Charter School Performance in New Jersey*

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Abstract

This paper investigates charter school performance in New Jersey from 2000 to 2006. The analysis shows that charter schools have lower performance than public schools in the same districts on fourth grade standardized tests for Language and Math, but performance improves as charter schools gain experience. In addition, I find that the N.J. Dept. of Education is effectively closing low-performing charter schools. Lastly, regression results provide evidence of a competitive effect from charter schools to public schools.

JEL Classification: H4; I2

Key words: Charter Schools; Student Achievement; Competition; New Jersey

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1 Introduction

Since Minnesota passed the first charter school law in 1991, 41 states and the District of Columbia have created laws allowing for charter schools (http://www.edreform.com, 2007). A "charter school" is a publicly financed but independently run school, and is generally free from many of the rules and regulations that traditional public schools must follow.[1]

Charter schools have been created to allow for increased educational choices and to exert competitive pressures on public schools. Those groups or organizations interested in opening a charter school must complete a lengthy application that details how the school will be created and run. This application is reviewed by a state or district education agency, who then grants the applicants a charter, which allows the school to operate. In New Jersey, a charter can be revoked, and the school shut down, if it encounters problems. Closures can occur for a variety of reasons, including financial, governance and/or performance problems.

This paper investigates charter school performance in New Jersey from 2000 to 2006, focusing specifically on schools' performance on general education students' fourth grade standardized exams. The data set includes charter schools and the public schools in the same districts.

This paper aims to answer the following questions: (1) How are charter schools in New Jersey performing relative to the schools in their "host" districts; (2) do charter schools improve their performance over time; (3) is the oversight role of the NJ Department of Education (NJ DOE) functioning properly in that it is shutting down charter schools that are low-performing; and (4) is there evidence of a competitive effect from charter schools to public schools? That is, is there evidence that charter school performance affects public school performance?

Charter schools, by design, allow for innovation and therefore generate evolutionary forces in the education sector. Presumably, high-performing schools exert competitive pressures, and the low-performing schools exit (or improve), increasing the overall health of the school system. Charter schools provide variety, among which, presumably, the fittest will survive. However, unlike the marketplace where profits and market shares determine the winners, education agencies act in place of the market's "invisible hand."

[1] Technically speaking, a charter school is a "public" school in that it receives public funds for its operations. However, for the ease of exposition, I shall refer only to non-charter public schools as "public" schools.

Charter school effectiveness can potentially be moderated by the agencies that oversee them.

This paper presents two sets of regressions to answer the four questions above. The first set looks at school performance on fourth grade standardized test scores as a function of student and school characteristics, including variables that relate to charter schools. For charter schools, I include a charter school dummy variable, the age of the charter school, and a dummy variable that takes on the value of one in the year a charter school was shut down (if shut down), zero otherwise.

School age is important to study since charter schools, like organizations in general, presumably have a learning curve; I investigate the degree to which, controlling for other factors, the age of the school affects performance. The variable for closed charter schools aims to investigate how the NJ DOE is doing in its decision making to shut down charter schools. Most of the schools that have lost their charters in New Jersey have done so because of governance and financial issues, rather than student performance *per se*. Were schools that were closed also low performers?

The regression results show that, all else equal, fourth graders in charter schools are performing worse than their public school counterparts in the same districts. The coefficient for the age of the charter school is positive, however, it is not statistically significant across all specifications. Lastly, charter schools that have lost their charters were, in fact, low performing in the year the school was shut down. On average, these charter schools had passing rates about twelve percentage points lower for language and about seven percentage points lower for mathematics as compared to the other schools in the sample.

The next set of results investigate whether their is a competitive effect from charter schools to public schools. To investigate this, I create two variables. First, from the first set of regressions, for each district, I take the average residual of charter schools to look at the effect of charter school "shocks" on public school performance. Second, also from the first set of regressions, I look at the average charter school fixed effect in each district. The results show that these variables for language arts are positive and statistically significant; however, interestingly, I find mixed results from these variables for mathematics, with no effect from the charter school shocks, but with a positive effect from the charter school fixed effects.

The rest of the paper proceeds as follows. The next section reviews the

relevant literature. Then, section 3 discusses charter schools in New Jersey and the data set. Next, section 4 presents regression results for charter school performance. Then, section 5 presents regressions that investigates the competitive effect of charter schools. Lastly, section 6 presents some concluding remarks. An appendix gives additional information about charter school closures in New Jersey.

2 Related Literature

Charter School Performance The rise of charter schools across the nation has a spawned a small body of literature investigating whether charter schools do indeed improve student performance. The results of these studies is decidedly mixed, with no clear pattern, as of yet, emerging across states or school districts.

Part of the problem encountered in econometric studies of charter school performance is the issue of self-selection of students into charter schools. If students who enroll in charter schools have some unique characteristics that make them more likely to enroll in the charter schools, then the measured effects of charter schools may be biased, if these characteristics are not somehow controlled for. If student motivation and the decision to enroll in a charter school are positively related, for example, the charter school effect may be biased upwards if some measure of motivation is missing from the equation.

Hanushek *et al.* (2005) try to overcome this problem by following a group of students in Texas who move from public schools to charter schools; this allows to control for the fixed student effects. They conclude that charter school student performance is not significantly different than performance in public schools.

Bettinger (2005) looks at students in Michigan. Using difference-in-difference estimation (i.e., the growth of the difference between charter and public school performance) and lagged dependant variables, he finds that there is no statistical difference between charter and public schools. In addition, using an instrumental variable approach, he tests for whether charter schools have a positive effect on nearby public schools, and does not find any evidence of a competitive effect.

Zimmer and Budden (2007) study charter school effects in two specific urban districts in California–Los Angeles and San Diego–where there are

large minority student populations.[2] Using a fixed- and random-effects models, they find mixed results for the effects of charter schools themselves, and their effect on minority students.

In this paper, I include a lagged dependent variable to control for any possible selection bias, as well as any other important omitted variables. Furthermore, I create two new variables that are presumably exogenous and allow for testing for a competitive effect.

Competition, Entry and Productivity Aside from the literature on economic growth, within economics in general, there have been relatively few studies investigating the direct effect of entry and the number of competitors on organizational productivity.[3] Nickell (1996) finds support for the hypothesis that the number of competitors is associated with higher rates of factor productivity growth. A study by Geroski (1989), who looks at U.K. firms from 1976 to 1979, finds that innovative activity is a more important determinant than domestic entry; that foreign entry has little effect on productivity growth. However, Aghion *et al.* (2004) show that for U.K. firms, entry, as measured by a higher share of industry employment in foreign firms, has led to faster total factor productivity growth of domestic incumbent firms and thus to faster aggregate productivity growth. Baldwin and Gorecki (1991) find that for Canadian firms entry can account for 24% of productivity growth in the industries their sample. Macdonald (1994) finds that for U.S. manufacturers, from 1975 to 1987, increases in import competition led to large increases in productivity for highly concentrated industries.

Within the education sector, there is some evidence that competition among school districts improves performance. Blair and Staley (1995) find that the academic performance of school districts within Ohio was positively related the performance of neighboring districts, but that the effect was small. Borland and Howard (1992) show that high degrees of school district concentration, as measured by the Herfindahl-Hirschman Index, was negatively related to student performance.

In sum, the literature seems to suggest that entry and the number of competitors does play a role in effectuating the "invisible hand" of market

[2] Zimmer and Buddent (2007) also cite several other charter school studies. They conclude as well that the evidence is mixed.

[3] Nickell (1996) writes, "[T]his general belief in the efficiency of competition exists despite the fact that it is not supported either by any strong theoretical foundation or by a large corpus of hard empirical evidence in its favor" (p. 725).

performance and firm productivity. This assumption and evidence can not be directly translated to charter schools because of the mediating role that education agencies play in regard to charter schools.

3 Charter Schools in New Jersey

In 1996, New Jersey's Charter School Program Act was signed into law with the intention of providing school choice, school curriculum variety and the opportunity to improve pupil performance (Charter School Program Act of 1995, N.J.S.A. 18A:36A-2). The law stipulates that charters are to be granted by the commissioner of the New Jersey Department of Education (NJ DOE).

Each charter school is to be governed by a board of trustees, but it is subject to continued oversight by the NJ DOE and can be shut down if the school encounters financial, governance or performance problems. In addition, after four years, a charter must be renewed, and the commissioner may revoke it if the school has "not fulfilled any condition imposed by the commissioner in connection with the granting of the charter or if the school has violated any provision of its charter" (Charter School Program Act of 1995, N.J.S.A. 18A:36A-17).

The state's first thirteen charter schools opened in the fall of 1997. As of June 2007, 54 charter schools are in operation in fifteen counties. As of October 2006, the latest year with available student data, there were 51 charter schools with approximately 15,000 students (about 1.1% of total New Jersey enrollment).

3.1 Applications, Entry and Exit and Oversight

Figure 1 shows the number of charter schools applications and the percent of those applications accepted since 1997. If the number of applications are an indication of demand, then we can see that in the early years, there was a relatively high demand, which subsequently dropped off by 2003. The initial burst of applications most likely reflected a pent up demand for charter schools. The increase starting in 2005 most likely reflects a new set of applicants that were taking a "wait and see" approach with the initial set of charter school openings.[4] Overall, since 1997, the percent of applications has

[4]The New Jersey DOE does not track information about the applicants or the reasons applications are rejected.

trended downward, though there is some year-to-year variation around this trend.

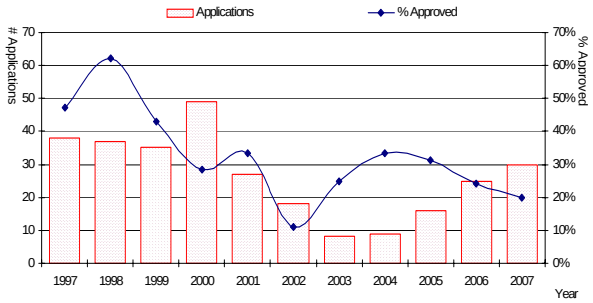

Figure 1: Number of charter school applications and percent approved, New Jersey, 1997 to 2007. Source: New Jersey Charter School Resource Center (2007).

Figure 2 shows the entry and exit patterns of charter schools over the ten year period. From 1997 to 2000, there was an initial burst of openings; since 2001 charter school opening have been occurring at a much lower rate. Looking at the closures, we see that the number of closures peaked in 2001. The years 2000 and 2001 most likely reflect an initial "shake-out" period, where the weakest charter schools from the earlier years were closed.

Since charter schools began operation in New Jersey in 1997, 15 charter schools have been shut down (9 of those have had fourth grades). The NJ DOE has closed charter schools because of governance, fiscal and performance problems. The average number of years of operation at the time of closure is 2.58; For 75% of the closures, schools were in operation for three years or less. Thus, the DOE is generally shutting down relatively young schools. Appendix A lists the closures information.

Presumably, new charter schools require a few years for them to develop their organizational skills. There is a large body of work on organizational learning curves, which demonstrate that output per worker (or per worker hour) is an increasing function of total, cumulative output produced by a firm (see Dodgson, 1993, and Epple, *et al.*, 1991, for example). As a simple test for this (data details are given below), I ran a regression of the log of the percentage of students passing in each charter school versus the age of the school (in years), using school-level fixed-effects estimation (within or time-demeaned transformation), from 1999 to 2006.

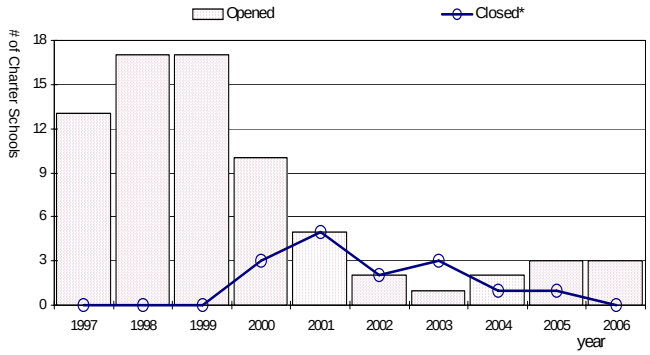

Figure 2: Charter school opening and closings in New Jersey. Note that in general openings occur in September, while closings occur in June of each year. Sources: See Appendix. *Excludes consolidations of schools of different grades.

Equations (1) and (2) presents the estimated learning curve results for charter schools with 4th graders in New Jersey:[5]

$$\ln\left(\%\widehat{Pass\,Language}\right) = \underset{(0.07)}{3.5} + \underset{(0.05)}{0.39}\ln\left(Age\right) \quad (1)$$

$$\ln\left(\%\widehat{Pass\,Math}\right) = \underset{(.11)}{3.0} + \underset{(.08)}{0.49}\ln(Age) \quad (2)$$

As we can see, there is evidence that as a charter school get older its passing rate increases. For example, for the language exam, the elasticity of passing with respect to age is 0.39, i.e., each 1% increase in age is associated with a 0.39% increase in the passing rate; while the learning curve is a bit higher for mathematics.

3.2 Concentration and Location

Of the 54 charter schools in New Jersey, about 55% are located in New Jersey's four largest cities (Newark, Jersey City, Trenton, and Camden, respectively). These cities tend to have large minority populations and household

[5]Language: $n = 208$, # groups= 39, $R^2 = 0.33$. Mathematics: $n = 207$, # groups= 39, $R^2 = 0.30$. Clustered standard errors are presented below the estimtes. Fixed-effects (within) regression. All coefficients are stat. sig. at greater than 99%.

incomes below New Jersey's median income. Table 1 demonstrates this. The table suggests that parents in these districts are interested in having greater choices beyond their local public schools, and that there are a wide variety of groups and organizations interested in supplying these choices.[6]

	Charter School Data, 2007			City Data, 2000		
District	# Charter Schools	% of NJ Total	% Cumulative	Pop.	Med. HH Inc. ($)	% Minority
Newark	11	20.4	20.4	273,546	30,665	85.8
Jersey City	9	16.7	37.0	239,614	40,310	76.4
Camden	6	11.1	48.1	79,904	18,007	92.9
Trenton	4	7.4	55.6	86,327	34,356	75.4
Plainfield	3	5.6	61.1	47,829	52,800	88.5
Hoboken	2	3.7	64.8	38,577	69,000	29.5
New Jersey	54	100	100	8,724,560	61,672	23.4

Table 1: Charter school concentration and city population data for selected districts in New Jersey. Sources: Charter Schools: New Jersey Charter School Resource Center (2007) City Data: U.S. Census Bureau: http://quickfacts.census.gov/qfd/index.html

3.3 The Data

The data used to perform the regression analyses come from the New Jersey School Report Card and Student Enrollment data sets (available at http://www.state.nj.us/education/data/). The NJ DOE collects several variables, at the school level, regarding student performance, school, student and teacher characteristics. As of July 2007, New Jersey does not have any student level data that would allow for the comparison of charter and public school students; therefore I must rely on school level data to estimate the effects of charter schools.

The data consists of a panel of schools for seven years, from 1999 to 2006 (charter school data does not exist before then). The focus of this paper is on the performance of general education fourth graders, and only schools that have this grade are included. I restrict the sample to include

[6] See Glomm *et al.* (2005) for a study of the relationship between district diversity and the number of charter schools.

charter schools and public schools in districts that have at least one charter school with a fourth grade in that district. In addition, because I use a lagged dependant variable to control for potential student self-selection problem, this reduces the sample to include schools for which there are at least two years of observations, and it causes performance data for 1999 to be eliminated as well. Three charter schools were eliminated because they were shut down after only one year of operation.

The sample used for the regressions below is an unbalanced panel with a total of 259 schools, with a minium of one observation and a maximum of seven observations for each school, with an average of 5.2 observations per school. The panel includes a total of 35 charter schools, in 18 different districts.

In regard to test performance, New Jersey has implemented confidentiality regulations that prohibits the release of test score information for small class sizes. Thus for some small schools there is missing data for a few, but not all, years. In a few cases, there is no data for a particular school at all, either because it was shut down in the first year, or it was simply never reported. These, however, represent a relatively small subset of the population of charter schools with fourth grades. The omissions, to the best of my knowledge, do not generate systematic biases in the sample.

In a few cases, charter school test score information is reported based on all students, but not for only general education students (this would happen, for example, if there was only one or two special education students in the school). As a result if the total school performance was reported but not the general education performance, a predicted value for the general education performance was used based on a simple ordinary least squares regression of general education student performance on total school performance performance.[7] This occurred in ten cases.

In addition, for some schools, there were missing data points for some years for some variables, such as attendance, student mobility and teacher education. In these cases, two-period moving averages were used. For the earliest years, an average of the data points for the following two years was used, for middle years, an average of one year previous and one year following was used, and for the last year, an average of two prior years was used (note

[7] For Language, $\widehat{\%\text{Gen Ed Pass}} = 4.2 + 1.0\,(\%\text{Total Pass})$, $R^2 = .96$, # obs.= 148. For Math, $\widehat{\%\text{Gen Ed Pass}} = 0.66 + 1.04\,(\%\text{Total Pass})$, $R^2 = .97$, # obs.= 149. All coefficients stat. sig. at greater than 99%.

that this does not materially affect the results; the data set and notes about estimated values are available upon request).

Table 2 lists the variables and the descriptive statistics. The dependant variables are the percentage of students in each school that are at or above proficiency for language arts and mathematics standardized tests (i.e., the passing rate of each school).[8] For students there is data on the racial characteristics and measures of poverty. The variable $\%\,Free\,Lunch$ refers to the percentage of students eligible for free lunches during the school year, while $\%$ *Reduced Lunch* refers to the percent of students eligible for lunches at reduced cost. Student eligibility for the reduced or free lunch program is determined by a student's household income.

For teacher variables I include the fraction of teachers that have either a Masters or Doctorate degrees (as opposed to only having a Bachelor's degree). For school characteristics, there is the length of each school's day, total enrollment, student mobility (which is the percent of student turnover during the year), the average class size for the school, and the average attendance rate for the school.

Finally there is a set of charter school variables. First is a charter school dummy variable that takes on a one if the school is a charter, zero otherwise. To control for a possible learning curve, I include the charter school's age, interacted with the charter school dummy variable. Next I include a dummy variable that takes on a one if a charter school closed in that year, zero otherwise. This variable is to test the hypothesis that the NJ DOE is effectively shutting down low-performing schools. Lastly, the length of a charter school's school year is also included (public schools have an 180-day school year). Note table 2 includes two statistics for charter school closures. Of all the charter schools in the sample, 25.7% were closed. However, for the panel of charter schools, the last year of operation of these charter schools represents only 2.3% of the total number of data points.

{Table 2 Here}

[8] Before 2003, fourth graders took the so-called Elementary School Proficiency Assessment (ESPA) exam. Starting in 2003, in response to the No Child Left Behind legislation, the exam was changed to the Assessment of Skills and Knowledge (ASK 4). In the regressions below, year dummy variables are included to account for the effects of the different exams.

4 Charter School Performance

To test the effectiveness of charter schools, their learning curves and the effectiveness of the Department of Education, we have the following regression model for school i at time t,

$$y_{it} = \alpha_0 + \alpha_1 y_{it-1} + \boldsymbol{\beta}_1' \mathbf{x}_{it} + \boldsymbol{\gamma}_1' \mathbf{z}_{it} + \delta_t + d_i + \varepsilon_{it}, \tag{3}$$

where y_{it} is the percentage of students in each school passing the standardized tests. y_{it-1} is the lag of the dependant variable, which, as discussed above, is included to control for self-selection bias with regard to charter schools, as well as other possible omitted variables. $\mathbf{x}_{it}$ are those set of variables that relate to charter schools (charter dummy, charter age$\times$chart dummy, and charter closure dummy), $\mathbf{z}_{it}$ are variables that relate to student, teacher and school characteristics. δ_t is a year dummy variable to control for both the different exams and varying passage rates across New Jersey over time. d_i is a district dummy variable to control for any fixed district effects, such as income levels or parental involvement. Finally ε_{it} is the random error term.

Table 3 presents the results. Comparing the coefficient on the charter dummy with and without the lagged dependent variable shows that without the lag dependent variable the charter effect is much larger in absolute value and negative. This would suggest that charter schools are serving students who are under-performing in public schools, rather than serving highly motivated students, on average. Including the lag dependent variable reduces the size of the coefficient, but shows that, on average, charter schools are performing worse than their public school counterparts. Note that in this regression, I include public schools that have at least one charter school in their district, however, in a few cases there is no test score data for that charter school, in a particular year.

Furthermore, the coefficient for charter school age is positive as would be expected, though it is not statistically significant across all specifications. However, a one-side test, would reject a non-positive null hypothesis with at least a 90% level of confidence.

In general, as charter schools get older, they improve their performance. Using the estimated coefficients for equation (2), we would predict that a charter school would erase the language performance gap after a little more than 9 years, on average. For mathematics–using equation (4)–we would predict the gap would be closed after more than 10 years.

{Table 3 Here}

5 Competition Effect

To investigate the effects of charter schools on the host district schools, we have the following econometric model. Let the performance of public school p in year t be given by

$$y_{pt} = \alpha_0 + \alpha_1 y_{pt-1} + \boldsymbol{\beta}_1' \mathbf{c}_{pt} + \boldsymbol{\gamma}_1' \mathbf{z}_{pt} + \delta_t + d_p + \mu_{pt}, \tag{4}$$

where y_{pt-1} is lagged performance, $\mathbf{c}_{pt}$ is the set of charter school variables that will presumably affect a public school, $\mathbf{z}_{pt}$ are public school characteristics, δ_t is a time dummy variable, d_p is a district's fixed effect, and μ_{pt} is the random error term.

The problem, however, with measuring $\boldsymbol{\beta}_1'$ is that there may be an endogenous relationship with $\mathbf{c}_{pt}$ and y_{pt}, since presumably charter schools and public schools are competing with one another. Thus, to get a unbiased measure of how charter schools affect public schools, we need to find exogenous measures.

To measure the effect of charter schools on public schools I include the following variables:

1. *Average residual of charter schools.* Equation (3) controls for selection bias by including a lagged dependant variable, thus the residual is a measure of the random component of performance. We can think of the residual as the measured "shock" to performance. If public schools are affected by the performance of charter schools then we would expect that a positive unpredicted boost to charter school performance would spill over to public schools; thus we would expect a positive relationship between the average charter school "shocks" and public school performance.

2. *Average charter fixed effects.* Presumably, each charter school has a "fixed effect," i.e., a school-specific intercept that measures the sum of those things that affect performance and don't change from year to year. Fixed effects estimation is a common method to control for the enduring aspects of organizations, such as corporate culture and history-dependent factors (see Henderson and Cockburn (1994) and

Jensen and McGuckin (1997), for example). Since fixed effects, are, by definition, fixed, then it is not affected by possible competition. If there is a competitive effect we would expect the average fixed effects of charter schools to be positive.

{Table 4 Here}

To create the two variables, I perform the following steps for both the language arts and mathematics exams. First I reran equation (3), but this time, I included dummy variables for each school in the sample (instead of district dummy variables) to measure each school's fixed effect. Then, for each year, I take the average of the charter school residuals for each district. Finally, for each year, I take the average fixed effects for each charter school in each district. Then I run equation (4) for only public schools (with at least one fourth grade charter in the district) including the two new variables. One caveat is in order. Because there is a missing data for some charter schools for some years, these schools are not included in the residual or fixed effects averages. Clearly their omission may affect the results. I have no reason to believe their omission biases the sample.

Table 4 gives the descriptive statistics for these variables for language and mathematics. Note that in this regression, if a district had only one charter school in a particular year and there was no test performance data for that charter school, then all of the public schools were omitted from the sample, since there were no charter residuals for that district, nor was data available for estimating the charter school fixed effect.

The results are presented in table 5. The regressions show a positive and statistically significant effect for both variables for language arts. However, for mathematics, we see a positive effect from the charter fixed effects, but no apparent effect from the charter school shocks. In general, these results suggest that when charter schools have positive shocks to performance and/or when they have positive fixed effects, this can influence public school performance; the nature and reason for the competitive mechanism, however, needs to be explored in future research.

Some caveats about the results are in order. Table 5 shows that across New Jersey there appears to be positive competition effects. However, rerunning the regressions on specific subsamples generates mixed results for the two new variables (these results are available upon request). The regressions that include, for example, only the so-called Abbott districts, give similar

results as table 5. The Abbott districts are New Jersey's poorer urban districts that have been singled out to received additional school funds. (See http://www.nj.gov/education/abbotts/ for more information about the Abbott schools.) Also, when I rerun the regressions on the four biggest school districts, Newark, Jersey City, Camden and Trenton, I also find similar results. However, when I rerun the regressions for just Newark, for example, I find negative and statistically significant effects for language arts but positive and statistically significant effects for mathematics. In short, while the results appear to be significant for New Jersey, as a whole, there are some districts where we do not get the predicted results. This would suggest, that while there may be a competitive effect across the state, district-specific factors may also play a role in whether charter schools can have positive competitive effects or not.

{Table 5 Here}

6 Conclusion

This paper has investigated charter school performance in New Jersey from 2000 to 2006, focusing on schools with fourth grades. I present two sets of regressions. The first looks at each school's passing rate on 4th grade standardized language arts and mathematics exams. I find that charter schools perform worse on both exams than public schools in the same districts, but that the gap between charters and public schools diminishes as charter schools get older. The estimated time to close the gap is about a decade. Also I find that the NJ DOE, which plays the role of the "visible hand" by deciding whether to shut down a charter school or not, appears to be closing schools that are low performers. These schools had passing rates of about eight to twelve percentage points lower than the other schools in the sample, *ceteris paribus*.

The second set of regressions tests for whether there is a competitive effect from charter schools to public schools. To do this I create two additional variables. First, from the first set of regressions, I take averages of the charter school residuals for each district and year to see if "shocks" to charter school performance spill over to public schools. Second, I estimate each charter school's fixed effect and take the average charter school fixed effect for each district and year. I then include these on the right-hand side of a regression

that looks at public school performance as a function of these two variables and other student and school factors.

I find that these two variables are positive and statistically significant for language, and only the fixed effect variable is significant for mathematics. These findings provide evidence that public school performance is improved only when charter schools perform well. Overall, charter school performance in New Jersey is quite mixed. Some schools consistently have low student passing rates, while other have high passing rates from year to year; the regression results bear this out.

The findings here suggest that the policy of revoking or not renewing a school's charter should perhaps be even stricter: that if, after say four years of operation when schools must apply for charter renewal, those charter schools that are still performing substantially lower than their host district schools should be shut down, otherwise students in charter schools suffer and schools in the host districts do not benefit from the competitive effect. The fact that there are large variations in charter school fixed effects implies that some schools are quite well-organized and productive, even in their initial years when schools are still moving up their learning curves, while others continue to struggle, despite small gains from year to year.

One question for future research is whether education agencies should alter their charter granting rates. On one hand, allowing more charter schools to open would presumably create a more effective "survival of the fittest" process; yet those least-fit schools would be harming enrolled students and not increasing competition. On the other hand, a stricter charter-granting process may allow for more competitive schools to open, but this may make the charter granting process more arbitrary and deny parents more access to school choice.

A Charter School Closures

Table 6 provides information on charter school closures in New Jersey.

{Table 6 here}

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Variable	Mean	Std. Dev.	Min.	Max.
Standardized Exam Performance				
% Passing, Language Arts	64.58	22.65	0.0	100.0
% Passing, Mathematics	54.74	25.57	0.0	100.0
Student Data				
% White	9.88	18.84	0.0	91.5
% Black	54.87	32.31	0.0	100.0
% Hispanic	31.17	25.13	0.0	91.6
% Native Am.	0.29	1.09	0.0	20.7
% Asian	3.78	6.62	0.0	34.5
% Free Lunch	63.65	22.55	0.0	100.0
% Reduced Lunch	9.80	6.63	0.0	73.9
Teacher Data				
% w/ Bachelors only	66.87	12.52	11.0	100.0
% w/ Masters	30.53	12.20	0.0	89.0
% w/ Doctorate	2.35	4.62	0.0	31.7
School Data				
School Day (Hours)	6.51	0.40	5.3	9.0
Total Enrollment	518.98	259.52	67.0	1597.0
Student Mobility	22.41	13.20	0.0	128.3
% Avg. Attendance	93.90	1.77	84.4	99.7
Avg. Class Size	18.59	3.17	3.4	28.6
Charter School data (# obs.: 173)				
% Charters in Sample	13.0			
% Charters Closed in Sample	25.7			
% Charter Panel with Closure	2.3			
Charter School Age	5.25	1.93	1.0	9.0
School Year (Days)	186.59	9.09	180	212

Table 2: Charter and public school descriptive statistics, 2000 to 2006. Number of Observations 1340. Source: NJ DOE.

	(1) Language	(2) Language	(3) Math	(4) Math
Lag Dep. Var.		0.473 (15.4)***		0.534 (16.4)***
Charter	−16.6 (3.29)***	−7.59 (2.18)**	−22.04 (3.04)***	−11.8 (2.30)**
Charter Age	1.57 (2.13)**	0.823 (1.45)	1.86 (1.85)*	1.09 (1.38)
Charter Closed	−8.25 (1.36)	−12.6 (3.35)***	−4.84 (0.66)	−6.88 (1.79)*
Enrollment	−0.008 (3.07)***	−0.004 (2.34)**	−0.009 (2.74)***	−0.005 (2.43)**
Length of School Day	1.00 (0.51)	0.568 (0.48)	0.975 (0.41)	0.828 (0.63)
Number of School Days	0.149 (0.75)	0.124 (1.01)	0.230 (0.80)	0.201 (1.31)
% Student Mobility	−0.113 (2.22)**	0.006 (0.14)	−0.118 (1.83)*	0.008 (0.16)
Avg. % Attendance	1.43 (2.94)**	0.746 (2.02)**	1.81 (3.46)***	0.784 (2.20)**
Avg. Class Size	−0.246 (1.28)	−0.191 (1.50)	−0.290 (1.15)	−0.313 (1.99)**
% Teachers w/ Masters	−0.016 (0.26)	−0.002 (0.07)	−0.059 (0.64)	−0.056 (1.02)
% Teachers w/ Doctorate	0.040 (0.28)	0.071 (0.64)	0.192 (1.12)	0.089 (0.82)
% Black Students	−0.364 (6.44)***	−0.200 (5.4)***	−0.502 (7.03)***	−0.255 (5.85)***
% Hispanic Students	−0.169 (2.55)***	−0.100 (2.41)**	−0.282 (3.32)***	−0.153 (3.08)***
% Native Am. Students	−0.352 (1.02)	−0.496 (1.77)*	−0.531 (1.34)	−0.692 (1.81)*
% Asian Students	0.181 (1.3)	0.103 (1.19)	−0.002 (0.02)	−0.021 (0.22)
% Free Lunch Students	−0.176 (3.79)***	−0.097 (2.80)***	−0.145 (2.44)**	−0.069 (1.84)*
% Reduced Lunch Students	0.125 (1.17)	0.071 (0.97)	0.088 (0.78)	0.052 (0.64)
Constant	−46.9 (0.83)	−39.7 (0.96)	−87.8 (1.26)	−50.4 (1.17)
# Observations	1340	1340	1340	1340
R^2	0.64	0.71	0.56	0.69
$\bar{R}^2$	0.62	0.70	0.55	0.68
F-stat. for District Dummies	7.6***	3.4***	8.0***	3.3***

Table 3: Dependant variable: % students passing. Clustered robust t-stats. below estimates. Year and district dummies not presented. *Stat. sig. at 90% level; **Stat. sig. at 95% level; ***Stat. sig. at 99% level.

	Mean	St. Dev.	Min.	Max.
Avg. CS Residual Language	-0.700	9.10	-25.52	26.85
Avg. CS Residual Math	-0.423	9.13	-37.69	21.94
Avg. CS Fixed Effect Language	-1.05	9.41	-30.75	21.60
Avg. CS Fixed Effect Math	-7.39	11.51	-41.23	34.85

Table 4: Average charter school residuals and fixed effects. # obs.=1022. Source: See text.

	(1) Language	(2) Math
Lag Dep. Var.	0.496 (13.74)***	0.537 (14.38)***
Avg. CS Residual	0.100 (2.51)**	0.005 (0.10)
Avg. CS Fixed Effect	0.404 (3.10)***	0.182 (1.67)*
Enrollment	−0.004 (2.11)**	−0.005 (2.46)**
Length of School Day	−1.01 (0.45)	0.828 (0.37)
% Student Mobility	0.018 (0.39)	0.033 (0.55)
Avg. % Attendance	0.770 (1.72)*	1.09 (2.66)***
Avg. Class Size	−0.196 (1.24)	−0.294 (1.50)
% Teachers w/ Masters	−0.004 (0.06)	−0.026 (0.34)
% Teachers w/ Doctorate	0.020 (0.16)	0.100 (0.81)
% Black Students	−0.175 (3.88)***	−0.240 (4.92)***
% Hispanic Students	−0.089 (1.84)*	−0.152 (2.79)***
% Native Am. Students	−0.358 (1.22)	−0.304 (1.11)
% Asian Students	0.088 (0.93)	−0.061 (0.63)
% Free Lunch Students	−0.087 (1.92)*	−0.059 (1.25)
% Reduced Lunch Students	0.123 (1.27)	0.100 (1.14)
Constant	−27.75 (0.62)	−53.8 (1.32)
Observations	1022	1022
R^2	0.71	0.70
$\bar{R}^2$	0.69	0.69
F-stat for District Dummies	1.88**	1.50*

Table 5: Regression results for competitive effect of charter schools on public schools. Dependant variable: % students passing. Clustered robust t-stats. below estimates. Year and district dummies not presented. *Stat. sig. at 90% level; **Stat. sig. at 95% level; ***Stat. sig. at 99% level.

School	District	Opened	Closed	Reason
Samuel DeWitt Proctor Academy	Trenton	1997	2000	Academic; Fiscal
REACH Charter High School	Egg Harbor	1999	2000	Fiscal; Programmatic
Simon Bolivar	Newark	1999	2000	Facilities
Family Alliance	Willingboro	1999	2001	Fiscal; Facilities
Greenville	Jersey City	1999	2001	Mismanagement
Alexander Hamilton	Paterson	1999	2001	Financial; Governance
College Prep Academy	Dover	2000	2001	Mismanagement
Russell Academy	East Orange	2000	2001	Financial; Governance
Greater Trenton Area Acad. Tech.	Trenton	1998	2002	Academic
CALLA	Plainfield	1999	2002	Fiscal
Franklin	Franklin Twp.	1999	2003	Fiscal
Paterson CS For Urban Leadership	Paterson	2000	2003	Fiscal; Administrative
Learning Center	Atlantic City	2000	2003	Fiscal; Governance
Granville	Trenton	1998	2004	Fiscal; Governance
Pleasantville CS for Acad. Excell.	Pleasantville	1998	2005	Fiscal, Programmatic

Table 6: Charter School Closures in New Jersey. Sources: Center for Ed. Reform (2002) and NJ Charter School Resource Center (2007).