

The Impact of Charter Schools on Student Academic Achievement

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Abstract

The purpose of the present study is to examine the impact of charter schools on student academic achievement. Using school level data from Massachusetts for the period 2011-2017, it was found that charter schools had higher average SAT scores in both math and reading than non-charter public schools, holding all other factors constant. Using a random effects model, it was found that the average math SAT score was 17.6 points higher in charter schools, and the average reading SAT score was 28.6 points higher in charter schools. These results corroborate the findings of prior studies, especially Angrist, Cohodes, Dynarski, Pathak, and Walters (2016).

Keywords: Charter School; Academic Achievement; SAT Scores

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The Impact of Charter Schools on Student Academic Achievement

Charter schools are publicly funded schools that have significant autonomy and are not subject to the same regulations and bureaucratic structures as are regular public schools (Bulkley & Fisler, 2003). Charter schools grew out of a desire to bring a market-oriented approach to public education. The belief was that these schools, due to their significant autonomy, would be able to operate more effectively and efficiently than regular public schools (Bulkley & Fisler, 2003). Given that educational achievement in charter schools may be different from educational achievement in non-charter schools, many believed that this competition may force poorly performing public schools to reform or close, thus resulting in better educational achievement for all students, not just for those students in charter schools (Bulkley & Fisler, 2003).

Prior studies on the effects of charter school status on academic achievement primarily examined the following outcome measures: school-level standardized assessments (Dobbie & Fryer, 2015; Imberman, 2011a, 2011b; Angrist, Cohodes, Dynarski, Pathak, and Walters, 2016; Witte, Weimer, Scober, and Schlomer, 2007; Bifulco & Ladd, 2006; Sass, 2006; Bettinger, 2005; Buddin & Zimmer, 2005); risky behaviors (Dobbie & Fryer, 2015); college enrollment (Angrist, et al., 2016; Sass, Zimmer, Gill, and Booker, 2016; Booker, Sass, Gill, and Zimmer, 2011); future earnings (Sass et al., 2016); and SAT scores (Angrist et al., 2016). Results of these prior studies were mixed, with some showing a positive association between charter schools and academic performance while other studies showed a negative association.

In order to further examine the effectiveness of charter schools, the present study will attempt to determine if academic outcomes, as measured by average school level SAT scores, are significantly better in charter schools than they are in non-charter public schools. Given that only one other study examined the impact of charter schools on SAT scores, the present should provide a unique perspective on the impact of charter schools on student academic achievement.

Literature Review

There has been a plethora of research on the impact of charter schools on a variety of academic outcome measures. As noted previously, prior studies examined a wide variety of outcome measures, and the results of these studies suggest that the impact of charter schools on these various academic outcome measures is inconclusive. Some studies found that charter schools have positive effects on student academic achievement (Angrist et al., 2016; Sass et al., 2016; Dobbie & Fryer, 2015; Booker et al., 2011; Witte et al., 2007), while others found mixed or negative effects (Imberman, 2011a, 2011b; Bifulco & Ladd, 2006; Sass, 2006; Bettinger, 2005; Buddin & Zimmer, 2005). Most prior studies used student level data, and only one study (Angrist et al., 2016) used SAT scores as its outcome measure. Most studies looked at only one state, although some studies focused on only one school (Dobbie & Fryer, 2015; Angrist et al., 2010).

Regarding the most relevant prior study, Angrist et al. (2016) looked at the impact of charter schools on academic performance in Boston. In order to obtain student level data, the authors collected lists of charter school applicants for the period 2002-2009 and linked that data

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with administrative data regarding student demographics and SAT test scores. Using a two-stage least squares model, the authors estimated the effects of charter school attendance on a variety of outcome measures. They examined graduation rates, college enrollment rates, and AP and SAT test scores. The authors found that charter schools had no effect on the probability of either high school graduation or college enrollment. However, charter schools greatly increased the likelihood of sitting for AP exams and significantly increased SAT scores. Their results indicated that math SAT scores increased by an average of 52 points, and reading scores increased by 26 points.

Most other studies that found positive effects of charter schools looked at college enrollment, high school graduation rates, future earnings, or standardized school-level assessments (Sass et al., 2016; Dobbie & Fryer, 2015; Booker et al., 2011; Angrist et al., 2010; Witte et al., 2007). Prior studies that found negative effects of charter school attendance typically used as outcome measures student behaviors and standardized assessment scores (Imberman, 2011a, 2011b; Bifulco & Ladd, 2006; Sass, 2006; Bettinger, 2005; Buddin & Zimmer, 2005). None of the studies that found negative relationships between charter schools and academic performance looked at SAT scores, graduation rates or college enrollments.

The present study will differ from this prior research in several important ways. First, the present study will look at school level data for the Commonwealth of Massachusetts. Second, this study will use longitudinal data for the period 2011-2017. Third, school-level average math and reading SAT scores will be used as outcome measures of student performance. Hence, the present study should offer a novel approach to the issue of the impact of charter schools on student academic performance.

Empirical Technique

Using prior research as a guide, the following equation is estimated in the present study:

$$Y = \alpha_0 + \alpha_1 \text{CHARTER} + \alpha_2 \text{BLACK} + \alpha_3 \text{ASIAN} + \alpha_4 \text{HISPANIC} \quad (1) \\ + \alpha_5 \text{MASSCORE} + \alpha_6 \text{ATTENDANCE} + \alpha_7 \text{SIZE} + \alpha_8 \text{YEAR}$$

The variables are defined as follows (Prior research that utilized similar explanatory variables are noted in parentheses after the relevant variable):

(1) Y is the average school level math SAT score and the average school level reading SAT score.

(2) CHARTER equals one if the school is a charter school and zero otherwise.

(3) BLACK is the percentage of the school's student population that is African-American. (Angrist et al., 2016; Sass et al., 2016; Dobbie & Fryer, 2015; Booker et al., 2011; Witte et al., 2007).

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(4) HISPANIC is the percentage of the school's student population that is Hispanic. (Angrist et al., 2016; Sass et al., 2016; Dobbie & Fryer, 2015; Booker et al., 2011; Witte et al., 2007).

(5) ASIAN is the percentage of the school's student population that is Asian-American. (Angrist et al., 2016; Sass et al., 2016; Dobbie & Fryer, 2015; Booker et al., 2011; Witte et al., 2007).

(6) MASSCORE is the percentage of students who successfully completed the Massachusetts Core Curriculum.

(7) ATTENDANCE is the attendance rate.

(8) SIZE is the average class size.

Finally, YEAR is included to capture any possible time trend in SAT scores. SAT scores were used as a measure of student academic achievement primarily because it is a standardized test used by most schools for purposes of college admission. In addition, many high schools use the SAT exam as an assessment tool in determining whether students are meeting minimum standards for academic performance (Angrist et al., 2016). Finally, SAT scores offer a more continuous measure of academic performance than graduation rates or future earnings.

A panel data model was used to estimate Equation (1). This model is superior to both cross-sectional and time series models for two reasons. First, panel data models control for potentially important but unobservable school-level effects that may be correlated with other determinants. If a panel data model is not used when appropriate, school-level effects may be omitted, and omitted variable bias may result. Second, panel data, which combines time-series and cross-sectional data, greatly increases the degrees of freedom; hence, one can examine school-level data even though there are limited annual data available.

There are two ways in which a panel data model may be defined. A fixed effects model is a classical regression model with school-level dummies. If parameter estimates vary across schools, then a random effects model should be used. A random effects model allows for parameter estimate variation among schools by utilizing a generalized regression model where the variance is dependent upon a school-level disturbance term. A random effects model was used in the present study primarily because time invariant variables, such as the CHARTER dummy variable, cannot be used in a fixed effects model.

Data and Results

Data for this study were obtained from the Massachusetts Department of Elementary and Secondary Education, School and District Profiles, Statewide Reports and the SAT Performance Reports. All data is at the school level. As previously noted, data was obtained for the years 2011 to 2017. Descriptive statistics are presented on Table 1. All variables defined in the previous section were used in estimating the random effects model.

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Table 1

Descriptive Statistics

Variable	Mean	Standard Deviation
BLACK	0.07	0.13
ASIAN	0.04	0.06
HISPANIC	0.11	0.15
MASSCORE	0.80	0.29
ATTR	0.95	0.03
SIZE	17.90	2.77
Math SAT	522	49.70
Reading SAT	513	50.10

Results for math SAT scores are presented in Table 2, and results for reading SAT scores are presented in Table 3. These results indicate that charter schools have a positive impact on both math and reading SAT scores. These results suggest that, holding all other factors constant, charter school average math SAT scores are 17.6 points higher than math scores at non-charter schools and that charter school average reading SAT scores are 28.6 points higher than reading scores at non-charter schools. These results corroborate the findings of Angrist et al. (2016) and suggest that academic performance is enhanced at charter schools.

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Table 2

Random Effects Results; DV = Math SAT

Variable	Coefficient	Test Statistic
Intercept	-5722.47	-2.34**
BLACK	-93.52	-6.83***
ASIAN	193.90	9.43***
HISPANIC	-121.83	-12.16***
MASSCORE	4.90	2.81***
ATTR	26.20	2.00**
SIZE	0.23	1.04
CHARTER	17.63	2.96***
YEAR	3.09	2.54**

$R^2 = 0.526$, *** $p < .01$, ** $p < .05$ * $p < .10$

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Table 3

Random Effects Results; DV = Reading SAT

Variable	Mean	Standard Deviation
Intercept	-11927.10	-4.65***
BLACK	-138.21	-10.43***
ASIAN	140.40	6.99***
HISPANIC	-130.67	-13.50***
MASSCORE	5.72	3.29***
ATTR	12.86	0.98
SIZE	0.11	0.51
CHARTER	28.60	5.01***
YEAR	6.18	4.85***

$R^2 = 0.561$, *** $p < .01$, ** $p < .05$, * $p < .10$

Regarding the control variables, public and charter schools that have higher percentages of African-American and Hispanic students have lower average SAT scores, while public and charter schools that have a greater percentage of students who completed the Massachusetts Core Curriculum have higher average SAT scores. Charter and public schools that have higher percentages of Asian students have higher average SAT scores. These results are consistent with the results of prior studies.

Concluding Remarks

Although charter schools are only 30 years old, they have become a mainstay of the American educational system. Charter schools are based on the notion that school choice may improve student academic achievement. Since teachers and administrators in charter schools have much greater autonomy than teachers in regular public schools, it was felt that this autonomy would result in superior educational achievement for charter school students. In addition, it was believed that the rise of charter schools would result in the closing or the reform of many poorly performing public schools. With the closure or reform of these underperforming schools, the educational achievement of all students in the district, even those not attending charter schools, would improve dramatically.

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In order to determine if charter schools are positively related to superior academic performance, the present study used school-level data from Massachusetts in order to determine if school average SAT scores were higher in charter schools than in non-charter public schools. Using data for the period 2011-2017, it was found that, holding all other factors constant, the average math SAT score in charter schools was 17.6 points higher than in non-charter schools and the average reading SAT score in charter schools was 28 points higher than in non-charter schools. These results suggest that charter schools are improving the educational achievement of charter school students.

It is important to note, however, that charter schools have much more diverse student populations than non-charter public schools. For the period examined, the average percentage of students who are African-American was 4% for non-charter schools and 28% for charter schools, and the average percentage of students who are Hispanic was 11% for non-charter schools and 19% for charter schools. Even though the results of the present study suggest that charter schools have positive impacts on SAT scores, this assumes that all other explanatory variables remain constant. Hence, other factors, such as racial composition or attendance rates, may have larger impacts on academic performance than the charter status of a school.

An important area for further research would be the impact of diversity on a school's academic performance. According to the results of the present study, for every percentage point increase in the percentage of the study body that is African-American, the average math SAT score falls by 14 points and the average reading SAT score falls by 20 points. Hence, although the charter status of a school has a positive impact on a school's average SAT scores, the racial impact was enough of a negative influence on the sample used in the present study such that average SAT scores were actually lower in charter schools due to their much greater racial diversity. Given the wide disparity in diversity between charter and non-charter schools, this area of research may shed additional light on the impact of socioeconomic factors on students' academic performance.

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