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The Evolution of Charter School Quality

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**ABSTRACT**

Studies of the charter school sector typically focus on head-to-head comparisons of charter and traditional schools at a point in time, but the expansion of parental choice and relaxation of constraints on school operations is unlikely to raise school quality overnight. Rather, the success of the reform depends in large part on whether parental choices induce improvements in the charter sector. We study quality changes among Texas charter schools between 2001 and 2011. Our results suggest that the charter sector was initially characterized by schools whose quality was highly variable and, on average, less effective than traditional public schools. However, exits from the sector, improvement of existing charter schools, and positive selection of charter management organizations that open additional schools raised average charter school effectiveness over time relative to traditional public schools. Moreover, the evidence is consistent with the belief that a reduction in student turnover as the sector matures, expansion of the share of charters that adhere to a No Excuses philosophy, and increasingly positive student selection at the times of both entry and reenrollment all contribute to the improvement of the charter sector.

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## 1. Introduction

The role of charter schools in improving academic achievement is controversial, and existing evidence has led to contrasting conclusions about appropriate future policies. Some studies of oversubscribed charter schools in specific cities have indeed found positive achievement impacts,<sup>1</sup> though these findings have yet to be generalized. Other studies of charter schools that attempt to go beyond the oversubscribed set of schools using different methodologies have found essentially no or even negative differences in average achievement between charter and traditional public schools.<sup>2</sup> These incongruous findings provide support for both advocates and opponents of charter schools. Advocates point to the high quality of a number of oversubscribed schools. On the other hand, opponents highlight the mediocre average outcomes and large variability in performance among the broader set of schools. Drawing appropriate implications for policy from these conflicting results is nonetheless hampered by the cross-sectional nature of the analyses. For a deeper understanding of this market-oriented reform, it is necessary to examine the dynamics of the charter sector.

Little comprehensive research exists on the evolution of charter school quality. Two studies, however, provide evidence consistent with effective market forces pushing schools to improve. First, Hanushek et al. (2007) show that higher school value-added has a strong effect on the probability of student reenrollment in a charter school, suggesting that households respond to quality. Second, CREDO (2013) finds that average charter school effectiveness has improved relative to traditional public schools in a number of states. Importantly, the study shows that closure of poorly performing charter schools appears to be one of the primary mechanisms for improvement.

This paper brings new evidence to bear on these important issues. Specifically, the paper has two principal aims. First, it describes how the distribution of charter school quality in Texas, one of the largest

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<sup>1</sup> Abdulkadiroğlu et al. (2011), Angrist et al. (2012), and Angrist, Pathak, and Walters (2013) report results for charter schools in and around Boston, and Dobbie and Fryer (2011) and Hoxby, Murarka, and Kang (2009) report results for New York City.

<sup>2</sup> See, for example, evidence from statewide studies in Bifulco and Ladd (2006), Sass (2006), Booker et al. (2007), and Hanushek et al. (2007). See also the multiple state comparisons in CREDO (2009, 2013).

charter school states, has evolved between 2001 and 2011. Second, it investigates the extent to which more fundamental factors – changes over time in student turnover, student selection into and out of charters, and the share of schools that adhere to a “no excuses” philosophy – contribute to the observed changes in school quality. We focus on the latter two factors because they receive by far the most attention in the charter school policy debate, and we add the significant fall in student turnover, largely unnoticed in the debate, because unrelated analyses show the importance of turnover in generating externalities that affect achievement.

Our analysis clearly indicates that charter school quality has improved over time in Texas. In terms of value-added to mathematics and reading achievement, the distribution of charter school quality initially lies to the left of that for traditional public schools but then converges and subsequently moves slightly to the right of the public school distribution during the decade under study. Although average school value-added for charter schools and for traditional public schools is quite similar in 2011, there is compelling evidence that market forces are generating dynamic improvements in the charter sector. We thus turn to disentangling the sources of these improvements.

Each component driving the dynamics underlying the charter school distribution leads to improvement over time. First, similar to CREDO (2013), we find that schools that close are drawn disproportionately from the least effective charter schools. Second, schools that open during the period of study far outperform those that close; the average value-added for new charters is roughly equal to the average among existing charters. Third, charter schools remaining open throughout the decade from 2001 to 2011 exhibit increases in average school value-added. Together these changes raise the mean and reduce the variance of charter school value-added relative to traditional public school value-added.

The policy implications of these improvements hinge in large part on the relative contributions of changes in student composition versus real improvements in the quality of instruction. We find evidence that both forces are at work. Specifically, a reduction in student turnover as the sector matures, an

expansion of the share adhering to a no excuses philosophy, and increasingly positive student selection all contribute to the improvement of the charter sector.

The remainder of the paper is organized as follows: Section 2 provides basic background on charter schools in Texas and on the growth of this sector. Section 3 describes the data, and Section 4 details the value-added specification used to measure school effectiveness. Section 5 illustrates changes over time in the distribution of charter school effectiveness and highlights the contributions of school entry, exit, and improvement to the evolution of charter school quality. Section 6 investigates more fundamental factors contributing to the sector gains. Finally, Section 7 discusses implications for charter school policy and further research.

## **2 The Texas Charter School Program**

Texas – the focus of analysis here – is an active charter school state. Since enacting charter school legislation in 1995, the Texas charter sector has grown into one of the largest in the nation, ranking second nationally in both the number of charters operating and the number of students served by charters in 2010-11.<sup>3</sup> We begin this section with a description of the enabling legislation and subsequent modifications. We then describe the evolution of the charter school sector.

### **2.1. Institutional Structure**

The Texas Education Code establishes four types of charters: home-rule school district charters, independent school district charters, university/college campus or program charters, and open enrollment charters. Open-enrollment charters constitute the majority of charter schools and educate a substantial fraction of the students enrolled in the sector. Open-enrollment charters are awarded under the auspices of the Texas State Board of Education, which acts as the primary overseer for these schools. These schools become independent educational entities, and the state designates a unique county-district

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<sup>3</sup> U.S. Department of Education (2014), Table 216.90  
[[http://nces.ed.gov/programs/digest/d13/tables/dt13\\_216.90.asp](http://nces.ed.gov/programs/digest/d13/tables/dt13_216.90.asp), accessed June 30, 2014].

identifier for schools operating under each open enrollment charter. District charters, by contrast, are established by and accountable to the school districts in which they reside. University charters make up the remaining charters in the state and their establishment and operation is similar in character to open-enrollment charters. No home-rule district charters have been established as of this writing.<sup>4</sup>

The defining feature of open-enrollment charter schools is their receipt of public funding without many of the regulatory restrictions inherent in traditional public schools, chiefly in the realm of personnel hiring. Outside of the requirements imposed by No Child Left Behind legislation for teachers in core areas in any open-enrollment charter receiving federal funds, these charter schools have almost no restrictions on hiring and firing. In practice, they may hire teachers who currently lack certification or bring skills and experiences that may not be rewarded in conventional public schools. In addition, open-enrollment charters are able to set salary and benefit schedules freely. By contrast, district charters maintain the hiring and salary rules of their home districts. This distinction leads to some important differences in the characteristics of staff: open-enrollment charters tend to employ less experienced teachers who are less likely to have a post-graduate degree than teachers in traditional public schools. Open enrollment charters also pay, on average, lower salaries.

Despite these differences in hiring and staffing, all charters in Texas are similar in their stated goals to implement new curriculum and disciplinary practices that improve the educational outcomes of their students. The path to achieving these goals differs, however, as the public mission statements and foci of charters vary widely. Many combine standard skills enrichment with an emphasis on discipline; others center their curriculum on more specialized interests such as athletics, the sciences or music and the arts. Regardless of their curriculum, all charters are subject to the same accountability and testing requirements as traditional public schools, and measures of school contributions to achievement capture quality along a dimension central to the enabling legislation and interest in educational reform in Texas.

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<sup>4</sup> Home rule charter districts offer the possibility of increased flexibility for the entire district, but they also have a number of procedural requirements including approval by local voters. As of 2014, only the Dallas Independent School District had met the initial requirements and had a charter commission that was developing a charter for the voters, but the process is incomplete and no operations had begun.

Institutionally, there is not a one-to-one match between each charter granted and a specific school (called a campus in Texas). A charter school management organization (CMO) can apply for and hold more than one charter, and each charter can include multiple campuses in the same manner that a traditional public school district can include multiple campuses.

Figure 1 illustrates the institutional structure of the Texas charter sector and the dimensions over which a CMO can expand operations. *America Can!*, a 501(c) (3) non-profit organization, successfully applied for a charter and operated one of the first charter schools in Texas in 1997. This CMO subsequently expanded along two dimensions. First, it received an additional four open enrollment charters between 1999 and 2005 for a total of five charter districts; and second, it increased the number of campuses operated in three of the charter districts. This pattern highlights a key aspect of the regulatory structure of charter schools in Texas: the approval process of charter districts in good standing to expand the number of schools is far less involved than the process of applying for a new charter, meaning that the cost of procuring approval for an additional school is likely to be modest relative to other costs associated with adding a school.

From 1997 to 2000, there was no statutory limit on the number of open-enrollment charters granted to management organizations that committed to operate schools that served at least 75% “at-risk” students. Two changes were made in 2001. In response to reports of poor performance and mismanagement at some schools, the legislature relaxed the at-risk student composition constraint.<sup>5</sup> At the same time, a strict limit of 215 was imposed on the number of charters awarded under the open-enrollment program. This limit implicitly advantaged existing charter holders by limiting the entry of new charter holders in an environment that permitted existing charter holders to expand through the opening of new campuses.

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<sup>5</sup> Even though the at-risk requirements were modified, the charter sector has continued to enroll an increasingly larger share of poverty students compared to the traditional public school sector.

## **2.2. Open Enrollment Charter School Growth**

Figure 2 illustrates the growth of open enrollment charters between 1995 and 2011. By 2011 roughly 3.5% of public school students attended an open enrollment charter. Up to 2001, growth in the number of charter school operators and districts largely drove the expansion in the charter sector as both the number of charter holders and districts increased only slightly more slowly than the number of charter schools. After 2001, however, the numbers of charter holders and districts remained roughly stable (around 150 holders and 200 districts), while the number of schools roughly doubled.

Figure 3 shows the numbers of charter districts by active status relative to the state limit and the annual charter authorizations and discontinuations. Elimination of the separate “at-risk” charter category and more than doubling of the cap on open enrollment charters in 2001 constituted a major change, though the annual increase in the number of new charter districts declined steadily between 1999 and 2002, hovering at slightly above zero. Between 2001 and 2011, some charter school operators entered and some exited the system, some charters were revoked or voluntarily turned in, and some new charters were authorized by the state. The bulk of the increase in charter schools, however, occurred through expansion among existing charter districts. Given the low level of entry by the end of the period, it is unsurprising that the share of inactive charter districts fell below 5 percent by 2011.

## **3. The UTD Texas Schools Microdata Panel**

The cornerstone of this research is the microdata constructed by the Texas Schools Project at the University of Texas at Dallas that includes test scores, demographic characteristics, and information on school attendance and academic programs for a panel of students and schools.<sup>6</sup> Our analysis focuses on over 400 separate charter school campuses and their enrollees for the period 2001 to 2011. School information includes location, grades offered, enrollment, charter school type, state accountability rating,

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<sup>6</sup> A more detailed description of the underlying database can be found in Kain (2001) and other publications on the website for the Texas Schools Project: <http://www.utdallas.edu/research/tsp-erc/>.



and information on all staff. Student information includes demographics, mathematics and reading test results, school attended, grade, and academic program information. Students who switch schools, including those who transition between traditional public and charter schools, can be followed as long as they remain within the Texas public school system.<sup>7</sup>

Mathematics and reading assessments come from two statewide criterion-referenced achievement tests that were administered during our period of study. From 1993 - 2003, the Texas Assessment of Academic Skills (TAAS) was administered each spring to eligible students enrolled in grades three through eight. In 2003, Texas introduced a new exam called the Texas Assessment of Knowledge and Skills (TAKS).<sup>8</sup> TAKS expanded the number of subjects for which students were required to demonstrate proficiency and elevated the difficulty of the tests. Because the test structure, number of questions, and average percent right vary across time and grades, we transform all test results into standardized scores with a mean of zero and variance equal to one for each grade and year. We subsequently examine the sensitivity of these results to the imposition of a new testing regime. To avoid potential bias introduced by pooling Spanish language exams with the rest, we standardized these exams separately.

Any school without students in the TAAS/TAKS data is excluded from the sample; therefore, our number of charters will differ from public records of the number of authorized charter schools. (Note, however, that students do not have to have to complete the tests to be included in the TAAS/TAKS file). Also omitted are those charter schools exclusively serving children with special needs, residents in treatment programs, or students with diagnosed behavioral problems.

For the subsequent analysis of the sources of charter sector improvement, we construct a unique data base that incorporates the operational focus of each charter school. Specifically, on the basis of information gathered through interviews and records investigations, we classified each CMO on the basis of whether or not it adheres to a “no excuses” philosophy as defined in Section 6 and Appendix B.

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<sup>7</sup> Private schools enrollment in Texas remains relatively small at less than six percent in 2011 (U.S. Department of Education (2014)).

<sup>8</sup> The TAKS exam was recently repealed by the Texas legislature and schools will now transition to End of Course Exams.

## **4. Measuring Charter School Quality**

The primary concern in measuring charter school performance is that unobserved differences between charter school and traditional public school attendees contaminate comparisons of the achievement in the two sectors. We begin with a short review of analytical approaches used in studies of charter schools and then describe our school value-added specification.

### **4.1 Lotteries, Selection on observable characteristics, and Student Fixed Effects**

The most commonly used methods to account for potential confounding factors in the study of charter schools are lottery-based random assignment, student fixed effects, matching against the distribution of students in prior traditional public school attended, and regression that controls for prior achievement along with demographics.<sup>9</sup> Lottery studies capitalize on the random offer of admission to applicants of charter schools when the applicants exceed the number of available openings. The applicants who are randomly denied admission are used as a control group. In the absence of non-random attrition, this approach provides clear identification of the impacts of charter schools, but results cannot be generalized to the larger set of charter schools since the over-subscribed schools are likely to be among the highest quality charters.

The absence of lotteries in most schools rules out using these methods in the larger set of charters, leaving student fixed effects, matching, and value-added regression as alternative observational methods for accounting for unobserved differences between charter schools and traditional public schools. Student fixed effects estimators compare outcomes while a student attends a charter school to outcomes for the same student when attending a traditional public school. This approach fully accounts for fixed differences in ability, family background, and other achievement determinants between charter and traditional public school students. However, it does not account for time-varying differences that may be related to entry into a charter school (e.g., a temporary negative family shock that leads to low

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<sup>9</sup> Early cross-sectional studies that adjusted in one way or another for just student demographics but lacking prior achievement data have been largely discredited and abandoned as more appropriate data and research methods have become available.

achievement followed by charter school entry). Moreover, as CREDO (2013) points out, only students who switch between schools in the charter and traditional public school sectors contribute to the estimates. This restriction excludes the experiences of an increasing share of students that enter charter schools prior to 4<sup>th</sup> grade (when the testing structure first permits observing achievement gains). This reduces the effective sample sizes but more importantly might limit the ability to generalize to all charter school entrants if the educational return to attending a charter differs by timing of entry.

CREDO (2013) adopts an approach that matches charter school students to students in traditional public schools. Essentially each charter school student is matched on prior achievement and other characteristics with a similar student in one of the traditional public schools that charter school student previously attended.<sup>10</sup> This approach permits the inclusion of all charter school students in the estimation of charter school effectiveness and covers both over- and under-subscribed charter schools. It must, however, rely upon the stronger assumption of no differences in the unobserved time invariant and time varying factors for the charter and traditional public school students with whom they are matched.

In a comparison of lottery-based estimates with estimates from ordinary regression, matching, and student fixed effects approaches, Fortson et al. (2012) find that the matching method produces estimates that are not significantly different from the lottery-based estimates. By contrast, estimates produced by regression adjustments and by student fixed effect specifications tend to be significantly different from the lottery-based estimates (despite being fairly close in magnitude). Importantly, the magnitudes of these differences between lottery-based experimental estimates on the one hand and the respective observational estimates on the other potentially reflect differences both in the influences of confounding factors and in the average value-added of the traditional public schools that comprise the counterfactual. Both the lottery and matching methods construct counterfactuals from traditional public schools that provide direct education alternatives for those students choosing the charter schools, while the regression method uses all traditional public schools regardless of proximity to construct the

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<sup>10</sup> Their method creates synthetic matches by combining information on up to seven similar students in the sending traditional public schools.

counterfactual. Thus, these results in Fortson et al. (2012) may be uninformative about the magnitudes of bias in the respective estimators.

In describing changes over time in charter school quality, the lottery-based, fixed effect and matching approaches have potentially serious drawbacks. First, any general equilibrium effects on the quality of traditional public schools will be amplified as these methods base their comparisons solely on those public schools from which the charter school students are drawn even though these public schools likely face the strongest competitive, peer group and financial pressures.<sup>11</sup>

Second and more important, the value-added of the counterfactual traditional public school to which students are compared in each of these three methods is likely to evolve over time in a way that attenuates estimates of the change in average charter school value-added vis-à-vis the change in average value-added in traditional public schools. Charter school quality almost certainly affects both the quality of the applicant pool and the alternative public schools from which lottery winners and losers are drawn or charter school students are matched. The key element is the change in relevant peer groups for both traditional and charter schools.<sup>12</sup>

The traditional public school counterfactuals used in each of these estimators depend upon the traditional public school quality distributions for students who transition to a charter. Since the accuracy and availability of information on charter school quality improves the longer a school is open, the number of families that select a charter based upon inaccurate information will reduce in the charter's tenure. Perceived improvements in charter school quality would tend to raise the alternative public school quality distribution of the applicant pool of sending schools, meaning that the comparison group used to generate

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<sup>11</sup> In fact, as described below, estimates reveal a positive correlation between estimated charter school value-added and the estimated value-added of traditional public schools previously attended by new entrants to charters.

<sup>12</sup> These issues have entered into the policy discussions through a concern that school choice in general leads to the highest achieving students and most involved parents leaving the traditional public schools and thereby damage the traditional public schools by lessening the political pressure and accountability in them. At one level, this is just an element of the general equilibrium effects of charter schools, which depend on how traditional public schools react to competition. But, here we are concerned about the analytical implications when considering the dynamics of market transitions and a changing comparison group.

the counterfactual estimate of traditional public school quality likely evolves along with the perceived quality of charter schools.<sup>13</sup>

The findings in Gleason et al. (2010) illustrate the possibility that changes over time in the distribution of traditional public schools can alter estimates of charter school effects. First, the lottery-based method generates substantial heterogeneity in estimated charter school effects. Second, the estimated effect of charter school attendance is much higher for low-income students. This finding is consistent with the possibility that the gains from charter school attendance are likely higher in areas with lower-quality traditional public schools (assuming that school quality tends to be lower as poverty increases). Some of the observed variation almost certainly reflects heterogeneity in charter school effects, but the pattern is consistent with the existence of heterogeneity in traditional public school quality as well. In our context, the assumption that this distribution is static is almost certain to be violated in a manner that biases toward zero estimates of the change over time in average charter school quality.

#### **4.2 School Value-added Models**

This section focuses on direct estimation of charter school value-added. To isolate school value-added, our estimates exploit the panel structure of our data and condition on lagged test scores to account for unobserved heterogeneity and influences of prior school quality.<sup>14</sup> Estimates from this approach compare charter schools to the universe of Texas traditional public schools, thus making the generalizability of the analysis clear.

Different strands of prior research produce evidence supporting an evaluation of charter schools based on relative value-added. Although much of the research on value-added has focused in teachers rather than schools, some evidence exists on the reliability of various estimates using charter schools.

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<sup>13</sup> Note that this is not a simple mechanical “creaming” issue resulting from just higher achieving students changing schools and thus increasing achievement in the receiving school while decreasing achievement in the sending school. Each of these evaluation approaches is designed to separate the level of initial achievement of students from the value-added of the school.

<sup>14</sup> Bifulco and Ladd (2006), Sass (2006), Booker et al. (2007), and Hanushek et al. (2007) also use panel data methods to identify charter school effects.

Abdulkadiroğlu et al. (2011) and Dobbie and Fryer (2013) present evidence that lottery and observational identification strategies generate broadly similar estimates. In their study of variation in teacher value-added estimates, Guarino, Reckase, and Wooldridge (2012) find that typically considered shocks appear to introduce less bias into value-added estimates produced by the lagged-achievement model than those produced by other models, including those with student fixed effects. Third, in an examination of school effects related to racial composition, Hanushek, Kain, and Rivkin (2009) find that student fixed effects have little effect on estimates produced by models with lagged student achievement. Finally, Chetty, Friedman, and Rockoff (2014) find for that one year lagged achievement along with common demographic characteristics effectively eliminates bias in the estimation of teacher fixed effects. And, even though Rothstein (2011) provides evidence of bias introduced by endogenous sorting into classrooms, the potential for this type of bias is mitigated here by focusing on schools rather than teachers, thus aggregating across classroom placements.<sup>15</sup>

Equation (1) presents the specification used in our estimation of school quality. Here achievement  $A$  for student  $i$  in grade  $g$  and school  $s$  is modeled as a function of student, family, and peer factors and a school fixed effect that is our measure of school quality ( $\delta_s$ ):

$$A_{igs} = \alpha_{ig} + X_{ig}\beta + P_{gs} + \delta_s + e_{igs} \quad (1)$$

where  $X$  and  $P$  are vectors of contemporaneous family background and peer characteristics during grade  $g$ ,  $\alpha$  is an individual intercept specific to grade  $g$ , and  $e$  is a stochastic term capturing other unmeasured influences. The year subscript is suppressed as is the year-by-grade error component that captures grade-specific changes over time in the test instrument.

If school quality was uncorrelated with  $\alpha$  and  $e$ , standard cross-sectional OLS regression would yield an unbiased estimate of our measure of school value-added ( $\delta_s$ ). But as noted above, the choice-

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<sup>15</sup> It may be that classroom placement of students is productive, i.e., average students gains are higher in schools where student groupings and matches with teachers are optimal. For our analysis this is simply reflected in the overall school value-added, and we make no attempt to disentangle such sources of any differences in school value-added.

based determinants of school enrollment and evidence on other types of school effects suggest that typically available variables contained in  $X$  will not account adequately for potentially confounding factors. In particular, as Hanushek et al. (2007) illustrate, both time invariant and time varying unobserved differences among students could potentially introduce bias, as could student and family shocks that accompany enrollment into a charter school.

By moving to panel data on students, we can use lagged achievement to capture the cumulative effects of prior family, community and school influences. Our approach assumes that conditional on prior achievement, differences in unobserved effort, ability, or the time path of prior knowledge acquisition do not introduce bias into the estimates of school value-added.<sup>16</sup> The estimation with panel data also makes possible the inclusion of controls for transition costs associated with changing schools. This is particularly important in the study of a sector with a large share of schools in their first few years of operation and with considerable within-sector mobility.

Within this framework, we can estimate the full distribution of school quality across both traditional and charter schools. Further, and key to this study, we can trace the evolution of quality across time and can then consider how market dynamics enter.

Although uncertainty remains about the “optimal” estimator of charter-school effectiveness, we conclude that school value-added regressions that account for demographic characteristics and prior student performance provide the best approach to learning about the evolution of the entire distribution of quality in the charter sector. Moreover, given the focus on changes over time in charter school quality, we rely on the assumption that the direction and magnitude of any bias remain stable over time and not the stronger assumption that the estimator produces unbiased estimates in all periods.

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<sup>16</sup> For direct analysis of the reliability of this approach, see Chetty, Friedman, and Rockoff (2014).

## 5. Evolution of the Charter School Quality Distribution

In this section, we first describe changes over time in charter school mathematics and reading value-added between 2001 and 2011 relative to traditional public schools. Subsequently, we examine the contributions of school improvement, school closures, and the entry of new schools to these changes.

### 5.1 Quality Changes

Figures 4 and 5 illustrate changes over time in the distributions of charter and traditional public school mathematics and reading value-added, respectively.<sup>17</sup> The top panel of Figure 4 shows that the distribution of charter school mathematics value-added was located to the left of the corresponding distribution for traditional public schools in 2001 and exhibited much higher variation. In subsequent years, the difference between sectors in both the location and variance of the distributions shrank steadily. By 2011, the distributions roughly coincide, though the charter school distribution continues to exhibit slightly more dispersion.<sup>18</sup> The larger variance in the charter school distribution may result in part from the smaller average school sizes and consequently higher error variance in the sector; the almost 50 percent increase in average charter school enrollment between 2001 and 2011 likely contributed to the decline in dispersion over this period. Nonetheless, evidence below indicates that the closure of many low performers also contributed significantly to that decline.

Importantly, evidence in Hanushek et al. (2007) showing charter school improvement in the early years of school operation suggests that these figures could understate relative sector quality and may even understate improvement given the rapid growth of the sector. Figure 2 illustrated the increase in the number of charter campuses over this period, a circumstance addressed in Figure 4b. This figure implicitly holds the age distribution of charter schools constant by reporting kernel density distributions based on residuals from estimates of school value-added on indicators for the first through fourth years of

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<sup>17</sup> Figures 4a and 4b report value-added distributions for the odd-numbered years, but results for all years produce a similar picture of monotonic changes.

<sup>18</sup> Note that the differential declines between 2001 and 2003, the period in which the state switched from the TAAS to the TAKS test, and between 2003 and 2011 when the TAKS was used throughout. This consistency indicates that the observed pattern is not just a testing phenomenon.



operation with the indicators set to zero for traditional public schools. The coefficients on the indicators (not reported) support the previous findings of significant quality improvement during the initial years of operation. Nonetheless, these controls have little effect on the observed pattern of charter school improvement, consistent with the fact that the share of schools in the early years of operation has remained fairly stable.

Figures 5a and 5b present quality distributions for reading, and the pattern is quite similar to the pattern reported for mathematics. Again, relative charter school effectiveness rises throughout the period, and the improvement is similar in distributions that adjust for length of charter school operation.

Together the results for mathematics and reading paint a consistent picture of gains in charter school effectiveness. Overall, the average performance of charter schools relative to traditional public schools improved over this period by 0.11 standard deviations of achievement in mathematics and an even larger 0.2 standard deviations of achievement in reading. This is a large change in comparison to typical estimates of the variance in teacher quality or the benefits of a large reduction in class size, particularly given the absence of an increase in average school spending. Note that all of the average gain in mathematics and 0.11 over half the gain in reading occurred between 2005 and 2011, consistent with the notion that improvement in the charter education market unfolds over time.

The interpretation of these figures with respect to the absolute level of charter school quality depends in part upon any overall trends in Texas schools. If, for example, the quality of traditional public schools in Texas is falling over this period due to the expansion of the charter sector or other factors, the catch-up of charter schools may not indicate much if any quality improvement. Alternatively, if traditional public schools improve – either in response to competition from the charter sector or for other reasons – the observed increase in charter school quality would actually understate the improvement in charter school effectiveness. Imberman (2011) highlights the difficulty of identifying the causal effect of competition on traditional schools resulting from charter schools. Therefore we simply describe changes over time in state average achievement to provide a context for the relative improvement of the charter sector.

During the sample period public schools in Texas showed overall improvements. The average score on the National Assessment of Educational Progress (NAEP) improved from 2000-2011 for fourth and eighth grade math and from 1998-2011 for fourth grade reading.<sup>19</sup> Public school performance held constant for eighth grade reading from 1998-2011. Moreover, because the population of Texas has become more heavily weighted over time toward blacks and Hispanics, who have scored below the white average, this improvement in the overall average is notable. Looking at subgroups, whites, blacks, and Hispanics each improved over this period on all of the NAEP tests including eighth grade reading.<sup>20</sup> Thus, the relative improvement of charter schools is not driven by a decline in the average quality of traditional public schools.

## **5.2 Entry, Exit, and Improvement**

The first look at the source of the underlying rightward shifts in the charter school value-added distributions comes from a description of charter school entry, closures, and improvement (Table 1).<sup>21</sup> The average improvements of 0.11 and 0.20 standard deviations in mathematics and reading, respectively, came from a combination of: (1) improvement in charter schools that persist throughout the period (Panel A); (2) the disproportionate closure of low value-added schools (Panel B); and (3) an average value-added of new schools that far exceeds that of the schools that closed (Panel C). Value-added increased by 0.06 standard deviations in math and 0.11 standard deviations in reading for schools open at both the beginning and end of the period. The difference between the average value-added of schools that closed during the period and those that entered equals 0.28 standard deviations in math and 0.40 standard

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<sup>19</sup> NAEP is a national test, often called the “Nation’s Report Card,” given to representative samples of students in all states. It has reported state performance in math and reading at grades 4 and 8 every two to four years since 1992. Reading tests were not available in 2000 but were available in 1998.

<sup>20</sup> Note that schools across the country also tended to improve on these tests over the period, perhaps indicating the impact of federal accountability legislation (No Child Left Behind, or NCLB). Nonetheless, Texas students as a whole and across the racial/ethnic subgroups generally improved more than the national average over this period.

<sup>21</sup> As noted, the tests changed in 2003. Appendix A provides a similar description for just the 2004-2011 period when the TAKS test was used throughout. For this shorter period, the same patterns of charter school improvement hold, although the magnitudes of change are smaller.

deviations in reading .<sup>22</sup> The major contribution of entrants to the overall changes in the distribution of charter school quality is amplified by the large number of entrants relative to the number of charter schools continuously open and relative to the number that closed between 2001 and 2011.

The much higher average value-added of entrants compared to exits suggests systematic differences in the quality of charter management organizations that expanded relative to those that contracted. To examine this relationship more closely, we construct a panel that identifies annual changes in the number of schools operated by each charter management organization. We directly estimate the relationship between CMO expansion and quality using regressions of the change in the number of schools operated on the average mathematics and reading value-added of the CMO and year fixed effects. Columns 1 and 2 of Table 2 show a strong, positive relationship between the change in the number of schools and average value-added of the schools operated in the previous year that is robust to the inclusion of CMO fixed effects. This pattern is consistent with the notion that quality affects demand for a CMO's schools, and CMOs respond in part by expansion or contraction of the number of schools in operation.

The remaining columns explore the possibility of asymmetry in CMO expansion and contraction. Columns 3 and 4 report the value-added coefficients from linear probability regressions of an indicator equal to one if the CMO increased its number of schools on value-added; and Columns 5 and 6 report the coefficient from a regression where the dependent variable is an indicator equal to one if the CMO decreased its number of schools. Again regardless of whether CMO fixed effects are included, the probability of increasing the number of schools in operation is positively related to average CMO value-added in the prior year, and the probability of decreasing the number of schools in operation is negatively related to CMO average value-added. This pattern is consistent with the notion that higher-quality CMOs increase their market share over time.

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<sup>22</sup> The value added of schools that closed is measured in 2001 while that of entrants is measured in 2011 meaning that a portion of the gap may result in part from the higher average experience of entrants at the time of measurement. However, the small differences in the overall school tenure distribution suggest that the impact of tenure is likely to be minimal relative to fixed differences in school performance.

## 6 Sources of Improvement

A key issue is the extent to which superior performance of successful charter schools is driven by more effective school operations as opposed to a more positively selected student body. These alternative mechanisms for charter school performance have fueled the policy debate about charter schools. The apparently strong performance among schools that adhere to a “no excuses” philosophy (described below) has received particular attention. In this section we describe changes over time in both the share of schools that adhere to such a philosophy and the selectivity of charter school students and then examine the associations among these variables and estimates of charter school effectiveness. We also add consideration of student turnover as a third factor based upon existing evidence of its importance and its dramatic decrease in the Texas charter sector as the sector matures. Note that the absence of compelling sources of strictly exogenous variation precludes causal claims. The sensitivity of the no excuses estimates to the inclusion of the other variables in combination with existing external evidence on the effects of turnover and peers, however, provide evidence that each of these factors is a likely contributor to the observed improvements in the charter sector.

The belief that students are inputs into education production in addition to being consumers of its output guides the model of schooling demand in the seminal work by Epple and Romano (1998). It has been reinforced by extensive work on peer effects in schools.<sup>23</sup> Informal conversations with CMO executives indicate that many share this belief. These executives, however, tend to emphasize peer behavior rather than peer achievement. The no excuses philosophy encapsulates this theory, often featuring a number of rules or policies including strict discipline, contracts that require parental commitment, and uniforms aimed at creating a positive environment for learning.<sup>24</sup> These rules may contribute to a positive environment both through their direct effects on behavior and through their influence on enrollment and reenrollment decisions. Recent evidence on the determinants of charter school quality reported in Furgeson et al. (2012), Angrist, Pathak, and Walters (2013), and Dobbie and

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<sup>23</sup> See the review in Sacerdote (2011).

<sup>24</sup> See Thernstrom and Thernstrom (2003), Mathews (2009).

Fryer (2013) highlights the particularly strong performance of charter schools that set high expectations, adopt a no excuses philosophy, or require uniforms. These studies, however, also raise the possibility that student selection – intentional or simply a response to school practices – contributes both to the strong performance of no excuses schools and to the improvement in Texas charters overall.<sup>25</sup>

We begin with a description of trends in these key factors previously identified in the literature. These can be directly related to performance in a standard “growth accounting” way based on existing causal estimates of their effect. We then estimate the relationship between mathematics and reading value-added on the one hand and these three factors on the other in a series of specifications designed to provide information on the sensitivity of the estimates to the inclusion of the other factors.

### **6.1. Trends over time**

The most straightforward trend we observe is the increased stability of attendance in the charter sector as it grows and matures. Previous analysis suggests that the disruption generated as a consequence of large numbers of students changing schools negatively impacts student achievement (Hanushek, Kain, and Rivkin (2004)). Hence, we begin by comparing the evolution of student mobility in the charter and traditional public school sectors. Figure 6 traces the proportion of charter and traditional public school students that are new to their school. For this, we restrict the sample to students attending a grade in schools where the prior grade was offered; i.e., the sample excludes students in brand new schools or the first grade offered in a school. Remarkably, the annual share of new students exceeded, on average, 50 percent in charter schools until 2006. The percentage of new students, however, declined by almost thirty percentage points between 2001 and 2011, although the level remained twice that of the traditional public schools.

To see the changes in composition of the students in charter schools, Figure 7 plots the mean differences in math and reading achievement and the probability of committing a disciplinary infraction between traditional public school students who transition to a charter school in the subsequent year and

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<sup>25</sup> Nichols-Barrer et al. (2014) consider the conjecture that student attrition from KIPP schools might explain their success but reject it.

their schoolmates who remain in the traditional sector. The high rate of charter school turnover shown previously, however, also means that the characteristics of new entrants may not fully capture the overall degree of selection. Therefore, the top panel compares all charter school entrants to schoolmates who remain in the traditional public sector, and the bottom panel compares only charter entrants who remain in the charter school into the second year with the same set of schoolmates. Importantly, all comparisons of achievement and behavior apply to those during the year prior to charter school entry and thus rule out any influences of the charter school. Moreover, disciplinary infraction comparisons within a traditional public school at a point in time hold constant infraction policies and procedures and isolate differences in behavior. Note that we first compute the differences between each charter school entrant and her schoolmates who remain in the traditional public sector and then average over the sample of entrants.

Between 2001 and 2004, the entering achievement and behavior characteristics of charter-school students largely did not improve relative to schoolmates who remained in the traditional public sector, but this picture changed markedly in subsequent years for both all entrants and those who remained into their second year at the charter. The average difference in mathematics achievement between students who entered a charter school and schoolmates who remained in the traditional sector was -0.23 standard deviations in 2001, fell to -0.30 in 2004, and then rose to -0.05 in 2011; the corresponding differences for reading were -0.20 standard deviations, -0.21, and 0.03, and the corresponding differences in the probability of a disciplinary infraction were 0.06, 0.16, and 0.05. In sum, student selection into charter schools moved from being negative in 2001 to roughly neutral in 2011 based on achievement but changed little in terms of behavior.

Entrants who remained in their charter schools into the second year following the transition were less negatively selected in 2001 and generally more positively selected in 2011 than new entrants as a whole, indicating adverse selection out of charters. By comparison, differences between the traditional public school students who initially remained in the traditional sector but switched schools in the subsequent year and those who remained in their traditional school into the subsequent year were far

smaller than the differences between all charter entrants and those who remained at their school into the subsequent year (not shown).

Finally, Figure 8 shows that, by our measures, the share of students attending schools classified as adhering to a no excuses philosophy rises from roughly 18 to 38 percent between 2001 and 2011. This change in school operations thus also has the potential for explaining a portion of the achievement gains of charter schools. Importantly, the designation of a CMO as adhering to a No Excuses philosophy is not straightforward, as many that appear to operate with rules and practices that correspond to the No Excuses philosophy do not designate themselves in this way. Appendix B describes the extensive information and decision-rules that we use to determine whether a CMO follows a No Excuses philosophy.

## **6.2. Growth Accounting for Charter School Improvements**

There is evidence from other studies that these trends in enrollment, selection, and no excuses philosophy likely contributed to the improvement in the charter sector. In this section we employ estimates from existing studies on student turnover and prior peer achievement to assess their contributions to the observed trends in performance of Texas charter schools. Specifically, we consider how much of the improvements in average charter school mathematics and reading value added can be plausibly attributed to student turnover and changes in peer composition. In the following section we investigate the possibility that selection and turnover account for a portion of the previously noted high performance of no excuses schools. Data limitations hinder efforts to identify the causal effects of specific aspects of school operations including those associated with the no excuses approach, though the findings in Furgeson et al. (2012), Angrist, Pathak, and Walters (2013) and Dobbie and Fryer (2013) strongly suggest that adherence to this model raises achievement.

The estimates in Hanushek, Kain, and Rivkin (2004) suggest that the substantial decline in the new-student share could account for a sizeable portion of the increase in charter school mathematics value added. The approximately 20 percentage point decline in the relative share of students that are new to the schools contributes by those estimates to roughly .04 standard deviations to the improvement of relative

charter school performance between 2001 and 2011.<sup>26</sup> In other words, the greater sector stability *per se* accounts for over one third of the decrease in the average mathematics value-added gap between charter and traditional public schools. This estimate of course does not provide the source of the decline in student mobility, although it is likely that at least a portion of the lower turnover results from an improvement in school operations. (Note that this is an estimate of the externality of high student turnover and is not any direct effect of moving on students).

Obtaining a similar estimate of the impact of changing student peer groups on the growth in charter school quality is more difficult, because the existing peer effect literature is broad and complex. As is well recognized, a number of factors impede identification of peer achievement effects, but some of these complications lessen if the focus is on prior, predetermined peer achievement. By and large, the weight of the evidence suggests this relationship with peer achievement is positive.<sup>27</sup> For our purposes, even with an estimate of the impact of peer quality, it is difficult to estimate the impact of changes in peers on the path of charter school improvement from the annual flows summarized in Figure 7. Those entering a charter school in an early grade may differ substantially from those entering in a later grade. Consequently, changes over time in the selectivity of students who enter a charter school during tested grades might not capture average changes across the entire population. Moreover, the increase in the low-income share of charter-school enrollment likely offsets some of the increase in selectivity given the lower average achievement of lower-income students. Nonetheless, the estimates from Hanushek et al. (2003) on Texas can be used to produce an upper bound on the contribution of improvements in peer achievement to the relative increase in charter school mathematics value added.<sup>28</sup> Under the very strong assumption that the 0.2 standard deviation increase over time in the selectivity of entrants equals the

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<sup>26</sup> Hanushek, Kain, and Rivkin (2004) find that the added disruption of high turnover creates an externality. That analysis is based on value-added models of achievement in Texas that include student, school-by-year, and school-by-grade fixed effects to account for confounding factors including perceived school quality and neighborhood shocks. A ten percentage point higher level of mobility reduces mathematics achievement by approximately 0.2 standard deviations in Texas public schools (independent of any impact on the individuals who move).

<sup>27</sup> An extensive review of the evidence is found in Sacerdote (2011).

<sup>28</sup> Hanushek et al. (2003) do not provide any estimates for reading achievement. For math, a one standard deviation increase in peer average mathematics achievement is estimated to improve student math scores by 0.15 s.d.



increase over time in charter school peer average mathematics achievement, selection on mathematics achievement accounts for no more and probably much less than 0.03 standard deviations out of the 0.11 standard deviation increase in charter school value added.

Note that some of the public discussion confuses the effects of selection into charter schools on school quality with the effects on average achievement. It is certainly the case that the increased selectivity raised observed achievement levels. However, we measure quality on the basis of achievement value-added regressions that explicitly condition on prior achievement. Therefore the primary pathway through which greater selectivity or “creaming” affects school quality is by improving peer group quality, and the evidence strongly suggests that such improvements have had a significant but small effect on average charter school value-added.

### **6.3 Student Turnover, Selection, and No Excuses Effects in Texas**

For policy, a pressing question is the extent to which student selection accounts for the higher performance of charter schools that adhere to a no excuses philosophy or other characteristics associated with superior outcomes. In order to gain a better understanding of the interrelationships among turnover, selection, and adherence to a no excuses philosophy, we estimate a series of models that regress mathematics or reading value added on various combinations of these variables.<sup>29</sup>

In the simplest models without school fixed effects found in Columns 1-4 of Table 3, the coefficient on the no excuses indicator equals 0.169 s.d. in the mathematics value-added specification without the other variables but falls by roughly 40 percent to 0.096 s.d. following the inclusion of the selection on achievement and turnover variables. Inclusion of the proportion new students variable alone

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<sup>29</sup> For this, the selection at the time of entry and reenrollment variables are computed as follows: first, each charter school entrant is assigned the difference between their prior achievement (or receipt of a disciplinary infraction) and the average among their traditional public school peers that remain in the traditional public sector. Next, these differences are averaged over all students that enter each school. The reenrollment selection variables are computed similarly with the exception that the differences are averaged over only those students who remain in the same charter into their second year. For students who enter a charter school in year  $t$ , the degree of selection upon entry is related to value-added in year  $t$ , while the degree of selection at the time of reenrollment for the second year is related to value-added in year  $t+1$ . Standard errors are clustered at the school level; clustering at the CMO level has little effect on the standard errors.

drops the coefficient to 0.106, and the addition of the selection on achievement variables leads to the additional 0.01 drop. Nonetheless, the no excuses coefficient remains highly significant, indicating that average value-added in no excuses charters exceeds that for other charters even controlling for both turnover and selection. Moreover, the inclusion of the selection on disciplinary infractions variables do not decrease the no excuses advantage, supporting the notion that this dimension of student composition does not drive the changing performance of charter schools.

Despite the absence of a compelling source of exogenous variation in charter school philosophy, these estimates provide information with which to consider the likely contributions of student composition to existing estimates of the benefit of adherence to a no excuses philosophy. They suggest that turnover rather than selection is likely to account for a greater portion of the no excuses effect, though the exact portions depend upon variation in each of these variables in the sample under consideration. Moreover, these results also indicate that student peer composition does not account for a majority of the effect. Importantly, there is substantial variation in the operations and quality of schools classified as no excuses, and the performance differential almost certainly varies across samples of such schools.

The year-to-year variation in the selection and turnover variables permits estimates of these variable effects in specifications that include school fixed effects (although the no excuses designation is absorbed by the fixed effects). The pattern of results in the final four columns of Table 3 illustrates the strength of the relationship between school value-added and selection on prior achievement. In particular, a highly significant positive relationship emerges between school value-added and the mathematics achievement differentials. This finding is unaffected by changes in the sample of students used in the comparison: when computed over all entrants, we find a positive .0075 whereas focusing only on those who persist to their second year yields a coefficient of .045 that is not significantly different. Moreover, these estimates decline only slightly following the inclusion of the proportion of new students and the selection on disciplinary infraction variables (column 8). Note that the selection on disciplinary infraction variables both have the expected negative signs but are not significant at the 10 percent level. It is

certainly possible that a variable constructed from more detailed information on classroom behavior would exhibit a stronger relationship with value added.

The no excuses coefficients in the full specification (Column 4) can also be used to estimate the contribution of the growth in the share of schools that adhere to a no excuses philosophy to the increase in charter school value-added, though these estimates should be considered suggestive given the absence of clear causal identification. Based on the 20 percentage point increase in the no excuses charter share, the coefficient of 0.096 indicates that the increase in the no excuses share accounts for slightly less than an additional 0.02 standard deviations of the 0.11 s.d. increase in mean mathematics value-added for charter schools relative to traditional public schools.<sup>30</sup>

A similar pattern of estimates emerges for reading value-added. We therefore focus only on some salient differences. First, the estimated impact on performance of no excuses charters is smaller in specifications without the other variables and falls by an additional amount following their inclusion. In the full model the no excuses coefficient for reading falls a little below two-thirds of the corresponding coefficient for math, though it remains highly significant. Second, the estimated relationship between reading value-added and selection at the time of reenrollment is quite small and insignificant. In combination with the much larger improvement in charter school average reading value added, the results suggest that these factors are associated with a much smaller share of charter school increases in reading than in mathematics value added.

#### **6.4 Other Contributing Factors**

Classification as no excuses is of course not the sole important dimension of school operations, and there are certainly other aspects of school operations, most notably the quality of leadership and instruction, that almost certainly vary among schools regardless of their philosophy. In fact, informal

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<sup>30</sup> Using the estimates in Col. 4 in growth accounting, we would find a somewhat larger contribution of student turnover (approximately 0.06 versus the previous 0.04) and virtually the same contribution of peer effects of changing math achievement. However, the estimates from Col. 8 imply larger contributions of changing peer math achievement but smaller (and statistically insignificant) estimates for student turnover when school fixed effects are included.

conversations with several executives employed by some of the largest CMOs operating in Texas, including several from no excuses CMOs, reveal a strong emphasis on finding and developing effective school leaders. Some CMOs devote substantial resources to the training of school leaders including year-long apprenticeships. These programs differ considerably from the traditional public school job ladder of teacher to assistant principal to principal. Other CMOs bemoaned the inability to afford such programs. Importantly, this commitment to leadership did not seem to depend on the degree of authority granted over personnel or programmatic decisions. Given the difficulty of measuring leadership performance, it is difficult to evaluate its contribution, but this would seem to be a primary area for further investigation.<sup>31</sup>

## **7 Discussion and Conclusion**

Using administrative microdata on schools and students, we trace the evolution of charter school quality in Texas and establish that charter schools have improved relative to traditional public schools over the observation period of 2001-2011. The distributions of charter school value added in mathematics and reading converged to those for traditional public schools despite substantial growth in the number of charter schools during this period.

The analysis provides support for the belief that market forces are generating dynamic improvements in the charter sector. First, consistent with existing evidence, we find that schools that close are drawn disproportionately from the less effective part of the charter school distribution. Second, we find that schools that open during the period of study far outperform those that close, with average value-added for new charters roughly equal to the average for existing charters. Finally, charter schools remaining open throughout the decade from 2001 to 2011 exhibit increases in average school value-

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<sup>31</sup> See Branch, Hanushek, and Rivkin (2012) on both the potential importance of principals and the difficulty of measuring differences among principals. Bloom et al. (2014) also point to the importance of management in schools, relying on surveys of specific management practices. England has introduced Academy Schools which call for conversion of traditional public schools into institutions very similar to charter schools, and this has led to positive but heterogeneous impacts on student performance. When surveyed, a majority of the Academy Schools indicated that change in leadership was the most important element of their conversion; see Eyles and Machin (2014).

added. Together these changes raise the mean and reduce the variance of school value-added relative to traditional public schools.

In looking deeper into the sources of these improvements, we find support for the beliefs that an expansion of the share of schools that adhere to a no excuses philosophy, increases in the selectivity of entering students, and a reduction in student turnover as the sector matures contribute to the charter sector's improvement, though much of the improvement remains unexplained by these three factors. Although the first two of these lie at the center of the debate over the desirability of the charter school reform, it is the third that makes the largest contribution based on existing evidence on the adverse effects of turnover on the learning environment.

Perhaps most important, the results highlight the value of taking a longer-term perspective on the impact of such a major education reform, particular one that relies on parental decisions and market forces. The relaxation of constraints on school management opened public education to many with little prior experience, and the large variation in school quality observed during the early years is consistent with growing pains associated with new markets. As schools improved, more successful CMOs expanded and many less effective schools left the market. Also, a much smaller share of charter school students were exposed to the type of instability and poor quality that likely precipitated many transitions.

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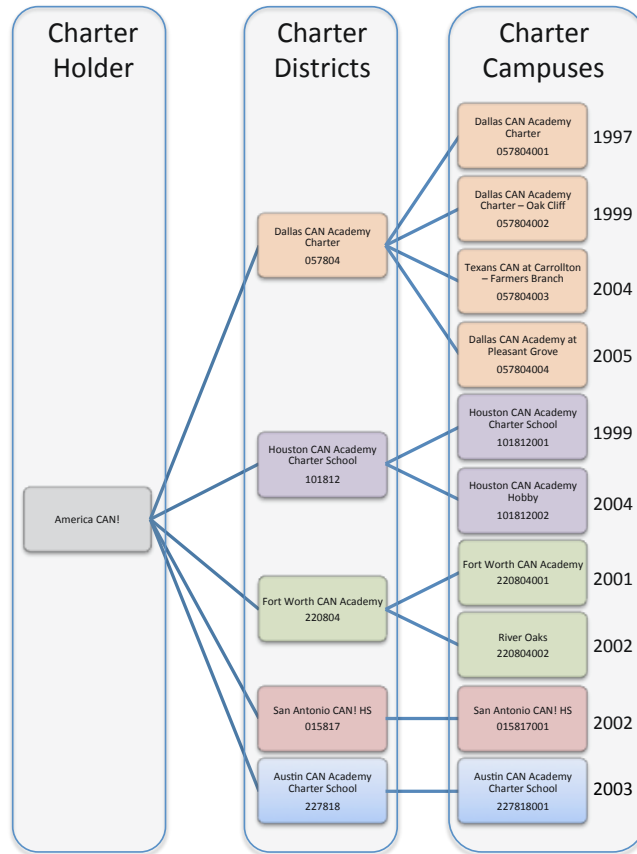
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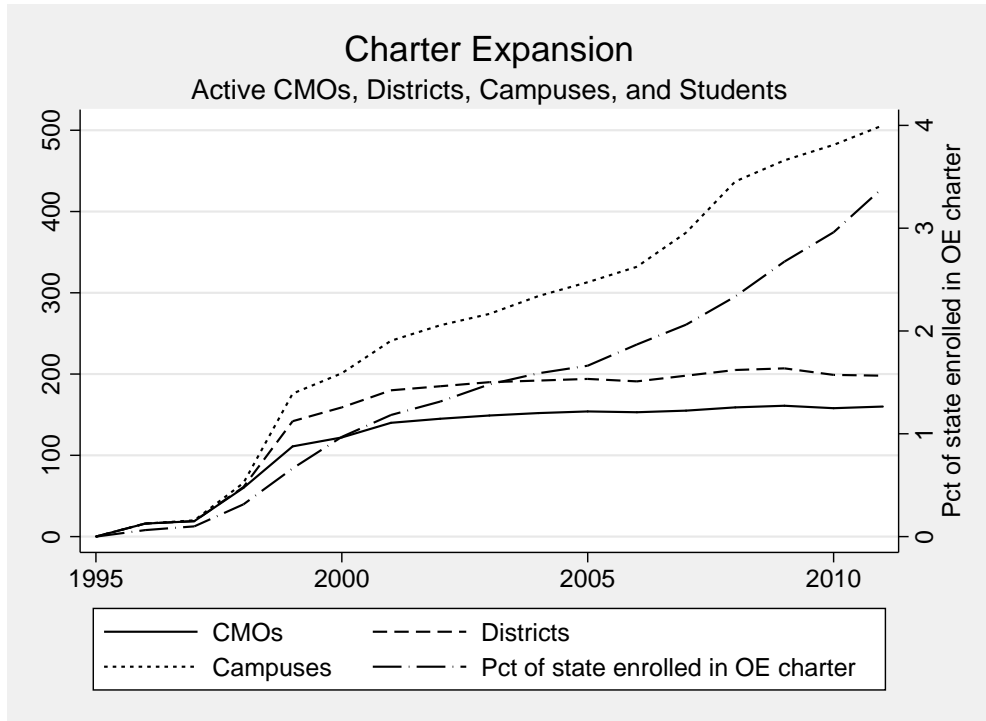


**Figure 1: An example of the charter sector organizational structure: the expansion of the America Can! CMO**

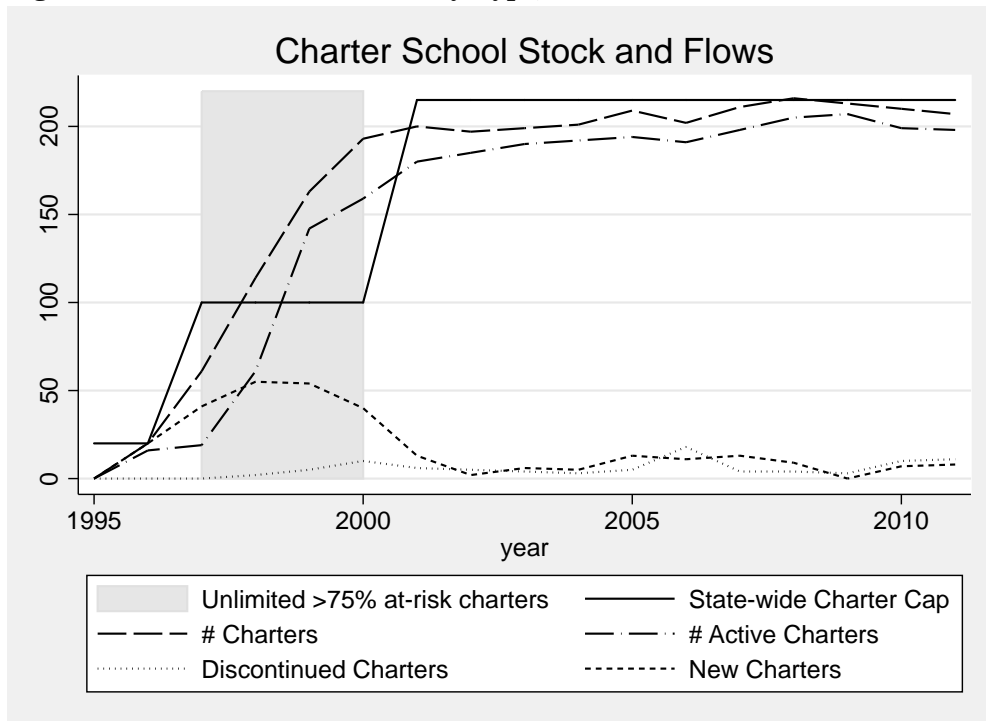


Note: The number in each district and campus block refers to the relevant state ID code.

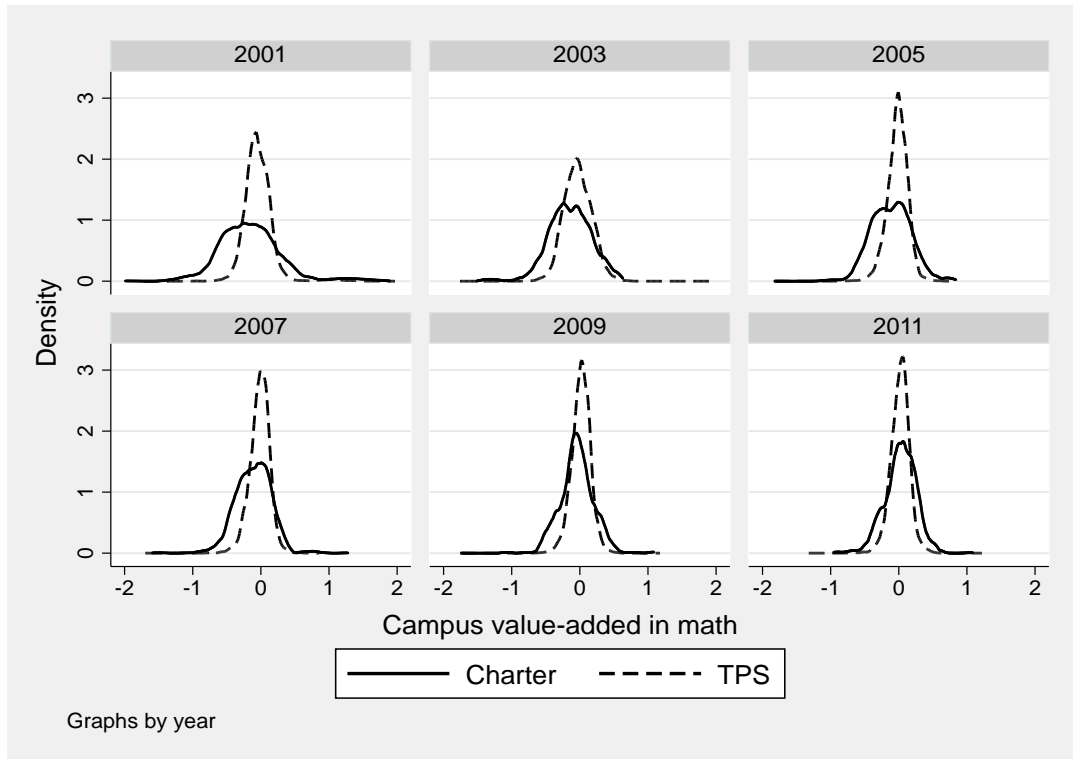
**Figure 2: The Growth in the Numbers of Open-enrollment Charter Schools, Districts, and CMOs and the Share of Students Enrolled in an Open-Enrollment Charter School, 1995-2011**



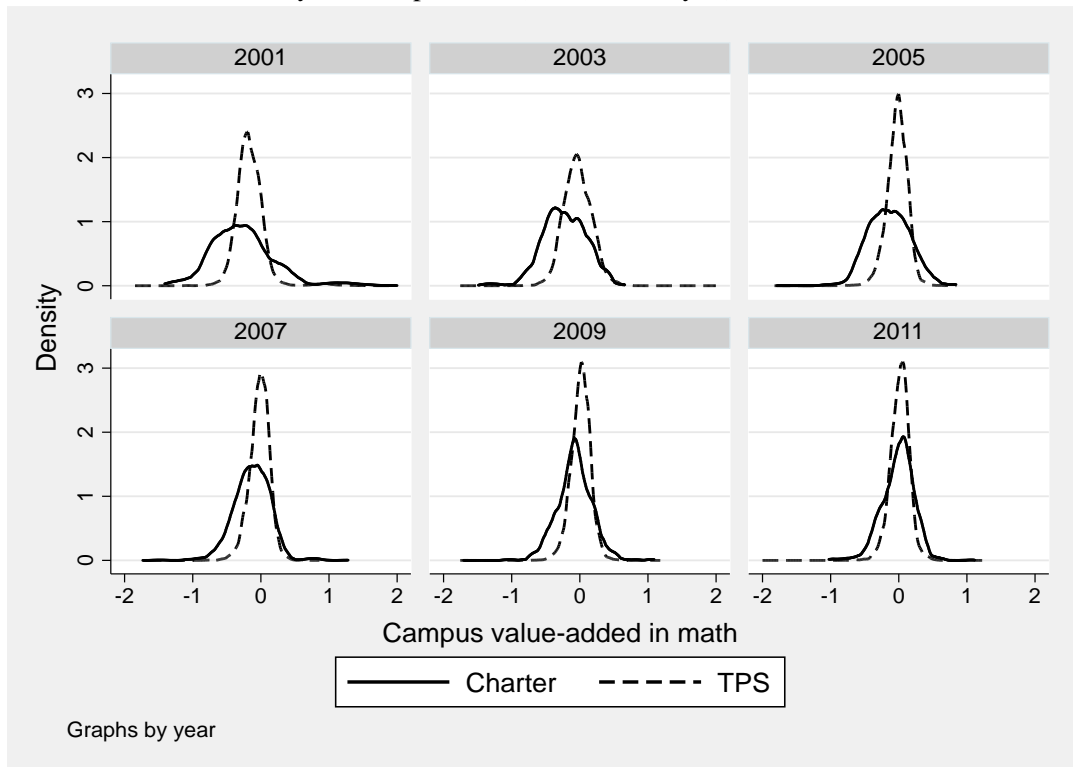
**Figure 3. Stock of State Charters by Type, 1995-2011**



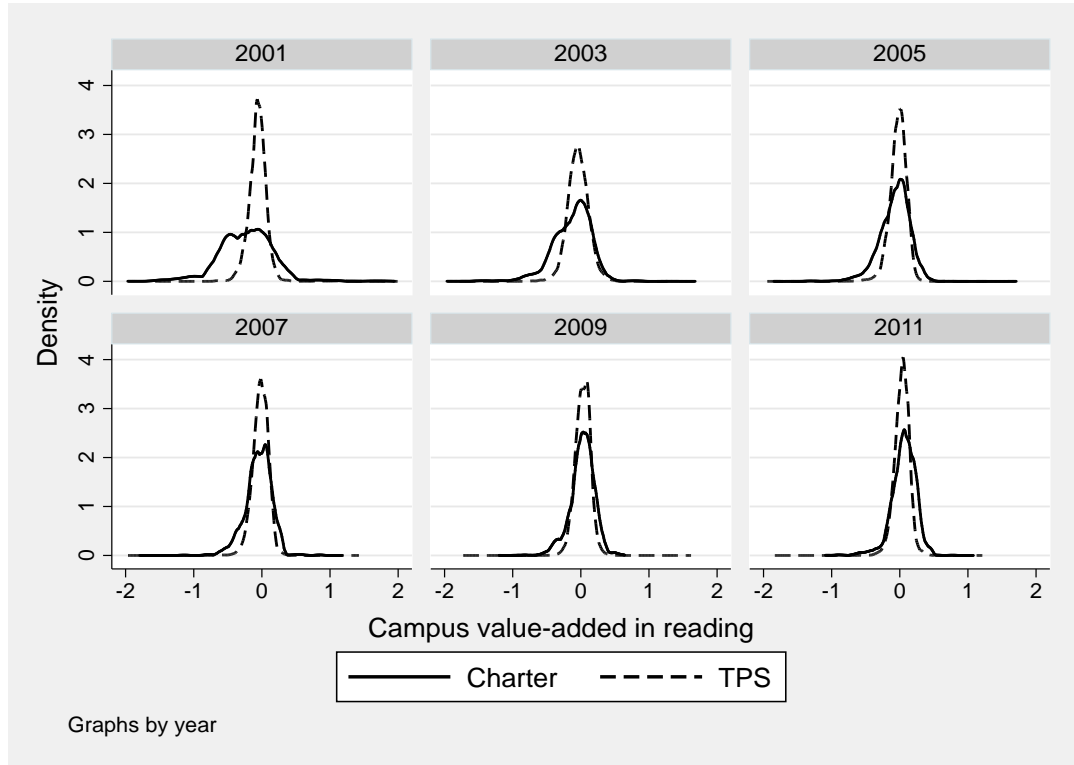
**Figure 4: Distributions of School Quality as Measured by Mathematics VA, by Year**  
Panel A: No controls for years of operation.



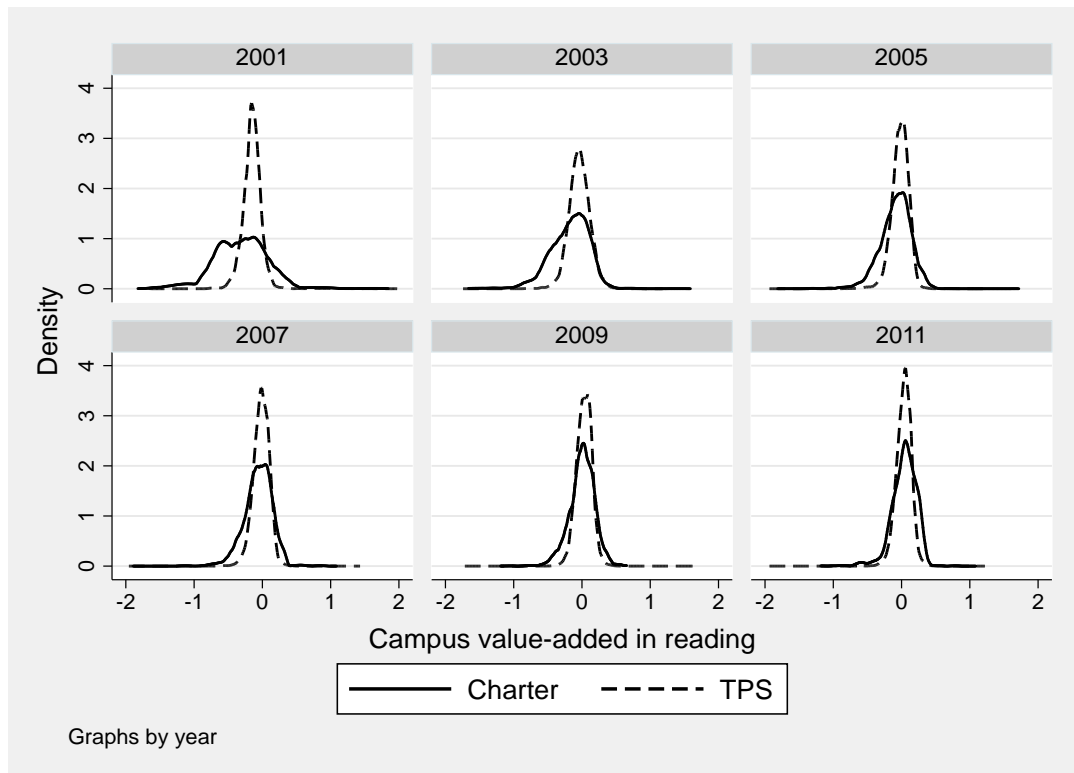
Panel B: Conditional on years of operation (1, 2, 3, 4, 5+ yrs.).



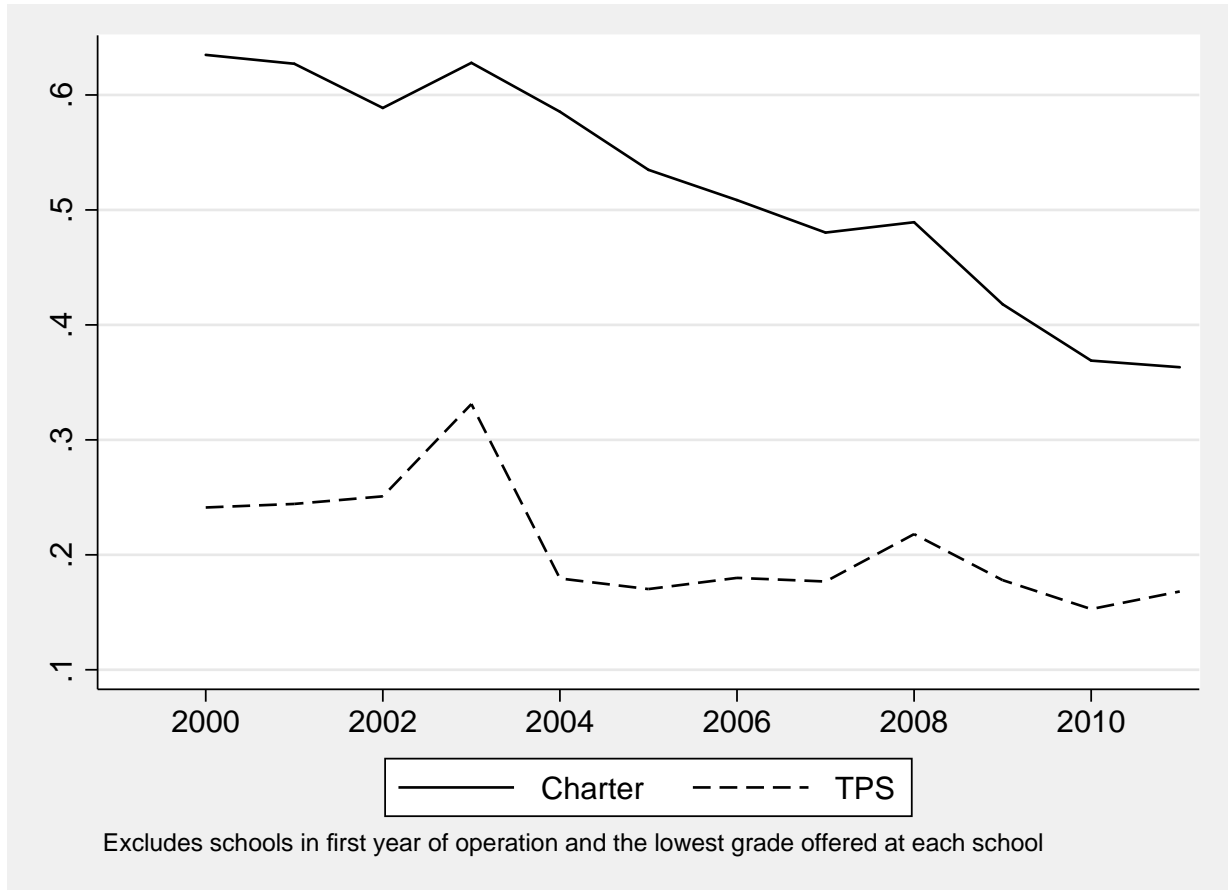
**Figure 5: Distributions of School Quality as Measured by Reading VA, by Year**  
Panel A: No controls for years of operation.



Panel B: Conditional on years of operation (1, 2, 3, 4, 5+).

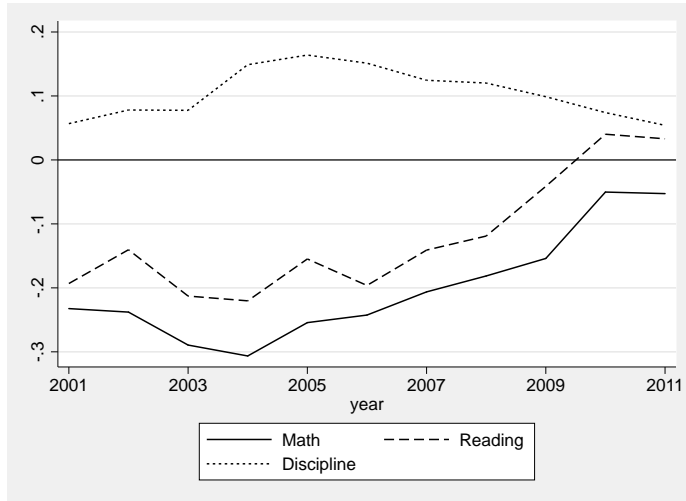


**Figure 6: Proportion of Students that are New to the School in the Charter and Traditional Public School Sectors: 2001 to 2011**

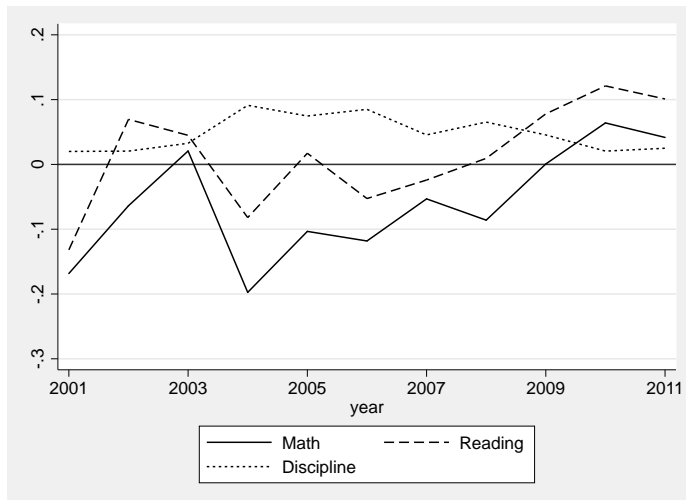


**Figure 7: Trends Over Time in Selection into the Charter Sector by Prior Mathematics and Reading Achievement and the Probability of Receiving a Disciplinary Infraction, by Subsequent Transitions of Charter School Entrants: 2001-2011**

Panel A: All Charter School Entrants

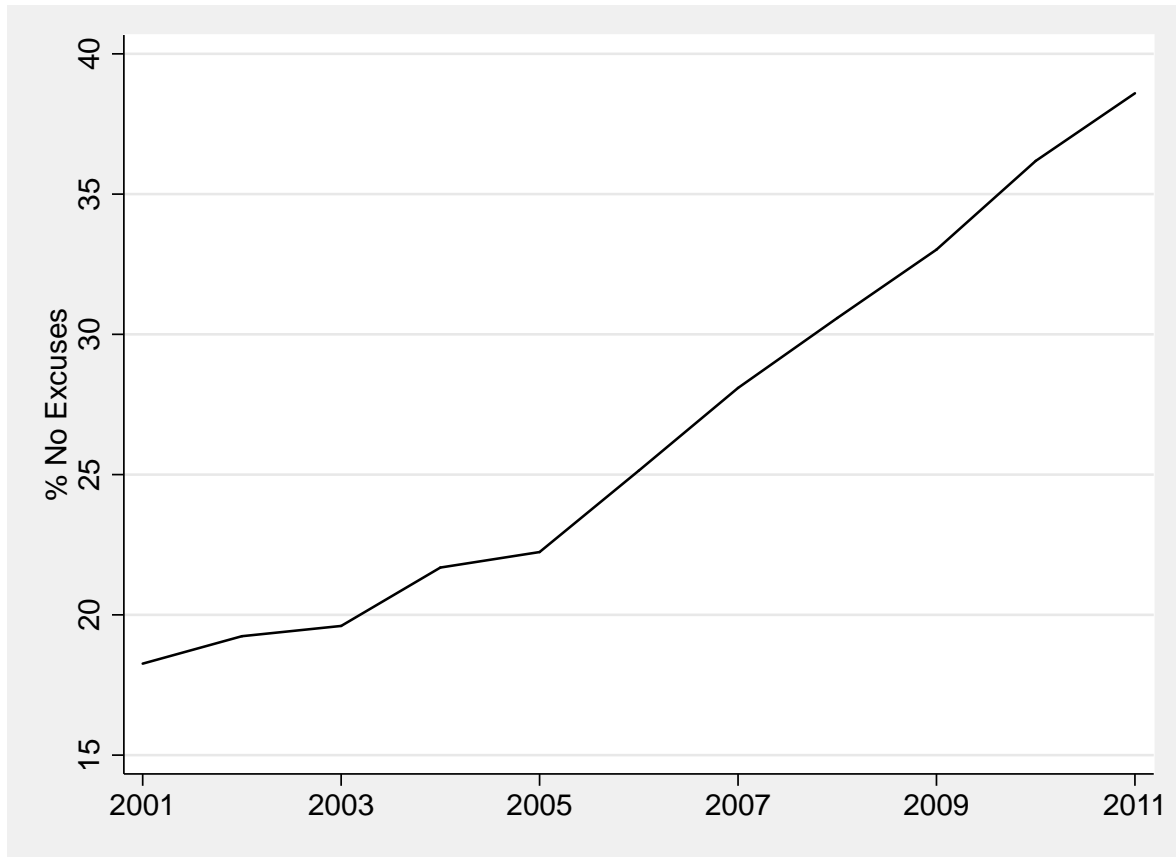


Panel B: Charter Entrants Who Remain into Their Second Year



Notes: The series compare students who transition to a charter school to their former schoolmates who remain at a traditional public school using information from the year prior to the transition. Math refers to average math achievement, reading refers to average reading achievement, and discipline refers to the probability of having committed any disciplinary infraction.

**Figure 8: Trends over time in the share of schools that adhere to a no excuses philosophy**



Note: No excuses status is defined at the CMO level, and the percentage is expressed in terms of the number of students enrolled at a 'no excuses' campus relative to all charter school students.



**Table 1. Average Charter School Mathematics and Reading Value-added and Enrollment shares for 2001 and 2011, by status of school operations.**

	Mathematics		Reading	
	2001	2011	2001	2011
<b>A. Schools in operation in 2001 and in 2011</b>				
Average Value Added	-0.06	0.00	-0.12	-0.01
Share of Charter Enrollment	0.79	0.24	0.79	0.23
Number of Schools	105		98	
<b>B. Schools in operation in 2001 but not in 2011</b>				
Average Value Added	-0.27	.	-0.36	
Share of Charter Enrollment	0.21	.	0.21	
Number of Schools	59		55	
<b>C. Schools in operation in 2011 but not in 2001</b>				
Average Value Added	.	0.01	0.04	
Share of Charter Enrollment	.	0.76	0.77	
Number of Schools	318		318	

Notes: Average value added for charter schools weighted by enrollment; traditional public school average value added in each year deducted from the corresponding charter average. Empty cells in panels B and C correspond to years when these school categories are no longer in operation or have yet to begin operation.

**Table 2: Estimated Effects of CMO Performance on the Number of Schools Operated**

	Net Change		Net Expansion		Net Contraction	
	(1)	(2)	(3)	(4)	(5)	(6)
CMO Average Math VA	0.186	0.191	0.084	0.075	-0.041	-0.044
	(0.049)	(0.052)	(0.019)	(0.020)	(0.013)	(0.014)
CMO Average Reading VA	0.223	0.203	0.083	0.070	-0.056	-0.051
	(0.053)	(0.056)	(0.020)	(0.021)	(0.014)	(0.015)
CMO FE	No	Yes	No	Yes	No	Yes
Mean	0.139		0.120		0.055	
N	1847		1847		1847	

Note: Data for regressions include all CMOs operating in each year. Each estimate comes from a separate regression. All regressions include year dummies. The dependent variable in columns (1) and (2) is the net change in the number of campuses in operation for a CMO, while columns (3)-(6) the dependent variable is an indicator equal to one if the net change is positive (expansion) or negative (contraction). Standard errors are clustered at the CMO level. All coefficients are significant at the 1 percent level.

**Table 3: Estimated effects of No Excuses, Selection at Entry and Reenrollment, and Share of Students New to the School on Charter School Mathematics Value-added**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>No Excuses Indicator</b>	0.169*** (0.025)	0.106*** (0.022)	0.095*** (0.022)	0.096*** (0.022)				
<b>Proportion New</b>		-0.350*** (0.041)	-0.269*** (0.057)	-0.297*** (0.058)	-0.129 (0.082)			-0.096 (0.088)
<b>Math score difference</b>			0.065** (0.026)	0.075*** (0.028)		0.075** (0.033)		0.064* (0.033)
Entrants			0.008 (0.014)	0.014 (0.015)		0.045** (0.022)		0.039* (0.023)
Persisters								
<b>Infraction Rate difference</b>								
Entrants				0.065 (0.050)		-0.154** (0.078)		-0.112 (0.075)
Persisters				0.02 (0.045)		-0.066 (0.044)		-0.052 (0.044)
<b>School Fixed Effects</b>	No	No	No	No	Yes	Yes	Yes	Yes
<b>N</b>		1,410				1668		

Note: School-by-year-level regressions with estimated mathematics value-added as the dependent variable. Regressions include demographic characteristics, year dummies. Standard errors, clustered at the campus level, are in parentheses. \*\*\* denotes significance at the 1 percent level, \*\* denotes significance at the 5 percent level, \* denotes significance at the 10 percent level.

**Table 4: Estimated effects of ‘No Excuses’, Selection at Entry and Reenrollment, and Share of Students New to the School on Charter Reading Value-added**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
<b>No Excuses Indicator</b>	0.133*** (0.020)	0.077*** (0.017)	0.063*** (0.017)	0.064*** (0.016)					
<b>Proportion New</b>		-0.311*** (0.036)	-0.218*** (0.044)	-0.262*** (0.048)	-0.205*** (0.065)			-0.175* (0.066)	
<b>Reading score difference</b>									
Entrants			0.082*** (0.022)	0.095*** (0.023)		0.089*** (0.032)		0.077** (0.032)	
Persisters			0.020 (0.014)	0.024* (0.014)		0.012 (0.020)		0.009 (0.020)	
<b>Infraction Rate difference</b>									
Entrants				0.111** (0.050)			-0.060 (0.066)	-0.021 (0.065)	
Persisters				-0.001 (0.039)			-0.077* (0.045)	-0.064 (0.044)	
<b>School Fixed Effects</b>	No	No	No	No	Yes	Yes	Yes	Yes	
<b>N</b>		1,396					1651		

Note: School-by-year-level regressions with estimated reading value-added as the dependent variable. Regressions include demographic characteristics, year dummies. Standard errors, clustered at the campus level, are in parentheses. \*\*\* denotes significance at the 1 percent level, \*\* denotes significance at the 5 percent level, \* denotes significance at the 10 percent level.

## Appendix A

**Table A1: Average Charter School Mathematics and Reading Value-added and Enrollment shares for 2004 and 2011, by status of school operations.**

	Mathematics		Reading	
	2004	2011	2004	2011
A. Schools in operation in 2004 and in 2011				
Average Value Added	-0.10	-0.03	-0.05	0.00
Share of Charter Enrollment	0.81	0.38	0.82	0.38
Number of Schools	185		185	
B. Schools in operation in 2004 but not in 2011				
Average Value Added	-0.19	.	-0.20	
Share of Charter Enrollment	0.19	.	0.18	
Number of Schools	66		67	
C. Schools in operation in 2011 but not in 2004				
Average Value Added	.	0.00		0.05
Share of Charter Enrollment	.	0.62		0.62
Number of Schools	249		249	

Notes: Average value-added weighted by enrollment. Empty cells in panels B and C correspond to years when these school categories are no longer in operation or have yet to begin operation.

## Appendix B: Classification of Schools as Adhering to the No Excuses Philosophy

We used a number of sources of information to determine whether a CMO adhered to the No Excuses philosophy. First, our research assistant called each school, described our project, and asked the representative if they could answer some questions about the school's approach to education. This often proved difficult, as many offered vague or curt responses. The research assistant then explored the website (if available), focusing on the mission or vision statements, superintendent's message, history, and other relevant information to gain a general feel for the school. Perhaps the most important source of information was the school handbook and code of conduct, and the research assistant carefully sifted through these documents. Finally, if none of these sources proved adequate, the research assistant searched for school reviews and articles that provided information on school policies and practices.

We focused on six areas to determine whether to classify a school as adhering to the No Excuses Philosophy. These areas are the following:

- **Discipline:** Most schools follow a progressive disciplinary system and provide clear expectations for behavior. Some schools, however, stand out as being particularly strict. We classify schools as strict in the discipline dimension if they use corporal punishment, impose strict zero tolerance policies for misbehavior, curfews, fine dining requirements (no talking or sharing), or sizable monetary fines for having cell phones or electronics, or undertake legal prosecution if a teacher is offended by students language or other actions.
- **Expectations:** We use the following questions to determine whether a school sets very high expectations: Does the school hold all students to the same high expectations regardless of extraneous circumstances or family background? Does the school follow state standards or hold their students to higher expectations (i.e. are students required to meet state required 90% compulsory attendance or do they require *all* students to maintain 95-100% attendance to stay enrolled?)? Does the school require that all students are accepted at a university? Are students expected to graduate from college?
- **Uniforms:** Does the school require students to wear uniforms? Adhere to a strict dress code? Are there serious consequences for failing to comply? Are students sent home? Fined? Given detention? How many infractions until there is a serious consequence?
- **Parental Involvement:** Are parents encouraged to actively participate in the school? Are parents required to sign a commitment form?
- **Incentives:** Does the school offer rewards to students who surpass expectations? Most schools recognize students through things such as honor roll, by allowing them to go on field trips, or by letting them have a free dress day. Some offer additional incentives such as monetary prizes or privileges for good grades, attendance, and have a strong belief in reinforcing good behavior.
- **Extra:** Is there an extended school day? Week? Year? Is Saturday school offered or required? Tutoring?

For some CMOs that were consistent across categories the classification decision was straightforward. For other CMOs the decision was more difficult, because they appeared to be strict in some dimensions but not others. In classifying these schools we placed particular emphasis on the strictness of the disciplinary practices.