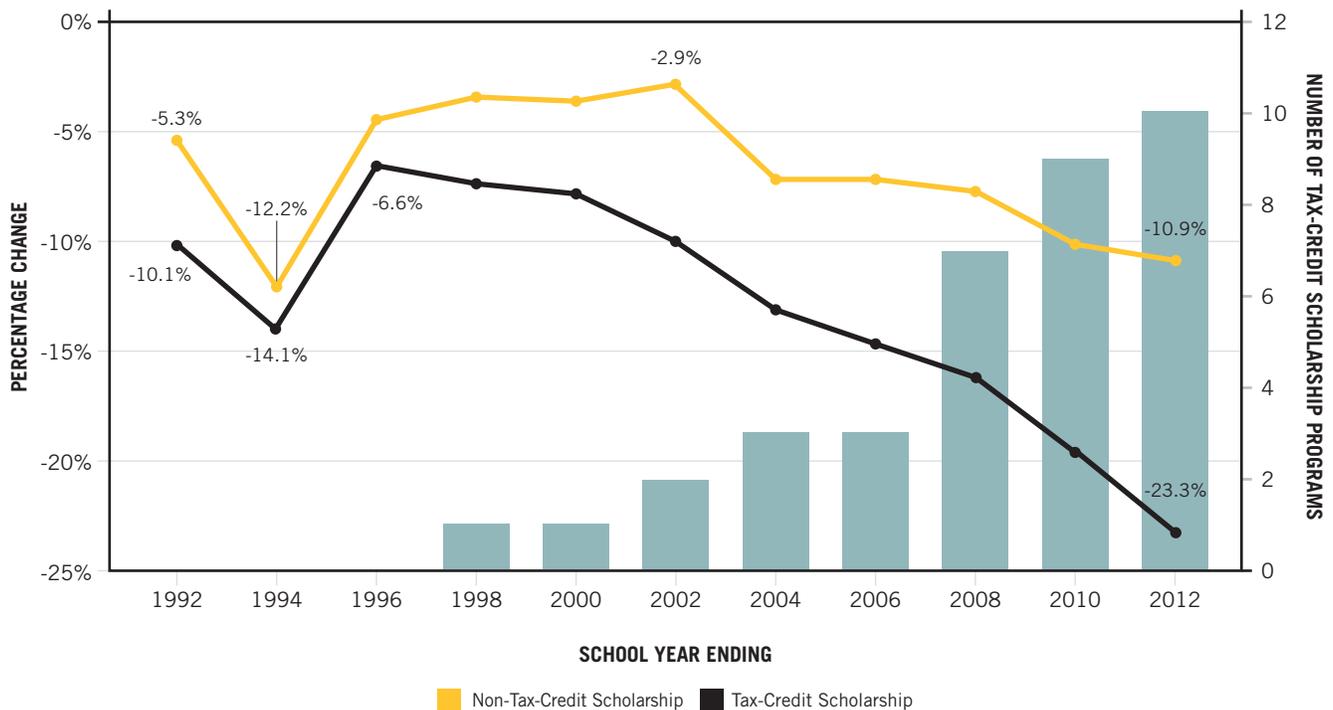


N = 17,660 Non-Voucher; 5,152 Voucher

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

FIGURE 4B

Biannual Percentage Change in Enrollment Over Year 1 in Tax-Credit Scholarship and Non-Tax-Credit Scholarship States—School Means

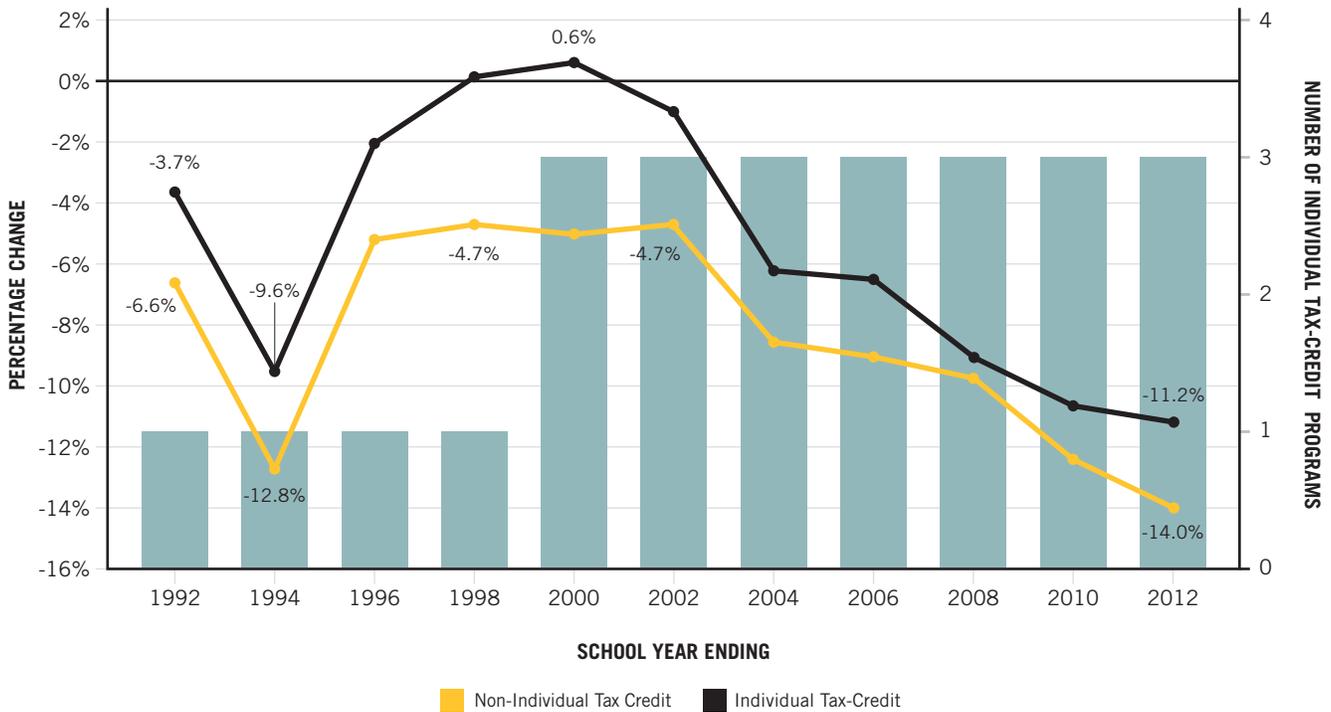


N = 17,840 Non-Tax-Credit Scholarship; 4,972 Tax-Credit Scholarship

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

FIGURE 4C

Biannual Percentage Change in Enrollment Over Year 1 in Individual Tax Credit and Non-Individual Tax Credit States—School Means

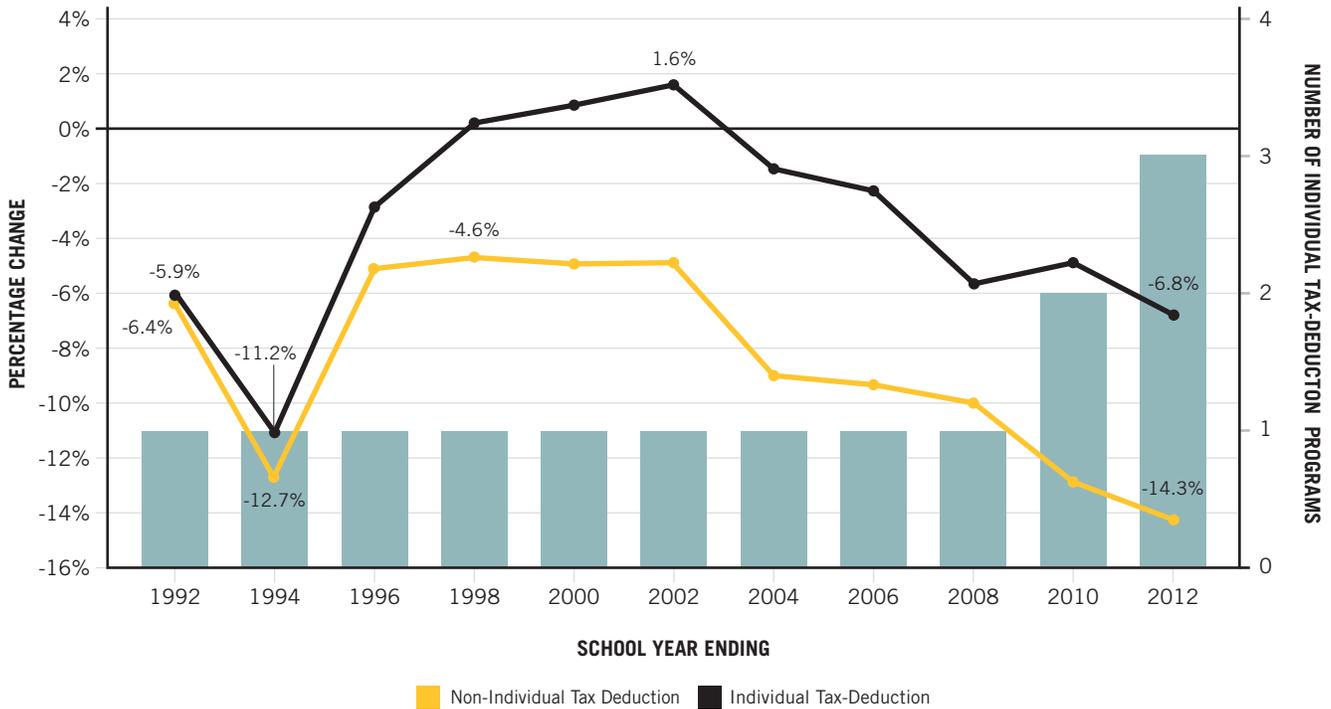


N = 20,933 Non-Individual Tax Credit; 1,880 Individual Tax Credit

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

FIGURE 4D

Biannual Percentage Change in Enrollment Over Year 1 in Individual Tax Deduction and Non-Individual Tax Deduction States—School Means



N = 21,342 Non-Individual Tax Deduction; 1,471 Individual Tax Credit

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

We drew the public school data from the Elementary and Secondary Information System (EISi). EISi data were available for all years that corresponded to the PSS data, and we matched public schools to private schools based on the grade levels they offer.

We created the specific outcome measure in the analyses by dividing each private school's enrollment by the total enrollment in the surrounding public schools. This ratio enabled us to track changes in the enrollment of private schools as compared to surrounding public schools. If the enrollment of private schools increased relative to the surrounding public school enrollment, for example, the ratio should increase. Conversely, if enrollment increased in public schools but remained constant or decreased in the private schools, then the ratio should decrease.

The analysis for this question was similar to that used in the previous analyses, where we examined the enrollment ratio trend in both a linear and a curvilinear pattern, paying particular attention to differences in the trend lines based on the presence of choice programs. Time-varying control variables included the presence of a charter school law and the percentage of free and reduced-price lunch (FRL) students in the public schools used in the comparisons.⁶⁸ Finally, as in the previous section, one analysis measured differences using a broad measure of choice, and a second analysis disaggregated by different choice programs.

As Table 4 indicates, the only significant effect when using a broad measure of choice was the interaction between status as a choice state and year. The positive coefficient indicates choice states saw a greater increase in relative enrollment over time, but the effect was very small, too small to be practically significant. Specifically, the outcome variable is a ratio (private school enrollment/average public school enrollment). Thus, in practical terms the coefficient of 0.004 means that from one year to the next, private schools in choice states saw an average increase in enrollment of 0.004 percentage points above the average growth

evident in schools in non-choice states vis-à-vis surrounding public schools.

Similarly, when choice was disaggregated into the respective programs, only one program saw significant effects—tax-credit scholarship—and the effects were quite small as seen in Table 5. Schools in tax-credit scholarships states saw a slight relative increase in enrollment but then saw a slight decrease. For practical purposes, however, the differences were not meaningful.

Taken together, the results across the different analyses of enrollment tell a consistent story. The enrollment patterns in private schools in choice states did not differ meaningfully or in most cases statistically from schools in non-choice states. This was the case whether choice was measured broadly or when disaggregated into specific programs or when enrollment trends are compared to general population trends.

Is there a significant difference in the percentage of racial/ethnic minority students after the introduction of private school choice programs?

Choice Measured Broadly

We examined trends in the percentages of racial/ethnic minority students served in private schools. As Figure 5A on page 23 illustrates, in general, the average percentages of minority students enrolled in private schools increased from 1994 through 2012. (The racial composition of private schools was not captured in the PSS in 1990 or 1992.) This was the case in states offering choice (measured broadly as any type of choice program) and those not offering choice. Although both types of states saw an increase, Figure 5B on page 23 suggests that the rate of growth compared to the first year of data was greater in choice states than non-choice states. Based on these descriptive results, it appears

TABLE 4

Private School Enrollment as a Function of Public School Enrollment Disaggregated by Choice Measured Broadly (significant variables in bold)

	Coeff.	se	p
Charter	-0.008	0.006	0.214
FRL	-0.170	0.071	0.017
Year	0.007	0.006	0.211
Year ²	-0.000	0.000	0.260
Choice State x Year	0.004	0.001	0.008
Choice State x Year ²	-0.000	0.000	0.442
Intercept	0.099	0.015	0.000

$R^2_{adj} = 0.31$; $N = 193,272$; dependent variable = ratio of average private school enrollment to average public school enrollment

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>; "EIS/tableGenerator," National Center for Education Statistics, accessed Jan. 10, 2016,

TABLE 5

Private School Enrollment as a Function of Public School Enrollment Disaggregated by Specific Choice Programs (significant variables in bold)

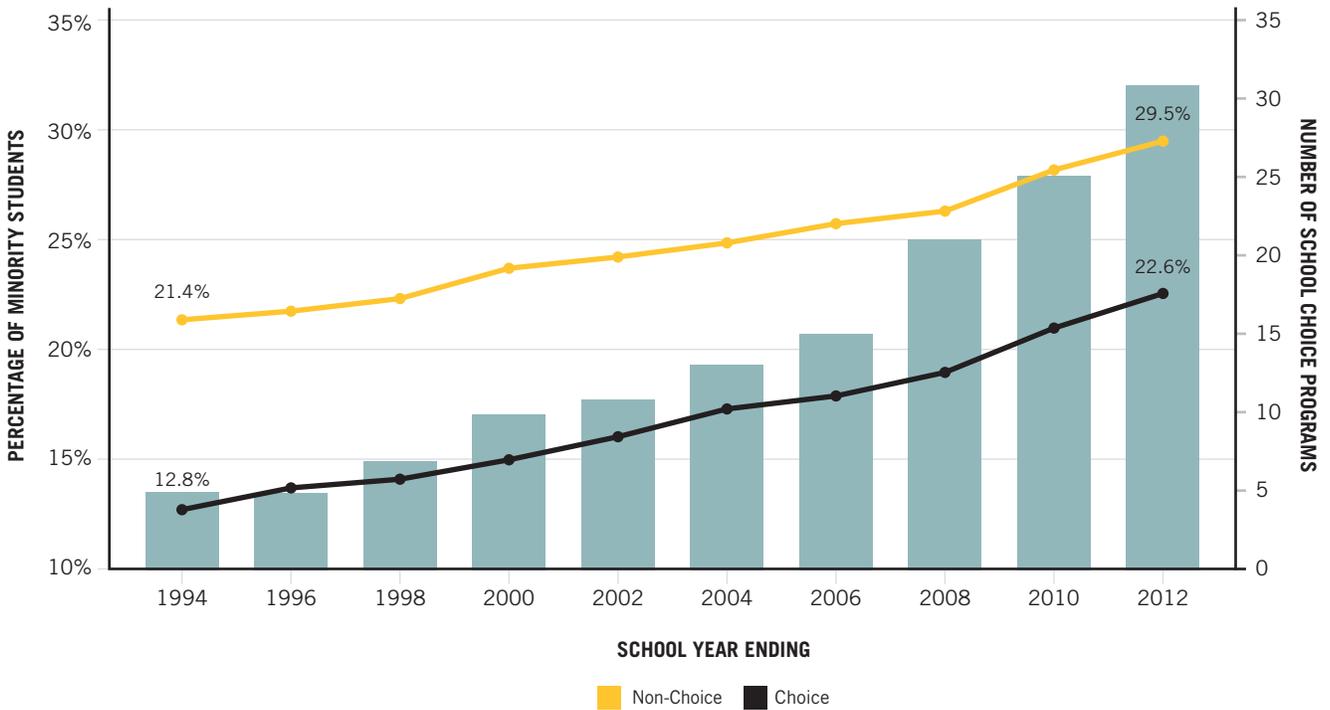
	Coeff.	se	p
Charter	-0.009	0.007	0.164
FRL	-0.172	0.071	0.016
Year	0.008	0.006	0.193
Year ²	-0.001	0.000	0.226
Individual Tax Credit State x Year	-0.005	0.004	0.270
Individual Tax Credit State x Year ²	0.001	0.000	0.154
Individual Tax Deduction State x Year	0.001	0.002	0.692
Individual Tax Deduction State x Year ²	-0.000	0.000	0.914
Tax-Credit Scholarship State x Year	0.006	0.002	0.000
Tax-Credit Scholarship State x Year²	-0.000	0.000	0.006
Voucher State x Year	0.001	0.002	0.736
Voucher State x Year ²	0.000	0.000	0.772
Intercept	0.101	0.015	0.000

$R^2_{adj} = 0.31$; $N = 193,272$; dependent variable = ratio of average private school enrollment to average public school enrollment

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>; "EIS/tableGenerator," National Center for Education Statistics, accessed Jan. 10, 2016, <http://nces.ed.gov/ccd/elsi/tableGenerator.aspx>.

FIGURE 5A

Biannual Percentage Racial/Ethnic Minority Students in Schools in Choice and Non-Choice States

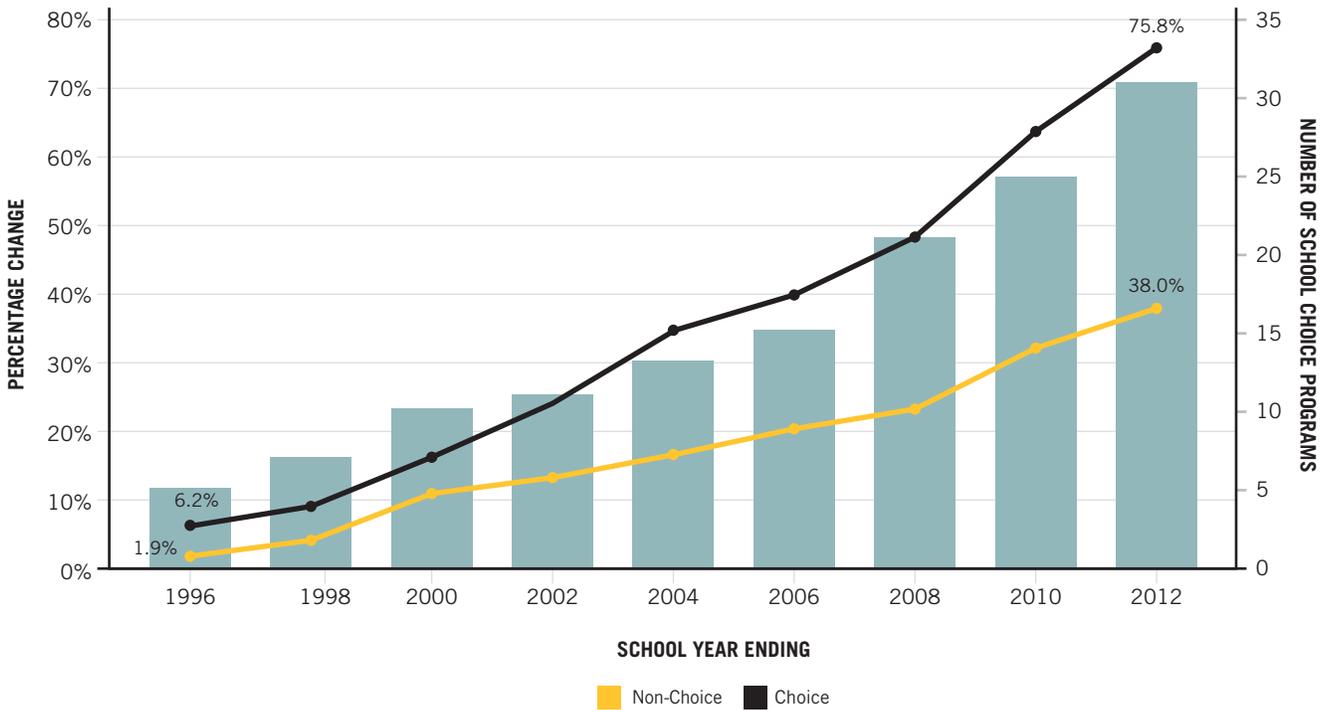


N = 14,003 Non-Choice; 9,132 Choice

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

FIGURE 5B

Biannual Percentage Change in Racial/Ethnic Minority Students Over Year 1 in Choice and Non-Choice States



N = 14,003 Non-Choice; 9,132 Choice

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

TABLE 6

Percent Racial/Ethnic Minority Students Between Schools in Choice and Non-Choice States (significant variables in bold)

	Coeff.	se	p
Charter	-0.020	0.161	0.901
Year	9.074	2.252	0.000
Year²	-0.363	0.113	0.001
Choice State x Year	-0.196	0.136	0.151
Choice State x Year ²	0.012	0.010	0.239
Intercept	-27.902	11.202	0.013

$R^2_{adj} = 0.76$; $N = 231,358$; dependent variable = average percentage racial/ethnic minority students per school

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>. <http://nces.ed.gov/ccd/elsi/tableGenerator.aspx>.

private schools operating in choice states have not grown “whiter,” on average, as compared to those in non-choice states and perhaps may have grown more diverse.

Those are, of course, descriptive trends only, but when subjected to the same type of statistical testing described previously, the results told a similar story. Table 6 indicates the interaction of choice and the time variables are not statistically significant, indicating the percentages of minority students in choice schools did not diverge from the pattern of non-choice schools. Specific to the hypothesis guiding this analysis, these results mean the student body demographics of private schools operating under choice mirror those of non-choice schools. Put simply, the demographics of private schools have not grown “whiter” while operating under conditions of choice, broadly measured.

Choice Measured by Specific Programs

When choice was disaggregated into different programs, results were similar to when choice is measured broadly. As Figures 6A through 6D starting on page 25 illustrate, the percentages of minority students increased over time in states with no type of choice and states that offered the specific school choice programs. Moreover, the

growth in choice states appeared to be greater in later years studied herein.

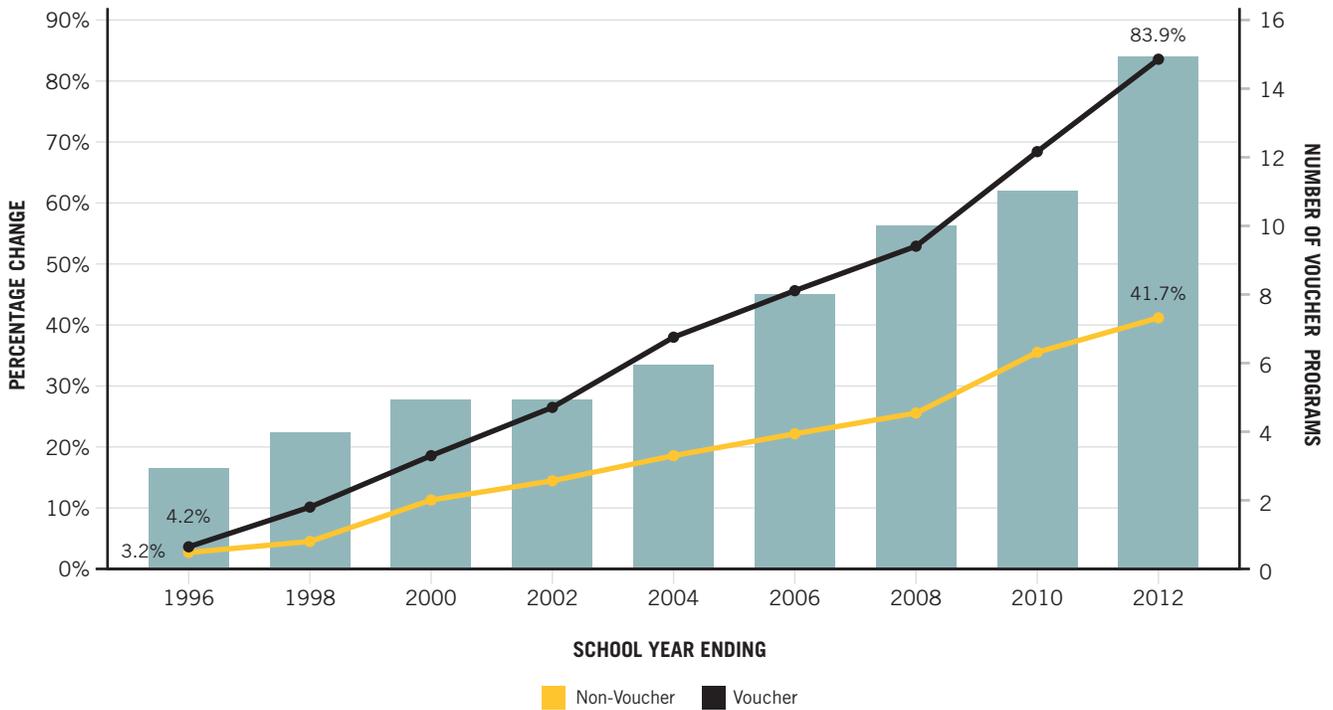
When subjected to statistical analysis, however, the results—found in Table 7 on page 27—were essentially the same as Table 6 suggests. For all programs save one, the interactions between program indicator variables and the time variables were not significant, again meaning the percentages of minority students in choice schools did not diverge from the pattern of non-choice schools once choice was introduced into the environment. The one exception is the interaction of voucher states and year squared. In later years, the coefficient indicates a small increase in schools operating in voucher states. Though, again, the difference is small. Consistent with the broader measure of choice, private school demographics have not grown “whiter” while operating under specific measures of choice, including vouchers and different types of tax-credit programs.

Percentage Minority Trends Compared to Population Trends

On average, the student populations of private schools in choice states have grown more diverse over time and similarly so compared to non-choice states, but how does the diversity of the schools

FIGURE 6A

Biannual Percentage Change in Racial/Ethnic Minority Students Over Year 1 in Voucher and Non-Voucher States

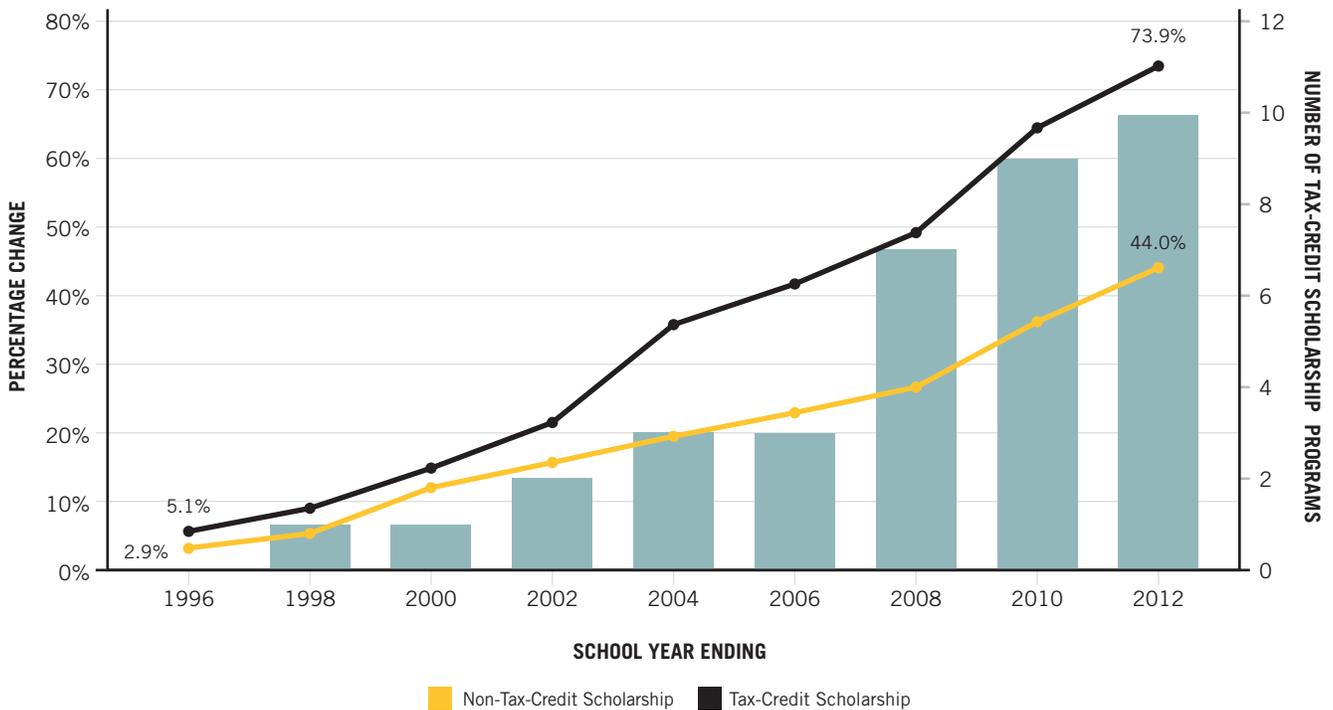


N = 17,871 Non-Voucher; 5,265 Voucher

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

FIGURE 6B

Biannual Percentage Change in Racial/Ethnic Minority Students Over Year 1 in Tax-Credit Scholarship and Non-Tax-Credit Scholarship States

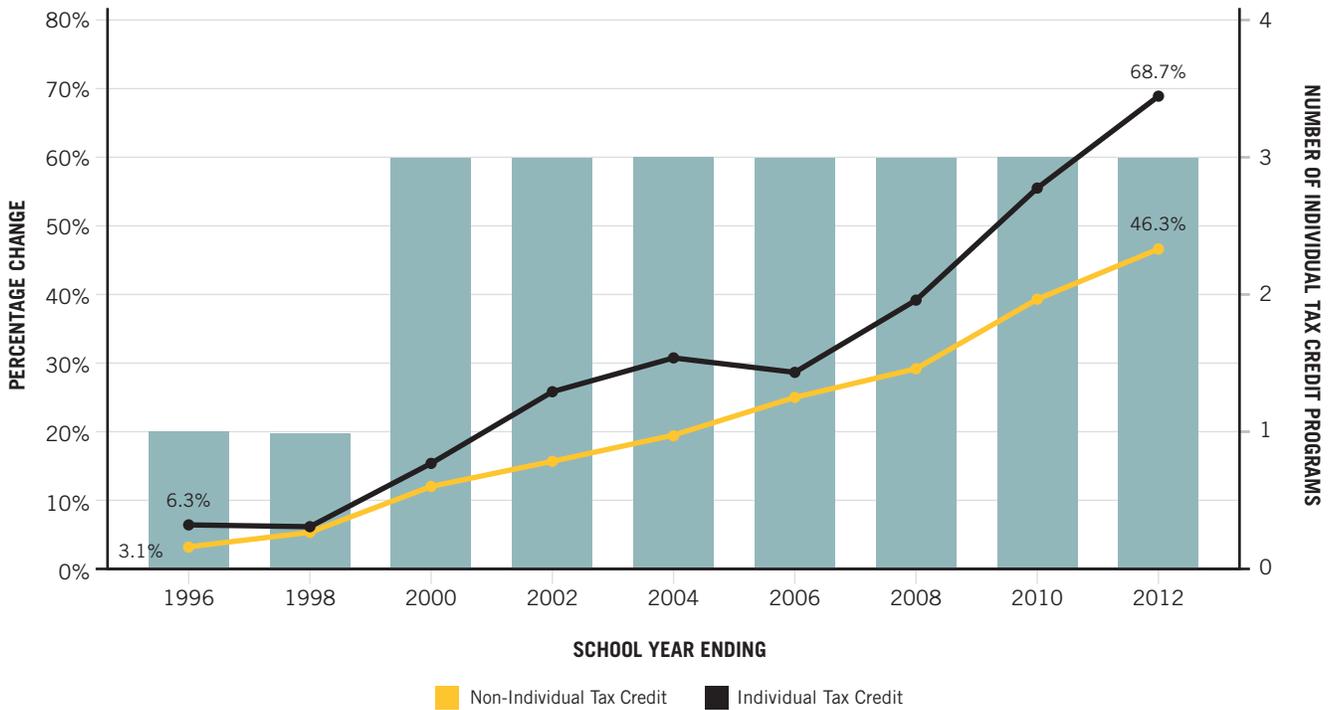


N = 18,046 Non-Tax-Credit Scholarship; 5,090 Tax-Credit Scholarship

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

FIGURE 6C

Biannual Percentage Change in Racial/Ethnic Minority Students Over Year 1 in Individual Tax Credit and Non-Individual Tax Credit

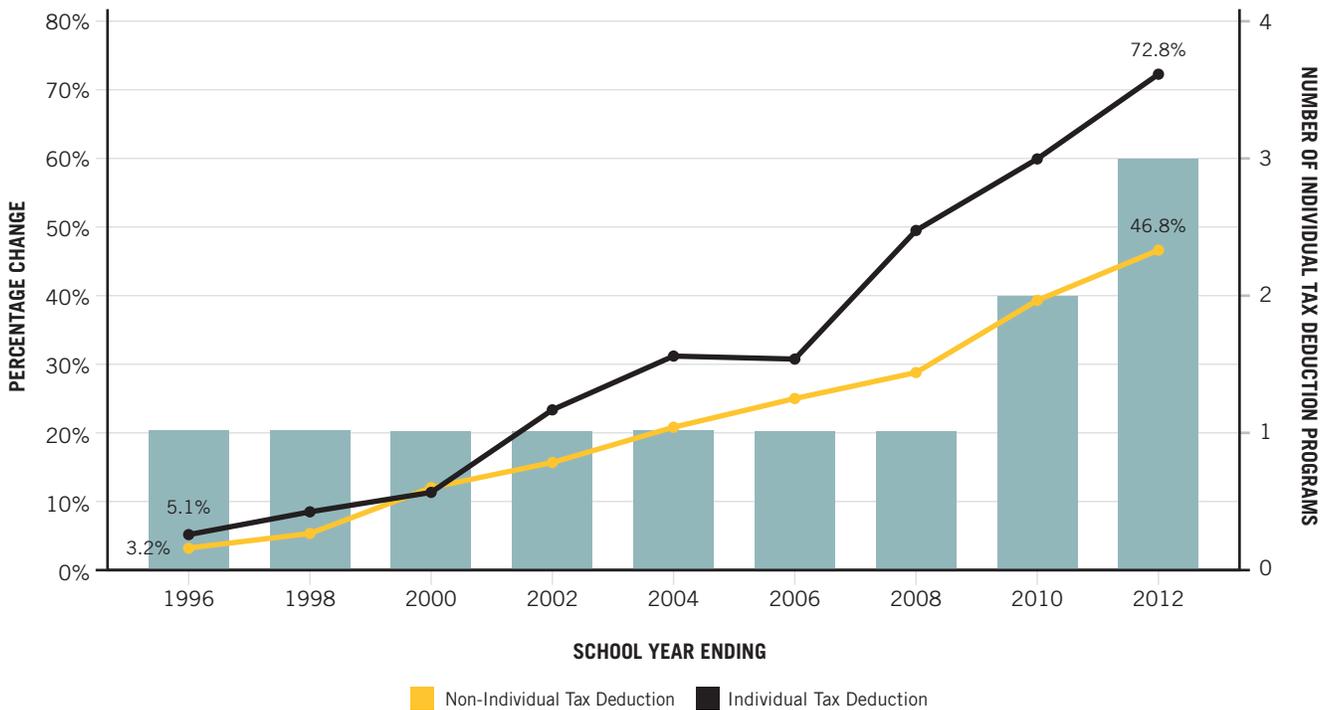


N = 21,273 Non-Individual Tax Credit; 1,863 Individual Tax Credit

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

FIGURE 6D

Biannual Percentage Change in Racial/Ethnic Minority Students Over Year 1 in Individual Tax Deduction and Non-Individual Tax Deduction States



N = 21,664 Non-Individual Tax Deduction; 1,472 Individual Tax Credit

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

TABLE 7

Percent Racial/Ethnic Minority Students Between Schools in Choice and Non-Choice States (significant variables in bold)

	Coeff.	se	p
Charter	-0.077	0.166	0.643
Year	9.054	2.253	0.000
Year²	-0.364	0.113	0.001
Individual Tax Credit State x Year	0.084	0.250	0.737
Individual Tax Credit State x Year ²	0.000	0.019	0.996
Individual Tax Deduction State x Year	-0.099	0.249	0.690
Individual Tax Deduction State x Year ²	-0.008	0.019	0.664
Tax-Credit Scholarship State x Year	0.056	0.249	0.741
Tax-Credit Scholarship State x Year ²	-0.003	0.013	0.804
Voucher State x Year	-0.250	0.172	0.146
Voucher State x Year²	0.027	0.013	0.042
Intercept	-27.914	11.203	0.013

*R*²adj = 0.76; *N* = 231,358; dependent variable = average percentage racial/ethnic minority students per school

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

compare to the geographical areas surrounding the schools? To answer this, we compared the percentage of racial/ethnic minority students in each school to the matched school-aged population within a one mile area around the respective schools.⁶⁹ In so doing, the analysis “benchmarked” each school’s composition to the surrounding community.

We drew the population data from the decennial census for 2000 and 2010. Although 1990 census data were available, the percentage of minority students were not available for the PSS, so this analysis is limited only to 2000 and 2010. The census data indicate the number of people in geographic areas disaggregated by age groups and race/ethnicity. We matched these age groups to the private schools whereby ages 5–9 in the population were matched to elementary schools, ages 10–14 to middle schools, ages 15–19 to high schools, and various combinations.

To create the specific outcome measure in the analyses, we divided each private school’s minority student percentage by the percentage of minority students within the surrounding school-aged population. This ratio enabled us to track changes in the composition of private schools as compared to the surrounding population. If the racial/ethnic composition of private schools increased relative to the surrounding population, for example, the aforementioned ratio would increase. Conversely, if the percentage of minority children increased in the population but stayed constant or decreased in the private schools, then the ratio would decrease.

The variable measuring changes over time is named “number of years.” This variable indicates the number of years respective choice programs were in effect in 2000 and 2010. For example, if a state’s voucher program went into effect in 1997, then “number of years” would show a value of four in 2000 and a value of 14 in 2010. For states with no programs in operation, “number of years” would

TABLE 8

Racial/Ethnic Composition of Private Schools as a Function of Composition of Population Disaggregated by Choice Measured Broadly

	Coeff.	se	p
Year	0.067	0.035	0.052
N Years of Choice	0.022	0.032	0.496
Year x N Years of Choice	-0.001	0.021	0.955
Median Income	0.000	0.000	0.885
Intercept	0.939	0.107	0.000

$R^2_{adj} = 0.48$; $N = 30,059$; dependent variable = ratio of percentage racial/ethnic minority students per private school to percentage racial/ethnic minority of school-aged children in surrounding population
 Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>; US Census Bureau, 2000 Census Summary File 1 (by state) [machine-readable data files], prepared by the US Census Bureau, 2000; US Census Bureau, 2010 Census Summary File 1 (by state) [machine-readable data files], prepared by the US Census Bureau, 2011.

TABLE 9

Racial/Ethnic Composition of Private Schools as a Function of Composition of Population Disaggregated by Specific Choice Programs

	Coeff.	se	p
Year	0.043	0.034	0.215
N Years of Individual Tax Credit	-0.011	0.064	0.866
Year x N Years of Individual Tax Credit	0.009	0.040	0.832
N Years of Individual Tax Deduction	-0.022	0.057	0.701
Year x N Years of Individual Tax Deduction	0.009	0.036	0.793
N Years of Tax-Credit Scholarship	0.066	0.096	0.491
Year x N Years of Tax-Credit Scholarship	-0.051	0.083	0.545
N Years of Voucher	0.067	0.058	0.250
Year x N Years of Voucher	-0.007	0.042	0.859
Median Income	0.000	0.000	0.581
Intercept	0.899	0.106	0.000

$R^2_{adj} = 0.48$; $N = 30,059$; dependent variable = ratio of percentage racial/ethnic minority students per private school to percentage racial/ethnic minority of school-aged children in surrounding population
 Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>; US Census Bureau, 2000 Census Summary File 1 (by state) [machine-readable data files], prepared by the US Census Bureau, 2000; US Census Bureau, 2010 Census Summary File 1 (by state) [machine-readable data files], prepared by the US Census Bureau, 2011.

take a value of zero in both 2000 and 2010. This type of coding reflects the fact that states that may offer the same type of choice program often did not begin offering the programs in the same years. By the year 2000, for instance, one state might have offered a program for two years, while another might have offered a program for eight years. Thus,

the programs' effects on student composition may not be the same in 2000.

If choice has the effect predicted by critics, the "number of years" variable would be statistically significant. It would also have a negative sign, showing the ratio of average percentages of

minority students in private schools to surrounding areas decreasing as the number of years of choice increased.

In the analysis, we also controlled for the median income within the geographic areas surrounding the private schools, included a year variable for 2000 and 2010 to control for any effects that would be idiosyncratic to those years, and included a variable interacting the year and “number of years” variables to measure a differential effect between “number of years” and the two different points in the decade. As with results above, we first examined a broader measure of choice and then disaggregated by type of choice program.

None of the variables were significant, using both a broad measure of choice (Table 8; number of years of any kind of choice) and number of years of specific types of choice (Table 9). That means the average percentage of minority students enrolled in private schools compared with the surrounding school-aged populations did not appear to change as a function of choice. Although the ratio did not increase, neither did it decrease, suggesting private schools under circumstances of choice do not grow “whiter.”

The results tell a consistent story across all the analyses specific to the percentage of minority students present in private schools. Contrary to charges by critics that private schools would grow less diverse as a result of choice, results show the average percentage of minority students in private schools grew over time in choice states similar to schools in non-choice states. Moreover, the percentage of minority students enrolled in private schools compared with the surrounding school-aged populations did not appear to change as a function of choice programs. As with the other analyses, this suggests private schools under circumstances of choice did not grow “whiter,” and the student body composition appeared consistent with the populations surrounding their schools.

Is there a significant difference in the number of grade levels schools offer after the introduction of private school choice programs?

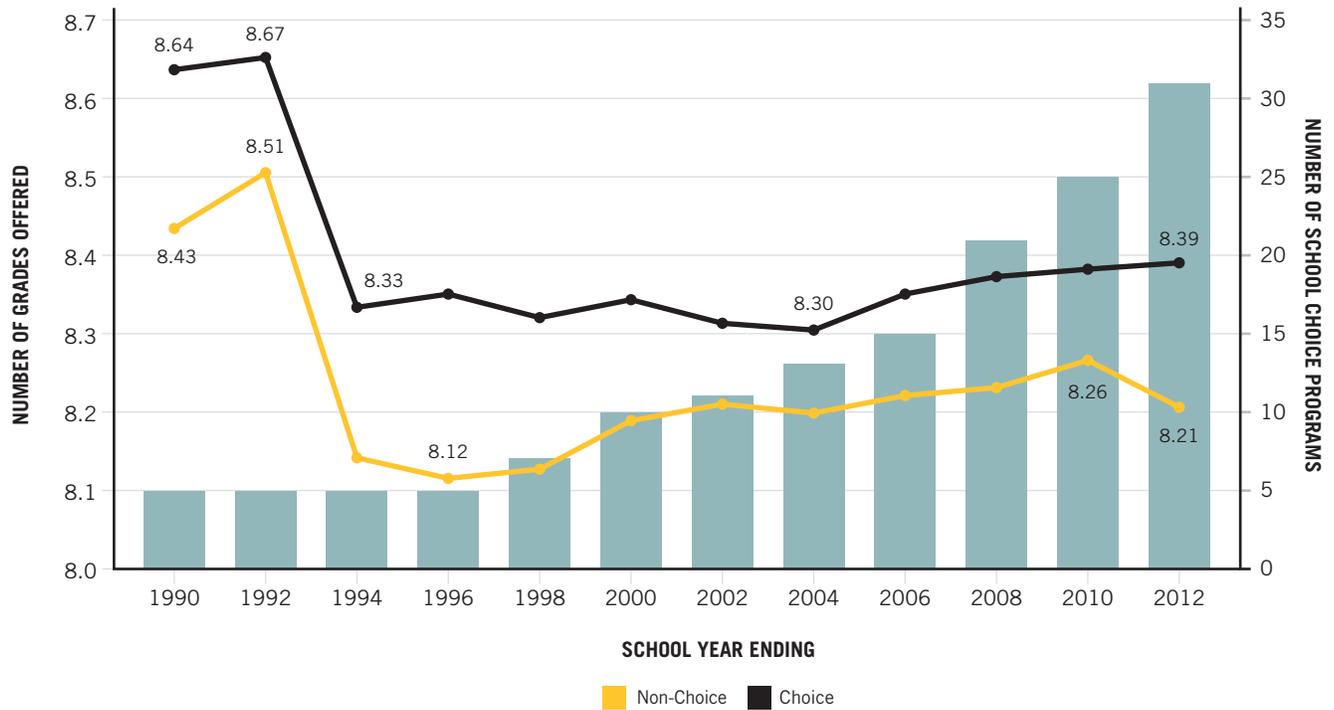
Choice Measured Broadly

For the final research question, we examined the extent to which the infrastructures of schools changed over time after the introduction of choice. Infrastructure was measured by the number of grade levels each school offers. Figure 7A shows the average number of grades private schools offer over time in choice and non-choice states, while Figure 7B shows the percentage change over time. In both figures, the trend lines show similar patterns for choice and non-choice states, with schools in choice states offering slightly fewer grades. It is important to note, however, that the scales on the Y-axes show small increments, thereby exaggerating differences. In Figure 7A, for example, the trend lines are moving within the space of two-tenths of a grade. Thus, the differences between states over time are tiny.

When subjected to statistical testing, the results confirm that differences in numbers of grades private schools offer over time did not differ meaningfully between choice and non-choice states as demonstrated in Table 10 on page 33. Interactions between choice and the time variables showed significance on the year term but not year squared. That means choice schools saw a slightly sharper decrease in the number of grades offered in early years (i.e., an average of two-hundredths of a grade per year), but a subsequent increase was not significantly different from non-choice schools. To reiterate, the differences were not meaningfully large. In fact, all of the changes relevant to the number of grades schools offer were exceptionally small.

FIGURE 7A

Biannual Average Number of Grades Private Schools Offered in Choice and Non-Choice States

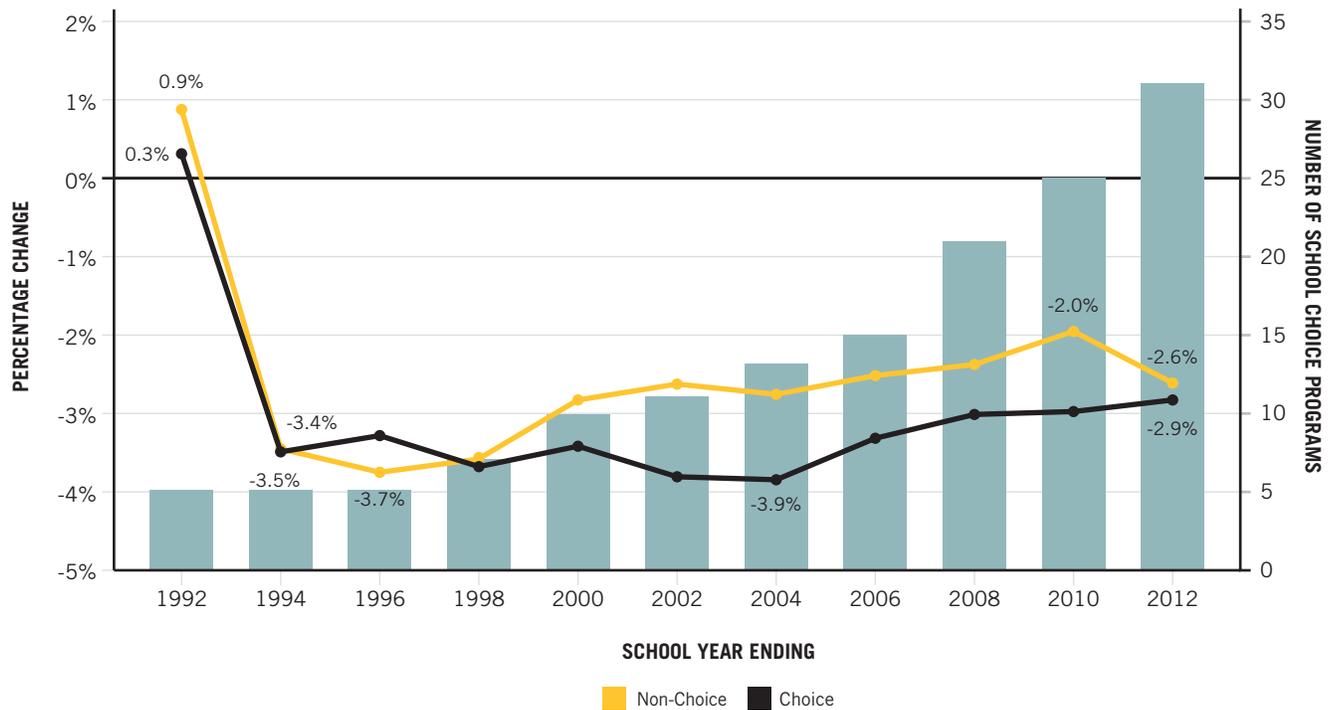


N = 13,809 Non-Choice; 9,009 Choice

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

FIGURE 7B

Biannual Percentage Change in Number of Grades Private Schools Offered Over Year 1 in Choice and Non-Choice States

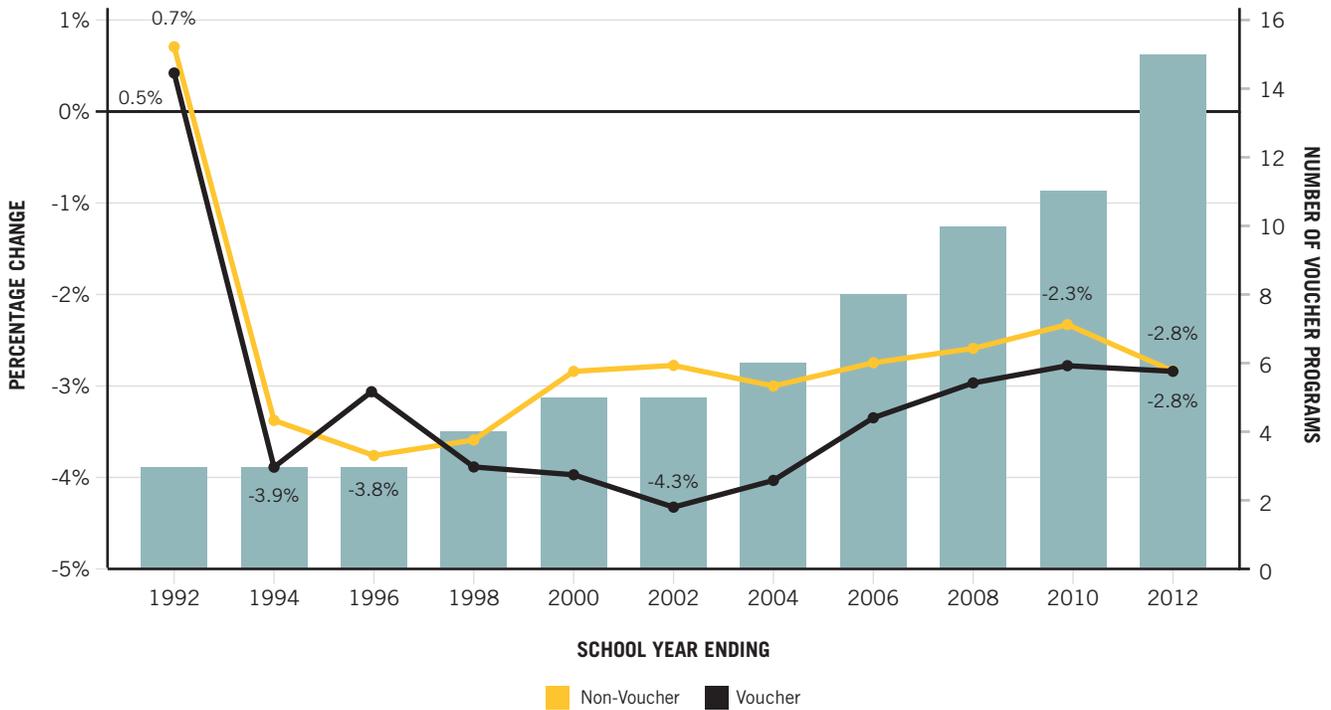


N = 13,809 Non-Choice; 9,009 Choice

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

FIGURE 8A

Biannual Percentage Change in the Number of Grades Private Schools Offered Over Year 1 in Voucher and Non-Voucher States

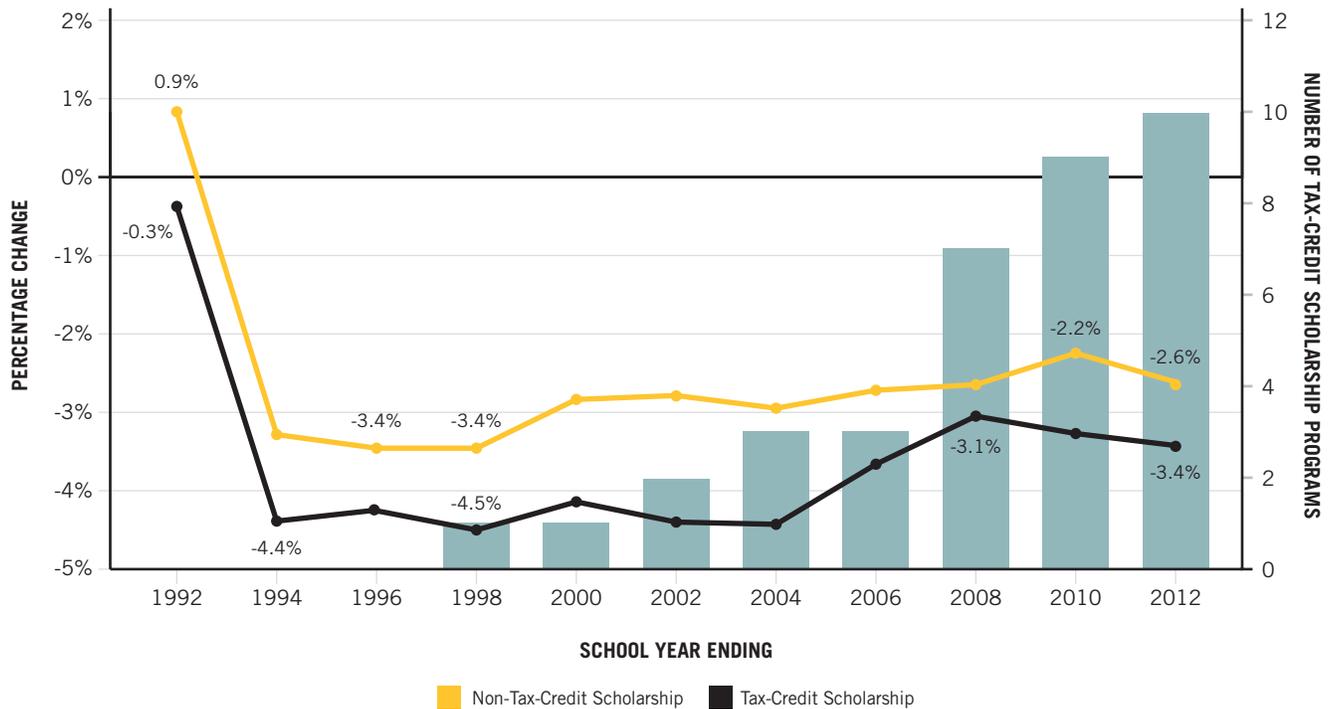


N = 17,666 Non-Voucher; 5,153 Voucher

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

FIGURE 8B

Biannual Percentage Change in the Number of Grades Private Schools Offered Over Year 1 in Tax-Credit Scholarship and Non-Tax-Credit Scholarship States

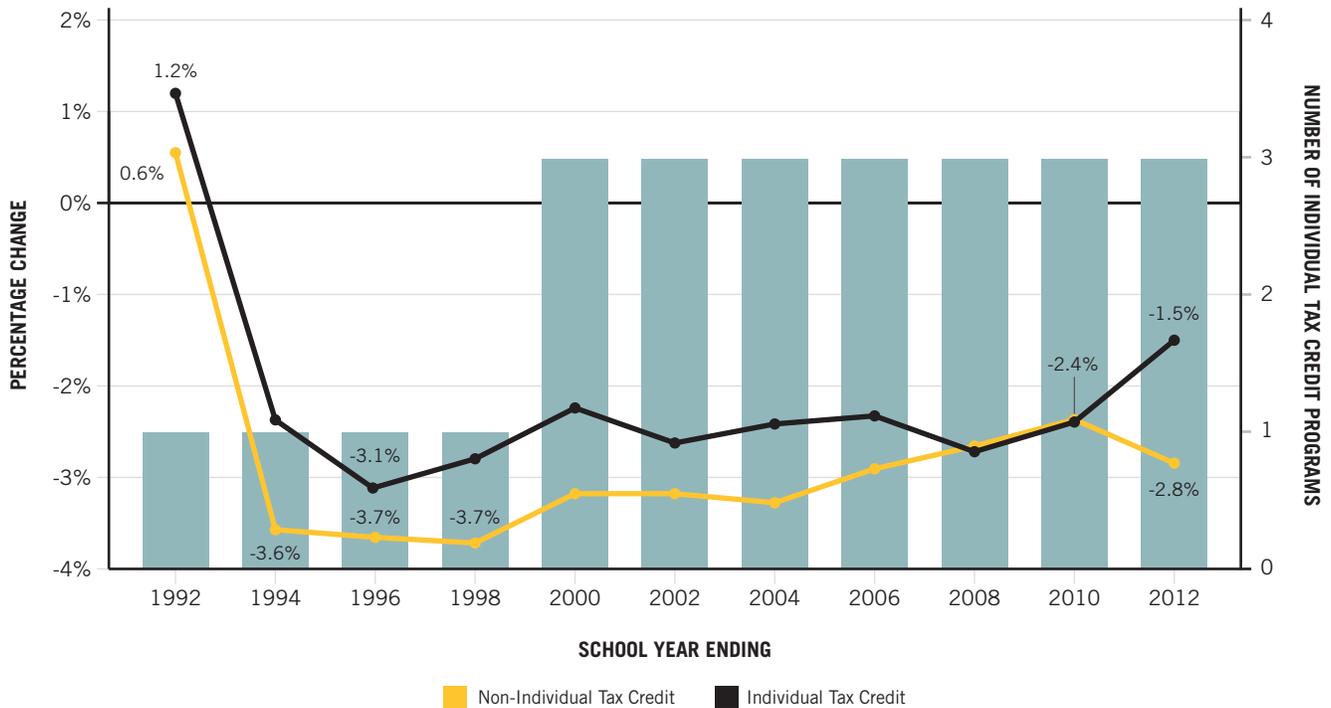


N = 17,845 Non-Tax-Credit Scholarship; 4,973 Tax-Credit Scholarship

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

FIGURE 8C

Biannual Percentage Change in the Number of Grades Private Schools Offered Over Year 1 in Individual Tax Credit and Non-Individual Tax Credit States

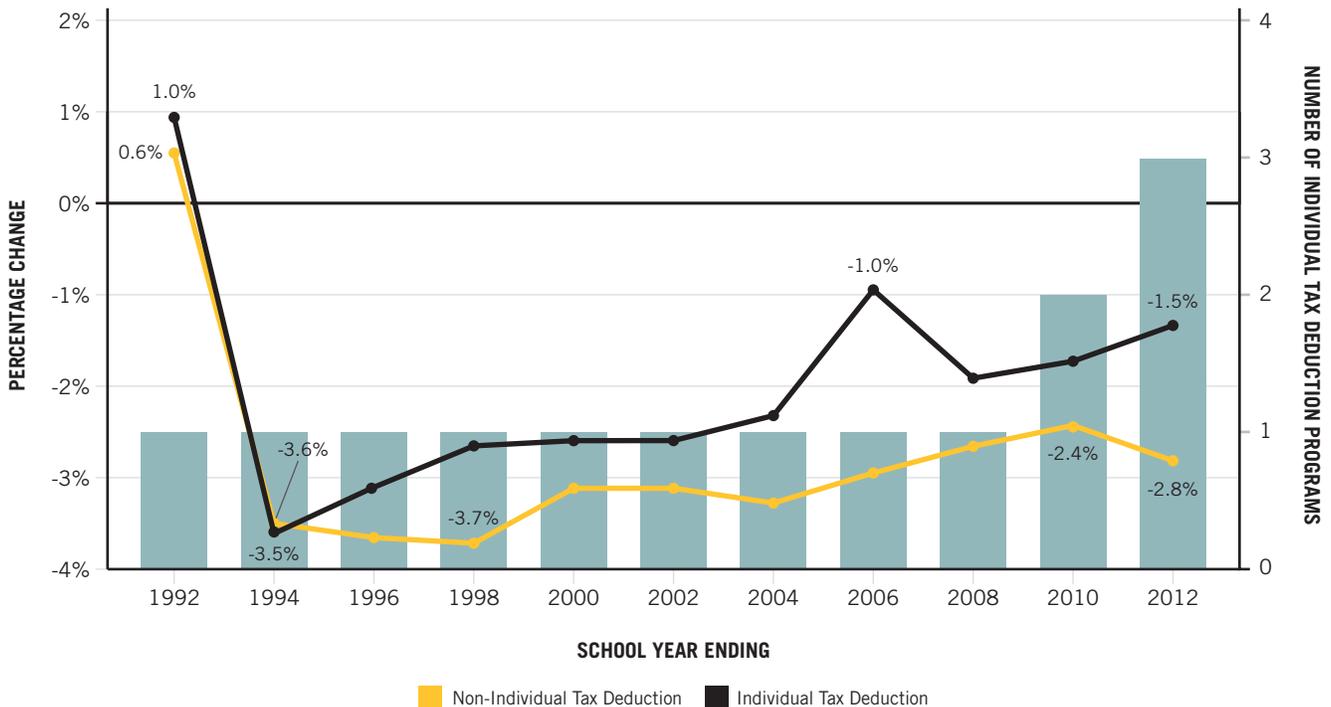


N = 20,938 Non-Individual Tax Credit; 1,880 Individual Tax Credit

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

FIGURE 8D

Biannual Percentage Change in the Number of Grades Private Schools Offered Over Year 1 in Individual Tax Deduction and Non-Individual Tax Deduction States



N = 21,348 Non-Individual Tax Deduction; 1,471 Individual Tax Credit

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

TABLE 10

Number of Grades Schools Offered by Choice and Non-Choice States (significant variables in bold)

	Coeff.	se	p
Charter	0.024	0.015	0.096
Year	-0.009	0.012	0.419
Year ²	0.002	0.001	0.052
Choice State x Year	-0.020	0.008	0.013
Choice State x Year ²	0.001	0.001	0.076
Intercept	8.302	0.011	0.000

$R^2_{adj} = 0.82$; $N = 273,822$; dependent variable = average number of grades offered per school

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

TABLE 11

Grades Private Schools Offered Based on Choice Programs (significant variables in bold)

	Coeff.	se	p
Charter	0.019	0.015	0.192
Year	-0.011	0.012	0.361
Year ²	0.002	0.001	0.067
Individual Tax Credit State x Year	-0.008	0.014	0.551
Individual Tax Credit State x Year ²	-0.000	0.001	0.841
Individual Tax Deduction State x Year	0.010	0.017	0.531
Individual Tax Deduction State x Year ²	-0.002	0.001	0.221
Tax-Credit Scholarship State x Year	-0.006	0.011	0.561
Tax-Credit Scholarship State x Year ²	0.001	0.001	0.344
Voucher State x Year	-0.018	0.011	0.099
Voucher State x Year²	0.002	0.001	0.024
Intercept	8.301	0.011	0.000

$R^2_{adj} = 0.82$; $N = 273,822$; dependent variable = average number of grades offered per school

Sources: Authors' calculations; "Data Files," Private School Universe Survey (PSS), National Center for Education Statistics, accessed Jan. 10, 2016, <https://nces.ed.gov/surveys/pss/pssdata.asp>.

Choice Measured by Specific Programs

When we measured choice by specific programs, we found similar results to our broad measure of choice. As Figures 8A through 8D on pages 31 and 32 show, the trend lines for each of the specific choice programs follow similar patterns, and any divergences are quite small and magnified only by the very small increments present on the Y axes.

When subjected to statistical testing, results indicate non-significant differences for almost all of the school choice program types, again indicating choice schools did not appear to expand the number of grades they offered at a rate different from non-choice schools. Vouchers were the one program type that showed significant interactions with time squared. As Table 11 indicates, schools in states with voucher programs saw a slightly sharper increase (after an initial nonsignificant decrease) in the number of grades schools offered compared to non-voucher schools. We hasten to add, however, that the effect here was extraordinarily small. Schools in voucher states saw growth in the number of grade levels schools offered at a rate of about two-thousandths of a grade per year above the growth evident in non-voucher states. In other words, the practical significance associated with voucher policies was essentially zero.

Together, these results indicate the number of grade levels private schools offered in choice and non-choice states changed very little over time. And the trends showed little or no divergence based on the introduction of choice. Thus, school capacity trends in private schools under conditions of choice look substantively the same as conditions without choice, both broadly measured and disaggregated by different types of choice programs.

DISCUSSION AND CONCLUSION

This study began with a simple but important premise: The introduction of school choice

programs should result in an increase in private school enrollments and capacity over time. Choice and economic theories suggest that choice increases the ability of a broader range of families to exit their neighborhood public schools in favor of private schools. In light of increased demand, private schools should expand their capacity and enroll a greater number of students. This study also tested whether school choice results in private schools serving smaller percentages of racial/ethnic minority students, a common concern among choice critics.

The results were not, however, consistent with such expectations. Across all analyses, the enrollment trends of private schools in states with private school choice programs either did not differ significantly or differed only trivially from schools operating without the presence of choice. This was the case whether school choice was measured broadly or in disaggregated form based on different types of choice programs. Similarly, the trends in racial/ethnic composition of private schools in choice states differed little from those in non-choice states, no matter how choice was defined.

Considering these findings in reverse order, the fact that private schools in choice schools did not grow “whiter” seems contrary to the persistent assertion that choice programs will result in segregation.⁷⁰ For several reasons, however, this is not entirely surprising. First, private school choice programs have historically been targeted toward specific student populations, such as low-income families, students with special needs, or those trapped in under-performing or “failing” schools. Because of the strong correlation between income and race/ethnicity,⁷¹ the disproportionate representation of minority students in special education,⁷² and the greater likelihood of “failing” schools to be located in urban areas populated by minority families,⁷³ it is entirely logical that the greatest proportion of students taking advantage of choice programs would be racial/ethnic minorities.

The trend evident in these results may also stem

from school choice enabling religious schools to fulfill one of their historic missions to an even greater degree—providing children who are financially challenged, including racial and ethnic minorities, the opportunity to attend rigorous academic and faith-based programs.⁷⁴ Seeing such efforts as a form of social welfare, many religious school leaders have set as one of their goals to help break the cycle of poverty by providing disadvantaged students a rigorous education.⁷⁵ Then, there is the simple explanation that, even in circumstances of universal choice, white parents may not see a need to leave public schools they perceive as high-quality.⁷⁶ Higher-quality schools continue to be populated disproportionately by white students.⁷⁷ If parents think their children are receiving the education they need or want from such schools—except for religious instruction that can be provided at their houses of worship—then paying twice for a private school might seem irrational. In that case, this report’s results appear contrary to predictions of racial sorting. Though the impulse among some may be to ascribe this study’s enrollment and capacity results to a failure of school choice to live up to theoretical expectations, other reasons—working in concert—are more likely.

First, as other authors have found, private school leaders appear slow to respond to changes in their environments. In the context of choice interventions, this is logical.⁷⁸ New school choice programs have often been limited in their scope, meaning the number of new students any given private school may see after policy adoption may be small, so small, in fact, as to limit the ability of schools to significantly increase their capacity. Adding a grade, for example, requires hiring at least a new teacher plus curricular material and other related resources, all of which demand enough student growth to cover the increased costs. The prudent school leader would naturally be reluctant to take on the additional costs absent clear and present demand.⁷⁹ Such reluctance would be even more pronounced among private school entrepreneurs, who would need to see sufficient demand before committing to opening and operating a new school.

Second, the significant decline in size of the Catholic school system, which largely pre-dated the adoption of many of today’s choice programs, likely has contributed to small or non-significant differences in capacity and enrollment present in this study. The closure of private schools occurs with some regularity,⁸⁰ but it has been particularly acute among Catholic schools.⁸¹ In 1930, Catholic schooling comprised 60 percent of private school enrollment,⁸² but since 1990, a little more than 20 percent of Catholic schools closed, displacing about 300,000 students.⁸³ Thus, by the time many of the contemporary school choice programs saw adoption, many Catholic schools were gone, with little to no likelihood of reopening. The effect was to further limit capacity of the private school market to show growth under conditions of choice.

Third, limitations in school choice policies themselves may depress demand and growth in enrollment and capacity. Historically, most choice programs have been targeted in nature, designed to serve only low-income students or those with special needs.⁸⁴ Moreover, until recently, many programs operated on a small scale, some as trials, with firm caps on participation,⁸⁵ limits on the percentage of students in a school who may be school-choice students, income limitations on the parents to qualify for the program, geographic limitations, grade limitations, and limitations based on where the student last attended school.⁸⁶

Then there are the financial limitations associated with subsidies. As several authors note, subsidies, such as vouchers, must be large enough to cover or nearly cover private tuition to enable many families to enroll in private schools.⁸⁷ On the school side, if the voucher is set significantly below the average per-pupil cost, then many private schools may choose not to participate by taking voucher students.⁸⁸ As David Fleming noted, “Minimal voucher amounts may motivate some private schools to use vouchers to fill empty seats, but they will not encourage educational entrepreneurs to open schools.”⁸⁹

Program limitations are not purely financial, however. Religious schools may be cautious about participating in programs that could be accompanied by intrusive government regulation and oversight, thereby depressing increased enrollment and capacity.⁹⁰ Almost 20 years ago, survey evidence indicated more than half of private schools were likely to refuse to accept voucher students because of over-regulation.⁹¹ One analysis of Milwaukee private schools found that the accreditation requirement imposed upon schools that sought to participate in the voucher program caused many schools to stop participating in the program or close altogether,⁹² and the issue was manifest again in 2016 in Louisiana's newly created voucher program. Under one of the most highly regulated school choice programs in the nation, Louisiana's private schools that accept voucher students may not use their own admissions criteria, may not charge more than the amount of the voucher, and must administer the state test. The result was that two-thirds of Louisiana private schools refused to accept voucher students.⁹³ Indeed, Louisiana private school leaders expressly identified intrusive regulations that would affect their schools' independence, character, or identity as a reason for non-participation.⁹⁴

Caution to participate may also stem from a fear that even constitutionally "safe" private school choice programs can disappear if funding is eliminated in the state budget. Some programs often depend on annual appropriations in state budgets, and a change in the legislature's makeup could result in insufficient funding. Anticipating this possibility, private school leaders might hesitate to expand the number of seats made available to choice program students out of fear their school would be vulnerable in the event that funding were taken away.

IMPLICATIONS AND RECOMMENDATIONS

Together, these results and the likely reasons for them point to the next vanguard issue in school choice: capacity. From a broad perspective, the mechanics of school choice, particularly at scale, depend on a critical mass of families exiting their neighborhood schools, but without viable alternatives—i.e., private school capacity—the critical mass is unlikely.⁹⁵ Of course, private schools or private school entrepreneurs are unlikely to blindly subscribe to a "build it and they will come" fantasy. Just like anyone else, private school leaders see the limitations imposed on choice programs in the form of participation or tuition caps or targeted student populations and recognize the demand likely will not justify significant expansion.⁹⁶ Moreover, for leaders of religious schools, the very real possibility of regulations forcing them to significantly alter the content of their teaching and even their facilities (i.e., removing religious iconography), provides a serious disincentive to participate in choice programs.⁹⁷ Indeed, making such changes undermines the very missions that motivate such schools.⁹⁸

If legislators are sincere in their intent to see choice work at scale, the issue of capacity can no longer be ignored. More than 25 years ago, John Chubb and Terry Moe predicted the capacity problem when they warned against policies that focused exclusively on creating demand and ignored mechanisms to encourage and promote the emergence of new and different types of schools.⁹⁹ Their warning was prescient. As Foundation for Excellence in Education's Matthew Ladner observed of current programs,

*"Existing school voucher and tax-credit programs have been designed, in essence, to allow students to transfer from public schools into a preexisting stock of nonprofit private schools....Few state lawmakers have created choice programs robust enough to spur the creation of new private schools."*¹⁰⁰

Consequently, others have recently begun referring to capacity as one of the most significant limitations on the choice movement.¹⁰¹ Results from this report confirm such observations.

Increasing capacity will likely mean, among other things,¹⁰² finding a balance between light regulatory restrictions or burdens and accountability; adopting programs that are more universal rather than targeted, thereby producing enough demand to reduce risk for private school leaders to expand; and structuring financial subsidies, whether in the form of tax programs or vouchers, to incentivize greater private school involvement and to put a greater number of schools within reach of more families. We recognize such recommendations are rather general, but because this issue has seen surprisingly little attention among researchers, pundits, policymakers, and others, we position these results and recommendations as an initial catalyst to begin creative and productive discussion and, undoubtedly, debate about the role of capacity in school choice and recommendations for its expansion.

FUTURE RESEARCH

Further debates and discussions would also benefit from additional studies that build on the methods and results reported here. Methodologically, future research should apply different statistical models to these research questions. These can include difference-in-difference analyses or fixed effects models that include year as discrete variables rather than modeling time as linear and non-linear trends. Further analyses could also include additional control variables. For example, we do not control for changing patterns of religiosity over time, which could play a significant role given that most private schools in the United States are affiliated with a faith-based organization. Specific to the analyses in which we compared enrollment and school demographic characteristics to surrounding communities, future research could

adjust the buffers we imposed around the schools. Particularly in dense urban areas, differences in the sizes of the buffers may produce different comparison groups, thereby yielding different results than what we report.

Perhaps one of the more significant additions to this work would be differentiating states' school choice programs based on how "strong" or "weak" such programs are. In our analyses, all programs are treated equally, even though the features of voucher programs differ non-trivially, for example. Moreover, temporal changes in these programs are not captured in our analyses and may play an important role in the outcomes we measured.

New data are always being reported, of course, so future research would benefit from adding more years of data from the PSS and EISi. The analysis of school demographics compared to surrounding communities could also take advantage of annual census data now made available through the American Community Survey. These annual data did not become available in a comprehensive form until the mid-2000s, so the addition of more recent years of data in the PSS will allow for more robust analyses than were possible at the time we started this study.

Finally, we took a national approach to our study, which necessarily means localized effects, differences, and nuances are lost. The analyses we report here could be applied at state, county, and even district levels to understand better local effects and contexts.

APPENDIX

Methods

This appendix provides a more detailed description of the analyses used in this report.

As a reminder, the study was guided by this question: Is there a significant difference in the following three factors after the introduction of private school choice programs?

1. Private school enrollment
2. The percentage of racial/ethnic minority students in private schools
3. The number of grades private schools offered (i.e., capacity)

Of the only other two studies to use PSS data for a longitudinal analysis similar to ours, one used t-tests and ANOVA¹⁰³ and the other used interrupted time series,¹⁰⁴ with both studies comparing trends across states. We used a time series analysis with linear and quadratic trends interacted with program indicator variables and school and year fixed effects. This enabled us to detect differences in trends between schools in choice states and those operating in non-choice states. As noted in the Future Research section above, several types of analyses could have been employed in this study. We elected to use models with linear and quadratic trends because we were interested in studying trends rather average differences over time, such as what would be produced in a difference-in-differences analysis, and the descriptive statistics clearly indicated non-linear trends. Ultimately, a number of different models and variations on models could have been applied here. For the sake of report length, we could not apply all of the possibilities and hope other researchers will exploit the recommendations for future research above.

For all three research questions, the analyses began with a parsimonious model in which the primary independent variables of interest were whether a

state offered any type of choice program, year, year squared, and the interaction of choice and the two year variables. Standard errors were clustered on school. The first model took the form:

$$1. Y_{it} = \alpha_i + \beta_1(\text{charter}_{it}) + \beta_2(\text{year}_{it}) + \beta_3(\text{year}_{it}^2) + \beta_4(\text{choice} \times \text{year}_{it}) + \beta_5(\text{choice} \times \text{year}_{it}^2) + \varepsilon_{it}$$

where

Y = each school's enrollment, percentage minority students, or total grade levels offered per year
 choice = 0 for states with choice programs and 1 for non-choice states

charter = 0 for when a school's state did not have a charter law and 1 when it did

year = integers, with the first year of data as zero and integers increasing by one each subsequent year

α = intercept

ε = error term

To examine the possible effects of specific program types, a second model disaggregated the choice variable into the different choice programs and took the form:

$$2. Y_{it} = \alpha_i + \beta_1(\text{charter}_{it}) + \beta_2(\text{year}_{it}) + \beta_3(\text{year}_{it}^2) + \beta_4(\text{individual tax credits} \times \text{year}_{it}) + \beta_5(\text{individual tax credits} \times \text{year}_{it}^2) + \beta_6(\text{individual tax deductions} \times \text{year}_{it}) + \beta_7(\text{individual tax deductions} \times \text{year}_{it}^2) + \beta_8(\text{tax-credit scholarships} \times \text{year}_{it}) + \beta_9(\text{tax-credit scholarships} \times \text{year}_{it}^2) + \beta_{10}(\text{vouchers} \times \text{year}_{it}) + \beta_{11}(\text{vouchers} \times \text{year}_{it}^2) + \varepsilon_{it}$$

where terms are as defined above, except the individual choice programs = 0 for states with the respective choice programs and 1 for non-choice program states.

For analyses in which we compared the dependent measures of enrollment and percentage minority to surrounding populations, we used two different models, one for enrollment and one for percentage minority. The analysis for enrollment looked similar to models (1) and (2), but with a different

dependent measure and an additional control variable. The dependent measure is an enrollment ratio, where each private school's enrollment is divided by the average enrollment of matched public schools each year within five miles. The additional control variable is the average percentage of free and reduced-price lunch (FRL) students per year in the public schools used in the comparisons.

The analyses for percentage minority took different forms. With only two years of decennial census and PSS data available to match, only two years of data—2000 and 2010—were present in the models. The first analysis took the form:

$$3. Y_{it} = \alpha_1 + \beta_1(\text{year}_{it}) + \beta_2(\text{number of years of choice}_{it}) + \beta_3(\text{year} \times \text{number of years of choice}_{it}) + \beta_4(\text{median income}_{it}) + \epsilon_{it}$$

where

Y = ratio score of each private school's percentage minority to surrounding school-aged population percentage minority within one mile
 year = 0 for 2000 and 1 for 2010
 number of years of choice = integers, 0 to 11
 median income = median income of geographic area surrounding each private school

The variable measuring changes over time is named “number of years of choice.” This variable indicates the number of years respective choice programs were in effect in 2000 and 2010. For example, if a state's voucher program went into effect in 1997, then “number of years” would show a value of four in 2000 and a value of 14 in 2010. For states with no programs in operation, “number of years” takes a value of zero in both 2000 and 2010. This type of coding reflects the fact that states that may offer the same type of choice program often did not begin offering the programs in the same years.

The use of the year variable controlled for any effects that would be idiosyncratic to those years, and a variable interacting the year and “number of years” variables to measure a differential effect

between “number of years” and the two different points in the decade. As with the analyses above, we first examined a broader measure of choice and then disaggregated by type of choice program. Thus, in model (3) “number of years of choice” measures the number of years a state had any kind of choice. In model (4), this is adjusted to be the number of years of a specific type of choice program.

For the disaggregated measures of choice, the model took the form:

$$4. Y_{it} = \alpha_1 + \beta_1(\text{year}_{it}) + \beta_2(\text{number of years of individual tax deductions}_{it}) + \beta_3(\text{number of years of tax-credit scholarships}_{it}) + \beta_4(\text{number of years of vouchers}_{it}) + \beta_5(\text{number of years of individual tax credits}_{it}) + \beta_6(\text{number of years of individual tax credits} \times \text{year}_{it}) + \beta_7(\text{number of years of individual tax deductions} \times \text{year}_{it}) + \beta_8(\text{number of years of tax-credit scholarships} \times \text{year}_{it}) + \beta_9(\text{number of years of vouchers} \times \text{year}_{it}) + \beta_{10}(\text{median income}_{it}) + \epsilon_{it}$$

Finally, it is important to note that in all models, the unit of analysis is the school. The results reported above indicate average effects at the school level, not at higher levels of aggregation.

LIMITATIONS

All studies have limitations, of course, and this one is no different. First, time series and fixed effects analyses are strong quasi-experimental methods of isolating the effects of the independent variables of interest, but they cannot answer questions of causality with the same robustness as randomized control trial studies. Thus, the results reported herein should be understood to be strongly correlational. Second is the inclusion of two potentially important covariates—public school quality and religiosity. Specific to the former, the theory of markets suggests private schools will enter markets or expand their capacity in areas

where competitors (i.e., public schools) offer a sub-standard product, thus spurring demand for a superior product.¹⁰⁵ Of course, the lack of a consistent, standard measure of public school quality makes this rather difficult. Prior studies have attempted to use proxies for quality (e.g., class size or student to teacher ratio), but results have been mixed and indeterminate.¹⁰⁶ If or when other research identifies a reliable and consistent proxy for public school quality that can be applied in longitudinal research spanning many years, the use of that proxy in future like that above has the potential to be a useful improvement.

As to the second potential covariate, prior cross sectional research suggests the religiosity of geographical areas may explain, in part, differential patterns in new private school entrants into a market or other forms of increased capacity.¹⁰⁷ Like measures of public school quality, however, limitations on consistent, reliable, longitudinal data on religiosity disaggregated to the level of analysis used herein were prohibitive. Given the improved measures of religiosity now available, future research could benefit from the inclusion of this construct.

Third, in addition to covariate limitations, this study is also constrained by its analytical approach. As a report rather than a book, this study necessarily took a focused analytical approach. Future research could expand upon our study as described above.

NOTES

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48. Note that this differs from the number of classrooms in a given school. Instead, it measures whether a school adds new grade levels to those already existing, such as when a K-5 school adds middle school grades.

49. As noted on the NCES’ PSS website, the purposes of the PSS are: “a) to generate biennial data on the total number of private schools, teachers, and students; and b) to build an accurate and complete list of private schools to serve as a sampling frame for NCES surveys of private schools. The PSS began with the 1989-90 school year and has been conducted every two years since. The target population for the survey consists of all private schools in the U.S. that meet the NCES definition (i.e., a private school is not supported primarily by public funds, provides classroom instruction for one or more of grades K-12 or comparable ungraded levels, and has one or more teachers. Organizations or institutions that provide support for home schooling without offering classroom instruction for students are not included.). The survey universe is composed of schools from several sources. The main source is a list frame, initially developed for the 1989-90 survey. The list is updated periodically by matching it with lists provided by nationwide private school associations, state departments of education, and other national private school guides and sources...The PSS consists of a single survey that is completed by administrative personnel in private schools. Information collected includes: religious orientation; level of school; size of school; length of school year, length of school day; total enrollment (K-12); number of high school graduates, whether a school is single-sexed or coeducational and enrollment by sex; number of teachers employed; program emphasis; existence and type of kindergarten program. The Private School Universe Survey produces data similar to that of the NCES Common Core of Data (CCD) for the public schools. The data are useful for a variety of policy- and research-relevant issues, such as the growth of religiously-affiliated schools, the length of the school year, the number of private high school graduates, and the number of private school students and teachers.” See “Private School Universe Survey (PSS),” National Center for Education Statistics, accessed Oct. 10, 2016, <http://nces.ed.gov/surveys/pss>.

50. Ungraded schools are those that do not assign students to traditional grade levels, such as 1st grade, 2nd grade, and so forth. Without such grade designations, it was impossible to measure differences in the number of grades offered. Thus, they were dropped from the sample.

51. See notes 14 and 21 above.

52. Stephen P. Broughman (statistician, National Center for Education Statistics), e-mail message to authors, Nov. 17, 2015.

53. Barrow, “Private School Location and Neighborhood Characteristics,” p. 644.

54. Not all choice programs are created equally. Some have greater restrictions on who may benefit from the programs, how much money participants can claim or receive, what kind of schools can participate,

and so forth. For analytical purposes, however, we made no distinction between programs other than the broad categories identified above (individual tax credits, vouchers, etc.).

55. “What is School Choice?,” EdChoice, accessed Oct. 10, 2016, <http://www.edchoice.org/school-choice/what-is-school-choice>.

56. Number of observations for these and all figures represent averages, as the number of schools changes per year.

57. Fairlie, “Racial Segregation and the Private/Public School Choice,” p. 2.

58. Richard Buddin, *The Impact of Charter Schools on Public and Private School Enrollments*, Policy Analysis 707 (Washington, DC: Cato Institute, 2012), <http://object.cato.org/sites/cato.org/files/pubs/pdf/PA707.pdf>; see notes 16, 18, and 35 above.

59. See note 35 above.

60. Downes and Greenstein, “Understanding The Supply Decisions of Nonprofits”; see note 38 above.

61. See note 19 above.

62. Ibid.

63. Robert P. Haining, “The Nature of Georeferenced Data,” in *Handbook of Applied Spatial Analysis*, ed. Manfred M. Fischer and Arthur Getis (Berlin, Ger.: Springer, 2010), pp. 197-217, doi:10.1007/978-3-642-03647-7_12; David O’Sullivan and David Unwin, *Geographic Information Analysis*, 2nd ed. (Hoboken, NJ: Wiley, 2010).

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66. Charter schools were excluded from the comparison public schools.

67. Because of the relative scarcity of school choice literature that uses GIS, there was little definitive direction on how large the buffers needed to be for this comparison. We chose five miles for two reasons. First, we wanted to ensure that the buffer would be large enough to include multiple comparison schools, as more data points would mean greater representation and more stable averages. In high density areas, we could have achieved this with smaller buffers, but this would not be so in areas with smaller population density. We also sought to avoid buffers that would be too large and thereby include comparison schools that were unrepresentative of populations surrounding the

private schools. Thus, we chose a buffer size that balanced between larger and smaller population density. Second, it is increasingly common that students commute to school, both public and private. Thus, the relevant populations in schools may not be those who live in directly adjacent neighborhoods but also may include those who travel some distance. Recent research suggests average commuting distances are approximately 2.7 miles, with non-trivial percentages of students traveling up to four, five, or six miles or more. Thus, the use of a five-mile buffer enabled us to capture comparison populations taking into account student commutes. Julia Burdick-Will, “Neighbors, But Not Classmates: Neighborhood Disadvantage and Educational Heterogeneity,” (paper presented at the Annual Meeting of the American Educational Research Association, Chicago, IL, Apr. 17, 2015); Glazerman, “School Quality and Social Stratification”; Elizabeth J. Wilson, Julian Marshall, Ryan Wilson, and Kevin Krizek, “By Foot, Bus or Car: Children’s School Travel and School Choice Policy,” *Environment and Planning A* 42, no. 9 (Sept. 2010), pp. 2168-85, doi:10.1068/a435.

68. These models included school and year fixed effects.

69. Note that this buffer is smaller than what we used with the comparison to public schools. This is because for the census data, we needed to limit the number of tracts intersecting within a buffer. For some schools in rural areas there would only be one census tract; for dense areas there were multiple numbers of tracts. Using a five-mile buffer to examine population would have negated the usefulness of understanding surrounding neighborhoods because a large buffer would capture areas outside of neighborhoods.

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