WORKING PAPER

Charter School Performance in Urban Districts

Are They Closing the Achievement Gap?

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Abstract

In the national effort to improve educational achievement, urban districts offer the greatest challenge as they often serve the most disadvantaged students. Many urban leaders, including mayors and school district superintendents, have initiated charter schools, which are publicly supported, autonomously operated schools of choice, as a mechanism of improving learning for these disadvantaged students. In this analysis, we examine the effect charter schools are having on student achievement generally, and on different demographic groups, in two major urban districts in California. The results show that achievement scores in charters are keeping pace, but not exceeding those in traditional public schools. The findings also show that the charter effect does not vary systematically with the race/ethnicity or English proficiency status of students.

INTRODUCTION

In the national drive to improve school learning, urban school districts pose some of the greatest challenges. These districts serve the vast majority of poor, minority, and immigrant children in the country. As various achievement indicators have begun to creep upward for the nation as a whole, poor and minority students have largely been bypassed, and early gains in reducing achievement gaps have not been maintained (Hess [19]). Achievement levels are low in urban districts, even when controlling for their level of poverty (Education Week [8]).

While a number of curriculum, professional development, and leadership reforms have been instituted to address the challenges in urban districts across the country, some reformers, including mayors of some of the largest cities, are looking to charter schools as a mechanism of fundamental change for improving student achievement. Charter schools, which are publicly supported, autonomously operated schools of choice, now educate a significant portion of many of the major urban school districts' students including Cincinnati, Columbus, Dayton, Detroit, Los Angeles, Kansas City, Milwaukee, Phoenix, San Diego, and Washington. In addition, initiatives are in place to expand the role of charter schools in other major urban districts including Chicago, New York, and Indianapolis (Hendrie [18]).

Recent analyses have examined the statewide performance of charter schools in Arizona, California, Michigan, North Carolina, and Texas. However, there is little research on the performance of charter schools in urban environments or on the effects of charter schools on students disaggregated by various demographic characteristics, including race/ethnicity.

In this paper, we examine the performance of charter schools in the nation's 2nd and 15th largest school districts, Los Angeles Unified School District and San Diego Unified School Districts—both for all students in these charter schools and for students grouped by limited English proficiency status and race/ethnicity. Currently, Los Angeles has 49 charter schools, enrolling over 25,000 students, while San Diego has 21 charter schools enrolling over 9,000 students.[1] These charter schools often serve a disproportionate share of minority students and advocates hope to reduce the prevailing achievement gap between minority and non-minority students. This paper uses student-level data to examine the progress charter schools are making in achieving this objective.

PAST RESEARCH

Since its inception in 1991, the charter school movement has seen tremendous growth as 40 states and the District of Columbia have passed charter school laws. There are now over 3,400 charter schools enrolling nearly 1 million students nationwide (Vanourek [33]). As the charter school movement has grown, rhetoric from advocates and opponents has dominated the debate. Supporters hope that charter schools will be able to cut through red tape and offer innovative and effective educational programs, provide new options to families (especially low-income and minority families), and promote healthy competition for traditional public schools (Kolderie [23], Finn et al. [11], Nathan [26] [27]). Opponents argue that charter schools are no more effective than traditional public schools, that they may exacerbate racial segregation, that they create fiscal strains for school districts, and that too many of them are fly-by-night operations (Wells et al. [34], Fiske and Ladd [10], Lacireno-Paquet et al. [24]).

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[1] http://www.ed-data.k12.ca.us/profile

Only recently have researchers been able to provide any quantifiable results. While some of this research has relied upon school-level data (Miron, Nelson, and Risley [25], Rogossa [30], Greene, Forester, and Winters [12]) or point in time data of a cross-section of charter and traditional public schools (AFT [1], Hoxby [21]), the most reliable results have used student-level data. A key weakness of a school-level analysis is the high degree of aggregation, which masks changes over time in the school's population of students, and variation of performance across different subjects and grades. In essence, school-level data may not pick up the nuances of school characteristics and can only provide an incomplete picture of why outcomes vary across schools. Similarly, point in time data, even if it is student-level, do not account for the amount of time spent in different schools and factor out the various non-school forces at work. Dealing with this methodological problem is challenging under any circumstances, and it is especially problematic in evaluating charter schools, where students are likely to differ from those in traditional public schools simply because they have chosen to attend charter schools. These differences between choosing and non-choosing students may be related to achievement in positive or negative ways, thereby producing "selection bias" in comparing achievement in charter schools and traditional public schools.

One way of dealing with selection bias is to collect longitudinal student-level data. Longitudinal designs minimize the problem of selection bias by examining the academic gains made by individual students over time, factoring out students' baseline achievement levels. Moreover, they permit "within-student" comparisons of achievement gains, examining changes in the achievement trajectories of individual students who move from traditional public schools to charter schools, or vice versa.

Longitudinal, panel data sets for individual students have been used in state-level studies of charter schools, including studies by Solmon et al. [32] in Arizona, Bifulco and Ladd [4] in North Carolina, Sass [31] in Florida, Gronberg and Jansen [13], Hanushek, Kain, and Rivkin [15] and Booker, et al. [5], (separately) in Texas, and Zimmer et al. [36] in California.[2] These studies, however, have not yet converged to produce a clear and consistent finding about the academic effectiveness of charter schools. Furthermore, these studies have focused on statewide charter performance and have not focused on urban environments or the performance of charter students by demographic characteristics.

One notable exception to these statewide analyses is Hoxby and Rockoff's [22] examination of three charter schools in Chicago, which provided some evidence that charter students outperform non-charter students. Their analysis capitalized on the fact that these schools are oversubscribed and used a lottery mechanism to admit students. Presumably the lottery winners and losers are similar in every way except admission into these schools. Tracking performance of both sets of students then creates an unbiased perspective of performance. However, Hoxby and Rockoff's study has one major drawback. While it provides the best possible evaluation for those schools included in the evaluation, it may have limited implications for those schools that do not have wait lists. In fact, you would expect schools with wait lists to be the best schools, and it would be surprising if they had the same results as charter schools without wait lists.

Also worthy of note is a more recent paper by Bifulco and Ladd [4] in which they examine the effect charter schools in North Carolina have on the distribution and

[2] Others have examined statewide charter performance using non-longitudinally linked student-level data including Bettinger [2] in Michigan and Buddin and Zimmer [6] in California.

achievement of students by race. Again, using a longitudinal student-level data set, the authors find that charter schools lead to greater segregation by race and that charter schools have a negative effect on the performance of both black and white students, but the effect for blacks is substantially larger than the effect for whites. They attribute these large negative effects for blacks to the segregation of blacks into charter schools.

In our analysis, we will build on the work of Bifulco and Ladd as well as others as we examine the performance of charter schools for students of different demographic characteristics, using longitudinally linked student level data in two major urban districts of Los Angeles and San Diego. Given the chronic challenge of reducing achievement gaps for disadvantaged students in urban environments, our results have strong implications for policymakers and educators.

DATA

Los Angeles Unified School District and San Diego Unified School District provided student-level data, which includes student performance on the Stanford 9 achievement test in reading and mathematics as well as information on students' grade, gender, ethnicity, English skills, and an indicator variable for whether they attend a charter school or not in each of the years under study.[3] In total, the data set includes 2,592,518 student-year observations from Los Angeles and 442,532 student-year observations from San Diego from 1997-98 through 2001-02 school years. Of these observations, 81,297 are student-year observations in charter schools in Los Angeles and 22,880 are student-year observations in charter schools in San Diego.

[3] In the 2002-03 school year, California switched to a new test making the 1997-98 through 2001-02 years the longest consecutive years with a consistent test that we could use.

We carried out separate analyses for elementary and secondary students in the Los Angeles and San Diego districts. The analyses are separated by district to allow for the possibility of different charter effects in the two settings. In addition, the size differences between the districts meant that the large, Los Angeles district would inherently dominate pooled results. In both districts, students are typically in self-contained classrooms (a single teacher throughout the day) up to the 6^{th} grade. Students in grades 6 through 8 and 9 through 12 are generally enrolled in middle and high schools, respectively, and are taught by a variety of teachers through the day. These structural differences in the learning environment suggest that the charter effect might differ between elementary and secondary schools.

Table 1 shows the enrollment patterns for traditional public and charter schools in Los Angeles and San Diego.[4] The table shows that charter students are a relatively small share of enrollment in both districts—about four and two percent of elementary and secondary students, respectively, in Los Angeles compared to about two and eight percent of elementary and secondary students in San Diego.

Table 1 also shows that the race/ethnic mix of charter enrollments differs somewhat from that of traditional public schools in the district. In Los Angeles, Hispanics are underrepresented in both elementary and secondary school charters. Hispanics comprise 73 and 69 percent of traditional elementary and secondary enrollments, respectively, in Los Angeles, but they make up only 44 and 23 percent of charter elementary and secondary enrollments, respectively. In San Diego, Hispanics are underrepresented in elementary charters (39 percent of traditional and 35 percent of

[4]The tabulations in Table 1 are based on students that are given state-mandated student achievement tests. The tests are given in grades 2 through 11, so these tabulations do not include students in kindergarten, grade 1, or grade 12.

charters), but they are overrepresented in secondary charters (33 percent of traditional and 45 percent of charters). The enrollment patterns show that blacks are substantially overrepresented in charters compared to traditional schools in both elementary and secondary schools in Los Angeles and in elementary schools in San Diego. Blacks are also overrepresented in secondary schools in San Diego, but the gap is much smaller than it is in the other comparisons.

For our analysis, we also break out the distribution and performance of Limited-English Proficient (LEP) students because these can be some of the most challenging students to educate due to their language barrier. The share of LEP enrollments in Los Angeles charters is about 20 percentage points lower than in traditional public schools. In contrast, the share of LEP enrollments in San Diego charters is only about five percentage points lower than for traditional public schools in this district.[5]

[5] A commonly used indicator of socioeconomic status for students is participation in the Department of Agriculture's free-and-reduced lunch program. San Diego Unified School District does not include this lunch-status variable in its research data files, so the information was not included in our breakdowns or analysis.

Table 1
Patterns of Race/Ethnicity and LEP Status for Traditional Public and Charter Schools in Los Angeles and San Diego Unified School Districts for 1998 through 2002

	Los Angeles		San Diego	
	Traditional Public	Charters	Traditional Public	Charters
Elementary School Students				
# of Students	1,134,300	47,021	192,063	3,797
Race/Ethnicity (%)				
Black	11	41	16	41
Hispanic	73	44	39	34
Other	16	15	45	25
LEP(%)				
Yes	49	28	33	29
No	51	72	67	71
Secondary School Students				
# of Students	1,376,921	34,276	227,689	19,083
Race/Ethnicity (%)				
Black	13	54	14	19
Hispanic	69	23	33	45
Other	18	23	52	36
LEP(%)				
Yes	29	10	78	72
No	71	90	22	28

A key feature of the data is a student-level identifier that we use to track student progress from year to year. Longitudinal data on student achievement is used to isolate the effects of charter schools on student performance from the backgrounds of individual students who choose to attend charters. If charter and traditional school students differ from one to another in some unmeasured manner, then a traditional regression model might provide a misleading indication of the performance of charter schools. For example, suppose charter school parents were more motivated than traditional school parents and made greater efforts to encourage their child's learning. Then a regression of achievement scores on charter status and observed student characteristics like race/ethnicity and SES might suggest that charter status had a positive effect on achievement, because students with greater parental support were more likely to be enrolled in charter schools. The result would be a statistical artifact associated with the way that charters and students were matched with one another, however, and it would not reflect the success of charters in improving student achievement. Our research approach uses the longitudinal nature of the data to control for these unmeasured student factors that affect achievement from year to year and isolates the contribution of charter school attendance on student achievement.

Student test scores are measured in terms of the percentile normal curve equivalent based on the Stanford 9 norming sample. Because the test scores are reported in national norms, the performance of students can be interpreted relative to a representative sample of national students. Therefore, gains over time are relative gains. If, for example, a student is in the 45th percentile for math in the 3rd grade and the 50th percentile for the 4th grade, then the student's achievement level is growing relative to his/her grade cohort.

Table 2 shows that student achievement scores vary substantially across race/ethnicity and LEP groups. Black and Hispanic students average about 14 to 22 percentile points lower in both reading and math than other students (primarily white non-Hispanics).

The table also shows large achievement gaps for LEP students. As might be expected, the gap is larger in reading (where language skills are particularly important) than in mathematics, but LEP students lag substantially behind other students in both reading and math. The LEP population differs somewhat between elementary and secondary schools and across the two districts. In Los Angeles, over 90 percent of LEP students are Hispanic, so the primary language transition is from Spanish to English. In San Diego, about 75 percent of LEP students are Hispanic, so substantial numbers of students are fluent in a language other than Spanish. Language problems are much more prevalent in elementary schools than in secondary schools—over 60 percent of Hispanic elementary students are classified as LEP in both districts, but only 38 and 47 percent of Hispanic secondary students are LEP in Los Angeles and San Diego, respectively.

Table 2
Differences in Reading and Math Test Scores by Race/Ethnicity and LEP Status in Los Angeles and San Diego Unified School Districts (Averaged across 1998 through 2002)

	Los Angeles		San Diego	
	Reading	Math	Reading	Math
Elementary School Students				
Race/Ethnicity		National Percentile Rank		
Black	39.0	39.0	45.3	45.7
Hispanic	35.6	41.6	39.8	45.5
Other	55.6	60.9	59.4	62.9
LEP		National Percentile Rank		
Yes	30.5	38.1	34.8	43.0
No	47.0	50.0	56.6	58.5
Secondary School Students				
Race/Ethnicity		National Percentile Rank		
Black	36.4	37.9	40.7	41.5
Hispanic	33.6	39.1	37.2	41.8
Other	51.6	58.5	54.9	59.6
LEP		National Percentile Rank		
Yes	22.2	32.2	26.9	36.3
No	42.6	46.4	52.3	55.0

STUDENT ACHIEVEMENT ANALYSIS

In assessing whether students in charters are performing better or worse than comparable students in traditional public schools, as noted above, a complication is that some students may have greater motivation or more parental support than others, which is hard to measure and can create a selection bias. These types of unmeasured factors may persistently affect how well a student learns irrespective of whether the student attends a traditional public school or charter school. As Hanushek, Kain, and Rivken [15] point out, this is a problem researchers have encountered for years when examining the performance of private schools. Previously, researchers have addressed this issue through various means including an estimate of the selection process using a Heckman [16] approach, an instrumental variable approach, or in the case of school vouchers, using randomized designs (Evans and Schwab [9], Neal [28], Howell and Peterson [20]).[6]

In our case, we use the nature of the student-level data to help deal with the selection issue. The student-level identifier allows students to be tracked over time, which creates a mechanism to adjust for unmeasured student factors that may predispose a student's success or failure in a particular school. More specifically, the statistical model adjusts for these student-specific factors by controlling for fixed student effects in the student achievement regressions. Below, we describe our research approach for estimating the general charter effect first, and then show our approach for estimating charter effects for students of different races.

We illustrate our research design by first describing a basic approach for estimating a charter school effect in equation (1):

[6] Please see Hanushek, Kain, and Rivken [15] for more details.

$$s_{it} = \mu_i + \gamma C_{it} + x_{it}\beta + \upsilon_{it} \quad (1)$$

where *i* and *t* index individual students and years, respectively; *s* is test score; μ is an unobserved student-specific factor that does not vary over time; γ is an unobserved parameter reflecting the possible effect of charter school attendance on *s*; *C* is an indicator variable that equals one if the school is a charter school and zero otherwise, **x** is a 1 × K vector of K observable factors affecting *s*, **β** is a K × 1 vector of unobserved parameters, and ν is a random error term. The model includes observed family background characteristics like race/ethnicity and other demographics that are likely to affect student achievement.

Two common approaches to estimating a school-level effect over time are a random-effect or a fixed-effect model. The most appropriate approach depends upon the correlation between μ and the observed factors (C and **x**). A random-effects model assumes that unobserved permanent factors affecting student achievement (μ) are uncorrelated with observed factors (C and **x**). This type of model would seem appropriate if we had a relatively complete set of observed factors affecting student achievement. Alternatively, the fixed effect model uses the longitudinal nature of the data to "difference out" the μ for observations on the same individual. In our analysis, we ran both a random effect and fixed model and used a Hausman test, which examines the correlation between the error term and the regressors. The Hausman test showed that the estimated student-specific error term was significantly correlated with student background variables in the model. Therefore, the parameter estimates from the random-effects model are inconsistent due to an omitted variable bias. This violation of the random-effects assumptions suggested that a fixed-effect model is the more appropriate approach for estimating the charter effect.

To estimate the charter effect through a fixed effects approach, we average the variables for the i^{th} individual student and subtract this result from equation (1), so the transformed fixed-effects equation is

$$s_{it} - \overline{s_i} = \gamma(C_{it} - \overline{C_i}) + (x_{it} - \overline{x_i})\beta + (\upsilon_{it} - \overline{\upsilon_i}) \qquad (2)$$

where the "bar" above each variable is the corresponding variable mean. The student fixed-effect combines all student-level factors that are invariant over time and affect student achievement, so the results do not include separate parameter estimates for student factors like ethnicity than are invariant over time.[7] The available student background variables do not vary over time, so the **x** vector consists of a test year variable to detect any trend in scores.[8]

A more general random-growth model was also used to control for the heterogeneity of students attending different classrooms (Heckman and Hotz [17], Papke [29], Wooldridge [35]). The random growth specification generalizes the fixed-effects model to allow for individual students to differ not only with respect to a constant factor (μ) but also differ on the rate of test score growth over time. The basis for the random growth rate model is equation (3):

$$s_{it} = \mu_i + \tau_i t + \gamma C_{it} + x_{it}\beta + \upsilon_{it} \qquad (3)$$

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[7]In our analysis, we test for serial correlation in the residuals in equation (2). First differencing is a preferred estimation method if there is strong positive serial correlation in panel data (Wooldridge [35]). In this case, our test of serial correlation was weak, so the parameters from the first-differenced model, which we display in our results section, are similar to those of the fixed-effects model.

[8]Assessments of standardized achievement tests are often subject to score inflation (Hamilton [14]). Researchers find that scores in a state or school tend to rise over time without any commensurate increase in general learning or proficiency. This is often attributed to "teaching to the test."

where τ is an individual-specific growth rate. Equation 3 is a more general version of Equation 1 that allows for individual-specific differences in both the test score intercept and slope. The model is now first-differenced to obtain equation (4):

$$\Delta s_{it} = \tau_i + \gamma \Delta C_{it} + \Delta x_{it} \beta + \Delta \upsilon_{it} \qquad (4)$$

The differencing eliminates the μ, and τ becomes the intercept of the differenced equation.[9] Equation 4 is estimated by fixed effects to eliminate τ_i and to obtain estimates of γ and β.

The potential advantage of the random-growth model over the fixed-effect model depends on two factors. First, the random-growth model is more appropriate if the test score trend varies across students (remember that the fixed-effects model also controls for an overall test score trend). Second, the random-growth approach is preferred if the student-specific trend is correlated with charter school enrollment or other exogenous variables in the model. The estimated parameters γ and β will vary little between these two model if these two factors do not hold. A limitation of the random-growth model is that it requires at least three successive years of test score data to isolate a test score trend. This data requirement means that the random-growth model was estimated for a much smaller sample than the fixed-effects model.

As an extension to these models, we estimate the charter interaction effects by race/ethnicity (black, Hispanic, and other race/ethnicity) and by whether the student is classified as limited-English proficiency (LEP). For the fixed-effects analysis, equation 2 is modified to add interaction terms between the charter school dummy variable and a vector of student characteristics as specified in equation 5:

[9] The growth term simplifies because $\tau_i t - \tau_i (t-1) = \tau_i$.

$$s_{it} - \overline{s_i} = \gamma(C_{it} - \overline{C_i}) + (C_{it}R_i - \overline{C_iR_i})\delta + (x_{it} - \overline{\mathbf{x_i}})\beta + (\upsilon_{it} - \overline{\upsilon_i}) \qquad (5)$$

where the charter dummy variable (C_{it}) for student i in time period t is interacted with a vector of demographic characteristics (R_i) of student i, including race/ethnicity and limited-English proficiency (LEP), and δ is a 3 × 1 vector of unobserved effects. In this formulation of the model, γ represents the effect of charter schools on test scores of students who are not black, Hispanic, or classified as LEP. The coefficients on the interaction terms (δ) indicate whether charter effects are higher or lower for black, Hispanic, or LEP students than for similar students in traditional public schools.

The random-growth model was also modified to add interaction terms that show whether there is a charter effect difference by race/ethnicity or LEP status.

$$\Delta s_{it} = \tau_i + \gamma\Delta C_{it} + \Delta(C_{it}R_i)\delta + \Delta x_{it}\beta + \Delta\upsilon_{it} \qquad (6)$$

As in the earlier random-effects specification, this differenced model is estimated by fixed effects to eliminate the individual student effect and derive consistent estimates of γ, δ, and β.

For all these models, we split our analysis by secondary and elementary students. Students are considered to be secondary students if they are in grades 6 and above and elementary students for grades 5 and below. In the next section, we describe the results of these analyses.

RESULTS OF GENERAL CHARTER SCHOOL EFFECTS

The fixed-effects and random-growth model results for Los Angeles and San Diego elementary students are reported in Table 3. The results across the two models provide similar conclusions. In both the fixed-effects and random-growth model, the coefficients for charter school students in Los Angeles are insignificant for math and reading. In San Diego, charter students do significantly worse than their counterparts in traditional public schools in both reading and mathematics. The fixed-effects model shows that charter students are lagging behind conventional school students by 1.5 and 2.6 percentile points in reading and mathematics, respectively. The gap is wider for the random-growth model which estimates that charter school students are 2.1 and 5.0 percentile points behind in reading and mathematics, respectively. The results indicate that charter students are keeping pace with traditional school students in Los Angeles, but they are lagging behind their counterparts in San Diego.[10]

[10] The low r-squares in Tables 3 through 6 reflect the fact that both the fixed- and random-growth models "difference out" all student level factors that are time invariant. We initially estimated random-effects models for Equation 1 and explained 20 to 30 percent of the variance in student test scores where the vector of student characteristics included indicators for race/ethnicity and LEP status. As discussed above, a Hausman test was used to compare of random- and fixed effects estimates for Equation 1. The test showed significant changes in the parameter estimates for the two models, indicating that the μ_i term was correlated with the observed factors in the model (C and **x**). As a result of these tests, our analysis focused on the fixed- and random-growth models to estimate the parameters γ and β.

Table 3
Fixed-Effects and Random-Growth Models of Student Achievement and Charter Status for Elementary Schools in Los Angeles and San Diego Unified School Districts

	Fixed-Effects Model		Random-Growth Model	
	Reading	Math	Reading	Math
Los Angeles Elementary Schools				
Charter	0.1473	0.0417	-0.6286	-0.3017
	(0.1762)	(0.2131)	(0.3425)	(0.4151)
Trend	3.5705*	1.7804*	NA	NA
	(0.0273)	(0.0325)		
Trend Squared	-0.3384*	-0.0323*	-0.6286	-0.3017
	(0.0060)	(0.0072)	(0.3425)	(0.4151)
Constant	33.9755*	40.9045*	3.7660*	4.2854*
	(0.0285)	(0.0337)	(0.0641)	(0.0755)
Observations	1010480	1042681	518864	546711
Unique Students	477747	483940	295770	305877
R-Squared	0.08	0.03	0.00	0.00
San Diego Elementary Schools				
Charter	-1.5031*	-2.6010*	-2.1003*	-4.9920*
	(0.3860)	(0.4731)	(0.6962)	(0.8647)
Trend	2.9510*	2.6223*	NA	NA
	(0.0614)	(0.0745)		
Trend Squared	-0.4472*	-0.6152*	-0.6470*	-0.8095*
	(0.0139)	(0.0169)	(0.0349)	(0.0433)
Constant	46.2647*	51.8461*	3.8667*	3.7786*
	(0.0614)	(0.0740)	(0.1495)	(0.1839)
Observations	189838	194047	96161	99623
Unique Students	91616	92666	55149	56605
R-Squared	0.03	0.01	0.01	0.01

Notes: Robust standard errors are in parentheses. An asterisk indicates that the coefficient is statistically significant at the 5% level. Second differencing for the random-growth model means that a linear trend indicator cannot be estimated.

Table 4 shows that the charter effect for secondary schools varies considerably in several dimensions. First, the charter coefficients are consistently larger in absolute terms for the random-growth model than for the fixed-effects model. Some of these differences are insignificant, but the general pattern of differences suggests that it is important to control for differences in individual test score trends in the statistical model for secondary students. The Los Angeles results from the random-growth model show that charter students score about 1.0 percentile point higher in reading and about 1.5 percentile point lower in math than do students in traditional public schools after controlling for student backgrounds. In contrast, the San Diego results show that charter students score 1.6 percentile points *higher* in reading and 1.9 percent *lower* in math than do students in traditional public schools.

Table 4
Fixed-Effects and Random-Growth Models of Student Achievement and Charter Status for Secondary Schools in Los Angeles and San Diego Unified School Districts

	Fixed-Effects Model		Random-Growth Model	
	Reading	Math	Reading	Math
Los Angeles Secondary Schools				
Charter	-0.2757*	1.2567*	-0.9924*	1.4772*
	(0.1312)	(0.1457)	(0.2401)	(0.2650)
Trend	1.0598*	1.9801*	NA	NA
	(0.0216)	(0.0238)		
Trend Squared	-0.2344*	-0.2900*	-0.3208*	-0.2758*
	(0.0050)	(0.0055)	(0.0097)	(0.0106)
Constant	36.7966*	40.4820*	1.7077*	1.7272*
	(0.0205)	(0.0226)	(0.0427)	(0.0465)
Observations	1160952	1168906	648703	655692
Unique Students	486859	488534	312079	314157
R-Squared	0.00	0.02	0.00	0.00
San Diego Secondary Schools				
Charter	0.9229*	-1.6764*	1.5988*	-1.9155*
	(0.1073)	(0.1187)	(0.1901)	(0.2119)
Trend	0.0519	1.1625*	NA	NA
	(0.0469)	(0.0520)		
Trend Squared	-0.2326*	-0.2771*	-0.3145*	0.0024
	(0.0109)	(0.0121)	(0.0205)	(0.0228)
Constant	48.0657*	50.3533*	0.6720*	-0.0873
	(0.0439)	(0.0486)	(0.0893)	(0.0990)
Observations	240190	241825	136208	137710
Unique Students	99691	100037	64542	64872
R-Squared	0.02	0.01	0.00	0.00

Notes: Robust standard errors are in parentheses. An asterisk indicates that the coefficient is statistically significant at the 5% level. Second differencing for the random-growth model means that a linear trend indicator cannot be estimated.

It should be noted that our estimate of the charter school effect does not capture the possibility of a competitive effect on traditional public schools from the presence of a nearby charter school. If the introduction of charter schools creates a competitive pressure for traditional public schools to improve their performance, then our analysis would understate the possible positive charter effect. However, in a survey of California's traditional public schools and school districts, Zimmer et al. [36] found that charter schools have not caused traditional schools or school districts to change curricula, educational programs, and hiring practices, which would suggest no competitive reaction bias. Regardless of the possible bias, our general results suggest charter school performance is on par with traditional public schools.

ACHIEVEMENT RESULTS ACROSS RACE/ETHNICITY

As noted in the introduction, one challenge facing major urban districts is the significant achievement gap among students of different race/ethnicity and socioeconomic status. In some districts, policymakers and educators have looked to charter schools as possible solution to this achievement gap. This analysis focuses on two major urban districts, Los Angeles and San Diego, and examines possible differences in charter effects across black, Hispanic, and other students as well as by their LEP status.

For both the elementary and secondary analysis presented, in Tables 5 and 6, the charter coefficient represents the charter effect for non-black, non-Hispanic, and non-LEP students, who form the reference group. The coefficient estimates for the interaction terms of black and charter, Hispanic and charter, and LEP and charter are estimates of the performance of these charter students relative to the charter students in the omitted category. In other words, the coefficient values, and the test of significance, show the effects for black, Hispanic, or LEP students relative to non-black, non-Hispanic, and non-LEP students in charter schools. To examine the effect of black, Hispanic, and LEP charter students relative to the performance of their respective counterparts in traditional public schools, we must combine the coefficient estimate of the general charter effect and the coefficient estimate for the respective interaction term. Similarly, to test for significance, we must conduct a joint significance test between the general charter coefficient and the coefficient for the respective interaction term. We should also note that because we include an LEP dummy variable interacted with charter status, we are effectively controlling for LEP status when examining the effects of Hispanics and therefore, the interaction coefficient of Hispanic and charter status is an estimate of non-LEP Hispanics in charter schools. The interpretation of the coefficients and the tests for significance are explained in greater detail below.

The results in Tables 5 and 6 show substantial differences in parameter estimates for the fixed- and random-growth models. These differences suggest that test score trends differ substantially across students and these differences are correlated with the estimated charter school effects (γ and δ). Thus, we focus on our results from the random-growth model.

In Table 5, the elementary school coefficient estimate for the omitted category students in Los Angeles, largely populated by white non-Hispanic students, suggests no significant difference between charter students and traditional public schools, while in San Diego, the coefficient estimates suggest that charter students in the omitted category are lagging behind their counterparts in traditional public schools by 3.6 points in reading and 5.3 points in math.

Table 5
Fixed-Effects and Random-Growth Models of Student Achievement, Charter Status, and Student Type for Elementary Schools in Los Angeles and San Diego Unified School Districts

	Fixed-Effects Model		Random-Growth Model	
	Reading	Math	Reading	Math
Los Angeles Elementary Schools				
Charter	-0.5537	-1.9478*	1.9107	-0.1645
	(0.7064)	(0.8662)	(1.4251)	(1.7409)
Black & Charter	0.6363	1.9358*	-3.2685*	-1.0575
	(0.7457)	(0.9134)	(1.5033)	(1.8374)
Hispanic & Charter	1.3447	3.1278*	-1.7974	1.6443
	(0.7566)	(0.9260)	(1.5801)	(1.9289)
LEP & Charter	-0.7393*	-1.2711*	-0.3782	-1.2741
	(0.2588)	(0.3135)	(1.0258)	(1.2328)
Trend	3.5678*	1.7758*	NA	NA
	(0.0273)	(0.0325)		
Trend Squared	-0.3381*	-0.0317*	-0.3967*	-0.5061*
	(0.0060)	(0.0072)	(0.0146)	(0.0173)
Constant	33.9820*	40.9187*	3.7664*	4.2859*
	(0.0287)	(0.0340)	(0.0641)	(0.0755)
Observations	1010480	1042681	518864	546711
Unique Students	477747	483940	295770	305877
R-Squared	0.08	0.03	0.00	0.00
San Diego Elementary Schools				
Charter	-2.7121*	-3.4963*	-3.6007*	-5.3414*
	(0.8509)	(1.0497)	(1.5147)	(1.8676)
Black & Charter	2.0270	3.5564*	0.7205	1.5438
	(1.0370)	(1.2760)	(1.8737)	(2.3176)
Hispanic & Charter	0.2852	-1.2779	1.0639	-0.1828
	(1.1010)	(1.3572)	(1.9821)	(2.5176)
LEP & Charter	0.9044	-0.0153	2.5201	-0.5128
	(0.8612)	(1.0563)	(1.8636)	(2.3463)
Trend	2.9512*	2.6204*	NA	NA
	(0.0614)	(0.0745)		
Trend Squared	-0.4471*	-0.6148*	-0.6475*	-0.8093*
	(0.0139)	(0.0169)	(0.0349)	(0.0433)
Constant	46.2643*	51.8445*	3.8686*	3.7777*
	(0.0614)	(0.0740)	(0.1495)	(0.1839)
Observations	189838	194047	96161	99623
Unique Students	91616	92666	55149	56605
R-Squared	0.03	0.01	0.01	0.01

Notes: Robust standard errors are in parentheses. An asterisk indicates that the coefficient is statistically significant at the 5% level. Second differencing for the random-growth model means that a linear trend indicator cannot be estimated.

Black, Hispanic, and LEP students are statistically doing about the same as the students in the omitted category with only Los Angeles black students lagging behind in reading by 3.3 percentile points. To examine whether black students in Los Angeles elementary charter schools do significantly different than black students in traditional public elementary schools, we add the coefficient estimate of the charter coefficient (1.91) and the coefficient estimate of the interaction term between charter and blacks (-3.27) for a combined estimated effect of –1.36. We then test whether the combined coefficients are significantly different from zero. In this case, the t-value is -2.83. For math, black students have a combined estimated effect of –1.22 and statistically significant t-value of –2.08. Therefore, the results suggest black elementary charter students are lagging behind their traditional public school counterparts. The combined effects for Hispanic and LEP in Los Angeles are statistically insignificant.

The San Diego elementary school results in Table 5 show that black, Hispanic, and LEP charter students are doing about the same as those charter students in the omitted category. However, black charter school students, relative to black students in traditional public schools, have test scores that are –2.88 and –3.79 points lower and statistically significant in reading and math, respectively, relative to traditional public school students. In reading, the interaction terms for Hispanic and LEP largely offset the main negative charter effect, so the overall test score performance of these groups is not significantly different than that of traditional public school students. In math, however, the interaction terms reinforce the main effects and the overall charter test scores are predicted to be –5.52 and –5.85 for Hispanic and LEP students, respectively.

At the secondary level, again focusing on the random-growth model results, Table 6 suggests that the omitted category of Los Angeles secondary charter students are statistically lagging behind traditional public secondary school students in reading, but keeping pace in math. The results also suggest that black and Hispanic charter secondary students are statistically performing better than charter students in the omitted category in select subjects with black students having higher test scores in reading and Hispanic students having higher test scores in math. LEP charter secondary students are on par with the charter students in the omitted category.

The overall charter effects for secondary students for different groups of Los Angeles students are mixed. In reading and math, black students in charter schools are keeping pace with students in traditional public schools. Non-LEP Hispanic charter students score 1.62 percentage points *lower* in reading and 3.64 *higher* in math than do traditional public school students. LEP Hispanic students in charters fare slightly worse than Hispanic students with better English skills – their charter effect is –2.19 for reading and 2.09 for math.

The random-growth secondary school results for San Diego show the main charter effect for students, not classified as black, Hispanic, or LEP, is 2.71 in reading and –4.15 in math. In reading, black, Hispanic, and LEP students all have test scores significantly higher than traditional public schools students. Black reading scores are 1.63 points higher than for traditional public school students, and Hispanic scores are 0.70 and 0.81 points higher for non-LEP and LEP students, respectively. In math, Black students are scoring about 2.58 percentage points lower than traditional public schools students. In contrast, the large positive interaction term for the Hispanic and charter term offsets the main math effect, so the overall effects for non-LEP and LEP Hispanics are insignificantly different from zero. Unlike other secondary charter students in San Diego, Hispanic students are keeping pace with students in traditional public schools.

In general, the results of the above analysis suggest that charter schools are having, at best, mixed results for students of different racial/ethnic categories and LEP students. While there are some cases in which charter schools do improve the performance of blacks and Hispanic, it is clear that they are not consistently creating greater gains than their traditional public school counterparts. We should note that these results are for two large districts in California, and the effects of charter schools may differ in other states and districts, where the charter laws and operational environment differ from that in these California districts.

Table 6

Fixed-Effects and Random-Growth Models of Student Achievement, Charter Status, and Student Type for Secondary Schools in Los Angeles and San Diego Unified School Districts

	Fixed-Effects Model		Random-Growth Model	
	Reading	Math	Reading	Math
Los Angeles Secondary Schools				
Charter	-0.0630	1.4354*	-2.3512*	0.6107
	(0.3974)	(0.4388)	(0.6956)	(0.7648)
Black & Charter	-0.1637	-0.5283	2.0232*	0.2758
	(0.4292)	(0.4740)	(0.7624)	(0.8391)
Hispanic & Charter	-0.3216	0.3761	0.7354	2.8293*
	(0.4812)	(0.5336)	(0.8553)	(0.9389)
LEP & Charter	-0.2352	0.4748	-0.5719	-1.3472
	(0.4179)	(0.4607)	(0.9536)	(1.0383)
Trend	1.0598*	1.9795*	NA	NA
	(0.0216)	(0.0238)		
Trend Squared	-0.2344*	-0.2900*	-0.3209*	-0.2757*
	(0.0050)	(0.0055)	(0.0097)	(0.0106)
Constant	36.7956*	40.4824*	1.7088*	1.7263*
	(0.0206)	(0.0226)	(0.0427)	(0.0465)
Observations	1160952	1168906	648703	655692
Unique Students	486859	488534	312079	314157
R-Squared	0.00	0.02	0.00	0.00
San Diego Secondary Schools				
Charter	0.6580*	-3.4344*	2.7141*	-4.1494*
	(0.1844)	(0.2054)	(0.3274)	(0.3702)
Black & Charter	0.2627	1.5711*	-1.0880*	1.5700*
	(0.3098)	(0.3433)	(0.5348)	(0.5978)
Hispanic & Charter	0.4769	2.4672*	-2.0161*	3.9534*
	(0.2658)	(0.2951)	(0.4704)	(0.5282)
LEP & Charter	-0.0302	0.9727*	0.1087	0.3192
	(0.2568)	(0.2835)	(0.5160)	(0.5702)
Trend	0.0529	1.1746*	NA	NA
	(0.0469)	(0.0520)		
Trend Squared	-0.2330*	-0.2804*	-0.3188*	0.0121
	(0.0109)	(0.0121)	(0.0206)	(0.0228)
Constant	48.0672*	50.3559*	0.6922*	-0.1337
	(0.0439)	(0.0486)	(0.0895)	(0.0991)
Observations	240190	241825	136208	137710
Unique Students	99691	100037	64542	64872
R-Squared	0.02	0.01	0.00	0.00

Notes: Robust standard errors are in parentheses. An asterisk indicates that the coefficient is statistically significant at the 5% level. Second differencing for the random-growth model means that a linear trend indicator cannot be estimated.

CONCLUSIONS

Our results show that charter schools are doing little to improve the test scores of their students in Los Angeles and San Diego. The elementary school results show that Los Angeles charter students are keeping pace with traditional school students in reading and math, but charter students are lagging behind their traditional school counterparts in San Diego. At the secondary-school level, Los Angeles charter students score slightly higher than traditional school students in reading and slightly lower in math. The test score pattern across reading and math is reversed in San Diego. In all cases, the charter school effect is small compared to the overall annual trend in test scores.

The results show only small differences in charter effects across race/ethnic and LEP groups of students. One of the strongest rationales for charter schools, and school choice generally, is that choice gives greater opportunities for disadvantaged students, primarily minority students. In some cases, political and district leaders have bought into the charter philosophy in hopes of closing the achievement gap of minority and non-minority students. Our results suggest that charter schools are not consistently producing improved test scores for minorities above and beyond traditional public schools. Charter schools may have positive effects on other outcomes that are not assessed here, such as safety and curriculum breadth, but charter schools in Los Angeles and San Diego are not showing pervasive gains in student test scores.

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