

ACHIEVEMENT IN CHARTER SCHOOLS AND REGULAR PUBLIC SCHOOLS IN THE UNITED STATES: UNDERSTANDING THE DIFFERENCES

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ABSTRACT

This study compares the reading and mathematics proficiency of charter school students to that of their fellow students in neighboring public schools. Ninety-nine percent of all elementary students in charter schools are included in the study. The charter schools are compared to the schools that their students would most likely otherwise attend: the nearest regular public school with a similar racial composition (the "matched" school). Compared to students in the matched regular public school, charter students are 5.2 percent more likely to be proficient in reading and 3.2 percent more likely to be proficient in math on their state's exams. Students in charter schools that have been in operation longer are more likely to have a proficiency advantage over their peers in the matched regular public school. In reading, the advantage is 2.5 percent for a charter school that has been operating 1 to 4 years, 5.2 percent for a school operating 5 to 8 years, and 10.1 percent for a school operating 9 to 11 years. Also, charter school students are more likely to have a proficiency advantage if their school has funding that is at least forty percent of that enjoyed by regular public schools. The results suggest that charter schools are especially likely to raise the achievement of students who are poor or Hispanic.

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EXECUTIVE SUMMARY

This study compares the reading and mathematics proficiency of charter school students in the United States to that of their fellow students in neighboring public schools. Because charter schools are public entities, their students take state exams. Thus, this study is based on schools that enroll approximately 99 percent of elementary students who attend charter schools. The charter schools are compared to the schools that their students would most likely otherwise attend: the nearest regular public school with a similar racial composition (the "matched" school).

Compared to students in the matched public school, charter students are 5.2 percent more likely to be proficient in reading and 3.2 percent more likely to be proficient in math on their state's exams. Charter schools that have been in operation longer have a greater proficiency advantage over the matched public schools. For example, in reading, the advantage is 2.5 percent for a charter school that has been operating 1 to 4 years, 5.2 percent for a school operating 5 to 8 years, and 10.1 percent for a school operating 9 to 11 years.

The results show that charter schools are especially likely to raise the achievement of students who are poor or Hispanic. This is a useful finding because charter schools serve students who are disproportionately likely to be minorities or poor.

Charter school students are more likely to have a proficiency advantage if their state has a strong charter school law that gives the schools autonomy and that ensures that charter schools get funding equal to at least 40 percent of the total per-pupil funding of regular public schools.

In states where charter schools are well-established, charter school students' advantage in proficiency tends to be greater. For instance, in Arizona, fourth grade charter students are about 10 percent more likely to be proficient in reading and math than students in the matched regular public schools. In California, the corresponding proficiency advantages are 9 percent in reading and 5 percent in math. In Colorado, the corresponding proficiency advantages are 12 percent in reading and 14 percent in math.

North Carolina is the only state in which charter students' proficiency is statistically significantly lower, by 4 percent, in both reading and math, compared to students in the nearest public school. In addition, Texas' charter students appear to be statistically significantly less proficient in math (not reading).

By adjusting for schools that serve at-risk students, the study focuses on regular charter schools that are expected to meet the same standards as traditional public schools. The study's "matching" method compares charter schools to public schools that are likely to share the same neighborhood, same economic conditions, and the same population of students and parents. The selection of a neighboring public school as the point of comparison ensures that the groups of students being compared are as similar as possible. It is also likely that the public school selected for comparison was the school that most of the charter school students would have attended, had there been no charter school.

A national study like this one is useful because it is comprehensive. Nevertheless, it is useful to complement studies like this one with studies based on randomization. Because many charter schools have more applicants than places, they routinely hold lotteries, which allow scientific, random assignment studies to be conducted. The key advantage of randomization-based studies is that the charter school students and regular public school students are comparable not only in terms of race, ethnicity, and income, but also on subtle dimensions like motivation and aptitude. Multiple studies based on randomization are underway. The first such study (Hoxby and Rockoff 2004) finds that a large system of Chicago charter schools raised math and reading scores by about 6 percentiles among students who entered in grade 5 or below.

Because charter schools enroll only 1.5 percent of students, it is important to include nearly all of them in a study. Results based on only a small sample of charter school students (for instance, studies that rely on the 3 percent sample of the National Assessment of Educational Progress) cannot be used to draw conclusions about states' charter school policies. A study that relies on a 3 percent sample of 1.5 percent of American students is a study based on only 0.045 percent of students. In contrast, this study uses data that are sufficient for detailed investigations of charter school students' proficiency, nationwide.

I. COMPARING CHARTER AND REGULAR PUBLIC SCHOOLS

Charter schools are a form of school choice that a growing number of people find interesting. This is because charter schools may provide positive competition for regular public schools. They may also be innovators in school management, curriculum, and the use of technology. They may provide alternatives for children who would otherwise be confined to failing schools. An effective, safe alternative school may be especially important for families who are disadvantaged because they often lack the means to escape a failing school by moving to another area. Charter schools are public schools and must accept all applicants equally. Also, charter schools participate in their states' accountability systems and obey many state and federal regulations. The essential difference between charter schools and regular public schools is that charter schools exist on a fee-per-student basis. If they can attract students, they can grow. However, if they fail to attract students, they close. In short, charter schools combine elements of regular public schools and private schools and therefore interest people who want to see reform in American education but who worry about a laissez faire market for education.

Charter schools are a fledgling reform: they enroll only 1.5 percent of American students. Several states have no charter schools at all, and only 7 states and the District of Columbia have more than 2 percent of their students in charter schools. Thus, charter schools are an important part of federal and state efforts to improve schools mainly because they help policy makers envision the future, not because they already enroll many students. Not surprisingly, much of the public is unfamiliar with charter schools and wonders how students fare in them. This study attempts to fill that gap by providing a comprehensive look at charter schools in the United States. It examines the achievement of 99 percent of fourth graders who attend charter schools.¹ Their performance is compared to that of students in the nearest regular public school that the students would most likely have attended if the charter school did not exist (the "matched" school).

I.A. Why a National Study Based on Charter and Matched Regular Public Schools?

It should be said at the outset that a national study like this one is useful because it is comprehensive, timely, and allows us to investigate how the effect of charter schools varies with their age, the support they receive from their state, and the population of students they educate. Comparing charter school to matched regular public schools helps policy makers answer the

question, “What if charter schools did not exist?” Moreover, the comparisons in this study provide some of the first available answers to questions like "Do charter schools improve as they gain experience?", "Do charter schools do better when they receive funding comparable to that of regular public schools?", and "Do charter schools have an especially large effect on the achievement of disadvantaged students who would otherwise have few alternatives to the nearest regular public school?"

Relative to methods based on controls (such as a student's being poor or a "percent poor" variable), the matching method used in this study is superior. First, it simulates the scenario a real parent would face. Should a parent send his child to the nearest regular public school or to a nearby charter school? This is inherently a local question for parents and local comparison are more useful than results that are based on aggregating achievement data up over a vast country. Matched schools share a neighborhood; local economic conditions; and a population of parents and students with certain incomes, races, ethnicities, and family structures. Moreover, matching is a superior statistical method because it does not rely on unrealistic assumptions about linearity. An example of such an unrealistic assumption is that being Hispanic always has the same effect on a student's achievement, regardless of whether he lives in South Texas, Miami, or Minnesota! Because we do not believe such assumptions, we should be wary of studies that simply control for being Hispanic, being African-American, or being poor. Matching produces results that are much more general and credible.

I.B. Other Studies, Good and Bad

Nevertheless, studies based on matching should be complemented by studies based on randomization. Randomization-based studies are the best, most scientific way to determine how charter schools affect students over several years. Because charter schools often have more applicants than spaces and are not allowed to select their students, they hold random lotteries among applicants. Therefore, a researcher can compare students who were randomly assigned to enroll or not to enroll in a charter school. A researcher can follow the charter school students and the randomly selected comparison group over several years of education, confident that both groups had families who were motivated to apply to charter schools. (Parents may be motivated to apply because they are ambitious for their children, but parents may also be motivated to apply because their children are already performing poorly in their regular school.) In addition,

a researcher can often see how students were performing *before* they applied to charter schools. Using pre-application data, a researcher can verify that the lottery was random and show which types of students are attracted to charter schools.

The first randomization-based study to produce results is Hoxby and Rockoff (2004), who study a large system of Chicago charter schools and find that they raise achievement by about 6 percentiles among students who enroll in charter schools in grade five or earlier.² (There are too few students who enroll in later grades to produce meaningful results for them.)

The reason that randomized studies are so valuable is that they guarantee that a researcher is comparing apples to apples. A randomized study tells us what would have happened to students if they had not attended charter schools. This is the best answer to policy makers' "what if" question: what if charter schools did not exist and students attended whatever school they would have attended in their absence?

A poorly designed study of charter schools compares apples to oranges—that is, it compares charter schools to schools that the charter students were unlikely to attend in any case. Keep in mind that the typical American student does not attend a charter school. Affluent parents whose children are doing fine in suburban schools rarely send them to fledgling charter schools. Instead, charter schools disproportionately arise where families are relatively poor, likely to be racial minorities, likely to speak English as a second language, and likely to have a single parent. Policy makers' "what if" question cannot be answered by, say, comparing a charter school student who would otherwise have attended an inner-city public school to a student in an affluent, suburban school.

The American Federation of Teachers (AFT) has recently promoted statistics based on the comparison of fourth graders in charter schools to the typical fourth grader in regular public schools. Much attention has been paid to this crude comparison, and many people have incorrectly interpreted it as sound evidence that charter schools reduce achievement. Little attention has been given to the fact that when the AFT compared black students to black students or Hispanic students to Hispanic students, the results did not confirm the crude comparison. In other words, even a mild attempt to compare apples to apples showed that the crude comparison was misleading. Moreover, the AFT study was based on a sample of only 3 percent of students. Because charter schools enroll only 1.5 percent of students in America, a 3 percent sample of

that tiny 1.5 percent of students is inadequate for determining how states' charter school policies affect achievement. (Three percent of 1.5 percent is only 0.045 percent of students!) A state's policy cannot be evaluated using the equivalent of one or two classrooms of students. An analysis of charter schools that is statistically meaningful requires larger numbers of students.³

I.C. Why this Study is Comprehensive

In contrast with studies based on very small samples, this study uses assessment data on 99 percent of fourth graders enrolled in charter schools, except that fifth or third graders are used in states that do not test fourth graders. It is important to understand that this is not a sample: it is all charter students for whom achievement results are reported. (The missing 1 percent are in first year start-up schools or schools so small that scores are kept confidential to protect individual students). This comprehensive study is possible because charter school students take their states' exams, under the same regulations as apply to students in regular public schools. The findings are representative of charter school students in the United States.

II. WHAT THIS STUDY DOES

II.A. Comparisons of Proficiency

This study examines differences in achievement between charter school students and students in regular public schools. The students' performance on their state tests is examined.⁴ To facilitate comparison between this study and national data, this study focuses on fourth graders, a sample of whom were tested by the National Assessment of Educational Progress (NAEP) in 2002-03.⁵ The District of Columbia and all 36 of the states that had charter school students enrolled in the relevant grade in 2002-03 are included.⁶ Of these states, 25 tested fourth graders, 11 tested fifth graders, and one tested third graders. Fourth grade test results are used when they exist; otherwise, the fifth or third grade results are used. Keep in mind that students are always being compared to others in *the same grade*. A charter school and its neighboring public school administer the same exams in the same grade.

This study focuses on reading achievement and mathematics achievement, which are tested by all states and NAEP.⁷ This study shows its findings in terms of proficiency levels, which all states and NAEP publish.⁸ Although states set proficiency levels somewhat

differently, charter students are always compared to regular public school students who face the *same* proficiency standards. If a state has a high standard for proficiency, the percentage of students who reach it will typically be lower in *both* the charter school and in the nearest regular public school. In addition, this study shows findings for individual states whenever they are statistically meaningful.

Under the No Child Left Behind (NCLB) law, all schools are encouraged to have very high participation rates on their state's exam in order to make Adequate Yearly Progress. Therefore, by using the most recent year of performance data that is available, this study maximizes the coverage of charter school students and their public school peers.⁹ Keep in mind, however, that charter school students are always compared to regular public school students who face the *same* regulations on test participation and publication of test scores.

In short, the data are chosen to facilitate comparison with national data. Students are always compared to others who take the same test, follow the same regulations, participate in the same state assessment program, and face the same proficiency standards.

II.B. Matching Charter Schools to Regular Public Schools

Each school address in the United States is translated into a latitude and longitude.¹⁰ The distance between each charter school and each regular public school is calculated and the nearest regular public schools are identified.¹¹ The schools that are strictly nearest form one comparison group used in this study. They share the charter school's neighborhood and local circumstances to the maximum extent possible. Usually, they also have a racial composition that is similar to that of the charter school.¹²

Occasionally, there is a second public school near a charter school that is almost as close as the nearest public school but is more similar to the charter school on the basis of racial composition. When such a second public school exists nearby, it is likely that the charter school is drawing from it, not the very closest school. After all, a charter school can only draw Hispanic students, say, from a regular public school that enrolls Hispanic students. Thus, the preferred matched school, for this study, is the regular public school with the racial composition most similar to that of the charter school, selected from the public schools that are no more than 5 percent or 0.5 miles (whichever is larger) further away than the nearest public school. The vast majority (92.4 percent) of the time, the matched schools *is* the school that is strictly nearest in

distance. This should surprise no one: tight geographic matching is usually sufficient to ensure that schools are similar on many dimensions simultaneously.

Geographic matching is particularly appropriate for the fourth graders whose scores are examined in this study. Because parents are wary of sending their young children far away for elementary schools, we can say with greater confidence that a fourth grader who attends a neighborhood charter school would otherwise likely be attending a very close regular public school.

II.C. A Note on Methods

A note on methods is in order. In statistics, it has been established that, when one very heterogeneous group is compared to another, univariate controls often produce results that are unsound. This is especially true if the group is drawn sparsely and idiosyncratically from the underlying population that is heterogeneous. Why are univariate controls unsound? Essentially, they are unsound because poor students are not the same regardless of where they live in the United States. Nor are Hispanic students interchangeable. Nor are African-American students interchangeable. And so on. We cannot simply extrapolate from one poor student (Hispanic student, African-American student, etc.) to others who live in different areas, under different circumstances. Yet, such extrapolation is what a simple univariate control does. Moreover, simple linear controls assume that the support of the distributions of the groups being compared (in this case, charter schools and regular public schools) is the same. This is far from true: charter schools are not only very heterogeneous, but have a sparse draw of locations from possible school sites, and have locations that are spread across the United States in a manner that is far from uniform.

In short, a comparison between charter school and regular public schools is exactly the situation in which simple linear controls work least well. In such circumstances, matching produces results that are much superior. Matching ensures that the distributions of the two groups have similar support, and matching ensures that we need only extrapolate from one neighbor to another. Also, matching produces results that are simple to interpret: we are learning about what a charter school student would experience if he were to attend the regular public school that he would probably otherwise be assigned.¹³

Note that controlling for characteristics *within* a matched sample is not at all equivalent

to simple linear controls in unmatched samples. This is true regardless of whether there is only one control or many. Controlling for characteristics within a matched sample is efficient and, moreover, does not impose the restrictive assumptions that are so problematic.

II.D. Computing the Differences in Proficiency

Within the matched sample, the procedure for computing the proficiency differences between charter school and regular public school students is simple. Subtract the percentage of students who are proficient in the nearest regular public school from each charter school's percentage of students who are proficient. This is the individual charter school's difference. Average these individual differences over all charter schools in the United States, weighting each school's difference by its number of students. The averages thus produced are representative of charter school students in the United States.¹⁴ This process can be implemented using a calculator, but it is more convenient to implement it using regression, which automatically generates standard errors. Moreover, multivariate regression is the ideal tool for exploring whether charter schools' effects on achievement are systematically related to their characteristics such as age, funding, and so on. Multivariate regression allows one to compute different effects for charter schools that are younger versus older, poorly versus well funded, and so on.

Because many charter schools are small and the proficiency of a single cohort of fourth graders is an imperfect measure of true achievement, an individual charter school's difference is often a noisy indicator of its true advantage or disadvantage vis-a-vis its neighboring public school. It is important not to overinterpret the individual charter schools' differences. Rather, the individual differences need to be averaged, as described, until the average includes a sufficient number of students to be statistically meaningful.

The standard errors that are computed for each proficiency difference indicate how much confidence we have that the difference is meaningfully different from random noise.¹⁵ It is conventional to report as statistically significant only findings about which we have at least 90 percent confidence. These are the findings I report.¹⁶

It will turn out that the average differences for the entire United States are statistically significant. Also, the average differences tend to be statistically significant for individual states in which charter schools are relatively prevalent. However, the average differences are not

statistically significant in a number of states where charter school students are so few that one cannot distinguish the average from noise with any confidence. For instance, all of the following states have fewer than 200 fourth graders in charter schools and do not produce statistically meaningful results: Arkansas, Connecticut, Indiana, Kansas, Mississippi, New Mexico, Nevada, Oklahoma, Oregon, Rhode Island, South Carolina, Utah, Virginia, and Wyoming. In addition, some states with a fair number of charter students do not produce statistically significant results because there is “noise” produced by factors like a new and unfamiliar test, brand-new charter schools, or social or economic circumstances that affect students.

Saying that a difference is statistically insignificant or meaningless is *not* evidence that there is zero difference in performance between charter schools and regular public schools. It is important to distinguish between results that are statistically insignificant and a finding of zero difference. An analogy may help. A poll that is 50-50 with a margin of error of 1 percent indicates a zero difference or a dead heat between political candidates. A poll that is 55-45 with a margin of error of 25 percent does *not* suggest that there is a dead heat, yet it is also not statistically meaningful evidence that one candidate will win. It is indistinguishable from noise. In many states, the charter school - public school comparison is parallel to the 55-45 poll with a 25 percent margin of error. When pollsters find that their margin of error is too large, they usually go out and poll additional people in the hope of reducing the error. Because this study already includes all available assessment data on charter school students, there is nothing to be done about the data when it does not produce statistically meaningful results. Fundamentally, the data are telling us that it is too early to evaluate charter policy on some dimension.

III. THE STUDY’S COVERAGE

III.A. Coverage of Charter Schools

All states’ charter students are included in the computation of the overall proficiency difference between charter schools and matched regular public schools. Thus, the overall difference is truly representative of the nation, not just large states.

Table 1 shows the states that had charter school students enrolled in the relevant grade (usually fourth) in 2002-03. Notice that most states had only a small fraction of their students

attending charter schools. Even among states with charter school enrollment, most had fewer than 2 percent of their students in such schools. The exceptions are Arizona (6.1 percent), California (2.5 percent), Colorado (3.8 percent), Delaware (4.3 percent), the District of Columbia (11.3 percent), Florida (2 percent), Michigan (3.8 percent), and Wisconsin (2.2 percent).

Table 1 also shows the number of charter schools with at least 10 students in the relevant grade. (The 10 student cut-off is used because test results by grade are generally not reported for smaller groups of students.) The total number of students in the relevant grades who attended these schools was 50,479 in 2002-03, which is the most recent year for which federal enrollment data are available.¹⁷ The study covers approximately 99 percent of the relevant students.¹⁸

Overall, the study covers the vast majority of charter school students in the relevant grades and provides an accurate representation of them. The sources of proficiency data are listed in the Data Appendix.

III.B. Information on Charter Schools' Circumstances

This study demonstrates how proficiency differences are affected by charter schools' circumstances: their age, the laws under which they operate, and the student population they face. This information is gleaned from The Center for Education Reform's *Charter School Directory 2004*, which contains a description of each school, and their *Charter School Laws Across the States 2004*, which outlines each states' charter school laws. All charter schools with proficiency data were covered by this procedure.¹⁹

IV. SIMPLE PROFICIENCY DIFFERENCES BETWEEN CHARTER SCHOOL STUDENTS AND STUDENTS AT MATCHED REGULAR PUBLIC SCHOOLS

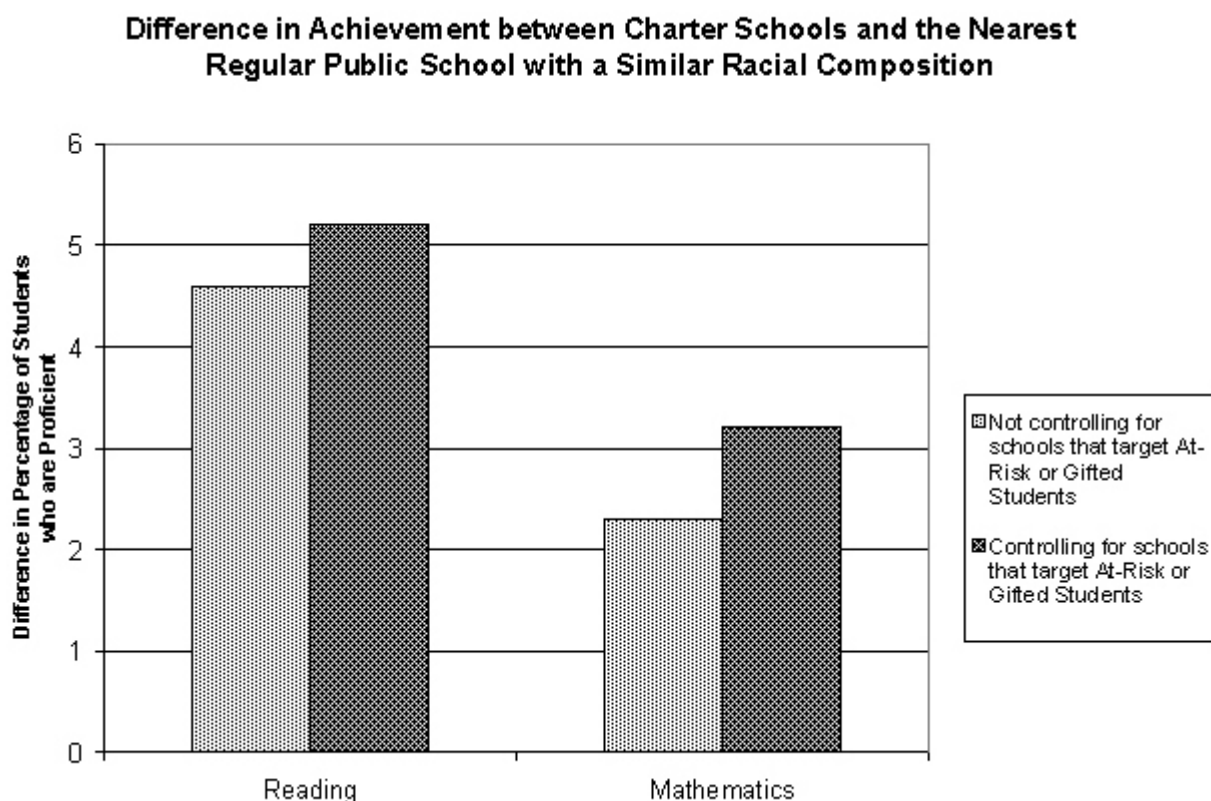
Tables 2 and 3 present findings on the proficiency differences between charter school students and students at matched regular public schools. (Appendix Tables 1 and 2 show parallel findings for the nearest regular public schools, based purely on distance.) Findings that are statistically significant with 90 percent confidence (one asterisk) or 95 percent confidence (two asterisks) are shown. Findings that are statistically *insignificant* at conventional confidence levels are indicated by the abbreviation "n/a". Figure 1 graphically depicts the findings from Tables 1 and 2.

Table 2 shows that, for the United States as a whole, charter school students are 4.6 percent more likely to be proficient on their state's reading examination on 2.3 percent more likely to be proficient on their state's mathematics examination, compared to students in the matched regular public school. These findings are an average over all states and charter schools.

A shortcoming of the simple calculations shown in Table 2 is that no account has been taken of the fact that about 8.0 percent of elementary charter schools target at-risk students and 0.3 percent of elementary charter schools target gifted students.²⁰ One cannot simply compare such schools to nearby regular public schools. Charter schools for at-risk students seek out applicants with poor achievement, so they should not be criticized for having students whose achievement is low. Put another way, if a school deliberately seeks out low-performing students, there is little or no information to be gleaned by comparing its outcomes to those of its matched regular public school.

In short, one must account for the targeting of at-risk and gifted students before one

Figure 1



computes charter schools' effects. This can be done by excluding schools that target or, equivalently, allowing at-risk or gifted students to have different achievement than other students. In Table 3, such allowances are made. Therefore, the charter school effect shown in Table 3 is the true one. (The effect shown in Table 2 is biased downwards by the naive inclusion of charter schools that target at-risk students.) Table 3 shows that, for the United States as a whole, charter school students are 5.2 percent more likely to be proficient on their state's reading examination on 3.2 percent more likely to be proficient on their state's mathematics examination, compared to students in the matched regular public school. These findings are *the* key results of the study. They are the best estimates of charter schools' effects on the achievement of all American elementary students.

Not surprisingly, students who are at-risk have scores that are statistically significantly lower. Gifted students do not have scores that statistically significant higher, but this non-result is simply a function of there being a tiny number of them in the study.

V. PROFICIENCY DIFFERENCES BY STATE

Table 4 presents state-level results that are exactly parallel to the key results in Table 3 -- that is, proficiency differences between charter schools and matched regular public schools, accounting for the targeting of at-risk and gifted students. A state is shown in Table 4 if it has at least one result that is statistically significant. The states where charter schools are relatively prevalent tend to have results that are statistically significant.²¹ None of the states with fewer than 200 students in the relevant grade appears.

Compared to students in the matched regular public schools, Alaska's charter students are about 20 percent more likely to be proficient in reading and math. Arizona's are about 10 percent more likely to be proficient in reading and math. California's charter students are 9 percent more likely to be proficient in reading and 5 percent more likely to be proficient in math. Relative to students in matched regular public schools, Colorado's charter school students are 12 percent more likely to be proficient in reading and 14 percent more likely to be proficient in math. The District of Columbia's charter school advantage is nearly identical to Colorado's. Hawaii's charter students are about 14 percent more likely to be proficient in reading and 12 percent more likely to be proficient in math than their fellows in the matched regular public

school. Illinois' charter school advantage is 16 percent in reading and 21 percent in math. Louisiana's is an even larger 33 percent in reading and 29 percent in math.²² Compared to students in the matched regular public schools, Massachusetts' charter school students are 8 percent more likely to be proficient in reading and math. Other states where charter school students are more likely to be proficient, on at least one test, include Florida, Georgia, New Jersey, Oregon, and Pennsylvania.

North Carolina stands out as the only state in which charter students are statistically significantly less likely to be proficient in both reading and math. The North Carolina charter school disadvantage is 4 percent in both subjects. In addition, Texas' charter school students are 7 percent less likely to be proficient in math. (In reading, the Texas proficiency difference is not statistically significant.)

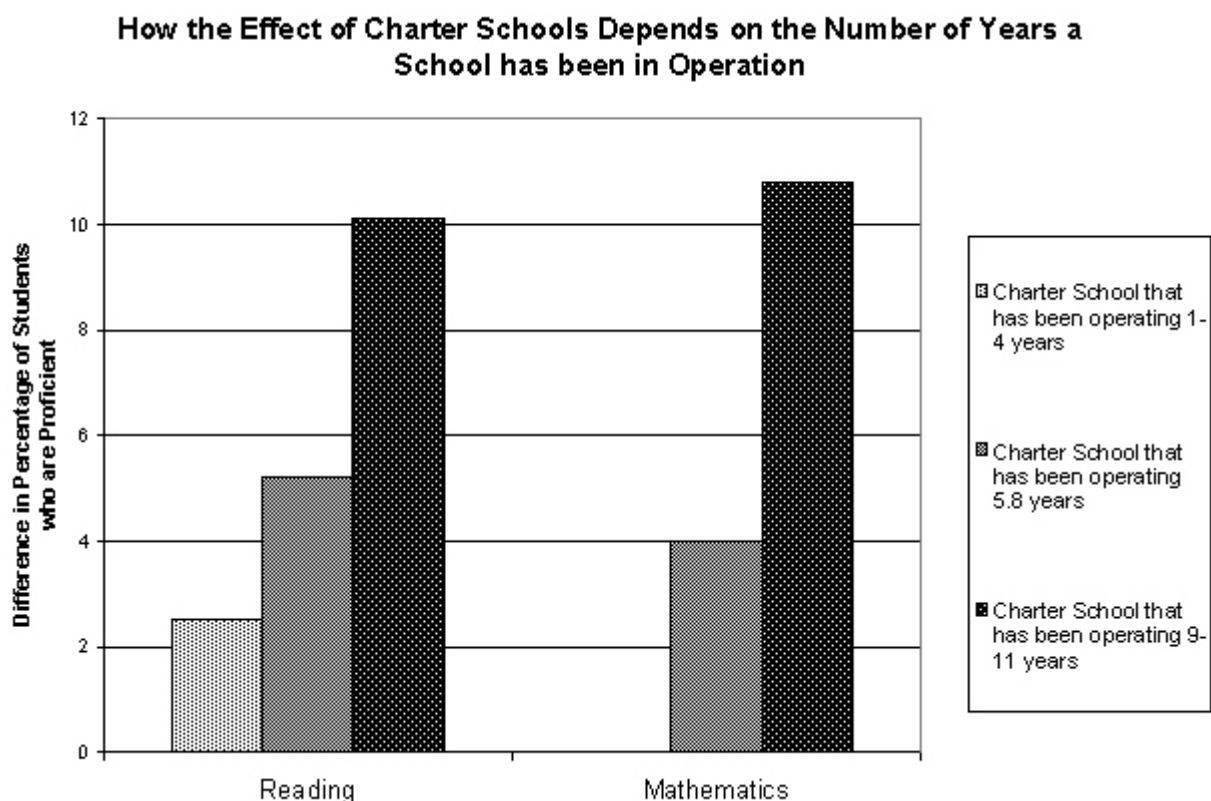
An inspection of Table 4 suggests that charter school students are more likely to experience raised achievement if their state enacted a charter law early. For instance, consider the enactment years of states that appear prominently in the table: Arizona, 1994; California, 1992; Colorado, 1993; the District of Columbia, 1996; Hawaii, 1994; Illinois, 1996; Louisiana, 1995; Massachusetts, 1993. These enactment dates are all on the early side. The average state that has a charter school law enacted it in 1996, and 10 states have no law yet. It turns out, however, that states that enacted charter laws early tend to have laws that are more highly rated by The Center for Education Reform (see the Ranking Scorecard in *Charter School Laws Across the States 2004*) and The Fordham Foundation (see *Charter School Authorizing: Are States Making the Grade?*²³). It may even be that, with experience, states systemically improve their charter school laws. We shall see that, while there is strong evidence that charter schools do better when they receive more support, it is not easy to pick out certain aspects of support that are more important than others. This is because a state's support for charter schools tends to be correlated across dimensions. That is, a state that enacted its law early is also likely to provide more adequate funding, more autonomy, multiple chartering authorities, and so on.

VI. PROFICIENCY DIFFERENCES BY THE NUMBER OF YEARS THAT A CHARTER SCHOOL HAS BEEN IN OPERATION

Both Table 4 and the experience of charter school authorities hint that charter schools may do better as they become more experienced. If experienced charter schools do better, it is likely to be for two reasons. First, a given charter school may improve over time as it works out the kinks in curriculum, management, and so on. Second, low-performing charter schools may exit quickly, while high-performing charter schools may linger and disproportionately contribute to the ranks of experienced schools. The latter "weeding-out" process is not only expected; it is intended. Recall that one hypothesized advantage of charter schools is that they will disappear if they cannot attract applicants.

Table 5 presents the results of an explicit test of the theory that more experienced charter school raise achievement more. Charter schools' proficiency differences, vis-a-vis their matched regular public schools, are allowed to depend on the number of years the charter schools have been in operation. Compared to their fellows in regular public schools, Table 5 shows that charter students are 2.5 percent more likely to be proficient in reading if their school has been in

Figure 2



operation for 1 to 4 years, 5.2 percent more likely to be proficient in reading if their school has been in operation 5 to 8 years, and 10.1 percent more likely to be proficient in reading if their school has in operation 9 to 11 years. For math, there is a roughly similar increase in the likelihood of a proficiency advantage with a school's years in operation. Figure 2 depicts the patterns graphically.

On a related point, we may wish to learn whether charter schools that close are really those that under-perform. The answer is yes, at least for the most recent year. Only 2 percent of the schools covered by this study closed between last year (when their achievement was recorded) and this year. However, compared to schools that remained open, the schools that closed had a 4 percent smaller proficiency advantage vis-a-vis their matched regular public schools.

VII. HOW PROFICIENCY VARIES WITH A STATE'S SUPPORT FOR CHARTER SCHOOLS

As noted above, states that enacted charter school laws earlier tend to be more supportive of charter schools on several dimensions. A state that is judged to be more supportive of charter schools if it establishes multiple, independent chartering authorities (so that a charter school need not seek authorization from the district with which is trying to compete); if it exempts charter schools from local collective bargaining agreements and other rules that constrain school management (such as a requirement that all teachers have certification obtained through regular channels); if it gives schools legal, operational, and fiscal autonomy; and if funding for charter schools is in the ballpark of funding for regular public schools.

We would like to test whether the proficiency advantage of more experienced charter schools (shown in Table 5 and Figure 2) is really just an indication that charter schools do better when they receive more support. That is, we know that older charter schools tend to be in states that are more supportive, but can we distinguish between the effects of experience and the effects of support?

It turns out that we can so long as we summarize a state's support for charter schools with one measure, rather than many correlated measures. The ratio of per-pupil funding in charter schools relative to funding in regular public schools is an efficient indicator of a state's support for charter schools. (This is a statistical fact, not an assertion.²⁴)

As a rule, charter schools receive substantially less funding than regular public schools. The typical state law only provides for charter schools' current operating funds, and leaves them to fend for themselves as regards capital and other funds. Because current operating funds make up only about 85 percent of total funds, charter schools are nearly always at a funding disadvantage. Moreover, most states guarantee only that charter schools receive the part of their revenue that is based on the state's school finance formula. Charter schools may receive none or only a fraction of the local revenue enjoyed by districts. Finally, states rarely guarantee that federal funds reach charter schools, and charter schools sometimes complain that their districts do not pass along federal revenues as they should.

Table 6 presents results in which the proficiency difference is allowed to depend on an indicator for charter schools' funding. Specifically, the indicator tags states in which charter schools receive less than 40 percent of the funding received by regular public schools. In addition, the proficiency difference is allowed to depend on the number of years a charter school has been in operation. The tables shows that a charter school's proficiency advantage is 6.4 percent greater in reading and 11.7 percent greater in math if its funding is at least 40 percent of that enjoyed by regular public schools in its state. That is, a state's support does have an important effect on the degree to which its charter schools raise achievement. Keep in mind that the funding ratio is merely an efficient way of measuring a state's support for charter schools. The funding ratio truly represents multiple dimensions of support. We should not conclude that only funding equity matters and that other forms of support that are highly correlated with it, such as autonomy or exemptions from collective bargaining, are irrelevant.

Table 6 also shows that controlling for the funding ratio hardly affects the relationship between a charter school's proficiency advantage and its years in operation. These findings suggest that experience and support are *not* the same thing. More experienced charter schools are likely be better and so are those that enjoy more support.

Table 7 confirms this conclusion. It shows the effects of experience in three states that not only have a large number of charter schools, but have charter schools that vary in experience. Because all charter schools in a state experience the same state laws, a proficiency advantage that rises with charter school experience *within* a state demonstrates that experience matters, even for a given level of state support. Examining Table 7, we see that in Arizona, California,

and Florida, a charter school's effect on reading and math proficiency is larger if the school has been in operation more years. For instance, relative to their fellows in regular public schools, California students are 5.7 percent more likely to be proficient in reading if they attend a charter school that has been operating 1 to 5 years, but they are 11.8 more likely to be proficient if they attend a charter school that has been operating 6 to 11 years.

For the purposes of policy evaluation, we should care about how charter schools function several years after a law is enacted, with several years of experience, and with funding like that of other public schools. After all, no one designs a charter school policy that is supposed to be experimental forever, with every year ushering in a new crop of inexperienced charter schools that lack capital funding.

VIII. DO CHARTER SCHOOLS IMPROVE ACHIEVEMENT MORE AMONG DISADVANTAGED CHILDREN?

One of the benefits of charter schools is supposed to be providing educational alternatives to families that would otherwise have no ability to choose a school. Middle-income families in the United States typically choose a school by choosing their residence and they often enjoy substantially freedom of choice. High-income families can not only choose a school by choosing a residence, they can afford to pay private school tuition on top of their local property taxes. Thus, they often choose over an array of public and private schools. In contrast, low-income families typically have little ability to choose a school. The limits on choice may be even greater for minority families, who may hesitate to move into neighborhoods where their racial or ethnic group is scarcely represented or has experienced discrimination in the past.

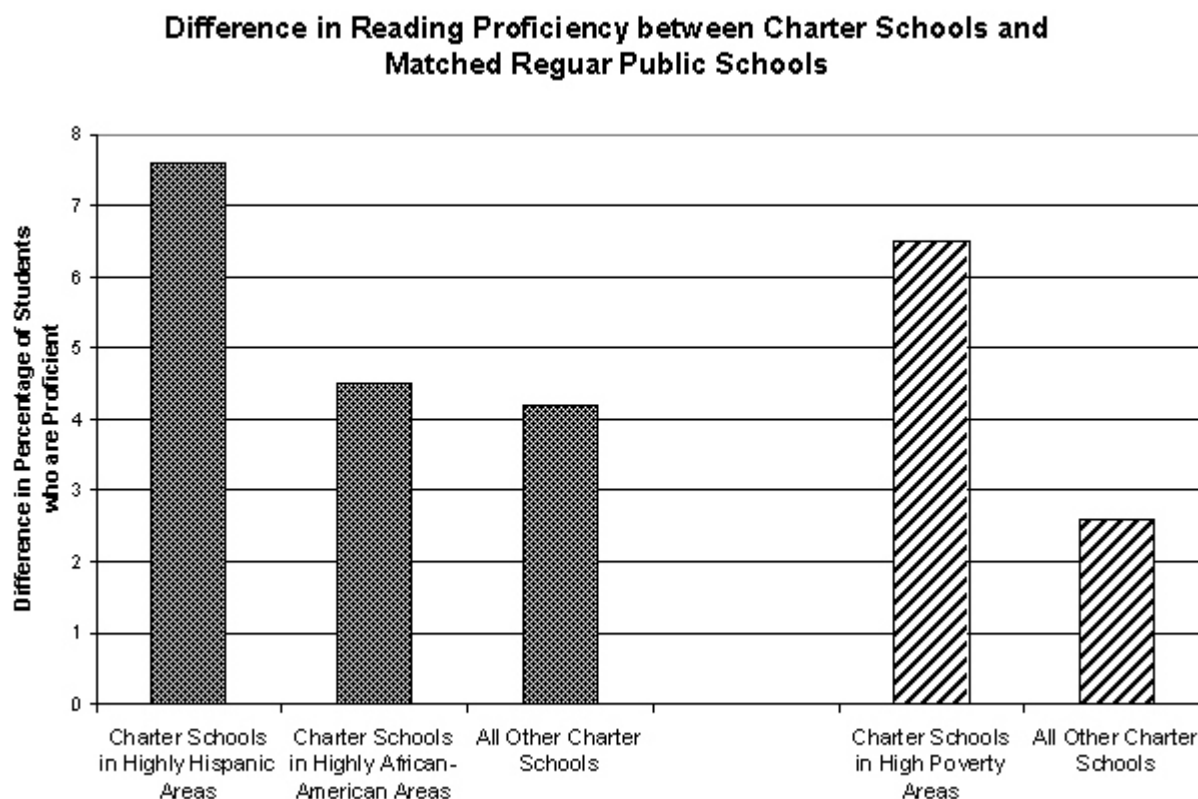
For all these reasons, we might hypothesize that charter schools have a more positive effect on achievement when they operation in environments where families otherwise have few choices. In other words, an area with a poor or minority population may be where charter schools make the most difference. It is certain that charter schools are more likely to arise in such areas.

Tables 8 and 9 present tests of the hypothesis that charter schools' proficiency advantage is greater when they work in areas where a high percentage of students are African-American, Hispanic, or poor. That is, they show the results of regressions in which the proficiency

difference is allowed to vary with the composition of the student population faced by both the charter school and its matched regular school. An area is classified as having a high percentage of African-American students if the share of students who are African-American in the charter school-matched regular public school pair is the top quartile. Classification of highly Hispanic areas is exactly parallel. Classification of disproportionately poor areas is also parallel, except that the poverty quartiles are separately defined for each state. (Separate definitions are needed for each state because the cost of living varies substantially among states.²⁵) Figure 3 depicts the results from Tables 8 and 9, graphically.

Table 8 demonstrates that charter schools' effects on reading and math proficiency are greater when they operate in areas that are highly Hispanic. For instance, the proficiency advantage of the typical charter school is 4.2 percent in reading and 2.1 percent in math, but is 7.6 percent in reading and 4.1 percent in math in a highly Hispanic area. The effects for charter schools that are in highly African-American areas are a little greater than the effects for a typical

Figure 3



charter school, but the difference in effects is not statistically significant.

Similarly, Table 9 demonstrates that charter schools' effects on reading proficiency are greater when they operate in areas that are disproportionately poor. For instance, the proficiency advantage of the typical charter school is 2.6 percent in reading, but is 6.5 percent in high poverty areas. In short, there is some, though not overwhelming, evidence that charter schools improve achievement more when they operate in areas where families are more disadvantaged and are less able to choose their school.

V. CONCLUSIONS

In this study, charter school students' achievement is compared to the achievement of students in a matched regular public school that is not only nearby (is the very closest school 92.4 percent of the time) but also has a similar racial composition. The matched regular public school is the one the charter students would likely otherwise attend. Thus, the results provide some evidence on how students' achievement would change if their charter schools did not exist. Because the study's sample includes approximately 99 percent of charter students in the fourth or other tested elementary grade, the results are comprehensive. Compared to students in the matched regular public school, charter students are 5.2 percent more likely to be proficient in reading and 3.2 percent more likely to be proficient in math, on their state's exams. Students in charter schools that have been in operation longer are more likely to have a proficiency advantage over their peers in the matched regular public school. For instance, in reading, the advantage is 2.5 percent for a charter school that has been operating 1 to 4 years, 5.2 percent for a school operating 5 to 8 years, and 10.1 percent for a school operating 9 to 11 years. Also, charter school students are more likely to have a proficiency advantage if their school has funding that is in the ballpark of that enjoyed by regular public schools. The results suggest that charter schools are especially likely to raise the achievement of students who are poor or Hispanic. In states that enacted earlier, stronger charter laws, charter schools tend to have a larger advantage in achievement vis-a-vis their matched regular public school. There are, however, exceptions such as North Carolina.

On the whole, the results suggest that the average charter school student in the United States benefits from having a charter school alternative. These results should presumably make

us patient enough to wait for the results of more multi-year studies based on random lotteries among charter school applicants. Such studies use the scientific method most likely to inform policy debates on charter schools.

TABLE 1
STATES' CHARTER SCHOOL ENROLLMENT AND THE STUDY'S COVERAGE

State	Charter Enrollment as a % of State's Total Enrollment	Charter Schools Operating in 2002- 03 with at least 10 Students in the Relevant Grade (usually 4th)	Relevant Enrollment in those Charter Schools	This Study Covers Approximately this % of Charter Students in the Relevant Grade
United States			50,479	99%
Alaska	1.9%	11	252	100%
Arizona	6.1%	113	3,380	89%
Arkansas	0.2%	1	36	100%
California	2.5%	199	11,231	100%
Colorado	3.8%	58	2,743	100%
Connecticut	0.4%	4	129	100%
Delaware	4.3%	8	522	100%
D.C.	11.3%	12	471	100%
Florida	2.0%	93	3,964	100%
Georgia	1.7%	28	2,575	97%
Hawaii	1.8%	7	233	100%
Idaho	1.2%	7	271	100%
Illinois	0.4%	9	366	100%
Indiana	0.1%	7	150	100%
Kansas	0.4%	5	107	60%
Louisiana	0.6%	8	330	88%
Massachusetts	1.6%	20	1,211	100%
Michigan	3.8%	135	6,729	99%
Minnesota	1.4%	30	792	100%
Mississippi	0.1%	1	42	100%
Missouri	1.1%	14	783	100%
Nevada	0.8%	6	199	92%
New Jersey	0.9%	34	1,270	94%
New Mexico	1.4%	5	197	80%
New York	0.4%	23	1,059	100%
North Carolina	1.5%	59	1,963	100%
Ohio	1.9%	68	2,811	100%
Oklahoma	0.4%	1	40	100%
Oregon	0.4%	7	125	100%
Pennsylvania	1.8%	47	2,552	100%
Rhode Island	0.4%	2	26	54%
South Carolina	0.2%	4	94	100%
Texas	1.3%	86	2,524	100%
Utah	0.3%	4	130	100%
Virginia	0.0%	1	13	100%
Wisconsin	2.2%	26	1,146	100%
Wyoming	0.1%	1	13	100%

Notes: Some percentages are less than 100 because states do not report performance of students in grades where few students have test results or where the school has started up only that year. Sources: National Center for Education Statistics, Common Core of Data; Author's Calculations Using States' Test Data.

TABLE 2
DIFFERENCES IN ACHIEVEMENT BETWEEN CHARTER SCHOOLS
AND THE NEAREST REGULAR PUBLIC SCHOOL WITH A SIMILAR RACIAL COMPOSITION

Average Difference between Charter School and Its Matched Regular Public School		
in the Percentage of Students who are Proficient		
	Reading	Mathematics
explanatory factor:		
Charter School	4.6 **	2.3 **

Notes: These are results from an univariate regression of the difference in percent proficient on an indicator for a school's being a charter school. The results are representative of elementary grade students in charter schools. That is, the regression is weighted by the number of students in the charter schools tested. A single asterisk indicates that the difference is statistically significant with a confidence level of 90 percent. Double asterisks indicate that the difference is statistically significant with a confidence level of 95 percent.

Source: Author's calculations based on proficiency data. The grade tested is generally the fourth grade, but fifth or third graders' results are used for states that do not test the fourth grade. See the Data Appendix for a full list.

TABLE 3
THE EFFECT OF CHARTER SCHOOLS ON ACHIEVEMENT
CONTROLLING FOR SCHOOLS THAT SELECT AT-RISK OR GIFTED STUDENTS

Average Difference between Charter School and Its Matched Regular Public School		
in the Percentage of Students who are Proficient		
<i>Controlling for Schools that Target At-Risk or Gifted Students</i>		
	Reading	Mathematics
explanatory factor:		
Charter School	5.2 **	3.2 **
Targets At-Risk Students	-8.5 **	-13.5 **
Targets Gifted Students	n/a	n/a

Notes: These are results from a multivariate regression of the difference in percent proficient on an indicator for a school's being a charter school, a school's targeting at-risk students, and a school's targeting gifted students. In the study, there are 91 charter schools that target at-risk students and 3 charter schools that target gifted students. The results are representative of elementary grade students in charter schools. That is, the regression is weighted by the number of students in the charter schools tested. A single asterisk indicates that the difference is statistically significant with a confidence level of 90 percent. Double asterisks indicate that the difference is statistically significant with a confidence level of 95 percent. "n/a" indicates that there is no statistically significant finding to report.

Source: Author's calculations based on states' proficiency data. The grade tested is generally the fourth grade, but fifth or third graders' results are used for states that do not test the fourth grade. See the Data Appendix for a full list. See text for definitions for a description of how schools were classified as targeting at-risk or gifted students.

TABLE 4
THE EFFECT OF CHARTER SCHOOLS ON ACHIEVEMENT, BY STATE

Average Difference between Charter School and Its Matched Regular Public School in the Percentage of Students who are Proficient (Controlling for Schools that Target At-Risk or Gifted Students)		
	Reading	Mathematics
United States	5.2 **	3.2 **
Alaska	19.3 **	19.6 **
Arizona	9.6 **	10.3 **
California	8.5 **	5.0 **
Colorado	12.3 **	13.5 **
District of Columbia	12.3 **	13.0 **
Florida	4.5 **	2.8
Georgia	6.1 **	4.6
Hawaii	14.3 **	12.1 **
Illinois	16.2 **	21.0 *
Louisiana	32.9 **	29.1 **
Massachusetts	8.4 **	7.8 **
Michigan	-3.2	-0.7
North Carolina	-4.3 **	-4.3 **
New Jersey	12.1 **	6.7
New York	n/a	n/a
Ohio	n/a	n/a
Oregon	13.9 *	n/a
Pennsylvania	8.8 **	n/a
Texas	n/a	-6.8 *
Wisconsin	n/a	n/a

Notes: These are results from multivariate regressions of the difference in percent proficient on an indicator for a school's being a charter school, a school's targeting at-risk students, and a school's targeting gifted students. The results are representative of elementary grade students in charter schools. That is, the regression is weighted by the number of students in the charter schools tested. A single asterisk indicates that the difference is statistically significant with a confidence level of 90 percent. Double asterisks indicate that the difference is statistically significant with a confidence level of 95 percent. "n/a" indicates that there is no statistically significant finding to report.

Source: Author's calculations based on states' proficiency data. The grade tested is generally the fourth grade, but fifth or third graders' results are used for states that do not test the fourth grade. See the Data Appendix for a full list.

TABLE 5
HOW THE EFFECT OF CHARTER SCHOOLS DEPENDS ON THE
NUMBER OF YEARS A SCHOOL HAS BEEN IN OPERATION

Difference between Charter School and Its Matched Regular Public School		
in the Percentage of Students who are Proficient		
<i>Allowing the Effect to Depend on the Years a Charter School has Been Operating</i>		
	Reading	Mathematics
explanatory factor:		
Charter School that has been operating 1-4 years	2.5 **	n/a
Charter School that has been operating 5-8 years	5.2 **	4.0 **
Charter School that has been operating 9-11 years	10.1 **	10.8 **
Targets At-Risk Students	-8.6 **	-13.6 **
Targets Gifted Students	n/a	n/a

Notes: These are results from a multivariate regression of the difference in percent proficient on an indicator for a school's being a charter school that has been operating for 1-4 years, operating for 5-8 years, operating for 9-11 years; a school's targeting at-risk students, and a school's targeting gifted students. In the study, there are 91 charter schools that target at-risk students and 3 charter schools that target gifted students. The results are representative of elementary grade students in charter schools. That is, the regression is weighted by the number of students in the charter schools tested. A single asterisk indicates that the difference is statistically significant with a confidence level of 90 percent. Double asterisks indicate that the difference is statistically significant with a confidence level of 95 percent. "n/a" indicates that there is no statistically significant finding to report.

Source: Author's calculations based on states' proficiency data. The grade tested is generally the fourth grade, but fifth or third graders' results are used for states that do not test the fourth grade. See the Data Appendix for a full list.

TABLE 6
HOW THE EFFECT OF CHARTER SCHOOLS DEPENDS ON
EQUALITY OF SUPPORT FOR CHARTER SCHOOLS

Difference between Charter School and Its Matched Regular Public School in the Percentage of Students who are Proficient <i>Allowing the Effect to Depend on Whether Charter Schools Have Substantially Less Funding than Regular Public Schools</i>		
	Reading	Mathematics
explanatory factor:		
Charter School's Funding is Less Than 40% of Regular Public Schools' Funding	-6.4 **	-11.7 **
Charter School that has been operating 1- 4 years	3.8 **	n/a
Charter School that has been operating 5- 8 years	5.6 **	4.8 **
Charter School that has been operating 9- 11 years	10.1 **	10.7 **
Targets At-Risk Students	-8.0 **	-12.6 **
Targets Gifted Students	n/a	n/a

Notes: These are results from a multivariate regression of the difference in percent proficient on an indicator for a school's being a charter school that has been operating for 1-4 years, operating for 5-8 years, operating for 9-11 years; a school's targeting at-risk students, and a school's targeting gifted students. In the study, there are 91 charter schools that target at-risk students and 3 charter schools that target gifted students. The results are representative of elementary grade students in charter schools. That is, the regression is weighted by the number of students in the charter schools tested. A single asterisk indicates that the difference is statistically significant with a confidence level of 90 percent. Double asterisks indicate that the difference is statistically significant with a confidence level of 95 percent. "n/a" indicates that there is no statistically significant finding to report.

Source: Author's calculations based on states' proficiency data. The grade tested is generally the fourth grade, but fifth or third graders' results are used for states that do not test the fourth grade. See the Data Appendix for a full list.

TABLE 7
THE U.S. AND STATES WITH LARGEST NUMBER OF CHARTER SCHOOLS
HOW THE EFFECT OF CHARTER SCHOOLS DEPENDS ON THE
NUMBER OF YEARS A SCHOOL HAS BEEN IN OPERATION

Difference between Charter School and Its Matched Regular Public School in the Percentage of Students who are Proficient				
<i>Allowing the Effect to Depend on Whether a School Closed After the Year Tested</i>				
Reading				
explanatory factor:	<u>U.S.</u>	<u>Arizona</u>	<u>California</u>	<u>Florida</u>
Charter School that has been operating 1-5 years	3.1 **	7.8 **	5.7 **	n/a
Charter School that has been operating 6-11 years	7.6 **	11.5 **	11.8 **	11.5 **
Targets At-Risk Students	-8.6 **	-11.5 *	n/a	n/a
Targets Gifted Students	n/a	n/a	1.8 *	n/a
Math				
explanatory factor:	<u>U.S.</u>	<u>Arizona</u>	<u>California</u>	<u>Florida</u>
Charter School that has been operating 1-5 years	n/a	10.1 **	n/a	n/a
Charter School that has been operating 6-11 years	7.5 **	10.5 **	12.2 **	15.3 **
Targets At-Risk Students	-13.7 **	-20.6 *	-16.8 **	-18.9 **
Targets Gifted Students	n/a	n/a	50.2 *	n/a

Notes: These are results from a multivariate regression of the difference in percent proficient on an indicator for a school's being a charter school that has been operating for 1-5 years, operating for 6-11 years; a school's targeting at-risk students, and a school's targeting gifted students. The results are representative of elementary grade students in charter schools. That is, the regression is weighted by the number of students in the charter schools tested. A single asterisk indicates that the difference is statistically significant with a confidence level of 90 percent. Double asterisks indicate that the difference is statistically significant with a confidence level of 95 percent. A result with no asterisk is not a statistically significant finding. "n/a" indicates that there are no statistically significantly findings to report.

Source: Author's calculations based on states' proficiency data. The grade tested is generally the fourth grade, but fifth or third graders' results are used for states that do not test the fourth grade. See the Data Appendix for a full list.

TABLE 8
SHOWING WHETHER CHARTER SCHOOLS HAVE A DIFFERENT EFFECT
ON ACHIEVEMENT IN AREAS WHERE A HIGH PERCENTAGE
OF STUDENTS ARE BLACK OR HISPANIC

Average Difference between Charter School and Its Matched Regular Public School in the Percentage of Students who are Proficient		
<i>Allowing Effect to Differ By Share of Students who are Black & Hispanic in Area</i>		
	Reading	Mathematics
explanatory factor:		
Charter Schools in Areas where a High Percentage of Students are African- American	4.5 **	2.6 **
Charter Schools in Areas where a High Percentage of Students are Hispanic	7.6 ** §	4.1 ** §
All Other Charter Schools	4.2 **	2.1 **
Targets At-Risk Students	-8.4 **	-13.4 **
Targets Gifted Students	n/a	n/a

Notes: These are results from a multivariate regression of the difference in percent proficient on an indicator for a school's being a charter school, a school's being a charter school in an area where a high percentage of students are African-American, a school's being a charter school in an area where a high percentage of students are Hispanic, a school's targeting at-risk students, and a school's targeting gifted students. An area is classified as having a high percentage of African-Americans if the share of students who are African-American in the matched charter-public school pair is in the top quartile. Classification of highly Hispanic areas is exactly parallel. The results are representative of elementary grade students in charter schools. That is, the regression is weighted by the number of students in the charter schools tested. A single asterisk indicates that the difference is statistically significant with a confidence level of 90 percent. Double asterisks indicate that the difference is statistically significant with a confidence level of 95 percent. The symbol § indicates that the result is statistically significantly different from that for "all other charter schools." "n/a" indicates that there is no statistically significant finding to report.

Source: Author's calculations based on states' proficiency data. The grade tested is generally the fourth grade, but fifth or third graders' results are used for states that do not test the fourth grade. See the Data Appendix for a full list.

TABLE 9
SHOWING WHETHER CHARTER SCHOOLS HAVE A DIFFERENT EFFECT
ON ACHIEVEMENT IN AREAS WHERE A HIGH PERCENTAGE OF STUDENTS ARE POOR

Average Difference between Charter School and Its Matched Regular Public School		
in the Percentage of Students who are Proficient		
<i>Allowing Effect to Differ By Share of Students in Area who get Free/Reduced-Price Lunch</i>		
	Reading	Mathematics
explanatory factor:		
Charter Schools in Areas where a High Percentage of Students are Poor	6.5 **	4.8 **
All Other Charter Schools	2.6 ** §	4.7 **
Targets At-Risk Students	-7.8 **	-12.3 **
Targets Gifted Students	n/a	n/a

Notes: These are results from a multivariate regression of the difference in percent proficient on an indicator for a school's being a charter school, a school's being a charter school in an area where a high percentage of students are poor, a school's targeting at-risk students, and a school's targeting gifted students. An area is classified as having a high percentage of students who are poor if the share of students who get free or reduced-price lunch in the matched charter-public school pair is in the top quartile for the state. The results are representative of elementary grade students in charter schools. That is, the regression is weighted by the number of students in the charter schools tested. A single asterisk indicates that the difference is statistically significant with a confidence level of 90 percent. Double asterisks indicate that the difference is statistically significant with a confidence level of 95 percent. The symbol § indicates that the result is statistically significantly different from that for "all other charter schools." "n/a" indicates that there is no statistically significant finding to report.

Source: Author's calculations based on states' proficiency data. The grade tested is generally the fourth grade, but fifth or third graders' results are used for states that do not test the fourth grade. See the Data Appendix for a full list.

APPENDIX TABLE 1
DIFFERENCES IN ACHIEVEMENT BETWEEN CHARTER SCHOOLS
AND THE NEAREST REGULAR PUBLIC SCHOOL[§]

Average Difference between Charter School and Its Matched Regular Public School		
in the Percentage of Students who are Proficient		
	Reading	Mathematics
explanatory factor:		
Charter School	3.6 **	1.3 *

Notes: [§]The nearest regular public school is, for this table, based purely on distance. These are results from an univariate regression of the difference in percent proficient on an indicator for a school's being a charter school. The results are representative of elementary grade students in charter schools. That is, the regression is weighted by the number of students in the charter schools tested. A single asterisk indicates that the difference is statistically significant with a confidence level of 90 percent. Double asterisks indicate that the difference is statistically significant with a confidence level of 95 percent.

Source: Author's calculations based on proficiency data. The grade tested is generally the fourth grade, but fifth or third graders' results are used for states that do not test the fourth grade. See the Data Appendix for a full list.

APPENDIX TABLE 2
THE EFFECT OF CHARTER SCHOOLS ON ACHIEVEMENT
CONTROLLING FOR SCHOOLS THAT SELECT AT-RISK OR GIFTED STUDENTS

Average Difference between Charter School and the Nearest Regular Public School[§]		
in the Percentage of Students who are Proficient		
<i>Controlling for Schools that Target At-Risk or Gifted Students</i>		
	Reading	Mathematics
explanatory factor:		
Charter School	4.1 **	2.3 **
Targets At-Risk Students	-7.9 **	-13.4 **
Targets Gifted Students	n/a	n/a

Notes: [§]The nearest regular public school is, for this table, based purely on distance. These are results from a multivariate regression of the difference in percent proficient on an indicator for a school's being a charter school, a school's targeting at-risk students, and a school's targeting gifted students. In the study, there are 91 charter schools that target at-risk students and 3 charter schools that target gifted students. The results are representative of elementary grade students in charter schools. That is, the regression is weighted by the number of students in the charter schools tested. A single asterisk indicates that the difference is statistically significant with a confidence level of 90 percent. Double asterisks indicate that the difference is statistically significant with a confidence level of 95 percent. "n/a" indicates that there is no statistically significant finding to report.

Source: Author's calculations based on states' proficiency data. The grade tested is generally the fourth grade, but fifth or third graders' results are used for states that do not test the fourth grade. See the Data Appendix for a full list. See text for definitions for a description of how schools were classified as targeting at-risk or gifted students.

DATA APPENDIX

Location, Enrollment, and School Classification Information comes from:

United States Department of Education, National Center for Education Statistics.

Common Core of Data, 2002-03 school year.

Electronic data. <http://nces.ed.gov/ccd/ccddata.asp>

supplemented with data from www.geocode.com when necessary;

Center for Education Reform, *Charter School Directory 2004*. Washington, D.C.: The Center for Education Reform, 2004.

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State Proficiency data comes from:

State of Alaska, Department of Education and Early Development.

Terra Nova Cat/6, Reading and Mathematics exam, Grade 4 Results, 2002-03 school year.

Electronic data. <http://www.eed.state.ak.us/tls/assessment/results.html>.

State of Arizona, Department of Education, Accountability Division, Research and Evaluation Section.

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State of Arkansas, Department of Education.

Arkansas Benchmark Exam, Grade 4 Results, 2003-04 school year.

Electronic data. http://arkedu.state.ar.us/whats_new/BENCHMARK.htm

State of California, Department of Education.

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Colorado Student Assessment (CSAP), Grade 4 reading results, Grade 5 mathematics results, 2003-04 school year.

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State of Florida, Department of Education.

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State of Georgia, Department of Education.

Criterion Referenced Competency Test (CRCT), Grade 4 results, 2002-03 school year.

Electronic data. <http://reportcard.gaosa.org/>

State of Hawaii, Department of Education.

Hawaii State Assessment (HSA) test, Grade 5 results, 2002-03 school year.

Electronic data. <http://doe.k12.hi.us/>

State of Idaho, Board of Education.

Idaho Standards Achievement Test (ISAT), Grade 4 results, 2003-04 school year.

Electronic data. <http://www.idahoboardofed.org/saa/>

State of Illinois, Board of Education.

Illinois Standards Achievement Test (ISAT), Grade 5 results, 2002-03 school year.

Electronic data. <http://www.isbe.net/research/default.htm>

State of Indiana, Department of Education.

Indiana Statewide Testing for Educational Progress-Plus (ISTEP+), Grade 3 results, 2003-04 school year.

Electronic data. <http://www.doe.state.in.us/istep/welcome.html>

State of Kansas, Department of Education.

Kansas State Assessment, Grade 5 results, 2002-03 school year.

Electronic data. <http://www.ksde.org/assessment/>

State of Louisiana, Department of Education.

Louisiana Educational Assessment Program (LEAP), Grade 4 results, 2003-04 school year.

Electronic data. <http://www.doe.state.la.us/lde/accountability/home.html>

Commonwealth of Massachusetts, Department of Education.

Massachusetts Comprehensive Assessment System (MCAS), Grade 4 results, 2002-03 school

year.

Electronic data. <http://www.doe.mass.edu/mcas/>

State of Michigan, Department of Education.

Michigan Education Assessment Program (MEAP), Grade 4 results, 2003-04 school year.

Electronic data. <http://www.michigan.gov/mde>

State of Minnesota, Department of Education.

Minnesota Comprehensive Assessment (MCA), Grade 5 results, 2003-04 school year.

Electronic data. <http://education.state.mn.us/ReportCard2004/>

State of Mississippi, Department of Education.

Mississippi Curriculum Test Data (MCT), Grade 4 results, 2003-04 school year.

Electronic data. <http://www.mde.k12.ms.us/ACAD/>

State of Missouri, Department of Elementary and Secondary Education.

Missouri Assessment Program (MAP), Grade 4 results (math), Grade 3 results (reading, known as Communication Arts), 2003-04 school year.

Electronic data. <http://www.dese.state.mo.us/commissioner/statereportcard/>

State of Nevada, Department of Education.

Nevada Criterion-Referenced Examination, Grade 5 results, 2003-04 school year.

Electronic data. <http://nevadareportcard.com/>

State of New Jersey, Department of Education.

Elementary School Proficiency Assessment (ESPA), Grade 4 results, 2002-03 school year.

Electronic data. <http://education.state.nj.us/rc/index.html>

State of New Mexico, Public Education Department.

New Mexico Standards-Based Assessment (NMSBA), Grade 4 results, 2003-04 school year.

Electronic data. <http://www.sde.state.nm.us>

State of New York, State Education Department (University of the State of New York).

New York State Testing Program, Grade 4 results, 2002-03 school year.

Electronic data. <http://www.emsc.nysed.gov/irts/>

State of North Carolina, State Board of Education, Department of Public Instruction.

ABCs of Public Education Tests, Grade 4 results, 2003-04 school year.

Electronic data. <http://abcs.ncpublicschools.org/abcs/>

State of Ohio, Department of Education.

Ohio Achievement Tests, Grade 4 results, 2003-04 school year.

Electronic data. <http://ilrc.ode.state.oh.us/>

State of Oklahoma, Department of Education.

Oklahoma Core Curriculum Test, Grade 5 results, 2002-03 school year.

Electronic data. <http://www.schoolreportcards.org/>

State of Oregon, Department of Education.

Oregon Statewide Assessment (OSA), Grade 5 results, 2003-04 school year.

Electronic data. www.ode.state.or.us/asmt/

Commonwealth of Pennsylvania, Department of Education.

Pennsylvania System of School Assessment (PSSA), Grade 5 results, 2003-04 school year.

Electronic data. http://www.pde.state.pa.us/a_and_t/

State of Rhode Island, Department of Elementary and Secondary Education.

New Standards Reference Exam, Grade 4 results, 2002-03 school year.

Electronic data. <http://www.ridoe.net/standards/stateassessment/>

State of South Carolina, Department of Education.

Palmetto State Achievement Tests (PACT), Grade 4 results, 2002-03 school year.

Electronic data. <http://www.myschools.com/reportcard/2003/>

State of Texas, Department of Education.

Texas Assessment of Knowledge and Skills (TAKS), Grade 4 results, 2002-03 school year.

Electronic data. <http://www.tea.state.tx.us/perfreport/>

State of Utah, Office of Education.

Core CRT test, Grade 4 results, 2003-04 school year.

Electronic data. <http://www.usoe.k12.ut.us/eval/evaluation/>

State of Virginia, Department of Education.

Standards of Learning (SOL), Grade 5 results, 2002-03 school year.

Electronic data. <http://www.pen.k12.va.us/VDOE/Assessment/home.shtml>

State of Wisconsin, Department of Public Instruction.

Wisconsin Knowledge and Concepts Examination (WKCE), Grade 4 results, 2003-04 school year.

Electronic data. <http://data.dpi.state.wi.us/data/performance.asp>

State of Wyoming, Department of Education.

Wyoming Comprehensive Assessment System (WyCAS), Grade 4 results, 2003-04 school year.

Electronic data. <http://www.k12.wy.us/aa.asp>

Note: The above list contains the sources of state assessment data. The most recent assessment data published by each state in mid August 2004 were used. States not shown had no charter school enrollment in the relevant grade in 2002-03.

Endnotes

1. In states where fourth graders are not tested, fifth or third graders' achievement is examined. See below for details.
2. See Hoxby and Rockoff, "The Impact of Charter Schools on Student Achievement", 2004. <http://post.economics.harvard.edu/faculty/hoxby/papers.html>
3. The National Assessment of Educational Progress (NAEP) is a reliable test that has proven extraordinarily useful for tracking American achievement over time. Its sampling scheme is carefully designed to this end. However, NAEP was not designed for comparisons between regular public schools and a phenomena as scarce and as idiosyncratically distributed as charter schools. Essentially, the problem is the following. NAEP is designed to be representative of American schools in general. NAEP picks up charter schools but only where they really are and in proportion to their share in the population (1.5 percent of students). Because charter schools are highly unusual and idiosyncratically distributed, the NAEP sample of charter school students is unusual and idiosyncratically distributed. The NAEP sample of regular public school students is, in contrast, usual. It thus includes many students who have no comparable peer in the charter school sample. Crude comparisons using NAEP data inevitably include inappropriate public school students in the control group.
4. The list of tests and data sources is in the Data Appendix.
5. In addition, it is wise to focus on elementary schools because charter schools are disproportionately elementary schools. For instance, fourth graders make up more than 11.3 percent of charter school students, even though they would make up only 7.6 percent if charter schools were equally distributed over all grades between kindergarten and twelfth.
6. For a study like this, it is important to use the uniform method to determine whether a school should be included and how it should be classified. The 2002-03 *Common Core of Data* (United States Department of Education, National Center for Education Statistics) was used as the standard. All state data was mapped onto, and classified according to, the Common Core. Charter schools that did not exist at the time recorded by the Common Core are not included in the study.
7. Some states have an English language arts exam or exams. In all cases, the exam or part of the exam closest to reading is used.
8. The No Child Left Behind (NCLB) law has caused all states to be explicit about their proficiency standards. The states' proficiency levels were used. The vast majority of the time, these are also the levels used for Adequate Yearly Progress calculations under NCLB. This study presents results based on proficiency levels because they are available for all states and are measured in the same units (the percentage who are proficient). Many states publish scale scores also. When standardized, the scale scores produce findings that confirm those based on the proficiency levels.

9. At the time this study was conducted, the District of Columbia and 14 states had published their data for the 2003-04 school year. 2002-03 data are used for the remaining 22 states. It is advantageous to use the 2003-04 data whenever available because participation rates rose in nearly all states between the two year, owing to the implementation of NCLB.

10. In most cases, the *Common Core of Data* 2002-03 provides the latitude and longitude of schools. The remaining school addresses were translated into latitude and longitude by geocode.com. See Data Appendix for citations.

11. The geocoding of address data has a small margin of error because addresses are mapped to discrete, not continuous, points of latitude and longitude in the United States. For instance, most addresses are mapped to a Census block. Then, the latitude and longitude at the center of that block are used. (The block is the smallest summary area used by the United States Census of Population). Some addresses are mapped by broader area—at worst, to a zipcode area.

The result of mapping addresses to discrete points of latitude and longitude is that schools with distances within 3 percent of one another are ties for the nearest public school. In dense urban areas, 0.3 miles rather than 3 percent defines a tie. When a tie occurs (usually, there is none), it is broken by using the school with the racial composition most similar to that of the charter school. The pool of potential comparison schools does not include non-regular public schools, such as alternative schools, schools for the disabled, schools that admit students based on examinations, and magnet schools to which a student must apply.

12. Compared to students in the nearest regular public school, charter schools' fourth graders are 2.4 percent more likely to be black, 1 percent less likely to be Asian, and 8 percent less likely to be Hispanic. If the free and reduced-price lunch programs generated pure measures of poverty, it would also be useful to match charter schools on the basis of these programs. However, the lunch program measures participation, not the eligibility of students, which is based purely on their family income. Charter schools that are small or recent start ups tend not to participate in the lunch programs even if some of their students are eligible. For a small school, the costs of running a formal program may exceed the benefits, and the school can always run an informal meals program.

13. For statistical work on this topic, see Heckman, Ichimura, and Todd, *Review of Economic Studies* 1997, 1998; Rubin and Thomas, *Annals of Statistics* 1992; Rubin and Thomas, *Biometrika* 1992; Rosenbaum *Journal of the American Statistical Association* 1989; Hirano, Imbens and Ridder, NBER Technical Working Paper 251, 2000; Hahn, *Econometrica* 1998.

14. Strictly speaking, they are representative of the 99 percent of charter school students who are covered by this study.

15. The computation of standard errors that are robust to heteroskedasticity does not affect which are reported.

16. In the tables, asterisks are used to indicate whether the confidence level is 90 percent or 95 percent.

17. The federal enrollment data are from the United States Department of Education, *Common Core of Data*, 2002-03. It is useful for computing comparable enrollment statistics across states, for computing the racial composition of schools, and for identifying the location of schools. See the Data Appendix for the full citation.

18. The coverage ratio is approximate, not exact, because some students who are enrolled in the fall are no longer enrolled in the same school when state tests are administered. In addition, federal enrollment data are not yet available for 2003-04.

19. In a small number of cases, there was an ambiguity in the *Charter School Directory 2004* or *Charter School Laws Across the States 2004*--most often a charter school that had moved campuses. Ambiguities were cleared up through consultation of schools' and states' online materials.

20. A school is classified as targeting at-risk students if its description in the *Charter School Directory 2004* says that its program is for students who are "at-risk"; "drop-outs"; "delinquents"; or under the care of the state, the courts, or the juvenile detention system. A school is classified as targeting gifted students if its description in the *Charter School Directory 2004* says that its program is for students or "gifted" or "talented".

21. Whether a state has results that are statistically significant depends not only on its number of charter school students but also on the variation in the difference between charter students' achievement and the achievement of students in the comparison schools. The greater is this variation, the greater the noise, and the less likely are the results to be statistically significant.

22. It should be noted that Louisiana's results, though statistically significant, are imprecisely measured, owing to the small number of charter schools in the state.

23. The reference is to Louann Bierlein Palmer and Rebecca Gau, *Charter School Authorizing: Are States Making the Grade?* Washington, DC: Thomas D. Fordham Institute, 2003.

24. This fact can be established formally by performing principal component analysis on the criteria in The Center for Education Reform's or The Fordham Foundation's rankings of charter school laws. States that give charter schools only a small fraction of the funding of regular public schools tend to support charter schools less on many dimensions, as shown by the correlation between the funding ratio and the first principal component.

25. In other words, one wants to avoid overclassifying areas in, say, Mississippi as poor and areas in, say, California as non-poor.