6

How School Choice Affects the Achievement of *Public* School Students

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Opponents of school choice often take the view that schools can be "only so good," so that what some students gain, other students must lose. This view of schools becomes most obvious when issues like "cream skimming" are discussed. The usual argument runs as follows: If the better students leave the regular public schools to attend choice schools, the students who remain in regular schools will be worse off. In fact, evidence suggests that the choice schools created by recent reforms do *not* cream skim. Nevertheless, cream skimming is a theoretical possibility, and we should care about the outcomes of students who remain in regular public schools, especially in the short term, when regular public schools are likely to contain the bulk of students.

THE IMPORTANT EFFECTS OF SCHOOL CHOICE ON *PUBLIC* SCHOOL STUDENTS

Experts on school choice, particularly those with a background in economics, find the view that schools can be "only so good" to be strange. As a rule, *the* key way in which organizations

respond to competition is by becoming more efficient. This tendency is so strong that we often say that an organization has "become more competitive" when what we really mean is that it has become more efficient or productive in response to competition. Thus, it is not only possible, but likely, that regular public schools will respond to competition from choice schools by raising their pupils' achievement or raising another pupil outcome valued by parents. Better outcomes are the way in which a regular public school would evince increased efficiency. This is because existing choice reforms are designed so that per pupil spending in the regular public schools cannot fall when a student leaves to attend a choice school. In fact, under all but one existing reform, a regular public school's per pupil spending actually *rises* when a student leaves.

In short, although achievement might fall in regular public schools if choice introduces cream skimming and only cream skimming, it might rise if regular public schools raise achievement in order to compete with choice schools. In this chapter, I examine how *public* school students' achievement was affected by three important, recent choice reforms: vouchers in Milwaukee, charter schools in Michigan, and charter schools in Arizona. I study these three reforms because they are the only ones in which the choice schools can, legally, garner a large enough share of enrollment to provide a nonnegligible amount of competition for the regular public schools. In fact, because even these choice reforms are still modest in size, I attempt to see whether public schools respond competitively when they face the loss of only 6 percent of their enrollment. Looking at early evidence, as I do, is the worst case for school choice. When a school has lost only a bit of its enrollment for only a few years, it might not respond competitively or respond in any way. Yet, the first few percent of students who leave could easily be the most attractive (extreme cream skimming). Thus, if I find evidence that public schools raise achievement when faced with early and minor competition from choice schools, the results are likely to understate the improvement in achievement that

regular public schools would attain when faced with more sustained, more substantial competition.

Because evidence on recent choice reforms necessarily has a short-term character, I also review evidence on how traditional forms of choice in the United States affect the achievement of *public* school students. In particular, I examine the effects of parents' being able to choose among public school districts by choosing their residence. This is the dominant form of choice that exists in the United States currently, but the availability of multiple school districts differs a great deal from one metropolitan area to another. I also review results based on parents' being able to choose private schools in the metropolitan area easily because their local private schools charge subsidized tuition.

Because choice schools in Michigan and Arizona are charter schools (and therefore supervised by the states' departments of education), complete information on the students they enroll is available. Therefore, I directly examine the race, ethnicity, and poverty of charter school students in the two states, comparing them with the student populations from which the charter schools draw. I look directly, in other words, for evidence that the charter schools are enrolling students who are unusual, given the populations from which they draw.

Could Regular Public Schools Raise Achievement?

It is very plausible that competition could stimulate regular public schools to raise achievement enough to swamp any adverse effects that choice might have via cream skimming. Perhaps it is useful to take a brief step back from the issue of school choice and think about another formerly public industry that is less controversial but that illustrates the same concerns. In the parcel post industry, the United States Postal Service (USPS) had a monopoly. When lawmakers proposed to allow private firms (like United Parcel Services, Federal Express, and DHL) to compete with the USPS, some commentators issued dire warnings. The private firms, they

argued, would cream skim the most profitable parcel post customers, and the common person's parcel service would deteriorate profoundly. They argued that USPS could not improve, and its parcel service would be slower, have fewer options, and so on if private firms were allowed to take some of its best customers. Exactly the opposite reaction has occurred. USPS is now far more efficient in parcel post than it was when it had a monopoly, and it has introduced new services, like Express and Priority parcel service, that make its customers better off. Customers who use the private firms' services are also better off, because they are getting better service than the USPS formerly gave them. With hindsight, the average person now sees that the USPS *was* able to improve when faced with competition and that the positive reaction to competition swamped other forces that might have led USPS parcel service to deteriorate.

In the school choice debate, there is obsessive interest in the question of "who wins" and "who loses" when choice is introduced. This obsession may turn out to be a mistaken application of energy. Choice need not make some students into losers and others into winners. It is at least possible that all students will be better off. Because students who remain in public schools are clearly the group whose "winning" is most in doubt, my focus in this chapter is exclusively on their achievement. (I should note here in passing that in a number of other studies that have examined the achievement of students who use vouchers or charter schools, the evidence suggests that students who enroll in choice schools have better achievement after one or more years. These "choice students," however, will not concern me further.)

I examine public school students in three states because only three choice reforms fulfilled some commonsense criteria. If we are interested in studying cream skimming and public schools' competitive reaction, it is necessary that the public schools actually faced nonnegligible competition. At a bare minimum, the choice program should be such that (1) there is a realistic possibility that at least 5 percent of students

ordinarily enrolled in regular public schools could go to choice schools, (2) the regular public schools lose at least some money (not necessarily the entire per pupil cost) when a student goes to a choice school, and (3) the reform has been in place for a few years. The reforms that satisfy these basic requirements are school vouchers in Milwaukee, charter schools in Michigan, and charter schools in Arizona. I describe each of these reforms below. Apart from these three reforms, most choice reforms fail to meet at least one of these requirements. In particular, choice reforms are typically characterized by constraints on enrollment (for instance, no more than one percent of local students can attend choice schools) or perverse financial incentives (for instance, the local district loses no money when it loses a student to a choice school, so that its per pupil spending rises as it loses students).[1]

The Effect of Vouchers on Milwaukee Public School Students

Vouchers for poor students in Milwaukee were enacted in 1990 and were first used in the 1990–91 school year. Currently, a family is eligible for a voucher if its income is at or below 175 percent of the federal poverty level (at or below $17,463 for a family of four).[2] For the 1999–2000 school year, the voucher amount was $5,106 per student or the private school's cost per student, whichever was less. For every student who leaves the Milwaukee public schools with a voucher, the Milwaukee public schools lose state aid equal to half the voucher amount (up to $2,553 per voucher student in 1999–2000). Milwaukee's per pupil spending in 1999–2000

[1]For a thorough review of current school choice reforms, see Nina Shokraii Rees, *School Choice 2000: What's Happening in the States* (Washington, D.C.: Heritage Foundation, 2000). In most cases where I have not used materials directly obtained from the relevant state's department of education, I have relied upon Rees for a description of reforms.

[2]As a rule, any child who is eligible for free or reduced-price lunch is also eligible for a voucher. The actual cut-off for reduced-price lunch is 185 percent of the federal poverty level, but the difference between 175 percent (the cut-off for the vouchers) and 185 percent is not rigorously enforced (and would be difficult to enforce).

was $8,752 per pupil, so the district was losing 29 percent of the per pupil revenue associated with a voucher student. Currently, the vouchers may be used at secular and nonsecular private schools.[3]

The voucher program had a difficult start. Although approximately 67,000 students were initially eligible for vouchers, participation was initially limited to only 1 percent of Milwaukee enrollment (later, from 1993 to 1997, 1.5 percent). Also, the future of the program was in doubt for its first eight years, owing to a prolonged court dispute over its legality. The dispute was resolved in 1998, after which the program not only became more certain but also became better funded and ten times larger, with a ceiling of 15 percent of Milwaukee enrollment.[4] Overall, although the voucher program that started in 1990 might have been expected to have had a small impact on the Milwaukee Public Schools beginning with the 1990–91 school year, the program generated very little potential competition until the 1998–99 school year. At the same time, because the program was already somewhat established and familiar to Milwaukee residents by 1998, one would expect a quicker response to this program than to a completely new program. In short, it is plausible to look for a productivity impact, if any, over the few most recent school years. The 1996–97 school year effectively predates serious competition.

Not all schools in Milwaukee experienced the same increase in competition as the result of the voucher program. The

[3]The information on the Milwaukee program and Wisconsin public schools is obtained from several publications of the Wisconsin Department of Public Instruction: *Knowledge and Concepts Examinations: Test Results,* electronic file; *Milwaukee Parental School Choice Program: Facts and Figures*; *Reading Comprehension Test Results,* electronic file; *School Finance Data*, electronic file; and *School Performance Report,* electronic file—all Madison, 2000.

[4]The future of the program is still somewhat in doubt. First, opinions of the state Supreme Court disagree on the question of whether it is constitutional to have vouchers that can be used at schools with religious affiliation; it is likely that the United States Supreme Court will eventually rule on this matter. Second, the Wisconsin legislature has threatened to fund the vouchers at such a low level that they would be unusable.

greater a school's share of poor children, the greater was the potential competition because the greater was the potential loss of students. Some Milwaukee schools had as few as 25 percent of their schools eligible for vouchers; others had as many as 96 percent eligible. Also, because private elementary schools cost significantly less than private high schools, more than 90 percent of vouchers were used by students in grades one through seven in 1999–2000. Thus, only elementary schools in Milwaukee faced significant potential competition.

These facts about the voucher program suggest that the following type of evaluation is most appropriate for examining the effect of vouchers on Milwaukee public school students. First, one should focus on achievement in grades one through seven. Second, achievement should be compared from 1996–97 (before significant competition) to 1999–2000 (after significant competition). Third, schools in Milwaukee can be separated into two groups. In schools that "faced more competition," a large share of students were eligible for vouchers, and cream skimming or competitive response should be more acute. In those that "faced less competition," a smaller share of students were eligible and the cream skimming or competitive response should be correspondingly smaller. In the language of medical experiments, the schools that faced more competition got the full treatment and the schools that faced less competition got a partial treatment. As in medical experiments, it is desirable to find some schools that were not treated at all: "control schools." I chose a control group of schools from Wisconsin that most closely matched Milwaukee's schools in urbanness, their shares of black and Hispanic students, and their poverty rates. Finding control schools was not easy because Milwaukee's schools are much poorer and have much larger shares of minority students than most other schools in Wisconsin. Because the control schools are slightly less disadvantaged than the Milwaukee schools, they initially had better achievement and higher achievement growth. In other words, if vouchers had no effect at all, the control schools

would be expected to improve relative to Milwaukee schools, simply because more advantaged schools tend to improve relative to less advantaged ones.[5] Thus, the evidence I present is likely to *understate* slightly any improvements that took place in Milwaukee's schools.

Table 1 shows some demographic indicators for the three groups of elementary schools: 32 Milwaukee schools that faced more competition (those in which at least two-thirds of students were eligible for vouchers), 66 Milwaukee schools that faced less competition (those in which less than two-thirds of students were eligible for vouchers), and control schools that faced no competition.

In the schools that faced the most competition, an average of 81.3 percent of students were eligible for free or reduced-price lunch (hence eligible for vouchers), 65.4 percent of students were black, and 2.9 percent of students were Hispanic. In the schools that faced less competition, an average of 44.5 percent of students were eligible for vouchers, 49.1 percent of students were black, and 13.7 percent of students were Hispanic.[6]

I included a Wisconsin elementary school in the control group if it (1) was not in Milwaukee, (2) was urban, (3) had at least 25 percent of its students eligible for free or reduced-price lunch, and (4) had black students compose at least 15 percent. Only twelve schools in Wisconsin met these criteria. In the control schools, average enrollment in a grade was 51 students, 30.4 percent of students were eligible for free or

[5]It is fairly obvious that more advantaged schools will have better achievement if we do not control for demographic differences among students. It is less obvious that more advantaged schools will have better achievement *growth,* but they do in fact. For instance, prior to 1996, Wisconsin elementary students took statewide tests in reading (only). In the pre-voucher period, achievement growth was negative in Milwaukee schools, based on these tests. In contrast, achievement growth was positive in the schools that form the control group.

[6]Note that these demographic numbers reflect what the schools looked like in 1990, *before* the voucher program was enacted. This is the correct method for choosing treated and control schools. One does not want to measure the extent of treatment using measures of student composition that potentially reflect how students reacted to the voucher program.

TABLE 1

Pupil Characteristics in Schools That Were Faced with More Competition, Less Competition, and No Competition from Vouchers in Wisconsin

	Percentage of Students Eligible for Free/Reduced-Price Lunch	*Percentage of Students Who Are Black*	*Percentage of Students Who Are Hispanic*
Schools faced with more competition	81.3	65.4	2.9
Schools faced with less competition	44.5	49.1	13.7
Schools faced with no competition (control schools)	30.4	30.3	3.0

Sources: Wisconsin Department of Public Instruction (various 2000) and United States Department of Education, *School District Data Book*.

Note: Schools faced with more competition are Milwaukee elementary schools where at least two-thirds are eligible for free or reduced-price lunch (hence also vouchers). There are 32 such elementary schools, each of which has an average fourth-grade enrollment of 72 students. Schools faced with less competition are Milwaukee elementary schools where fewer than two-thirds of students are eligible for free or reduced-price lunch (hence vouchers). In all these schools, at least 30% are in this category; 66 schools, each with an average fourth-grade enrollment of 71 students. Control schools are all the Wisconsin elementary schools that are urban, have at least 25% eligible for free lunch, and have at least 15% black students. Schools in this category: 12, each with an average fourth-grade enrollment of 51.

reduced-price lunch (and, therefore, would have been eligible for vouchers had they lived in Milwaukee), 30.3 percent of the students were black, and 3.0 percent of students were Hispanic.

Students in Wisconsin take statewide examinations in grades 4, 8, and 10. Because I am focusing on the reactions of elementary schools, I use the fourth-grade score, expressed in national percentile rank points (NPR), on five tests: mathematics, science, social studies, language, and reading. It is worth noting that during the period in question Wisconsin enacted a controversial reading curriculum that emphasized whole-language methods, as opposed to phonics.

Table 2 shows the results of comparing the three groups of schools before and after the voucher program created significant competition in 1998. Examine the top panel, which shows achievement on the math exam. In 1996–97, the schools that later faced the most competition attained 34.5 NPR points. In 1999–2000, they attained 53.3 NPR points, an annual gain of 6.3 points. The schools that ultimately faced less competition attained 33.7 NPR points in 1996–97 and 48.2 NPR points in 1999–2000, an annual gain of 4.8 points. Math achievement in the control schools grew from 50 NPR points in 1996–97 to 60.6 NPR points in 1999–2000, an annual gain of 3.5 points. Clearly, math achievement grew the most in the schools that faced the most competition from vouchers, less in the schools that faced less competition, and the least in the schools that faced no competition.

Without going through all of the numbers for science, social studies, language, and reading, we can look down the right-hand column of Table 2 and immediately see the same pattern for all subjects. In every subject, achievement grew most in the schools that faced the most voucher competition, a medium amount in the schools that faced less competition, and the least in the schools that faced no competition. The pattern holds even in reading and language, where the controversial curriculum may have been responsible for the lower rates of achievement growth, which are actually negative for schools that were not faced with a lot of competition from vouchers.

Overall, an evaluation of Milwaukee suggests that public schools made a strong push to improve achievement in the face of competition from vouchers. The schools that faced the most potential competition from vouchers raised achievement dramatically. Growth of four or more NPR points per year is highly unusual in education, yet Milwaukee schools managed such improvements in math, science, and social studies. Recall, moreover, that the achievement effects of vouchers are likely to be understated because the control schools contain slightly more advantaged students.

TABLE 2

Fourth-Grade Test Scores in Schools Faced with More Competition, Less Competition, and No Competition from Vouchers in Wisconsin

	1996–97	*1999–2000*	*Annual Change*
Math NPR Score			
Schools faced with more competition	34.5	53.3	6.3
Schools faced with less competition	33.7	48.2	4.8
Schools faced with no competition (control schools)	50.0	60.6	3.5
Science NPR Score			
Schools faced with more competition	31.9	52.8	7.0
Schools faced with less competition	32.3	49.7	5.8
Schools faced with no competition (control schools)	56.0	62.9	2.3
Social Studies NPR Score			
Schools faced with more competition	41.6	54.2	4.2
Schools faced with less competition	43.4	50.7	2.4
Schools faced with no competition (control schools)	61.0	65.6	1.5
Language NPR Score			
Schools faced with more competition	41.8	49.4	2.5
Schools faced with less competition	41.8	46.2	1.5
Schools faced with no competition (control schools)	53.4	53.2	–0.1

TABLE 2 *(continued)*

	1996–97	*1999–2000*	*Annual Change*
Reading NPR Score			
Schools faced with more competition	44.2	46.5	0.8
Schools faced with less competition	45.1	43.6	−0.5
Schools faced with no competition (control schools)	59.0	55.0	−1.3

Sources: Wisconsin Department of Public Instruction (2000 various) and United States Department of Education, *School District Data Book*.

Note: Test scores are measured in national percentile points. Statistics are based on weighted averages over schools in the relevant group, where each school is weighted by its enrollment.

The Effect of Charter Schools on Michigan Public School Students

In 1994, Michigan enacted a charter school law as part of a series of changes in its method of financing schools. Michigan charter schools receive a per pupil fee that is essentially the same as the state's foundation level of per pupil spending (the state's minimum level of per pupil spending, given the characteristics of the school's student population). For instance, in 1999–2000, the average charter school student in Michigan had $6,600 spent on his education, whereas the average regular public school student had about $7,440 spent on his education. Detroit public schools spent $8,325 per pupil and the average charter school student in Detroit had about $6,590 spent on his education. A district that loses a student to a charter school loses approximately the foundation level of per pupil revenue. Charter competition tends to be most substantial in the elementary grades because the charter fees more adequately cover costs for the lower grades. By the 1999–2000 school year, approximately 3.5 percent of all nonprivate elementary students in Michigan were enrolled in charter

schools. The corresponding number for secondary students was 0.7 percent. Charter schools can receive their charters from statewide organizations, such as universities, so they can compete with local public schools, unlike charter schools in many other states that have their charters granted and renewed by their local district.[7]

I evaluate the effect of charter schools on Michigan public school students in much the same way as I evaluated the effect of the Milwaukee voucher program. I separate schools into those that faced charter competition and those that did not, and I compare their performance before and after charter competition. I focus on elementary grades because public elementary schools felt most of the charter competition. Michigan students take exams in the fourth, seventh, and tenth grades, so I show results for the fourth and seventh tests. Michigan tests its students in math and reading, and the tests are scored in scale points (like the familiar SAT-I test). A scale point is worth between 1.25 and 2.5 percentile points, depending on the test and grade.

A few issues arise with Michigan that did not arise with Milwaukee. In Wisconsin it was easy to define *ex ante* the treatment and control schools: Schools outside of Milwaukee faced no competition, and Milwaukee schools faced competition that depended simply on the share of their students who were poor enough to be eligible for vouchers. In Michigan, "treatment" and "control" and "before" and "after" must be defined on a district-by-district basis, where a district is being "treated" and is in the "after" period once it is forced to recognize that it is losing a critical share of students to charter schools. Of course, we do not know what this critical share might be, but it is useful to know that the mean year-to-year change in a Michigan school's enrollment *prior to 1994* was 5.1 percent. Therefore, a

[7]Information on Michigan charter schools and all the data on Michigan schools are taken from the following publications of the Michigan Department of Education, Lansing (all 2000): *Directory of Michigan Public School Academies*; *K–12 Database,* electronic file; *Michigan Educational Assessment Program and High School Test Results,* electronic file; and *School Code Master,* electronic file.

small drawing away of enrollment by a local charter school would be hard to differentiate from normal year-to-year variation in enrollment. However, a persistent drawing away of enrollment of more than 5 percent, say, would be likely to be noticed and attributed to charter schools. I initially looked for a critical level of 6 percent, and because it worked well, I kept it. A critical level of 7 or 8 percent works very similarly.[8] In short, I say that a Michigan school faces "charter competition" if at least 6 percent of the students enrolled in its district are enrolled in charter schools.[9]

The left-hand columns of Table 3 list the Michigan districts in which charter schools account for at least 6 percent of total enrollment inside the district's boundaries. There are 597 districts in Michigan and only 34 listed in the table, so a nonnegligible charter school presence is still the exception and not the rule. Districts of all sizes, including Michigan's large city districts, are represented among the districts that face charter school competition. Detroit, Lansing, and Kalamazoo all have at least 6 percent of enrollment in charter schools.

The Michigan districts that had to face competition from charter schools probably were not a random group of districts. Charter schools may have formed as a response to

[8]Results for a critical level of 7 or 8 percent are available from the author. If one chooses a critical level much higher than 8 percent, the results depend unduly on just a few districts—simply because only a few districts ever face more than an 8 percent drawing away of their students. Descriptive statistics for the Michigan data set are also available from the author.

[9]Note that the charter schools' share of local enrollment is based, in Table 3, on the assumption that students attend charter schools in the district in which they reside. Because students who are in particularly unappealing districts are disproportionately likely to attend a charter school outside their district if they do attend a charter school, the statistics on which the table is based slightly understate the enrollment losses of bad districts. It is possible to construct estimates of the share of a district's students who attend charter schools, but such estimates are somewhat noisy and (in any case) generate results that are qualitatively similar to the results shown in Table 4. The alternative set of results may be found in the working-paper version of this chapter, available from the author.

TABLE 3
Michigan School Districts and Arizona Municipalities
Where at Least 6% of Pupils Entered Charter Schools

Michigan School Districts		*Arizona Municipalities*	
Alba	Huron	Avondale[a]	Keams Canyon
Bark River-Harris	Inkster-Edison	Benson	Kingman[a]
Big Rapids	Jackson[a]	Bisbee	Mayer
Boyne Falls	Kalamazoo[b]	Camp Verde	Page
Buena Vista	Kenowa Hills	Cave Creek	Phoenix[b]
Caledonia	Kentwood[a]	Chinle	Pima
Charlevoix	Lansing[b]	Chino Valley	Prescott
Coldwater	Mount Pleasant	Clarkdale	Queen Creek
Detroit[b]	Oak Park	Concho	Safford
Elk Rapids	Onekama	Coolidge	Saint Johns
Flat Rock	Pentwater	Cottonwood	Scottsdale[b]
Forest Hills[a]	Petoskey	Enrenberg	Sedona
Godwin Heights	Sault Sainte Marie	Flagstaff[a]	Show Low
Grand Blanc[a]	Southfield[a]	Fountain Hills	Sierra Vista
Hartland	Wayne-Westland[b]	Gilbert[a]	Tempe[b]
Hillsdale	Westwood	Globe	Tuba City
Holland[a]	Wyoming[a]	Golden Valley	Vail
		Green Valley	Winslow
		Higley	

[a]Indicates a large city district (enrollment in one grade between 500 and 1,000).

[b]Indicates a very large city district (enrollment in one grade typically more than 1,000).

Sources: Michigan Department of Education (2000 various) and Arizona Department of Education (2000 various).

Note: The share of students who live in a district and attend charter schools is difficult to calculate because students can attend charter schools located outside of their districts (Michigan) or municipality (Arizona). Statistics are calculated under the assumption that students attend a charter school located in their district (Michigan) or municipality (Arizona).

local circumstances. In some cases, they may have formed where parents were unusually concerned about education and active (good circumstances for achievement). Elsewhere, charter schools may have formed where parents and teachers were frustrated because the district was poorly run (bad circumstances for achievement). Thus, it is important to look at how each school changes, subtracting its initial level of performance. I do this by allowing each school's achievement to have a fixed effect, which is simply a method of subtracting each school's initial level of performance.

Moreover, I compare Michigan schools that faced charter competition with those that did not, over the same period. Recall that Michigan enacted a school finance reform, which affected all schools, at the same time that charter schools were enacted. Thus, I am looking for changes that occurred in schools facing competition, *above and beyond* the changes that occurred in other schools in the state, which may have been responding to the finance reform.

Table 4 shows the change in achievement for schools that faced charter competition above and beyond the change in achievement for schools that faced no such competition over the same period. This statistic is sometimes called "difference-in-differences" because it contains two differences:

average of (achievement after – achievement before) in schools that faced competition

minus

average of (achievement after – achievement before) in schools that did not face competition.

The statistic should be familiar from medical experiments in which researchers subtract the change in health experienced by the control group (who receive a placebo) from the change in health experienced by the treatment group (who receive the real treatment).

TABLE 4
Effects of Charter School Competition on
Michigan Public School Students' Achievement

Difference-in-Differences Results	*Dependent Var: Achievement Based on:*			
	Fourth-grade reading exam	*Fourth-grade math exam*	*Seventh-grade reading exam*	*Seventh-grade math exam*
Change in achievement (NPR score) after district is faced with charter school competition (charter schools represent at least 6% of enrollment in district)	1.21[a] (0.65)	1.11[b] (0.62)	1.37[a] (0.60)	0.96[b] (0.48)

[a]Change in achievement is statistically different from zero with 95% confidence.

[b]Statistically different at the 90% level.

Source: Michigan Department of Education (2000 various).

Note: The table is based on regressions of school level data from 1992–93 to 1999–2000. The dependent variable is a school's achievement—specifically, its scale scores on the Michigan Assessment of Educational Progress (MEAP) tests, which are administered to fourth and seventh graders. Regression includes school indicator variables that are constant over the period (location, neighborhood, organization) and year indicator variables that allow for statewide changes from year to year in the test itself or in the pressure to perform well. From 1992 to 2000, the means and standard deviation of average test scores (weighted by the number of test takers) were: mean of 611, standard deviation of 19 on fourth-grade reading; mean of 528, standard deviation of 16 on fourth-grade math; mean of 600, standard deviation of 17 on seventh-grade reading; mean of 521, standard deviation of 14 on seventh-grade math.

Table 4 shows difference-in-differences statistics for Michigan's fourth- and seventh-grade exams. Fourth-grade reading and math scores were, respectively, 1.21 and 1.11 scale points higher in schools that faced charter competition *after* they began to face competition. Seventh-grade reading and mathematics scores were, respectively, 1.37 and 0.96 scale points higher. Recall that these improvements in scores are relative not only to the schools' own initial performance (the first difference) but also to the gains made over the same period by Michigan

schools that did not face charter competition (the difference-in-differences).[10]

In short, Michigan public schools raised achievement in the face of competition from charter schools. They raised achievement not only relative to their own previous performance but also relative to other Michigan schools not subjected to charter competition. The improvements in achievement appear to occur once charter competition reaches a critical level at which a public school should notice that a charter school is consistently drawing away students.

Michigan public schools' gains are statistically significant, and we should keep in mind that a scale point is worth between 1.25 and 2.5 percentile points. Nevertheless, the improvement in Michigan's public schools is more modest than the improvement in Milwaukee schools subjected to voucher competition. We cannot know, at this point, why the difference is more modest. It is likely that the threat of competition in Milwaukee was more serious than the threat of competition in Michigan, if for no other reason than that Milwaukee's voucher program grew much more rapidly (when it was released from enrollment constraints) than Michigan's charter schools grew. This is perhaps because Milwaukee's program had some history by 1998, whereas charter schools were truly fledglings for the first few years after Michigan's reform.

[10]Some readers may be interested in detrended difference-in-differences results—that is, estimates that allow each school to have a different initial trend. To compute such results, I look for *changes* in a school's trend when it begins to face charter competition. I present such results for Michigan in Hoxby, "School Choice and School Productivity," in Hoxby, ed., *The Economic Analysis of School Choice* (Chicago: University of Chicago Press, 2002). They simply confirm the results shown in Table 4: schools that faced charter competition improved their achievement growth rates more than schools that did not face charter competition. Detrended difference-in-differences results are a valid test of the effects of charter competition, even if schools faced with charter competition had initial achievement growth rates different from schools that were not faced with charter competition.

There may be other reasons that the results for Michigan are more modest: It is simply too early to test other explanations.

The Effect of Charter Schools on Arizona Public School Students

Like Michigan, Arizona enacted a charter school law in 1994. Arizona's charter school law is widely regarded as the most favorable to charter schools in the United States, because it allows them to have considerable fiscal and legal autonomy. It also places few constraints on the growth of charter schools. As a result, 5.3 percent of Arizona's nonprivate enrollment was in charter schools in 1999–2000—the highest of any American state.

In Arizona, state-sponsored charter schools get a fee equal to the state's share of revenue (45 percent of total revenue for a regular public school). District-sponsored charter schools get a fee equal to local per pupil revenue but are less able to compete with the regular public schools because they must seek renewal of their charters from the very districts with which they compete.

My evaluation of Arizona follows the same strategy that I employ for Michigan, so I will merely highlight a few differences between the two situations. In Arizona, a municipality may contain multiple districts: for instance, a few elementary districts, a middle school district, and a high school district. A local charter school may therefore be competing with multiple districts. Therefore, I associate regular public schools and charter schools with a municipality, not a district. All Arizona fourth and seventh graders were required to take the Iowa Test of Basic Skills (ITBS) through 1995–96 and have been required to take the Stanford 9 test since then. The shift in the test does not pose problems for the analysis because both tests offer national percentile rank (NPR) scores (which have a 0.97 correlation at the school level), and all the schools switched tests in the same year. Thus, it is a simple matter to use the two tests

and allow for a one-time statewide shift in each national percentile rank.[11] I use NPR scores at the school level for the school years 1992–93 to 1999–2000. In order for the results in Michigan and Arizona to be as comparable as possible, I again use the same critical level—6 percent—that I use for Michigan in evaluating the level of charter schools as a competitive threat. However, a variety of critical levels between 6 percent and 11 percent produce similar results for Arizona.[12]

The right-hand panel of Table 3 lists the Arizona municipalities that had at least 6 percent of local enrollment in charter schools. Municipalities of all sizes are represented. The list includes some Arizona's largest cities (Phoenix, Tempe, Scottsdale), some medium-sized cities (Avondale, Flagstaff, Gilbert, Kingman), and 30 smaller municipalities.

As in Michigan, it is important to subtract out each Arizona school's initial achievement. Also, it is important that the difference-in-differences statistics control for what was happening to other Arizona schools over the same period. Although Arizona did not experience a school finance reform, it did have an activist state department of education that enacted numerous programs (including a school report card program so that parents would be better informed about performance).

Table 5 shows the results of the evaluation of Arizona's charter competition. The difference-in-differences statistics suggest that Arizona public schools raised achievement in response to competition from charter schools. Achievement

[11]To be precise, I allow for a one-time statewide shift in each percentile rank. The shifts are very small, however. The information on Arizona charter schools and all the data on Arizona schools are taken from the Arizona Department of Education (Phoenix, 2000): *Arizona Educational Directory,* electronic files, 2000; *Arizona Pupil Achievement Testing, Statewide Report,* 1988 through 1995 editions; *Average Daily Membership and Average Daily Attendance Records,* 1988 through 2000 editions; *School Report Card Program,* 1996 through 2000 editions, electronic PDF files and spreadsheet files.

[12]These results and descriptive statistics for the Arizona data set are available from the author. Choosing a level much higher than 11 percent makes the results depend unduly on just a few districts, simply because only a few districts ever face more than an 11 percent drawing away of their students.

TABLE 5
Effects of Charter School Competition on
Arizona Public School Students' Achievement

Difference-in-Differences Results	*Dependent Var: Achievement Based on:*			
Change in achievement (NPR score) after district is faced with charter school competition (charter schools represent at least 6% of enrollment in district)	*Fourth-grade reading exam*	*Fourth-grade math exam*	*Seventh-grade reading exam*	*Seventh-grade math exam*
	2.31[a]	2.68[a]	1.11	1.59[b]
	(0.69)	(0.79)	(0.95)	(0.89)

[a]Change in achievement is statistically significantly different from zero with 95% confidence.

[b]Significantly different at the 90% level.

Source: Arizona Department of Education (1996, 1997, 1998, 1999, 2000 various).

Note: The table is based on regressions of school-level data from 1992–93 to 1999–2000. The dependent variable is a school's achievement—specifically, a school's national percentile rank (NPR) score on a nationally normed standardized test (Iowa Test of Basic Skills or the Stanford 9). Regression includes school indicator variables that are constant over the period (location, neighborhood, organization) and year indicator variables that allow for statewide changes from year to year in the test itself or in the pressure to perform on the test.

rose by 2.31 NPR points on the fourth-grade reading exam, by 2.68 NPR points on the fourth-grade math exam, and by 1.59 points on the seventh-grade math exam. (The effect on seventh-grade reading scores appears to have been positive, but it is not statistically significantly different from zero.) Recall that these gains are not only relative to the schools' own initial performance (the first difference) but are also relative to the gains made over the same by Arizona schools that did not face charter competition (the difference-in-differences).[13]

[13]Some readers may be interested in detrended difference-in-differences results—that is, estimates that allow each school to have a different initial trend. To compute such results, I look for *changes* in a school's trend when it begins to face charter competition. Results in Hoxby (2002) for Arizona confirm the results shown in Table 5: schools that faced charter competition improved their achievement growth rates more than schools that did not face charter competition. Detrended difference-in-differences results are a valid test of the effects of charter competition, even if schools faced with charter competition had different initial achievement growth rates than schools that were not faced with charter competition.

In summary, Arizona public schools raised achievement in the face of competition from charter schools, and their improvements occurred after they faced charter competition above a critical level at which we might expect them to take notice of their students being drawn away by charter schools. The Arizona gains are similar to or just a bit larger than the gains made by Michigan public school students.

What Happened in Milwaukee, Michigan, and Arizona Public Schools?

The effects of the Milwaukee voucher, Michigan charter school, and Arizona charter school programs on *public* school students all suggest that the efficiency response to competition swamps cream-skimming effects (if any) that choice introduces. Moreover, not only does one effect swamp the other for the average public school student, it is likely to do so for even the public school student who is most harmed by choice. Consider the following highly pessimistic and unlikely scenario: Suppose that, prior to choice, a student was in a Milwaukee school where the average student scored at the 90th percentile for Milwaukee elementary schools. Suppose that, because of choice, all of his good peers left and he remained in a public school with peers who scored, on average, at the 10th percentile for Milwaukee elementary schools. In Milwaukee, on the math exam, the difference between elementary schools at the 90th and 10th percentiles is about 32 NPR points. This means that the Milwaukee student's worst-case scenario would be to experience a fall of about 32 national percentile points in his peer group. Moreover—to make an extreme assumption—let us say that the student is so much influenced by his peers that his scores fall by 32 points. This scenario is not strictly impossible, but it is so pessimistic that it is barely plausible. Nevertheless, if the student enjoys the achievement growth rates that Milwaukee students are enjoying now in schools that face significant competition from vouchers, he will "grow out of" the bad peer effects within four-and-a-half years—that is, he will be better

off for having experienced vouchers within five years of the voucher program affecting his school and peer group.

At the outset of this chapter, I noted that commentators on the subject of school choice are obsessed with the possibility that choice schools will "cream skim" from the public schools, not do the reverse; it even seems odd to raise the possibility of reverse cream skimming. Nevertheless, given that Milwaukee public school students are *positively* affected by choice, one might worry that the effects are due to reverse cream skimming. It is, however, easy to show that the effects of choice on public school students cannot be largely the result of reverse cream skimming. There are simply too few students changing schools to affect average test scores to the degree they in fact were affected. Between 1996–97 and 1999–2000, the Milwaukee public schools lost no more than 498 fourth graders to voucher schools. (The actual number is smaller because 498 is the total increase in vouchers for fourth graders, and some of the vouchers went to students who had been attending private schools, not Milwaukee public schools.) Witte, Steer, and Thorn (1995) inform us that disappointed voucher applicants (applicants who lost the lottery and therefore remained in the Milwaukee public schools) scored 5.6 points lower in reading and 10.2 points lower in math than the average Milwaukee student. They also show that voucher applicants performed at about the same level as other low-income Milwaukee students who were eligible for the vouchers.[14] If we assume that the departing voucher students were like the disappointed applicants, then their departure would raise fourth-grade scores in Milwaukee public schools by at most 0.4 points in reading and 0.8 points in math between 1996–97 and 1999–2000. These gains would imply an annual improvement of 0.14 points in reading and 0.26 points in math. Compare such improvements with 1.3 points in reading and 1.8 points in math, which are the actual annual gains of Milwaukee

[14]See John F. Witte, Troy D. Sterr, and Christopher A. Thorn, "Fifth-year Report: Milwaukee Parental Choice Program" (University of Wisconsin–Madison, Robert La Follette Institute of Public Affairs, 1995).

public school students, above and beyond the gains recorded by the control students in non-Milwaukee schools. (You can obtain the just-quoted numbers from Table 2, once you know that there were 2,376 students in schools facing more competition and 4,554 in schools facing less competition.) In short, the change in Milwaukee scores that could plausibly be caused by reverse cream skimming is an order of magnitude too small to account for the actual change in Milwaukee scores.

No scores are available for disappointed charter applicants in Michigan and Arizona, but I can compare the demographics of charter school students and regular public school students. Tables 6 and 7 show each district (Michigan) and municipality (Arizona) that has some charter school students and a total enrollment (public plus charter) of at least 1,000 students. Within each district or municipality, charter schools and public schools are compared on the shares of their students who are black and Hispanic. All the statistics are for the 1999–2000 school year.

Table 6 shows that Michigan charter schools do not cream skim or reverse cream skim in any consistent way. In the ten largest districts, for instance, some charter schools enroll a higher share of black students, some charter schools enroll a smaller share of black students, and some charter schools enroll a virtually identical share of black students as the regular public schools do. In the ten next largest districts, there is a similar lack of pattern. I should note that the black student shares are the most informative for Michigan because the state does not have many Hispanic students.

The Hispanic student shares are the most informative for Arizona because the state does not have many black students. Looking at the Hispanic share columns in Table 7, we see that charter schools appear to be very similar to the public schools with which they compete. In most cases, the charter schools' and regular public schools' shares of Hispanic students differ by only a few percent. Moreover, there is no consistent pattern to the differences that do exist. In short, the data suggest that cream skimming and reverse cream skimming are not important phenomena in Michigan and Arizona.

TABLE 6
The Demographics of Michigan's Regular Public and Charter School Students

District	*Pupils in District*	*%Black in Charter Schools*	*%Black in Public Schools*	*%Hispanic in Charter Schools*	*%Hispanic in Public Schools*
Detroit	168,118	90	91	4	4
Utica	27,038	8	1	3	1
Grand Rapids	25,648	49	44	4	18
Flint	24,411	75	74	1	2
Lansing	19,461	60	35	8	14
Ann Arbor	17,113	14	17	3	3
Dearborn	16,990	30	2	3	2
Wayne-Westland	15,128	81	15	2	2
Warren	14,513	26	2	0	1
Saginaw City	13,418	38	59	14	13
Pontiac	13,138	65	62	7	12
Kalamazoo	12,191	49	44	3	6
Port Huron	12,096	6	8	3	3
Chippewa Valley	11,931	3	1	0	1
Farmington	11,671	7	7	0	1
Southfield	10,856	81	80	0	1
Midland	9,786	3	2	3	2
Kentwood	8,899	18	18	4	5
Portage	8,701	10	5	2	2
Forest Hills	8,401	4	2	3	1
Jackson	8,055	21	34	2	3
Battle Creek	8,012	12	36	3	5
Lapeer	7,724	0	0	4	2
West Ottawa	7,552	3	3	10	12
Howell	7,220	0	0	0	0
Muskegon	6,905	76	50	9	8
Grand Blanc	6,656	12	8	2	1
Roseville	6,382	23	4	1	1

TABLE 6 *(continued)*

District	*Pupils in District*	*%Black in Charter Schools*	*%Black in Public Schools*	*%Hispanic in Charter Schools*	*%Hispanic in Public Schools*
Van Buren	6,316	81	23	0	1
Grand Haven	6,158	0	1	0	3
Wyoming	6,124	6	8	4	10
Holland	6,085	4	5	23	32
Benton Harbor	6,044	27	92	6	1
Bedford	5,611	1	0	1	2
Carman-Ainsworth	5,428	36	20	6	2
Saginaw	4,935	63	7	10	6
Ferndale	4,893	83	33	0	1
Holly	4,622	0	2	1	2
Hartland	4,606	1	1	0	1
Romulus	4,510	4	45	1	1
Mount Pleasant	4,407	2	2	2	3
Southgate	4,354	8	2	12	4
Kenowa Hills	4,147	6	2	5	3
Oak Park	4,107	100	84	0	0
Greenville	4,008	0	0	4	2
Highland Park	3,915	100	100	0	0
Coldwater	3,686	1	1	6	2
Inkster	3,607	90	98	0	0
Eaton Rapids	3,448	0	1	2	2
Lakeview (Calhoun)	3,381	14	4	6	2
Waverly	3,373	25	17	5	7
Sault Sainte Marie	3,315	0	0	0	0
Cedar Springs	3,273	0	0	3	2
Petoskey	3,253	1	1	1	1
Byron Center	2,905	2	1	1	2
Huron	2,677	4	1	2	2
Big Rapids	2,622	5	6	2	1
Godwin Heights	2,560	52	10	13	15

TABLE 6 *(continued)*

District	*Pupils in District*	*%Black in Charter Schools*	*%Black in Public Schools*	*%Hispanic in Charter Schools*	*%Hispanic in Public Schools*
Belding	2,503	0	0	0	1
Comstock Park	2,379	2	5	3	3
Hillsdale	2,234	1	0	2	1
Spring Lake	2,230	0	0	0	1
Buena Vista	2,046	88	90	6	6
Essexville-Hampton	2,007	5	1	14	2
Beaverton	1,842	2	1	0	1
Tawas	1,813	7	0	0	0
Manistee	1,802	3	1	7	3
Elk Rapids	1,737	1	0	3	5
Fennville	1,730	0	2	7	33
Leslie	1,495	0	0	0	2
Westwood Heights	1,463	64	57	2	3
Charlevoix	1,460	1	1	0	2
Atherton	1,270	10	4	4	2
Ishpeming	1,168	0	0	0	0

TABLE 7
The Demographics of Arizona's Regular Public and Charter School Students

	Pupils in City	*%Black in Charter Schools*	*%Black in Public Schools*	*%Hispanic in Charter Schools*	*%Hispanic in Public Schools*
Phoenix	206,773	16	7	40	46
Tucson	122,375	8	5	35	41
Mesa	74,134	4	3	19	21
Glendale	50,427	12	5	22	24
Scottsdale	33,926	4	2	9	7
Chandler	30,159	5	5	12	25
Gilbert	25,336	3	3	7	11
Yuma	23,253	3	3	69	64
Tempe	22,740	17	8	32	29

TABLE 7 *(continued)*

	Pupils in City	*%Black in Charter Schools*	*%Black in Public Schools*	*%Hispanic in Charter Schools*	*%Hispanic in Public Schools*
Peoria	20,769	6	4	26	20
Flagstaff	12,214	3	2	11	16
Casa Grande	8,085	2	5	42	46
Kingman	7,745	0	1	6	10
Avondale	7,220	12	7	35	45
Sierra Vista	7,015	12	11	24	22
Nogales	6,536	0	0	99	98
Apache Junction	6,013	1	1	10	12
Lake Havasu City	5,987	1	1	18	13
Prescott	5,643	0	1	8	9
Bullhead City	5,523	1	2	2	28
Douglas	4,722	0	2	100	89
Show Low	4,465	4	1	6	8
Cave Creek	4,230	2	1	4	5
Cottonwood	3,463	4	1	12	19
Page	3,446	1	0	5	2
Safford	3,272	2	3	32	41
Chino Valley	2,781	0	0	4	10
Globe	2,723	2	0	49	27
San Luis	2,220	0	0	100	100
Fountain Hills	2,214	1	1	7	4
Queen Creek	2,205	0	0	8	40
Somerton	1,993	0	0	100	94
Marana	1,914	0	2	9	27
Camp Verde	1,654	1	0	3	14
Willcox	1,639	0	0	27	42
Sedona	1,595	3	0	8	14
Higley	1,435	3	2	3	13
Benson	1,223	2	1	17	24
Bisbee	1,103	0	0	42	53

The Effect of Traditional Forms of School Choice on Public School Students

Parents' ability to choose among public school districts (through residential decisions) and to choose private schools are such established features of American education that they are taken for granted. Yet, through these mechanisms, American parents have traditionally exercised some choice over their children's schooling. These traditional forms of choice are useful for establishing the effects of choice on achievement, especially because the availability of traditional choice mechanisms varies greatly across metropolitan areas in the United States. Some metropolitan areas contain many independent school districts and a large number of affordable private schools; others are completely monopolized by one school district or have almost no private schooling.

In previous work, I have drawn upon traditional forms of choice to generate evidence about how choice affects achievement. I review this evidence here.[15] Traditional forms of choice generate evidence that is useful because it is *long-run* and *general*—that is, traditional choice can affect all schools, not just selected schools; and can affect schools for decades.

In the short term, an administrator who is attempting to raise achievement has only certain options. He can induce his staff to work harder; he can get rid of unproductive staff and programs; he can allocate resources away from non-achievement-oriented activities (building self-esteem) and toward achievement-oriented ones (math, reading, and so on). In the slightly longer term, he can renegotiate the teacher contract to make the school more efficient. If an administrator actually pursues all these options, he may be able to raise achievement substantially.

[15]For detail on the empirical work described here, see Hoxby, "Do Private Schools Provide Competition for Public Schools?" revision of National Bureau of Economic Research Working Paper no. 4978, August 2000; and Hoxby, "Does Competition Among Public Schools Benefit Students and Taxpayers?" *American Economic Review* 90, no. 5 (2000): 1209–38.

Nevertheless, choice can affect achievement through a variety of long-term, general mechanisms that are not immediately available to an administrator. The financial pressures of choice may bid up the wages of teachers whose teaching raises achievement and attracts parents. In this way it may draw people into teaching (or keep people in teaching) who would otherwise pursue other careers. Indeed, it may change the entire structure of rewards in teaching and thereby transform the profession.[16] The need to attract parents may force schools to issue more information about their achievement, thus gradually making parents better "consumers." Because parents' decisions are more meaningful when schools are financed by fees they control, choice may make schools more receptive to parent participation. The need to produce results that are competitive with those of other schools may force schools to recognize and abandon pedagogical techniques and curricula that are unsuccessful in practice though philosophically appealing. Finally, in the long term, choice can affect the size and very existence of schools. Choice makes enrollment expand and contract; it makes private schools enter and exit. In the short term, we mainly observe how the existing stock of schools changes its behavior.

Both traditional forms of choice can inform us about the long-run, general effects of choice on achievement.

Traditional Inter-District Choice

The first traditional form of choice occurs when parents choose among independent public school districts by deciding where to live. Of course, the extent to which parents can exercise this form of choice depends on the number, size, and housing patterns of districts in the area of the parents' jobs. There are some metropolitan areas in the United States that have many small school districts with reasonably comparable char-

[16]For more on this point, see Hoxby. "Would School Choice Change the Teaching Profession?" *Journal of Human Resources* (forthcoming; also NBER Working Paper no. 7866, August 2000).

acteristics: Boston, for instance, has 70 school districts within a 30-minute commute of the downtown area and many more in the metropolitan area. Miami, on the other hand, has only one school district (Dade County) that covers the entire metropolitan area. Most metropolitan areas are, of course, somewhere between these two extremes. A typical metropolitan area has an amount of choice that corresponds to having four equal-sized school districts (or a greater number of less equally sized districts).[17] For this traditional form of choice to be a useful guide to the productivity effects of choice, parents must choose districts that are fiscally and legally independent. This is because the mechanism by which parents' housing choices translate into budgetary incentives for a school to be productive does not operate if, say, a district relies entirely on state revenue or is otherwise held harmless from repercussions associated with an inability to attract parents.

How does one measure the degree of traditional inter-district choice in a metropolitan area? A particularly good index of inter-district choice is the probability that, in a random encounter, two students in the same metropolitan area would be enrolled in different school districts. If there were only one district, as in Miami, this probability would be equal to zero. If there were many districts, as in Boston, this probability would be very close to one (greater than 0.95).[18] It is interesting to note that metropolitan areas as disparate as Saint Louis and Seattle have comparably high degrees of inter-district choice. Metropolitan areas as disparate as Las Vegas and Wilmington equally have zero inter-district choice.

[17]People with jobs in rural areas typically have only one or two school districts among which to choose. In order to avoid a much-choice/little-choice comparison that mainly reflects urban/rural difference in school productivity, it is useful to focus on metropolitan areas when analyzing traditional inter-district choice.

[18]We can calculate this choice index, C_m, using the following equation:

$$C_m = 1 - \sum_{j=1}^{J} s_{jm}^2 ,$$

where s_{jm}^2 is the square of district j's share of enrollment in metropolitan area m.

Notwithstanding the range of metropolitan areas with less choice and the range of metropolitan areas with more choice, it is a good idea to control for background variables that might affect achievement: household income, parents' educational attainment, family size, single-parent households, race, region, metropolitan area size, and the local population's income, racial composition, poverty, educational attainment, and urbanness. Because I have good measures of racial, ethnic, and income segregation by school and school district, I also control for segregation that may be affected by inter-district choice. I also instrument for the measure of inter-district choice with factors that are likely to affect only the supply of districts, not the demand for them.[19]

The evidence on traditional choice among districts is shown in Table 8, which displays only the effects that are of primary interest, not the effects of control variables. The estimates show that inter-district choice has a positive, statistically significant effect on achievement. In particular, a metropolitan area with maximum inter-district choice (index approximately equal to one) has eighth-grade reading scores that are 3.8 national percentile points higher, tenth-grade math scores that are 3.1 national percentile points higher, and twelfth-grade reading scores that are 5.8 national percentile points higher.

[19]Although this is an issue that may interest only a few readers, we might be concerned that the conduct of local public schools affects the availability of inter-district choice. In particular, districts might consolidate with good districts but secede from bad districts. To obtain unbiased estimates, we need geographic factors that increase a metropolitan area's tendency to contain many independent districts but have no direct effect on contemporary public school conduct. As explained in Hoxby, "Does Competition Among Public Schools Benefit Students and Taxpayers?" streams and rivers are such factors because, early in American history, they were natural barriers that influenced the drawing of district boundaries. To lessen travel time to school, school districts were drawn smaller. Today, small streams and rivers probably have no direct effect on how schools conduct themselves.

TABLE 8
Effect of Traditional Inter-District Choice
on *Public* School Students' Achievement

Effect on Achievement	*8th-grade reading score*	*10th-grade math score*	*12th-grade reading score*
An increase of 1% in the index of inter-district choice (no choice to maximum choice) changes achievement by this many national percentile points in a metropolitian area	3.818[a] (1.591)	3.061[a] (1.494)	5.770[a] (2.208)

[a]Effect is statistically significantly different from zero at the 95% level of confidence.

Source: Hoxby, "Does Competition Among Public Schools Benefit Students and Taxpayers?" *American Economic Review* 90, no. 5 (2000): 1209–38. Observations are metropolitan area students from the National Education Longitudinal Study. Number of observations in each column: 10,790 (211 metropolitan areas), 7,776 (211 metropolitan areas), and 6,119 (209 metropolitan areas). Number of observations varies due to the availability of the dependent variable. See also *School District Data Book, Common Core of Data, City and County Data Book,* Geographic Names Information System, and United States Geographic Survey.

Note: Test scores are measured in national percentile points. The coefficients shown come from instrumental variables' estimation of regressions in which the dependent variable is one of the achievement measures shown on per pupil spending. The independent variables in the regression include the index of choice (instrumented by a vector of streams variables), several family background variables (household income, gender, race, parents' education), several neighborhood variables (mean household income in district, income inequality in district, racial composition of district, racial and ethnic homogeneity of district, educational attainment of adults in district), and several characteristics of the metropolitan area (population, land area, mean household income, income inequality, racial composition, racial homogeneity, ethnic homogeneity, educational attainment of adults, homogeneity of educational attainment, region of the country). Regressions are weighted by school enrollment. Standard errors are in parentheses and use formulas [Brent Moulton, "Random Group Effects and the Precision of Regression Estimates," *Journal of Econometrics* 32 (1986): 385–97] for data grouped by districts and metropolitan areas.

Traditional Choice of Private Schools

The second way in which parents have traditionally been able to exercise choice in the United States is by enrolling their children in private schools. Traditionally, private school tuition in America is not subsidized by public funds (as it is in Canada and many European countries), so parents can only afford private school if they can pay tuition and also pay taxes to support local public schools. Partly as a result, private schools enroll only 12 percent of American students.

In the United States, 85 percent of private school students attend a school with religious affiliation, but such schools include a variety of Christian and non-Christian schools and have tuition that ranges from a token amount to over $10,000. The remaining 15 percent of private school students attend schools with no religious affiliation; these include most of the independent, college-preparatory schools that charge tuition of $5,000 or more. The modal private school student in the United States attends a Catholic school that charges between $1,200 and $2,700.

A key feature of American private schools is that they typically subsidize tuition with revenues from donations or an endowment (or implicit revenues from an in-kind endowment such as buildings and land). The share of schooling cost that is covered by subsidies is larger in schools that serve low-income students, but even relatively expensive private schools charge subsidized tuition. For instance, Catholic elementary schools, on average, cover 50 percent of their costs with nontuition revenues.

The number of private school places (of a given quality) that are available at a given tuition varies greatly among metropolitan areas in the United States.[20] For instance, in some metro-

[20]The quality of a private school can be measured in various ways, the simplest of which is simply the amount of money the school spends on educating a student. Because private schools face strong incentives to be productive, their costs are a good guide to their quality. Private school expenditure sometimes understates the true cost of educating a student because, especially in schools with religious affiliation, labor is donated by volunteers and church buildings are used for educational purposes.

politan areas, 15 percent of the elementary student population is enrolled in private schools where tuition is about two-thirds of the schools' per pupil expenditure. (Typical amounts would be tuition of $1,800 and expenditure of about $2,700.) In other metropolitan areas, fewer than one percent of the elementary school population is enrolled in such schools, although places might be available in schools where tuition is higher because there are no tuition subsidies. In short, the supply of private schooling varies among metropolitan areas, and—thus—the degree to which parents have choice between public and private schools varies among metropolitan areas.

It is reasonable to use the actual share of students who attend private school in a metropolitan area as a measure of private school availability *if* the measure is instrumented by factors that affect the supply of private schooling rather than by factors that affect the demand for private schooling (such as the low quality of local public schools). The best instruments come from historical differences in the religious composition of metropolitan areas. Briefly, religious groups left endowments that today generate differences in the amount of nontuition revenue enjoyed by private schools. A private school presented by history with a generous endowment can provide a given quality of schooling at a lower tuition, which accordingly makes it more competitive with public schools than a private school with little or no endowment.[21]

Table 9 shows the results of greater availability of private schools. The estimates control for the same background variables that I used for inter-district choice (see above). The table shows that private school choice has a positive, statistically significant effect on *public* school students' achievement. For instance, compare two metropolitan areas, one

[21]Formally, the set of instruments for the share of enrollment in private schools is a vector of variables that measure the population densities of nine major religious denominations in 1950. So long as I control for *current* religious composition of metropolitan areas (which might affect the demand for private schooling), these historical religious population densities should mainly affect the supply of schooling and should have little or no direct effect on the achievement of public school students.

TABLE 9
Effect of Traditional Private School Choice
on *Public* School Students' Achievement

Effect on Achievement	*8th-grade reading score*	*8th-grade math score*	*12th-grade reading score*	*12th-grade math score*
An increase of 1% in the the share of students who attend private school changes achievement by this many national percentile points in a metropolitan area	0.271[a] (0.090)	0.249[a] (0.090)	0.342[a] (0.172)	0.371[a] (0.171)

[a]Effect is statistically significantly different from zero at the 95% level of confidence.

Source: Hoxby, "Do Private Schools Provide Competition for Public Schools?" Revision of NBER Working paper no. 4978, August 2000. Observations are metropolitan area students from the National Education Longitudinal Study. See also *School District Data Book, Common Core of Data,* and *City and County Data Book*.

Note: Test scores are measured in national percentile points. The coefficients shown come from instrumental variables' estimation of regressions in which the dependent variable is one of the achievement measures shown. The independent variables in the regression include the percentage of metropolitan area students enrolled in private schools (instrumented by a vector of religious composition variables from 1950), several family background variables (household income, gender, race, parents' education), several neighborhood variables (mean household income in district, income inequality in district, racial composition of district, racial and ethnic homogeneity of district, educational attainment of adults in district), and several characteristics of the metropolitan area (population, land area, mean household income, income inequality, racial composition, racial homogeneity, ethnic homogeneity, educational attainment of adults, homogeneity of educational attainment, region of the country). Regressions are weighted by school enrollment. Standard errors are in parentheses and use formulas (Moulton 1986) for data grouped by districts and metropolitan areas.

with a moderately high degree of private school supply (about 17 percent of students in private schools) and the other with a moderately low degree of private school supply (about 7 percent of students in private schools). The difference between moderately high and low private school choice is, thus, a 10 percentage point difference in the share of students in private schools. This means that we can interpret the coefficient shown in Table 9 as follows: A *public* school in the

metropolitan area with moderately high private school choice (as opposed to moderately low private school choice) has eighth-grade reading scores that are 2.7 national percentile points higher, eighth-grade math scores that are 2.5 national percentile points higher, twelfth-grade reading scores that are 3.4 national percentile points higher, and twelfth-grade math scores that are 3.7 national percentile points higher.

Discussion of the Effects of Traditional Forms of School Choice

One should keep in mind that both traditional forms of choice provide rather weak incentives compared with choice reforms like vouchers and charter schools. Moreover, many poor families cannot exercise either traditional form of choice. A family can only choose among districts if it can afford to live in a variety of areas, and a family can only exercise traditional private school choice if it can pay tuition. Thus, even if every metropolitan area in the United States had the maximum degree of the traditional forms of choice, poor families would probably be left with schools that did not aggressively pursue achievement.

CONCLUSIONS

In this chapter, I have presented evidence that suggests that the school choice debate should focus much more on how *public* schools respond to competition. It appears that public schools are induced to raise achievement when they are faced with competition and that this stimulus swamps any effect associated with cream skimming, reverse cream skimming, or the like. The choice reforms that are currently in place do not appear to generate both winners and losers—only winners. *Public* school students, who are often predicted to be losers, are winners because their schools apparently respond positively to competitive threats. This is not only good news for students; it should be welcome news to those who think that public schools have much good potential that is brought out only when need arises.