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PAPER

Is Charter School Competition in California Improving the Performance of Traditional Public Schools?

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Abstract

This research examines the effects of charter schools on traditional public schools. A premise of charter school initiatives has been that these schools have direct benefits for students attending these schools and indirect benefits for other students by creating competition for traditional public schools to improve their performance. Using California data, the analysis examines the responses to a survey of principals in a sample of traditional public schools. In addition, the research assesses how charter school competition affects student-level achievement trends in traditional public schools. The survey results showed that public school principals felt little competitive pressure from charters. Similarly, the student achievement analysis showed that charter competition (measured in a variety of ways) was not improving the performance of traditional public schools.

INTRODUCTION

The use of charter schools, which are publicly supported, autonomously operated schools of choice, continues to grow and has become a pivotal piece of a number of reform initiatives, including the No Child Left Behind (NCLB) legislation. In a little more than a decade, the charter school movement has evolved from a single school in Minnesota in 1992 to more than 3,400 charter schools in 40 states plus the District of Columbia in 2005. Supporters hope that the autonomy given to charter schools not only raises the achievement of students who attend these schools, but also promotes healthy competitive pressure on the existing K-12 educational system by giving families alternatives to traditional public schools. In fact, given that charter schools will probably never educate a substantial portion of the nation's student population, charter advocates argue that these schools may have their greatest impact through systemic effects—enhancing the performance of students who do not attend charter schools.

Advocates of school choice programs argue that charter schools and other forms of school choice programs, including private schools and magnet schools or other intra- and interdistrict choice programs, can create systemic effects by removing policy-induced education monopolies and allowing "customers" to move freely from one service provider to another (Friedman, 1955, 1962). Under these circumstances, according to theory, school choice programs, including charter schools can create competitive forces to improve performance and thus, the benefits of competition should accrue both to those who opt out of the traditional public school system (choosers) and, through competitive

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pressures, those who remain in traditional public schools (nonchoosers).

Despite these arguments, the effect school choice programs, including charter schools, have on choosers has received the lion's share of attention from policymakers, educators, and researchers. For charter schools, much of this research has relied on school-level data (Miron, Nelson, and Risley, 2002; Rogosa, 2003; Greene, Forster, and Winters, 2003), cross sectional student-level data (AFT, 2004; Hoxby, 2004; Finnigan et al., 2004), or nonlongitudinal student-level data (Buddin and Zimmer, 2005; Bettinger, 2005). However, the most reliable results have used longitudinal student-level data. Such data sets have been used in studies of charter schools in individual states, including studies by Solmon, Paark, and Garcia (2001) in Arizona; Bifulco and Ladd (2003) in North Carolina; Gronberg and Jansen (2001); Hanushek, Kain, and Rivkin (2002); and Booker et al. (2004a), (separately) in Texas; and Zimmer et al. (2003) in California. These studies, however, have not yet converged to produce a clear and consistent finding about the academic effectiveness of charter schools.

This focus on the effects of choosers, while important, may be shortsighted because the effects on nonchoosers may present the more policy relevant question. Research has only recently shed any light on this issue, and it has had mixed conclusions. The inconsistency of these results may stem from researchers using inconsistent measures of competition or it could stem from examining the competitive effects in different states and districts with different competitive environments.

Researchers have used a variety of proxies for competition because of the ambiguity of the manifestation of competition in an educational market. Education is provided through multiple layers, including teachers within classrooms who are managed

by principals who are provided resources and instructional and curriculum guidelines by the district. While actors in any single layer may feel competitive pressure, it might not ultimately affect the performance of students if the other layers are not equally motivated to improve. Alternatively, it might only matter that particular layers feel competitive pressures. For instance, a perceived competitive threat among teachers may be the only thing that matters because they are at the front lines of providing education. Or, it could be that the key to improving schoolwide performance is to motivate the principal. Or, still another alternative could be that it might not matter whether principals or teachers feel competitive pressure if many of the curriculum, instructional, and staffing decisions are made at the district level. In addition, each of these actors within these layers may perceive competitive threats differently, and each may have a different ability to react to these competitive threats.

Adding to the complexity of synthesizing results across studies is the real possibility that charter schools have different competitive effects in different types of environments. For instance, a growing trend among districts nationwide is to offer students an intradistrict choice of schools through open enrollment, in which families can choose among all schools within the district, or through magnet schools. In other districts, enrollment is based entirely on geographic residency. Charter schools may have very different competitive effects in these two environments. For districts with preexisting school choice, an already competitive market may diminish the competitive pressure created through charter schools. In contrast, the introduction of charter schools in a noncompetitive market with no current choice program could have a much more dramatic effect. In addition, some districts may have a growing enrollment and existing

schools may be overcrowded. Here, charter schools could serve as a "release valve" for these districts. Other districts may have declining enrollments and the loss of additional students to charter schools could exert real fiscal pressure for existing schools.

This research examines the competitive effects of California charter schools using both survey data of traditional public school principals and student-level test score data. The survey was administered to a statewide sample of traditional public schools (TPS), while the student achievement data were collected from six major school districts within the state. California has not yet implemented plans for a common statewide student identifier, so student achievement progress cannot be tracked longitudinally there. Several California districts do maintain longitudinally linked student achievement records, however. As a result, this research relies on student-level data from six districts with a prominent share of charter students.

The analysis is divided into two parts. First, we examine survey responses of the statewide sample of TPSs by examining what effect charter schools have had on TPSs. Also, we assessed the competitive pressures on schools included in the six districts in which we have student-level data. Second, we examine whether competitive pressures (or lack thereof) have an effect on school performance using student-level achievement scores from the six districts. Our student achievement analysis builds on the array of competitive measures used previously and then compares the results to the existing literature.

School Choice Environments

Included in our student-level data are six California districts, each with different degrees of current school choice programs and levels of charter school penetration.

Below, we describe these districts in greater detail, including a general overview of these districts in Table 1.

Los Angeles Unified School District (LAUSD), San Diego Unified School Districts (SDUSD), and Fresno Unified School District (FUSD) are not only among the largest school districts in California, but also among the largest school districts in the nation. LAUSD has nearly 747,000 students attending 677 schools while SDUSD has approximately 142,000 students attending 182 schools, and FUSD has more than 81,000 students attending 99 schools. Chula Vista Elementary School District (CVESD), Napa Valley Unified School District (NVUSD), and West Covina Unified School District (WCUSD) are more moderate in size. CVESD has more than 24,000 students in 39 schools, NVUSD has nearly 17,000 students in 34 schools, and WCUSD has more than 10,000 students in 13 schools.

These districts generally have vibrant school choice programs in which parents not only can choose to have their child attend a charter schools but can also request a transfer to a school outside of their local attendance area through an open enrollment policy.[1] In addition, all but CVESD and WCUSD have magnet schools in which parents can enroll their child. In each of these districts, to participate in the magnet or open enrollment program, a parent needs to apply for a transfer. Oversubscribed magnet schools normally sort among eligible students using a lottery. Admission to nonresidential schools under open enrollment hinges on available seats at the nonresidential school, where priority status is assigned to students in the residential area.

[1] California allows for parent or guardian of a school age child who is a district resident to select among traditional public schools, irrespective of the particular locations of his or her residence within the district. Because many schools will be oversubscribed, selection of pupils is made through a "random, unbiased process" (*California Educational Code, Section 35160).*

Table 1 also shows the annual enrollment growth rate in each of the six districts. Enrollment growth may impede some competitive pressures on local schools. The threat of student flight to charters, magnets, or other public schools may have little effect on a school that is already over capacity or that expects net enrollment growth in the next year.

Parents have different school choice opportunities across districts and within neighborhoods in each district. Competitive pressures from charters may vary depending on the other schooling choices available to parents in an area. This analysis controls for competitive pressures from magnets and other public schools as well as charters to assess how the entire competitive marketplace affects school performance.

Table 1: District Profiles

School District	Total Students	Total Schools	Magnet Schools	Charter Schools	Enrollment Growth (%)
Chula Vista	24,000	39	0	6	3.0
Fresno	81,000	99	12	8	0.7
Napa Valley	17,000	34	4	4	0.7
Los Angeles	747,000	677	130	39	1.6
San Diego	142,000	182	29	16	0.8
West Covina	10,000	13	0	1	2.6
Total	1,021,000	1,044	175	74	1.4

Source: California Department of Education, 2001–2002 school year.

Note: Total schools includes magnet and charter schools as well as traditional public schools that are not magnets. Annual growth refers to that average annual enrollment groups between over five years from 1997–1998 through 2001–2002.

CURRENT LITERATURE

Although the current literature on charter school competitive effects has provided valuable information, it has made critical assumptions about the competitive process, which could affect conclusions made about the competitive effects. For example, Hoxby (2001) defines competition as the percentage of students that attend charter schools within a district (i.e., market penetration) and finds substantial positive competitive

effects in Arizona and Michigan.[2] However, Bettinger (2005), using an instrumental variable strategy, also examines competitive effects in Michigan as measured by distance and finds no effects. Using school-level data in North Carolina, Holmes, DeSimone, and Rupp (2003) also used distance as a proxy for competition and found substantial competitive effects. In contrast, Bifulco and Ladd (2003) use student-level data in North Carolina and map out the distances of students exiting public schools to enter charter schools. Using this mapping, they analyze the effect charter schools have on TPSs within concentric distances of charter schools. Their analysis finds no competitive effects. Sass (2005) and Booker et al. (2004b) also use student-level data in Florida and Texas, respectively, to examine competitive effects. Similar to Bifulco and Ladd, Sass uses concentric circles around public schools and measures whether a charter school is within these concentric circles and what proportion of total students are enrolled in charter schools. Using these approaches, Sass finds positive, but small, competitive effects in Florida. Booker et al. uses two approaches, which find consistent and substantial competitive effects. First, as in the Hoxby study, the authors use market penetration measure at the district level. Second, they also use a campus-level market penetration measure, which is defined by the percentage of students at a particular campus that exits the school to go to a charter school. They find competitive effects across both measures.

Building off this body of work, we examine the effect charter schools have on TPSs by using survey and student-level data. The survey data are derived from a survey of a sample of TPSs, while the student-level data include test scores of students in six prominent school districts in California. For our survey analysis, we examine the

[2] More specifically, she identifies competition has occurring only when charter schools represent more than 6 percent of district's total student population.

responses of principals to surveys in which they were asked about the effect the introduction of charter schools had on the operation of their schools. In the next section, we describe the survey data and the analysis is greater detail. Later, we describe the student-level data and analysis more fully.

SURVEY ANALYSIS

Methods and Data Description

In spring 2002, we surveyed principals of all California charter schools and a matched sample of TPSs. Because charter schools are often over-represented by minority and low-income students than a typical public school (Gill et al., 2001), we selected a sample of TPSs using a propensity match methodology that matches schools based on racial and socioeconomic characteristics. (For details, see appendix A.).

In Table 2, we highlight the survey response rate across the state and within the district with student-level data. In both cases, we had a response rate of 75 percent.

Table 2: Survey Response Rates

Survey	Sample	Respondents	Response Rate
Survey of TPSs across the state	245	184	75%
Survey of TPS within the district with student-level data	44	33	75%

Employing the survey data, our analysis takes a two-pronged approach. We first examine the responses of all TPSs surveyed across the state and then, as a second approach, restrict the data to those schools in which we have student-level data. We then examine the responses of the principals in both data sets to gauge whether possible competitive pressures exist in California in general and in the districts we later examine

through our student-level data. By examining competitive effects both through survey and student level data, we add depth to our analysis.

Results

As part of our TPS survey, we asked three questions that have direct relevance to whether a school felt competitive pressure from charter schools. These questions are shown in Figure 1. Question seven asked whether students in their local attendance area attend a charter school. This is an attempt to provide context on the likelihood of whether the public school would feel competitive pressure. If they answered yes to this question, we asked, in question eight, whether the school or district had changed certain operational features as the result of the presence of charter schools. In essence, this question examines whether the possible loss of students has affected the way TPSs operate. Finally, question nine probes all schools, regardless of whether students in the area attend a charter school, on how they would characterize the effect from the introduction of charter schools. This question attempts to explore the mechanisms in which TPSs may feel competitive pressures.

7. Do any students in the local attendance area attend a charter school?

☐ Yes
☐ No → ***Go to Question 9***
☐ Don't Know

8. Please indicate if you agree or disagree with the following statements

Mark (X) one box per line

a. *This school* or the district has restructured compensation to teachers in response to the introduction of charter schools.	☐ Agree	☐ Disagree	☐ Don't Know
b. *This school* or the district has restructured hiring/firing/discipline policies of teachers in response to the introduction of charter schools.	☐ Agree	☐ Disagree	☐ Don't Know
c. *This school* or the district has changed the curriculum in response to the introduction of charter schools.	☐ Agree	☐ Disagree	☐ Don't Know
d. *This school* or the district has changed instructional practices in response to the introduction of charter schools.	☐ Agree	☐ Disagree	☐ Don't Know
e. *This school* or the district has changed professional development in response to the introduction of charter schools.	☐ Agree	☐ Disagree	☐ Don't Know

9. Characterize the effect that the introduction of charter schools has had on *this school* in the following categories:

	Very Positive	Some-what Positive	No Effect	Some-what Negative	Very Negative
a. Financial security	☐	☐	☐	☐	☐
b. Ability to acquire necessary resources from the district or state	☐	☐	☐	☐	☐
c. Teacher recruitment/retention	☐	☐	☐	☐	☐
d. Ability to attract and retain students	☐	☐	☐	☐	☐

Figure 1--Questions on the Competitive Effects of Charter Schools from the 2002 RAND Traditional Public School Survey.

The responses to question seven, eight, and nine from both the statewide sample and six-district sample of principals are shown in Table 3, 4, and 5. Table 3 highlights that about half of the TPSs, in both samples, have students from their local attendance area enrolling at a charter school, which suggest that if reduced market share is the

mechanism of competition, many California schools may not feel any competitive threat at all.

Table 3: Are Students in the Local Attendance Area Going to a Charter School?

	Statewide Percentage (N = 126)	Six-District Percentage (N = 20)
Yes	50.8	55.0
No	47.6	45.0
Don't Know	1.6	0.0

Source: 2002 RAND TPS Survey.

Of those principals that answer yes to question seven, Table 4 shows that, statewide, principals generally think that charter schools have not had much effect on operational practices. The only category in which more than 10 percent of TPSs have made changes is instructional practices with 11.6 percent of principals responding that they made a change. However, while never a majority, a substantial portion of the principals from the six districts claim that the school or the district had an effect on some operational features, with 25 percent of principals responding that they had changed their instructional practices and professional development.

Table 4: The Impact of Charter Schools on Matched TPSs or Their Respective Districts

	Statewide		Six District	
Impact of Charter Schools on TPS	N	Percentage Agree	N	Percentage Agree
Restructured compensation to teachers	82	4.7	15	20.0
Restructured hiring/firing/discipline policies of teachers	88	6.2	16	18.8
Changed curriculum	91	4.8	17	11.8
Changed instructional practices	90	11.6	16	25.0
Changed professional development	90	6.7	16	25.0

Source: 2002 RAND TPS Survey.

Table 5, which displays the results of question nine, generally shows consistent outcomes between the statewide and six-district samples and indicates that principals mostly responded that TPSs felt little effect from charter schools across the different categories. Only two categories, financial security and ability to attract and retain students, had more than 10 percent of TPS principals for both the statewide and six-district samples respond that charter schools had something other than "no effect". The only significant difference worth noting between the statewide and six-district sample is that the six-district sample had a slightly higher percentage of principals (15.1 percent versus 5.5 percent for the statewide sample) say that charter schools have had a "negative" or "very negative" on teacher recruitment and retention.

Table 5: The Effect from Charter Schools on TPS

	How Have Charters Affected Your School?				
	Very Positive	Positive	No Effect	Negative	Very Negative
Statewide (N = 177)					
Financial security	0.6	0.8	81.9	14.4	5.5
Ability to acquire necessary resources	0.0	0.5	93.1	6.2	0.2
Teacher recruitment and retention	0.0	0.4	94.1	4.4	1.1
Ability to attract and retain students	0.0	1.2	84.6	12.1	0.0
Six Districts (N = 33)					
Financial security	0.0	3.0	84.9	12.1	0.0
Ability to acquire necessary resources	0.0	3.0	90.9	6.0	0.0
Teacher recruitment and retention	0.0	3.0	81.8	12.1	3.0
Ability to attract and retain students	0.0	0.0	87.9	12.1	0.0

Source: 2002 RAND TPS Survey.

These tables suggest that charter schools generally have little to no impact on the perceived operation of TPSs and exert little competitive pressure. We will test this hypothesis further by examining the student achievement of TPSs based on various measures of competitive pressure.

STUDENT ACHIEVEMENT ANALYSIS

Data Description

Because the state lacks student identifiers to track students over time in their statewide achievement data, we focused on the six districts with a large share of charter students (Chula Vista Unified, Fresno Unified, Los Angeles Unified, Napa Valley, San Diego Unified, and West Covina Unified) and with student-level identifiers. These data were collected for 1997–1998 through 2001–2002 school years and include Stanford 9 reading and math test scores, which are based on percentile and normal curve equivalent for each student using the Stanford 9 norming sample.[3] In addition, the data include information on student ethnicity, English learner status, parental education, and school-lunch eligibility. We also collected schoolwide characteristics of each charter school and TPS. Across the six districts, the data set includes about 3.2 million student-year records and about 1.1 million different students. Using these data, we track the movements of students within particular districts and the performance of students over time.

Table 6 shows the means and standard deviations for student- and school-level variables used in the analysis for elementary, middle, and high schools. The results show that the achievement scores of California students in these six districts lag somewhat behind national norms for each type of school in both reading and math. More than 60 percent of students are Hispanic. Black and Asian students each constitute about 11 or 12 percent of enrollments. California schools face considerable challenges in teaching students with limited English proficiency (LEP)—50 percent of elementary students are

[3]Starting in 2002–2003, the California Department of Education switched from the Stanford 9 to the California Achievement Tests, 6th Edition (CAT/6). Therefore, our data sets include the full range of test scores for the Stanford 9.

LEP and 24 percent of high school students are LEP. In addition, almost 80 percent of young students in elementary schools come from low-income families and are eligible for free or reduced-price school lunch. Poverty rates are considerably lower for the families of high school students, but 64 percent of high school students live in a low-income family.

In addition to the student-level measures, additional school-level variables are included in the analysis to assess whether these factors affected student achievement. As expected from the student-level variables, most schools have large numbers of low-income students and English learners. These factors may have a cumulative effect on achievement in addition to the separate effects on individual students. For example, if a school has large number of low-income students or English learners, the school resources might be stressed and overall achievement levels might suffer. Table 1 also shows that student mobility is common in these urban public schools—17, 14, and 12 percent of students in elementary, middle, and high schools are in their first year at their respective schools. Finally, the data also include an indicator variable for whether the school offers a magnet program.[4] Only about 13 percent of elementary schools are magnets, but 39 and 64 percent of middle and high school students, respectively, are at magnet schools.

The analysis uses several measures to characterize the extent of pressures on a TPS to improve its performance in response to competition from charters and other public schools.

- *Distance to charter or other public school*. A nearby charter school may create competition for a public school. The pressure may come from students

[4]The data do not include specific information on whether a particular student is enrolled in a magnet program at the school. Rather, the indicator reflects that a magnet program is offered at the school.

switching to the charter or from parents demanding higher standards in their current school. Similarly, a nearby TPS or magnet school may pressure a school to improve.

- *Presence of charter and other alternatives within 2.5 miles*. This measure resembles the earlier distance measure, but it focuses on the specific area near a school, which could be thought of as an "educational marketplace." Distant charters or magnet schools may have much less effect on competition than the presence of nearby alternatives.
- *Number of charters and other alternatives within 2.5 miles*. More alternatives give parents more opportunities to shop for a school and demand better classroom performance.
- *Share of charter and other students within 2.5 miles*. This measure is a more precise indication of the availability of classroom seats in the neighborhood of a school. If the share of students in the TPS is small, then it faces great pressure to keep pace with nearby alternative schools.
- *Students lost to other schools within 2.5 miles*. This is a tally of the percentage of students switching to a nearby charter or other school in the previous year. If transfer rates are high, the school may be pressured to improve its performance relative to nearby schools to avoid the loss of revenues and personnel.

These types of measures have been used by Bifulco and Ladd (2003), Booker et al. (2004b), Bettinger (2005), and Sass (2005) to assess how charter school competition was affecting public school performance in North Carolina, Texas, Michigan, and

Florida, respectively. Some of these studies also included competition from schools beyond 2.5 miles. In our analysis, however, the districts are all urban, so the 2.5-mile radius typically included other schools and at least some charter schools.

Table 6 shows the means for these school-level competition measures. A key indication of charter importance in California is that 37 percent of elementary TPS students are within 2.5 miles of a charter school. Similarly, 24 and 9 percent of middle and high school students in a TPS are within 2.5 miles of a charter school, respectively. The charter enrollment shares are small, however, ranging an average of about 3 percent for elementary and middle school students to an average of about 1 percent of high school students. The analysis will focus on whether differences in these competitive measures across schools and over time affect the student achievement scores in these TPSs.

Table 6
Means and Standard Deviations by School Type

	Elementary School		Middle School		High School	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Student-Level Variables						
Reading Percentile	41.0544	19.8642	40.3140	19.6045	37.3366	19.0894
Math Percentile	46.0130	21.3198	43.1000	19.3749	45.4319	18.5694
Black	0.1157	0.3199	0.1261	0.3319	0.1214	0.3266
Hispanic	0.6461	0.4782	0.6454	0.4784	0.6071	0.4884
Asian	0.0940	0.2919	0.0922	0.2894	0.1156	0.3197
Limited English Proficiency	0.5001	0.5000	0.3056	0.4607	0.2430	0.4289
Free/Reduced Lunch	0.7933	0.3583	0.7832	0.3758	0.6382	0.4364
School-Level Variables						
Magnet School	0.1303	0.3366	0.3931	0.4884	0.6448	0.4786
Free/Reduced-Price Lunch (%)	78.2648	25.9012	70.2594	20.1507	58.7875	22.7443
English Learner (%)	47.5837	24.9659	31.3863	15.3808	25.0839	11.8804
First-Year Students (%)	17.2755	6.9938	13.6500	5.7903	11.7909	7.0549
School-Level Competition Measures						
Distance to Nearest Charter	4.0869	2.7763	5.8788	4.1841	8.3725	4.4810
Distance to Nearest Startup	6.6162	5.6354	7.1390	5.6389	5.4081	2.9829
Distance to Nearest Conversion	4.9199	3.0395	8.1329	4.4908	8.8472	4.3847
Distance to Nearest TPS	1.3881	0.2190	1.7196	0.6477	1.9861	0.8223
Distance to Nearest Magnet	2.1193	1.1417	2.3030	1.2989	2.6201	1.2947
Any Charter within 2.5 Miles	0.3769	0.4846	0.2371	0.4253	0.0911	0.2877
Any Startup within 2.5 Miles	0.2183	0.4131	0.1801	0.3843	0.0344	0.1823
Any Conversion within 2.5 Miles	0.2513	0.4337	0.1260	0.3318	0.0656	0.2475
Any Other TPS within 2.5 Miles	0.9976	0.0487	0.9251	0.2632	0.8034	0.3974
Any Magnet within 2.5 Miles	0.7687	0.4217	0.7330	0.4424	0.6037	0.4891
Number of Charters within 2.5 Miles	0.8598	1.6283	0.3658	0.7555	0.1353	0.4811
Number of Startups within 2.5 Miles	0.2556	0.5240	0.2005	0.4538	0.0345	0.1833
Number of Conversions within 2.5 Miles	0.6042	1.4067	0.1653	0.4679	0.1007	0.4324
Number of Other TPS within 2.5 Miles	15.3580	7.6015	4.1457	2.7874	2.9378	2.3863
Number of Magnets within 2.5 Miles	1.9090	1.8855	1.5274	1.4335	0.9631	0.9705
Share of Charters within 2.5 Miles	0.0329	0.0710	0.0276	0.0875	0.0138	0.0581
Share of Startups within 2.5 Miles	0.0042	0.0154	0.0034	0.0146	0.0051	0.0398
Share of Conversions within 2.5 Miles	0.0287	0.0689	0.0242	0.0842	0.0087	0.0430
Share of Other TPS within 2.5 Miles	0.8770	0.1072	0.6135	0.2444	0.4504	0.2764
Share of Magnets within 2.5 Miles	0.1082	0.1190	0.2458	0.2357	0.2573	0.2589
Lost to Charter in Past Year (%)	0.0067	0.0195	0.0067	0.0238	0.0067	0.0238
Lost to Conversion in Past Year (%)	0.0055	0.0183	0.0053	0.0230	0.0011	0.0021
Lost to Startups in Past Year (%)	0.0012	0.0057	0.0014	0.0042	0.0024	0.0068
Lost to Other TPS in Past Year (%)	0.2390	0.0755	0.3101	0.0667	0.0445	0.0296
Lost to Magnets in Past Year (%)	0.0810	0.0795	0.1908	0.1073	0.0269	0.0228

Note: The competition measures refer to schools of a similar type. For example, the share of charters within 2.5 miles for elementary schools is based on the share of charter students in grades K through 5 relative to all students in grades K through 5 within 2.5 miles of the TPS.

Table 7: Trends in Charter Schools in Six California School Districts for Student Achievement Analysis

	1998	1999	2000	2001	2002
All Schools					
Number of Charters	27	49	60	69	73
Number of Charter Students	16081	26244	33310	35870	38831
Share of Charter Students (%)	1.94	3.10	3.86	4.09	4.34
Elementary Schools					
Number of Charters	17	36	41	46	49
Number of Charter Students	8299	17874	19607	21110	22552
Share of Charter Students (%)	1.88	3.97	4.29	4.55	4.84
Middle Schools					
Number of Charters	11	19	26	35	37
Number of Charter Students	8420	11849	15577	17943	20245
Share of Charter Students (%)	2.76	3.95	5.10	5.73	6.28
High Schools					
Number of Charters	4	9	11	14	17
Number of Charter Students	4735	5985	8538	9338	10782
Share of Charter Students (%)	1.93	2.43	3.42	3.70	4.15

Note: Some charter schools span elementary, middle, and high schools grades, so the sum of the number of schools by grade exceeds the overall number of schools.

The last few years have been marked by dramatic growth in charter schools in California. Table 7 describes the pattern of charter school growth in the six districts used in our analysis. The results show the charters have more than doubled the number of schools and students for elementary, middle, and high schools for the five-year period from 1998 through 2002. Similarly, the share of students enrolled in charter schools has also doubled over this period. This charter school growth means that more students have opportunities to attend charters and that more traditional public schools face competition from charters in the local school marketplace.

Model

The model of student achievement in public schools is based on a three-way error component where the three components consist of a student-specific effect, a school-specific effect, and a year-specific effect (Abowd, Creecy, and Kramarz, 2002; Abowd,

Kramarz, and Margolis, 1999; Andrews, Schank, and Upward, 2004; Andrews, Schank, and Upward, 2005). The dependent variable is the student test score, T_{ijt}, observed for student *i* in school *j* at time *t*. Separate test specifications are estimated in reading and math. The formal model is

$$T_{ijt} = x_{it}\beta + w_{jt}\gamma + \theta_i + \psi_j + \mu_t + \varepsilon_{ijt} \qquad (1)$$

where x_{it} *and* w_{jt} are vectors of measured time-varying student and school characteristics, respectively; β and γ are parameter vectors for student and school effects; and unobserved student, school, and time heterogeneity are represented by θ_i, ψ_j, and μ_t. The last component of the model is a random error term, ε_{ijt}, that is orthogonal to all other effects in the model.

In many circumstances, a random-effects approach is used to estimate models like that in Equation 1. This approach assumes that the student, school, and time heterogeneity terms are orthogonal to the observed student- and school-level variables. In this situation, this seems unlikely because the measures of these variables are incomplete. For example, student motivation and parental support are important determinants of schooling outcomes, but these factors are not measured in test score databases, such as those used in this study. Similarly, schools can differ from one another in unmeasured ways that can be correlated with measured factors in the model. As a result, random effects estimation of Equation 1 is likely to yield inconsistent estimates of the parameters β and γ.

In preliminary statistical regressions, we compared coefficient estimates with random and fixed effects model using a Hausman specification test. The results indicated that unobserved student and school heterogeneity was significantly correlated with

observed factors in Equation 1 for separate runs for reading and math in elementary, middle, and high school. These results indicated that a fixed-effect approach was more appropriate for this statistical problem.

Fixed-effects methods produced consistent estimates of β and γ in Equation 1. The parameter for time heterogeneity was estimated directly with time dummies because the period of observation consisted of five consecutive years. Student and school heterogeneity are more complex. Student test scores are observed over time and, in many cases, across different schools. For a particular student spell at a school, the terms θ_i and ψ_j are both fixed. As a result, student and school heterogeneity can be eliminated from the model by taking spell-specific fixed effects for each student-school combination where:

$$T_{ijt} - \overline{T}_s = (x_{it} - \overline{x}_s)\beta + (w_{jt} - \overline{w}_s)\gamma + (\varepsilon_{ijt} - \overline{\varepsilon}_s) \; . \qquad (2)$$

This approach means that parameters corresponding to student and school characteristics that are invariant across spells are not identified. The model does eliminate student and school heterogeneity, however, without restricting factors to be orthogonal to measured student and school attributes.

Results

As we noted in the introduction, researchers have used a variety of measures of charter competition, partially because no one really knows when TPSs may actually feel a competitive threat. The results look at various measures of competition for elementary, middle, and high schools in reading and math. After controlling for student and school heterogeneity and measured school variables, little evidence was found that charters are affecting student achievement in other public schools at all.

Three broad types of models were estimated based on Equation 2. Model one isolated the effects of charter school competition on TPSs. Model two separated the effects of conversion and startup schools on nearby TPSs. Conceptually, conversion and startup schools may exert different levels of competitive pressure. When a TPS converts to a charter school, it generally maintains the existing students, while a startup school will actively try to attract students from other schools. In addition, earlier results in California (Zimmer et al., 2003; Buddin and Zimmer, 2005) showed that startup schools had stronger student achievement performance than conversions, so startups might generate more competitive pressure on TPSs than conversions would.

In the introduction, we also noted that competitive pressure exerted by charter schools may vary based on the existing competitive market among TPSs and magnet schools. To account for this possibility, model three adds measures of competition from nearby TPSs and magnets. The three types of models are summarized in Tables 8, 9, and 10. Full regression specifications for model one are reported in Tables B-1 though B-6. Coefficients on control variables (time dummies, magnet school indicator, free/reduced-price lunch percentage, English learner percentage, and first-year student percentage) were similar across models, so the full regression specifications of models two and three are not reported here.

Table 8 shows that almost each measure of charter competition has a statistically insignificant effect on student achievement in nearby TPSs. Only one of the measures has a statistically significant effect at the elementary, middle, and high school level. Even then the significant factor differs across school types, and the effect does not persist across reading and math within the same school type. Two of the three significant effects

have the opposite sign predicted by a theory of charter competition. In elementary reading, the regression result suggests that a nearby charter *reduces* reading scores at the TPS, but it has no effect on math achievement. In high school reading, the distance to nearest charter has a *positive* effect on reading scores—i.e., reading scores are higher if charters are further away from the TPS. The result for middle school math does show that the presence of a charter within 2.5 miles of the TPS is associated with a higher math achievement score. Overall, these student achievement results suggest that charter schools are not having an effect on the performance of TPSs, which is consistent with our survey results from school principals.

Table 8
Effects of Charter School Competition on TPS Performance

	Reading		Math	
	Coefficient	Standard Error	Coefficient	Standard Error
Elementary Schools				
Distance to Nearest Charter	0.0148	0.0687	–0.0709	0.1110
Any Charter within 2.5 Miles	0.3204	0.2927	0.1751	0.4815
Number of Charters within 2.5 Miles	–0.0840	0.2675	–0.4260	0.3979
Share of Charters within 2.5 Miles	–15.1273*	7.3813	–10.3971	10.8359
Lost to Charter in Past Year (%)	1.6216	8.1507	–9.8795	12.6713
Middle Schools				
Distance to Nearest Charter	–0.0019	0.0421	–0.0784	0.0611
Any Charter within 2.5 Miles	0.1869	0.5299	1.4088*	0.6265
Number of Charters within 2.5 Miles	0.1099	0.4081	0.7010	0.6627
Share of Charters within 2.5 Miles	–8.0722	9.3698	–13.7740	24.5579
Lost to Charter in Past Year (%)	–18.4525	35.3818	25.8199	31.7481
High Schools				
Distance to Nearest Charter	0.3033*	0.1108	0.2013	0.1387
Any Charter within 2.5 Miles	–0.1577	1.1209	–0.582	0.5453
Number of Charters within 2.5 Miles	–0.1477	0.7312	–0.3863	0.6471
Share of Charters within 2.5 Miles	–29.4159	15.3717	–15.8786	15.4893
Lost to Charter in Past Year (%)	–21.0126	28.1007	10.3569	38.204

Although Table 8 does not suggest a competitive effect from charter school generally, the effects charter schools have on TPSs may vary across different types of charter schools, which we examine in Table 9. Few startup high schools can be found in the district data (and none in Los Angeles), so the results in Table 3 are restricted to elementary and middle schools.

The results in Table 9 suggest that the competitive effects on TPSs differ little across conversion and startup charters. As in Table 8, almost none of the measures of competition have a statistically significant effect on student achievement at TPSs. In Table 3, the significant effects are consistent with competition (i.e., they have the right signs), but they fail to be consistent across school types or subject and provide little support for a competitive effect of either type of charters. The results show that middle

schools do better in reading if they are near a conversion school. Elementary schools do better in math if they are near a startup. In addition, math scores at TPSs are higher if they are within 2.5 miles of a startup. In general, Table 9 provides little evidence that startups generate more competitive pressures on nearby TPSs than conversions do.

Table 9
Effects of Charter Conversions and Startups on Public School Performance

	Reading		Math	
	Coefficient	Standard Error	Coefficient	Standard Error
Elementary Schools				
Distance to Nearest Conversion	0.0656	0.0890	–0.1255	0.1418
Distance to Nearest Startup|	–0.0364	0.0197	–0.0581*	0.0290
Any Conversion within 2.5 Miles	–0.2605	0.8386	–0.6523	1.4111
Any Startup within 2.5 Miles	0.3649	0.2780	0.3074	0.4051
Number of Conversions within 2.5 Miles	–0.3195	0.8102	–0.6985	1.3828
Number of Startups within 2.5 Miles	–0.0547	0.2823	–0.3932	0.4071
Share of Conversions within 2.5 Miles	–45.7737	24.7159	–14.0402	41.6997
Share of Startups within 2.5 Miles	–11.6389	6.8428	–9.9913	10.8314
Lost to Conversions in Past Year (%)	–6.7115	10.7792	–14.1600	17.6421
Lost to Startups in Past Year (%)	10.0748	10.2288	–5.5724	14.1041
Middle Schools				
Distance to Nearest Conversion	–6.8637*	2.4346	–7.9312	4.3917
Distance to Nearest Startup|	0.0086	0.0270	–0.0353	0.0359
Any Conversion within 2.5 Miles	0.2695	1.6889	3.2306	2.5441
Any Startup within 2.5 Miles	0.1866	0.5300	1.4017*	0.6279
Number of Conversions within 2.5 Miles	0.0820	0.5236	–0.2570	0.7645
Number of Startups within 2.5 Miles	0.1102	0.4125	0.7123	0.6700
Share of Conversions within 2.5 Miles	–1.5364	30.4087	–81.3306	75.8132
Share of Startups within 2.5 Miles	–8.7663	9.2744	–6.6061	27.0499
Lost to Conversions in Past Year (%)	–40.3959	51.2943	90.0448	48.7183
Lost to Startups in Past Year (%)	0.7334	43.1912	–30.5612	41.7740

Tables 8 and 9 provide very little evidence for a competitive effect. However, we have noted that a preexisting competitive market could blunt the competitive effects of charter schools. Therefore, we also examine the charter competitive effect while adding measures of competitive effects from other TPSs or magnet schools in Table 10.[5] Again,

[5] Another mechanism of competition is private schools. However, we did not have private school information for this analysis. It is unlikely that the lack of private schools would change our results

the measures of competition from charter schools generally indicated no competitive effects, and in the cases in which a significant effect occurred, it was often negative. We should also note that there seems to be very little competitive effects among TPSs or magnet schools. Together, this suggests that competition among the existing public schools cannot explain the lack of competitive effects from charter schools.

CONCLUSION

Recently, a growing literature has examined charter schools' competitive effects—with mixed results. We argued that the lack of consensus among these evaluations may stem from inconsistency in measures of competition or could stem from variations of district or state environments in which the competitive effects are examined. We specifically noted that environments could affect the competitive effects in a number of ways. First, a district or a state could have a healthy competitive environment among TPSs through open enrollment policies or through magnet schools, which could abate any competitive pressures charter schools could exert. We also noted that the nature of the enrollment growth or state or district policies could affect the competitive pressures charter schools create.

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because private schools may market their services to high-income families, while charter schools typically market themselves to low-income families.

Table 10: Effects of Charter and Public School Competition on Public School Performance

	Reading		Math	
	Coefficient	Standard Error	Coefficient	Standard Error
Elementary Schools				
Distance to Nearest Conversion	0.0593	0.0896	–0.1238	0.1431
Distance to Nearest Startup	–0.0363	0.0197	–0.0584*	0.0290
Distance to Nearest TPS	–6.6786*	0.2543	–5.4953*	0.3658
Distance to Nearest Magnet	–0.3724	0.4923	0.0833	0.8962
Any Conversion within 2.5 Miles	–0.2685	0.8393	–0.6554	1.4123
Any Startup within 2.5 Miles	0.3648	0.2777	0.3074	0.4052
Any Magnet within 2.5 Miles	–0.3823	0.4844	–0.1429	0.9858
Number of Conversions within 2.5 Miles	–0.1433	0.7421	0.4506	1.0963
Number of Startups within 2.5 Miles	–0.0159	0.2800	–0.2438	0.3968
Number of Other TPS within 2.5 Miles	0.1071	0.1547	0.0252	0.2123
Number of Magnets within 2.5 Miles	0.0944	0.1379	0.5993*	0.1950
Share of Conversions within 2.5 Miles	–40.0737	26.7434	10.2810	46.5068
Share of Startups within 2.5 Miles	–9.3879	12.0770	–1.3447	21.8979
Share of Other TPS within 2.5 Miles	2.3386	11.1782	8.6838	22.1865
Share of Magnets within 2.5 Miles	1.6604	2.1982	8.2109*	3.0665
Lost to Conversions in Past Year (%)	–8.8768	11.0863	–19.6252	18.1165
Lost to Startups in Past Year (%)	9.2394	10.2107	–8.4353	14.0561
Lost to Other TPS in Past Year (%)	0.3758	1.3045	3.2220	2.3640
Lost to Magnets in Past Year (%)	2.7185	1.9551	3.9977	3.1839
Middle Schools				
Distance to Nearest Conversion	–6.9977*	2.3598	–8.3094*	4.1503
Distance to Nearest Startup	0.0077	0.0268	–0.0375	0.0353
Distance to Nearest TPS	–0.4285	0.9251	0.4002	1.8754
Distance to Nearest Magnet	–0.1017	0.1928	–0.2702	0.2536
Any Conversion within 2.5 Miles	0.2685	1.6876	3.2329	2.5469
Any Startup within 2.5 Miles	0.1899	0.5301	1.3941*	0.6277
Any Magnet within 2.5 Miles	0.2699	0.3884	–0.6110	1.0274
Number of Conversions within 2.5 Miles	0.5983	1.3743	1.9693	2.1259
Number of Startups within 2.5 Miles	0.1170	0.4153	0.7370	0.6549
Number of Other TPS within 2.5 Miles	–0.0157	0.2107	0.0401	0.2371
Number of Magnets within 2.5 Miles	0.1615	0.3944	0.6996	0.6489
Share of Conversions within 2.5 Miles	–1.4965	31.0600	–83.6968	74.1994
Share of Startups within 2.5 Miles	–8.4757	10.3389	–8.5454	27.8557
Share of Other TPS within 2.5 Miles	–0.2391	8.2715	–3.1668	11.3416
Share of Magnets within 2.5 Miles	1.1462	1.4955	0.9134	2.6598
Lost to Conversions in Past Year (%)	–44.2613	51.6589	91.3820	49.5351
Lost to Startups in Past Year (%)	0.8613	42.7759	–30.5401	42.9026
Lost to Other TPS in Past Year (%)	5.8445*	2.7735	2.8524	3.7530
Lost to Magnets in Past Year (%)	–6.1319	4.0945	–5.6959	4.7281

Table 10: (Continued)

	Reading		Math	
	Coefficient	Standard Error	Coefficient	Standard Error
High Schools				
Distance to Nearest Charter	0.2910*	0.1135	0.1975	0.1396
Distance to Nearest TPS	0.4659	4.8105	–2.5665	2.5859
Distance to Nearest Magnet	–1.1367	1.3499	–0.1311	0.7097
Any Charter within 2.5 Miles	–0.0275	1.1665	–0.5555	0.5551
Any Magnet within 2.5 Miles	0.9779	1.1912	0.1935	0.2999
Number of Charters within 2.5 Miles	–0.5420	0.6012	–0.5632	0.5503
Number of Other TPS within 2.5 Miles	–0.5960	0.5713	0.0482	0.4438
Number of Magnets within 2.5 Miles	0.9629	0.5610	0.5244	0.3070
Share of Conversions within 2.5 Miles	–30.9816*	14.6384	–16.9380	16.0711
Share of Startups within 2.5 Miles	–2.0404	9.5648	–2.1254	10.1854
Share of Other TPS in 2.5 Miles	3.9286	2.7704	1.6822	1.3643
Lost to Charters in Past Year (%)	–24.4643	33.7132	7.8946	40.3576
Lost to Other TPS in Past Year (%)	–1.9113	20.2235	–3.2327	24.8229
Lost to Magnets in Past Year (%)	19.9463	30.0406	20.8743	29.8170

Our analysis tried to address these issues in a variety of ways. First, we used surveys to examine more directly whether TPSs have changed their operational behaviors in response to the introduction of charter schools. Next, we examined student-level data to gauge the competitive effects on student achievement using a broad set of proxies for competitive pressure employed previously in the literature. Finally, we added measures of competition among other TPSs to control for the level of competition above and beyond what charter schools exert. Across all these different approaches, we found very little evidence of a competitive effect from charter schools. Although this does not address whether the enrollment growth of California districts or state or local policies have diminished the possible competitive pressures charter schools can exert, which may vary in other states, it does suggests that charter schools are not creating competitive effects in California.

These results have significant repercussions for the charter school movement in California. Because charter schools do not create systemic effects through competition,

they may only affect the educational attainment of those students attending these schools, which represent about 2 percent of the current student population and will probably never represent a large share of the total. Thus, the case advocates make for charter schools as a mechanism for improving the performance of all schools is not supported by our analysis. In other words, charter schools, as a policy, are directed primarily at the students that attend these schools.

APPENDIX A

To create a data file of matched schools, we matched charter and noncharter schools by an estimated *propensity* score (Rosenbaum and Rubin, 1983). The propensity score is the probability that a school with a given set of characteristics is a charter school as opposed to a TPS. This single value can then be used to match charter schools to noncharter schools by finding those that have similar propensity scores. As part of the matching process, we allowed a TPS to be matched to multiple charter schools because of budget and time constraints. Beyond computational convenience, the propensity score also has the desirable property that the characteristics used to fit the propensity are balanced between charter schools and their matched noncharter schools.[6] To carry out the propensity match, we used a four-step procedure:

1. We stratified charter schools into eight categories used by the California Department of Education to designate school types for all public schools. These eight categories are: elementary schools, middle schools, high schools, county schools, continuation schools, juvenile hall schools, special education schools, and alternative education schools. Some charter schools had grade ranges that intersected multiple strata (e.g., a kindergarten through grade 12 school intersects the elementary, middle and high school strata). In these cases, the charter schools were included in each category and matched to a TPS for each category. Because of the small sample of county, continuation, juvenile hall, special education, and alternative education schools, a propensity match was not used in these cases.[7] Instead, if demographic data were available for these schools, the schools were matched based on the criteria of getting schools within 10 percent or racial characteristics of the charter schools. In many cases, demographic characteristics were not available for these schools and schools were matched to a TPS of the same school type within the district or the closest district. Roughly 60 charter schools were new in the 2001–2002 school year and not included in the 2000–2001 California Basic Education Data System . These schools could not be

[6] For examples of the use of Propensity Matches, please see Fiebach, et al. 1990, Connors, Speroff, Dawson, Thomas, Harrell, Wagner, et al.,1996; Stone, Obrosky, Singer, Kapoor, and Fine, 1995; Lieberman, Lang, Cohen, D'Agostino, Datta and Frigoletto, 1996; Dehejia and Wahba, 1999.

[7] The propensity match methodology can create good matches only with sufficient sample sizes.

matched to public schools. However, the unmatched charter schools were included in the weighting procedures described below using demographic data from the 2001–2002 school year.

2. Within grade range strata, we fit a logistic regression model to predict designation (1 = charter; 0 = traditional public) as a function of aggregate school characteristics. To guide the decision of which variables to use to do the match, we first examined the strategy used by the California Department of Education to match schools for the Academic Performance Index (API) and used this as a guideline in the match. The API uses percentage mobility, percentage ethnicity, pupil socioeconomic status, percentage of teachers who are fully credentialed, percentage of teachers who are emergency credentialed, percentage of students who are English language learners, average class size per grade, and whether the school operates multitrack year-round educational programs. However, some of the variables used in the API match could be an essential part of the charter school philosophy, such as class size or year-round schools, and would reduce the operational differences observed through our surveys. Therefore, policy variables were not used in our match (e.g., average class size per grade, percentage of teachers who are fully or emergency credentialed, or whether the school operates multitrack year-round educational programs). Also, many charter schools are startups with much higher mobility rates (in a case of a new school, 100%), and thus, the mobility variable was omitted. In the end, we matched the charter schools based on percentage ethnicity (percentage White, percentage Blacks, percentage Asian, and percentage Hispanic), pupil socioeconomic status (percentage free and reduced-price lunch),[8] and percentage English language learners. Using these characteristics, predicted values for each school are created and serve as the schools' propensity scores.

3. The propensity scores for charter school i and TPS j are p_i and p_j. Then, the distance between these schools (d_{ij}) are estimated as the absolute value of the difference between their propensity scores, $d_{ij} = | p_i - p_j |$. We calculated the distance between each charter school and every TPS.

4. We matched to each charter school the TPS minimum distance to it. That is, the matched TPS is the school that minimizes d_{ij} over all TPSs j.

While the matches between the two groups of schools are not perfect, it created a sample of TPSs with characteristics that closely resemble those of the charter schools. Table A.1 displays the characteristics of the matched elementary, middle, and high schools for charter schools and TPSs.

[8] It was later discovered that many charter schools do not participate in free and reduced-price lunch programs. Because the original propensity match included percentage free and reduced-price lunch, the final sample had to be weighted to account for this bias.

Table A.1: Match School Racial Breakdown

Schools	Percentage White	Percentage Black	Percentage Hispanic	Percentage Asians	Percentage Others	Percentage LEP
Elementary Schools						
Charters	48.5	14.9	27.8	2.7	6.1	15.6
Matched Public	51.5	13.3	27.7	2.9	4.6	17.1
Middle Schools						
Charters	51.8	11.7	23.8	2.3	10.4	9.4
Matched Public	54.3	13.8	22.5	4.0	5.4	10.6
High Schools						
Charters	52.9	9.6	26.4	4.0	7.1	10.0
Matched Public	53.2	5.3	28.8	6.8	5.9	10.2

Source: 2001 California Basic Education Data System Data.

Note: Matched public and charter schools were dependent on the availability of demographic information for each type of school.

APPENDIX B

Table B.1
Competitive Effects Regressions for Elementary School Reading

	(1)	(2)	(3)	(4)	(5)
Year = 1999	3.0712*	3.0276*	3.0499*	3.0804*	
	(0.1132)	(0.1116)	(0.1102)	(0.1104)	
Year = 2000	5.1325*	5.0680*	5.0999*	5.1386*	2.0490*
	(0.1724)	(0.1693)	(0.1671)	(0.1666)	(0.1078)
Year = 2001	6.7898*	6.6837*	6.7452*	6.7966*	3.7430*
	(0.2456)	(0.2355)	(0.2320)	(0.2299)	(0.1686)
Year = 2002	7.6023*	7.4713*	7.5466*	7.6163*	4.5134*
	(0.3037)	(0.2903)	(0.2857)	(0.2857)	(0.2241)
Magnet School	–0.3795	–0.3684	–0.4388	–0.4873	–0.3742
	(0.5667)	(0.5676)	(0.5783)	(0.5593)	(0.5732)
Free/Reduced-Price School Lunch (%)	0.0364*	0.0368*	0.0363*	0.0357*	0.0305*
	(0.0080)	(0.0081)	(0.0080)	(0.0080)	(0.0082)
English Learner (%)	–0.0600*	–0.0605*	–0.0600*	–0.0595*	–0.0536*
	(0.0093)	(0.0094)	(0.0093)	(0.0093)	(0.0094)
First-Year Students (%)	–0.0311*	–0.0314*	–0.0307*	–0.0308*	–0.0309*
	(0.0103)	(0.0103)	(0.0102)	(0.0103)	(0.0105)
Distance to Nearest Charter	0.0148				
	(0.0687)				
Any Charter within 2.5 Miles		0.3204			
		(0.2927)			
Number of charters within 2.5 Miles			–0.0840		
			(0.2675)		
Share of charter students within 2.5 miles				–15.1273*	
				(7.3813)	
Lost to Charter in Past Year (%)					1.6216
					(8.1507)
Constant	36.8268*	36.8251*	36.9921*	37.4158*	39.8530*
	(0.6185)	(0.5136)	(0.5549)	(0.5451)	(0.5185)
Observations	1,319,202	1,331,428	1,331,428	1,331,428	1,107,809
Number of Student-School Spells	691,847	698,364	698,364	698,364	607,238
R-squared	0.06	0.06	0.06	0.06	0.04

Note: Regression coefficients are for fixed-spell effects in Equation 2. Starred entries mean that the coefficient is significantly different from zero at the 5 percent confidence level. Robust standard errors are in parentheses.

Table B.2
Competitive Effects Regressions for Elementary School Math

	(1)	(2)	(3)	(4)	(5)
Year = 1999	2.6871*	2.6753*	2.7221*	2.7085*	
	(0.1581)	(0.1542)	(0.1546)	(0.1544)	
Year = 2000	3.9587*	3.9538*	4.0246*	3.9986*	1.3548*
	(0.2452)	(0.2388)	(0.2378)	(0.2384)	(0.1651)
Year = 2001	4.4237*	4.4463*	4.5778*	4.5173*	1.8078*
	(0.3258)	(0.3084)	(0.3075)	(0.3035)	(0.2321)
Year = 2002	6.0756*	6.0873*	6.2506*	6.1793*	3.4643*
	(0.4046)	(0.3827)	(0.3802)	(0.3788)	(0.3162)
Magnet School	1.7767	1.7673	1.4947	1.6884	2.0152
	(1.1823)	(1.1772)	(1.1648)	(1.1786)	(1.1016)
Free/Reduced-Price School Lunch (%)	0.0205	0.0195	0.0186	0.0188	0.0152
	(0.0120)	(0.0120)	(0.0120)	(0.0120)	(0.0123)
English Learner (%)	–0.0539*	–0.0531*	–0.0519*	–0.0524*	–0.0498*
	(0.0162)	(0.0163)	(0.0160)	(0.0161)	(0.0164)
First-Year Students (%)	–0.0737*	–0.0740*	–0.0724*	–0.0736*	–0.0696*
	(0.0154)	(0.0154)	(0.0153)	(0.0154)	(0.0146)
Distance to Nearest Charter	–0.0709				
	(0.1110)				
Any Charter within 2.5 Miles		0.1751			
		(0.4815)			
Number of charters within 2.5 Miles			–0.4260		
			(0.3979)		
Share of charter students within 2.5 miles				–10.3971	
				(10.8359)	
Lost to Charter in Past Year (%)					–9.8795
					(12.6713)
Constant	44.7439*	44.4286*	44.8029*	44.8202*	47.6168*
	(0.9916)	(0.8208)	(0.8709)	(0.8673)	(0.8385)
Observations	1,358,147	1,370,751	1,370,751	1,370,751	1,133,350
Number of Student-School Spells	702,966	709,618	709,618	709,618	615,232
R-squared	0.03	0.03	0.03	0.03	0.02

Notes: Regression coefficients are for fixed-spell effects in Equation 2. Starred entries mean that the coefficient is significantly different from zero at the 5 percent confidence level. Robust standard errors are in parentheses.

Table B.3
Competitive Effects Regressions for Middle School Reading

	(1)	(2)	(3)	(4)	(5)
Year,=,1999	3.2011*	3.2009*	3.2005*	3.2026*	0.0000
	(0.2431)	(0.2431)	(0.2430)	(0.2427)	(0.0000)
Year,=,2000	4.9848*	4.9787*	4.9805*	4.9938*	2.0083*
	(0.2857)	(0.2817)	(0.2822)	(0.2808)	(0.1840)
Year,=,2001	6.5002*	6.4840*	6.4876*	6.5235*	3.4944*
	(0.3579)	(0.3355)	(0.3384)	(0.3345)	(0.2285)
Year,=,2002	7.1867*	7.1692*	7.1737*	7.2279*	4.1830*
	(0.4474)	(0.4279)	(0.4307)	(0.4295)	(0.3381)
Magnet School	0.0612	0.0666	0.0698	0.0567	0.0077
	(0.4058)	(0.4081)	(0.4100)	(0.4062)	(0.4506)
Free/Reduced-Price School Lunch (%)	0.0109	0.0111	0.0111	0.0108	0.0107
	(0.0112)	(0.0113)	(0.0112)	(0.0111)	(0.0116)
English Learner (%)	–0.0265	–0.0264	–0.0266	–0.0267	–0.0237
	(0.0172)	(0.0174)	(0.0171)	(0.0172)	(0.0178)
First-Year Students (%)	–0.0202	–0.0199	–0.0202	–0.0208	–0.0225
	(0.0208)	(0.0208)	(0.0207)	(0.0211)	(0.0213)
Distance to Nearest Charter	–0.0019				
	(0.0421)				
Any Charter within 2.5 Miles		0.1869			
		(0.5299)			
Number of charters within 2.5 Miles			0.1099		
			(0.4081)		
Share of charter students within 2.5 miles				–8.0722	
				(9.3698)	
Lost to Charter in Past Year (%)					–18.4525
					(35.3818)
Constant	35.9638*	35.8986*	35.9052*	36.1590*	38.6435*
	(0.8140)	(0.8347)	(0.8371)	(0.8659)	(0.8632)
Observations	722,879	722,879	722,879	722,879	597,299
Number of Student-School Spells	420,837	420,837	420,837	420,837	361,203
R-squared	0.05	0.05	0.05	0.05	0.03

Notes: Regression coefficients are for fixed-spell effects in Equation 2. Starred entries mean that the coefficient is significantly different from zero at the 5 percent confidence level. Robust standard errors are in parentheses.

Table B.4
Competitive Effects Regressions for Middle School Math

	(1)	(2)	(3)	(4)	(5)
Year = 1999	1.5779*	1.5772*	1.5750*	1.5812*	1.3832*
	(0.2573)	(0.2576)	(0.2576)	(0.2564)	(0.6114)
Year = 2000	1.1532*	1.2384*	1.2616*	1.3235*	1.1936*
	(0.4604)	(0.4273)	(0.4261)	(0.4197)	(0.4252)
Year = 2001	0.7858	0.8543	0.9033	1.0519	0.8677*
	(0.6074)	(0.5702)	(0.5743)	(0.5656)	(0.2747)
Year = 2002	–0.1112	–0.0515	0.0046	0.1861	0.0000
	(0.7428)	(0.7213)	(0.7246)	(0.7304)	(0.0000)
Magnet School	–0.5765	–0.5106	–0.4965	–0.5551	–0.5023
	(0.5334)	(0.5813)	(0.5731)	(0.5632)	(0.6295)
Free/Reduced-Price School Lunch (%)	0.0300	0.0304	0.0307	0.0289	0.0281
	(0.0172)	(0.0169)	(0.0170)	(0.0175)	(0.0169)
English Learner (%)	–0.0596*	–0.0577	–0.0591*	–0.0583	–0.0535
	(0.0297)	(0.0300)	(0.0299)	(0.0303)	(0.0299)
First-Year Students (%)	–0.0186	–0.0168	–0.0188	–0.0201	–0.0230
	(0.0287)	(0.0284)	(0.0282)	(0.0292)	(0.0285)
Distance to Nearest Charter	–0.0784				
	(0.0611)				
Any Charter within 2.5 Miles		1.4087*			
		(0.6265)			
Number of charters within 2.5 Miles			0.7010		
			(0.6627)		
Share of charter students within 2.5 miles				–13.7740	
				(24.5579)	
Lost to Charter in Past Year (%)					25.8199
					(31.7481)
Constant	43.1462*	42.1723*	42.2733*	42.9095*	42.8462*
	(1.1747)	(1.1558)	(1.1799)	(1.3516)	(1.0620)
Observations	726,785	726,785	726,785	726,785	599,348
Number of Student-School Spells	422,339	422,339	422,339	422,339	361,922
R-squared	0.01	0.01	0.01	0.01	0.01

Notes: Regression coefficients are for fixed-spell effects in Equation 2. Starred entries mean that the coefficient is significantly different from zero at the 5 percent confidence level. Robust standard errors are in parentheses.

Table B.5
Competitive Effects Regressions for High School Reading

	(1)	(2)	(3)	(4)	(5)
Year = 1999	1.7303*	1.7027*	1.7031*	1.7195*	
	(0.2402)	(0.2394)	(0.2389)	(0.2410)	
Year = 2000	2.4360*	2.4191*	2.4208*	2.4559*	0.9574*
	(0.2855)	(0.2907)	(0.2900)	(0.2940)	(0.2120)
Year = 2001	3.0081*	3.0072*	3.0074*	3.0605*	1.5108*
	(0.3424)	(0.3643)	(0.3643)	(0.3685)	(0.2728)
Year = 2002	3.6774*	3.6482*	3.6466*	3.7210*	2.1590*
	(0.4892)	(0.5111)	(0.5114)	(0.5094)	(0.4225)
Magnet School	0.0318	0.0761	0.0793	–0.0499	0.2851
	(1.2047)	(1.2372)	(1.2333)	(1.1939)	(1.2622)
Free/Reduced-Price School Lunch (%)	0.0207	0.0224	0.0222	0.0194	0.0239
	(0.0119)	(0.0121)	(0.0120)	(0.0120)	(0.0124)
English Learner (%)	–0.0139	–0.0188	–0.0181	–0.0166	–0.0198
	(0.0311)	(0.0331)	(0.0336)	(0.0328)	(0.0348)
First-Year Students (%)	0.0264	0.0269	0.0268	0.0281	0.0315
	(0.0171)	(0.0185)	(0.0185)	(0.0180)	(0.0216)
Distance to Nearest Charter	0.3033*				
	(0.1108)				
Any Charter within 2.5 Miles		–0.1577			
		(1.1209)			
Number of charters within 2.5 Miles			–0.1477		
			(0.7312)		
Share of charter students within 2.5 miles				–29.4159	
				(15.3717)	
Lost to Charter in Past Year (%)					–21.0126
					(28.1007)
Constant	31.2185*	33.8103*	33.8099*	34.3080*	34.8313*
	(1.7327)	(1.3472)	(1.3450)	(1.3446)	(1.4063)
Observations	585,314	585,314	585,314	585,314	484,106
Number of Student-School Spells	337,264	337,264	337,264	337,264	291,995
R-squared	0.01	0.01	0.01	0.01	0.01

Notes: Regression coefficients are for fixed-spell effects in Equation 2. Starred entries mean that the coefficient is significantly different from zero at the 5 percent confidence level. Robust standard errors are in parentheses.

Table B.6
Competitive Effects Regressions for High School Math

	(1)	(2)	(3)	(4)	(5)
Year = 1999	0.8109*	0.8003*	0.7986*	0.8013*	
	(0.2613)	(0.2611)	(0.2615)	(0.2606)	
Year = 2000	0.0542	0.0406	0.0461	0.0637	–0.4480
	(0.3605)	(0.3598)	(0.3604)	(0.3660)	(0.3016)
Year = 2001	–1.7429*	–1.7505*	–1.7476*	–1.7144*	–2.3032*
	(0.4731)	(0.4674)	(0.4676)	(0.4724)	(0.3692)
Year = 2002	–3.0277*	–3.0476*	–3.0517*	–3.0082*	–3.5868*
	(0.5086)	(0.5063)	(0.5074)	(0.5131)	(0.3903)
Magnet School	–0.5612	–0.5316	–0.5237	–0.6017	–0.2608
	(1.7448)	(1.7797)	(1.7696)	(1.7616)	(1.8495)
Free/Reduced-Price School Lunch (%)	–0.0017	–0.0003	–0.0010	–0.0022	0.0014
	(0.0145)	(0.0145)	(0.0147)	(0.0148)	(0.0150)
English Learner (%)	0.0164	0.0122	0.0143	0.0145	0.0115
	(0.0264)	(0.0267)	(0.0267)	(0.0264)	(0.0287)
First-Year Students (%)	0.0006	0.0008	0.0006	0.0016	0.0040
	(0.0177)	(0.0181)	(0.0183)	(0.0187)	(0.0199)
Distance to Nearest Charter	0.2013				
	(0.1387)				
Any Charter within 2.5 Miles		–0.5820			
		(0.5453)			
Number of charters within 2.5 Miles			–0.3863		
			(0.6471)		
Share of charter students within 2.5 miles				–15.8786	
				(15.4893)	
Lost to Charter in Past Year (%)					10.3569
					(38.2040)
Constant	44.6428*	46.4064*	46.3888*	46.6238*	47.1292*
	(2.3737)	(1.4911)	(1.4802)	(1.5352)	(1.5486)
Observations	590,855	590,855	590,855	590,855	488,529
Number of Student-School Spells	339,675	339,675	339,675	339,675	294,108
R-squared	0.01	0.01	0.01	0.01	0.02

Notes: Regression coefficients are for fixed-spell effects in Equation 2. Starred entries mean that the coefficient is significantly different from zero at the 5 percent confidence level. Robust standard errors are in parentheses.

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