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THE  
CENTER  
FOR  
STATE  
AND  
LOCAL  
FINANCE

# Review of Charter Schools' Effects on Student Achievement and Life Outcomes

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## About the Report

This is the first in a three-part series of studies commissioned by the State Charter Schools Commission and performed by the Center for State and Local Finance that analyze the economic impact of start-up charter schools on the communities they serve and on the state of Georgia as a whole. This initial report summarizes the academic literature on the impact of charter schools on academic development and achievement. The second report will examine the economic impact of start-up charter schools on the communities surrounding them by analyzing the effects on real property values. The third report will use administrative data from Georgia's schools and government agencies to show the effect of start-up charter schools on academic achievement, the labor market, and the economic impact thereof on their communities. Examining the economic impact of charter schools on their communities has been previously undertaken in only a few other states. This series of reports, focusing on the Georgia experience with start-up charter schools, aims to make a meaningful contribution to this literature.

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## Introduction

Since the first charter school opened in 1992, 42 states and the District of Columbia have adopted provisions allowing charter schools (Epple et al. 2015). Advocating reform to struggling public education systems, the proponents of charter schools envisioned that charter schools' autonomy would allow charter schools to innovate and improve educational outcomes for their students. Proponents also hoped that the increased competition for students would spur improvements in traditional public schools (TPS). Improved academic performance is important as research has generally found that it leads to better economic outcomes for both individuals and communities (Hanushek and Kimko 2000; Card 1999).

The effect of charter school attendance on student academic achievement and life outcomes has been long debated and extensively researched, with research conducted in at least 27 states (Cremata et al. 2013). Most commonly, researchers have used changes in tests scores to measure student achievement, yielding mixed results: Studies estimating changes in student achievement across multiple schools have found no, small positive, or even small negative effects of charter school enrollment.

Evidence within many of these studies, however, indicates that student achievement improves as charter schools mature (Sass 2006; Bifulco and Ladd 2007; Booker et al. 2007). Studies also have documented student achievement gains in charter schools that employ an education model known as No Excuses (Hoxby and Murarka 2009; Gleason et al. 2010; Angrist et al. 2013). While not a rigidly-defined model, the No Excuses approach includes a strict disciplinary environment, longer school days and school years, and a focus on traditional reading and math; the schools employing this approach are typically in urban areas.<sup>1</sup> Our analysis of 50 start-up charter schools in Georgia had mixed results regarding the effects of charter schools on student achievement, mirroring the national literature.

In order to compare test scores across students, researchers commonly examine oversubscribed charter schools. They analyze the differences between students who "won" the enrollment lottery and attended the charter school and students who "lost" the lottery and attended a TPS. Because winning and losing the enrollment lottery is random, any difference in the academic performance between the lottery winners (who are charter school students) and losers (who are TPS students) can be considered causal. The results from the lottery studies alone, however, may be too narrow to apply to all charter schools (Angrist et al. 2013).

In addition to studies of academic performance, an emerging literature is providing some evidence that charter schools have been able to improve student life outcomes, including high school graduation rates and earnings (Booker et al. 2007; Dobbie and Fryer 2013; Booker et al. 2014; Fitzgerald 2014).

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<sup>1</sup> A growing body of literature has termed the approach of these schools as "No Excuses." There is not a strict definition of what is included in a No Excuses school. However, they share many similar characteristics. Later in this report, we list the characteristics we use to define No Excuses schools in Georgia.

The report is organized as follows. The next section discusses the theory that education can increase human capital and lead to positive economic impacts for communities and individuals. The third section summarizes key literature on charter schools and the importance of rigorous research methods when examining charter school effectiveness. Section four examines various measures used to gauge the success of charter schools, including student achievement, high school graduation rates, college attendance rates, and earnings. Section five reviews these student outcomes in relation to Georgia's current charter school landscape. For this section, we use results from the Governor's Office of Student Achievement (GOSA) evaluation of some of the state's charter schools with additional information about 50 Georgia start-up charter schools. Section six examines other economic benefits associated with better educational outcomes. The final section concludes the report. The Appendix provides a summary of the relevant high-quality empirical studies on the effectiveness of charter schools.

## The Economic Theory on Academic Achievement and Economic Impact

Economic theory holds that increased business investment in new machines and equipment (capital investment) fosters economic growth. Becker (1962) expanded the concept of investment to include schooling and training (investing in human capital). This theory states that better educated workers are more productive; this can lead to both economic growth, improving the larger economy, and higher wages, an economic benefit to individuals.

Since Becker published his article, the literature on human capital has expanded extensively and fits into two broad categories: the macroeconomic effects of education on countries' growth rates and the returns to earnings from education for individuals. While both of these areas of research have been fraught with debates about appropriate research methods, there is consensus on two outcomes. First, in the macroeconomic setting, better schooling, measured by cognitive development in a country, is related to greater economic growth (Hanushek and Kimko 2000; Hanushek and Woessmann 2012). Second, from the perspective of individuals, higher educational attainment leads to substantially higher lifetime earnings (Card 1999; Heckman et al. 2006).

In the wake of Becker's seminal article on how earnings can grow through the investment in human capital, Jacob Mincer (1974) formulated a model that explains earnings as a function of experience and education, while controlling for other factors that might affect earnings. The resulting Mincer regression equation is widely used by labor economists to measure the monetary returns from additional years of schooling. According to Thomas Lemieux (2006), the Mincer model "has been estimated on thousands of data sets for a large number of countries and time periods which clearly makes it one of the most widely used models in empirical economics."

While a useful tool for economists, the Mincer equation has its critics who argue that the model is overly simplistic. Nobel Prize-winning economist James Heckman, who is a leader in this area of research, was an early critic (Heckman and Polachek 1974). The principal concern is that education and ability are

correlated, so it is difficult to identify which of these two factors determines earnings. The most current literature on the relationship between educational attainment and earnings suggests that it is complicated to model but that the effect of education on earnings is nevertheless consistently positive (Heckman et al. 2015). Heckman asserts that sophisticated average treatment effect models are required to accurately identify the causal effect that education has on earnings.<sup>2</sup> In addition to considering a person's educational attainment, these models must also account for different levels of inherent skills and abilities and the sequential education decisions process that individuals face.<sup>3</sup> The models must also accurately account for the uncertainty associated with all of these decisions. For instance, there is a level of uncertainty present when a person makes a decision to obtain a college degree: She might not complete the degree, and therefore not receive the expected increase in wages associated with that degree. Despite its complexity, the Heckman model estimates of the returns to education are similar to those found using the Mincer equation. Heckman finds that for each additional step in educational attainment, such as earning a high school diploma, earnings increase by roughly 10 percent per year. (Note that this causal relationship also holds for additional milestones such as attending college and earning a college degree.)

It is important to note that recent studies such as Heckman et al. (2015) use sophisticated statistical techniques to prove that additional educational attainment is the causal agent responsible for improved earnings or other outcomes of interest. However, many empirical studies simply report the correlation between educational attainment and various outcomes but do not show that education is the actual cause of the outcome. For instance, an extensive literature documents the correlation between educational attainment and better life outcomes, such as health status, and societal benefits such as lower take-up rates of public assistance, lower incidences of crime and lower incarceration rates.<sup>4</sup> Later in this report, we discuss this literature. We next examine studies that have looked for causal connections between charter school attendance and factors associated with community economic impact, including academic achievement.

## Charter Schools: Research Methods Employed

Isolating a causal relationship between the charter school that students attend and outcomes of interest, such as academic achievement and their future earnings, is difficult. Differences among individual charter schools, such as the legal framework in which they operate, curricular focus, instructional style, teachers,

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<sup>2</sup> Much like a laboratory experiment, average treatment effects are determined by using a control group and a treatment group to measure outcome differences between those who received the experimental treatment and those who did not. In this type of research, an individual's level of education serves as the treatment in this experimental approach (Heckman et al. 2015).

<sup>3</sup> The choice by individuals to pursue additional education is modeled as a decision tree in which each decision offers an additional branch with additional choices. As in real life, the model requires that a student complete the prior level of education before she can choose to go on for additional education. For instance, the choice to attend college is conditional on the student's choice to complete high school.

<sup>4</sup> Many of these results can be attributed to the studies done on children in Chicago who participated in various early childhood programs. A widely known example of this research is the *HighScope Perry Preschool Study, Lifetime Effects: The HighScope Perry Preschool Study Through Age 40* (see Schweinhart et al. 2005).

schedules, and communities served, complicate the analysis. Because of these variations, much of the research on charter schools has been specific to one school or small set of schools within a given state, making it difficult to generalize the findings to other charter schools.

When comparing the outcomes of students who attended a charter school to those who attended a TPS, the research suffers from potential sample selection bias. By choosing to enroll, or attempting to enroll, in a charter school, a family and student are indicating intrinsic motivation and potentially higher value placed on education than families and students who do not attempt to enroll. Any effect found in a study that does not correct for this potential selection bias could just be capturing the effect of the higher levels of motivation and value placed on education rather than the charter school's impact on the student.

The extant research on charter schools has used multiple research methods to account for this potential selection bias. The method selected varies depending on the outcome being measured and the type of data available.<sup>5</sup> Ideally, researchers would be able to select students and randomly assign them to a charter school or a TPS, and then observe the differences in outcomes. However, that is not possible. The next best real-world alternative is referred to as a lottery-style research design. This research design takes advantage of the random selection that an attendance lottery provides in oversubscribed charter schools. Researchers are able to address selection bias by comparing the performance of students chosen for the charter school to that of students not chosen and who were not chosen and consequently attend a TPS. Thus, the comparisons of student outcomes only take place among individuals who wanted to attend that school, and as both groups are presumably similarly motivated, any difference can be attributed to the effect of attending the charter school.

Attrition poses a potential complication for lottery-based studies, if that attrition is related in some way to the results of the lottery. For example, students that move away or attend a private school after not getting a spot in the charter school would not be observed after the enrollment lottery occurs. If this decision is related to the results of the lottery, then it could bias the results since the comparison group would not necessarily be reflective of lottery losers. Researchers have found differences when comparing the population of students that leave the system after unsuccessfully participating in the lottery versus those that stayed in the system after unsuccessfully participating in the lottery. Some studies have also found significant differences in the group of students exiting the system after unsuccessfully participating in the lottery compared to the full sample of students that were observed before the lottery. Researchers can correct for the effect of such attrition, but at the cost of less precise estimates (Angrist et al. 2010; Engberg et al. 2014).

By design, the lottery research method can only evaluate the performance of oversubscribed schools, and thus results may not be generalizable to all charter schools. The oversubscription of these schools

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<sup>5</sup> An excellent survey of all of the academic literature on charter schools, and the various statistical methods used to correct for selection bias, was recently conducted by Epple et al. (2015). They identified five methods used to correct for this potential bias: 1) fixed effect approaches, 2) a random lottery design, 3) matching procedures, 4) an ordinary least squares (OLS) regression design, and 5) instrumental variable approaches.

suggests several important limitations to the application of the research to other charter schools. First, these charter schools may be oversubscribed because they are of high quality relative to other charter schools. Second, the strong demand may indicate that the area's public schools are of low quality and the charter school option presents only a marginal improvement. Third, a combination of reasons one and two is also possible. A final criticism of lottery-based studies is that two key assumptions are embedded in the research design: The lottery conducted was in fact random, and the records kept by the schools are accurate (Clark et al. 2011). Despite these criticisms, most lottery studies have high internal validity, meaning we can have confidence in the results for that individual school, but at the cost of external validity, meaning we might not be able to generalize the findings to all charter schools.

Lottery-style studies are not always practical for various reasons, such as the schools of interest are not oversubscribed or lottery results are not available. Another method that researchers have used to measure the effect of charter schools on educational outcomes is to compare the achievement of students who started out in a TPS and then moved to a charter school. This type of historical data, commonly referred to as longitudinal data, allows researchers to control for selection effects and other unobserved characteristics because the research design relies on the changes in educational attainment of individual students over time. This research design uses a statistical method known as fixed effects, which is a way of controlling for unobserved individual characteristics that do not change (remain fixed) over time.

While the fixed effects research design allows a broader array of charter schools to be studied, it too has some strong critics. Some have argued that the assumptions inherent in running fixed effects models are overly restrictive and poorly suited to finding a charter school effect. These studies rely on students who switch schools, who as a group might not accurately represent the population of charter school students and thus bias the results (Hoxby and Rockoff 2004). In addition, there are a limited number of these students, and the requirement that these students be administered at least two standardized tests while in TPS further shrinks the sample size. This smaller sample size limits the statistical power of these studies to find charter school effects on student achievement (Hoxby and Murarka 2007).

In an attempt to overcome the criticisms leveled at both lottery studies and fixed effects studies, the National Center for Education Evaluation and Regional Assistance (NCEERA) designed and funded an ambitious study that encompassed 36 charter middle schools in 15 states (Gleason et al. 2010). The researchers recruited established charter schools and were involved in all facets of the enrollment lottery process, verifying that it was random and that the data generated from it were accurate. Because the study was conducted across several states and covered both urban and nonurban charter schools, the results are more broadly applicable than previous lottery studies. The NCEERA study produced several interesting results, including differences in the performance of urban and nonurban charter schools in academic achievement. The findings of this study were important in guiding subsequent research on charter schools. Subsequent studies have tried to isolate and identify the source of the disparate effects found between urban and nonurban charter schools. We discuss these findings in greater detail later.

A variant of the fixed effects study design is often referred to as the value-added model. The value-added model uses a student's prior test scores and demographic characteristics to predict future test scores. Researchers use the difference between the actual test score and the test score predicted by the model as a measure of the charter school's contribution to student achievement. To evaluate the value added for a whole school, the difference between the actual and predicted test scores are averaged for each student. This method is currently being employed in Georgia by Dr. Tim Sass for GOSA (Sass 2014).

## Charter Schools: Measures of Success

This section explores the empirical literature on charter schools' effects on academic achievement, graduation rates, wages, and other life outcomes. The discussion is limited to high-quality studies that use the methods discussed in the previous section. For charter schools to have a measurable economic impact, they need to improve outcomes for students later in life. Charter schools that increase the number of students who graduate high school, attend college, obtain degrees and earn higher salaries would have positive economic impacts on their communities. A recent stream of the literature examines the potential effects that charter schools have on these outcomes. There is a much more established literature that examines the role that charter schools play in academic achievement. We examine that literature first.

### ACADEMIC ACHIEVEMENT

An extensive body of work explores the effects that charter schools have on academic achievement, as measured by performance on standardized tests. This rich literature has measured charter school effects on academic performance at the elementary and middle school levels.<sup>6</sup> Student achievement has been firmly linked to better life outcomes such as increased high school graduation rates and higher wages; consequently, the effects found in this literature are a reasonable stepping stone for better economic outcomes for students later in life.

In much of the earlier literature, the research design implemented often predicted a study's findings. For example, studies that relied on a fixed effect design tended to not find an effect of charter school attendance on academic achievement, or even to find a small negative effect. Lottery-style research designs, in contrast, tended to find large positive effects. However, a consensus is forming among researchers that one educational model, No Excuses, employed by charter schools predominantly in urban districts serving disadvantaged students is positively linked to educational outcomes.

The early published literature testing for a causal relationship between charter enrollment and student achievement addressed selection bias by relying on student-level longitudinal data. These studies are commonly referred to as fixed effects studies. Charter schools in at least 12 states have been studied

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<sup>6</sup> The literature on student achievement does not include nearly as many studies on charter high schools, as they are not as numerous as charter elementary schools and middle schools, nor have they been in existence as long. Thus, there are limited cohorts of students to study.

using the fixed effects design, with findings generally showing that charter school enrollment had little to no effect on student achievement compared to TPS (Zimmer and Buddin 2006; Booker et al. 2007; Hanushek et al. 2007; Imberman 2011, Ni and Rorrer 2012; Zimmer et al. 2012; Booker et al. 2014). In a set of studies using charter school data from North Carolina, Bifulco and Ladd found that charter school attendance had consistently negative effects on reading and math test score growth rates (Bifulco et al. 2004; Bifulco and Ladd 2006, 2007).

Despite a lack of support for improved student achievement in general, some studies have found that charter schools become more effective over time (Sass 2006; Bifulco and Ladd 2007; Booker et al. 2007; Hanushek et al. 2007; Ni and Rorrer 2012; Cremata et al. 2013). For example, Sass (2006) found that Florida charter schools initially underperformed TPS, but by their fifth year in operation, they had closed the performance gap in math and were outperforming TPS in reading.

One of the most extensive studies of charter schools to date was published in 2013 by the Center for Research on Education Outcomes (CREDO) at Stanford University. The study was in part a follow-up to a 2009 national study that covered 16 states plus Washington, D.C. By comparing 2013 results to the 2009 results, the authors found, like Sass (2006), that as charters mature, their students' academic achievement tends to improve.

In contrast to the results of fixed effects studies, lottery-style studies have consistently found that charter schools improved student achievement (Hoxby and Rockoff 2004; Hoxby and Murarka 2009; Abdulkadiroğlu et al. 2011; Dobbie and Fryer 2011; Dobbie and Fryer 2013; Curto and Fryer 2014). The effects in these lottery studies, which were conducted in Boston, Chicago, New York City, Washington, D.C., and Los Angeles, ranged from small to large positive effects for reading and math over TPS.

Because the scaling on test scores differs across tests, research on education reforms that consider the effect on test scores generally report results in terms of changes in standard deviation units. The standard deviation measures how dispersed the scores are, and thus indicates how large the change in the test score has to be for the result to be of significance. Suppose that one researcher found that an education reform implemented in one state increased the average test score by 60 points, while another researcher found that an alternative reform in another state that used a different test increased the average test score by 25 points. Those two score improvements are not comparable. But suppose that the standard deviations for the two tests are 600 and 100, respectively. For the first state, the reform increased test scores on average by 0.1 standard deviations ( $=60/600$ ), while for the second state, the reform increased test scores on average by 0.4 standard deviations ( $=25/100$ ). Compared to the results of most reforms, an increase in average test scores of 0.4 standard deviations would be considered a large effect.

Some of the upper bound results come from the lottery-type studies, such as those conducted in Massachusetts on the Knowledge is Power Program (KIPP) schools (Abdulkadiroğlu et al. 2011; Angrist et al. 2010, 2013). These studies find that one year at a charter middle school improves student achievement in math by about 0.4 standard deviations and about 0.2 standard deviations per year in English/language arts (ELA). To get a sense of the significance of these effects, Sass (2014) compared

them to other substantive education changes that have positive impacts on student achievement. For instance, reducing class size in elementary grades by seven students is associated with a 0.10 to 0.20 standard deviation increase in student achievement (Whitehurst and Chingos 2011), and the difference in the effectiveness of a first-year teacher and one with three years of experience is about 0.07 standard deviations (Dee and Wyckoff 2013). Note that it is difficult to compare results across studies because they vary by year, school and grade level. In addition, none of the studies of charter school's effectiveness cited here report the underlying test mean or standard deviation.

Clark et al. (2011) uncovered a key insight into why such large discrepancies have been found in the literature on the effects of charter schools on student achievement. They observed that there was a link between the geography of the areas and type of students served by charter schools and student achievement. On average, charter schools serving large urban areas or those serving lower achieving or more disadvantaged students had positive effects on student achievement. No such positive effects were found for charter schools in nonurban areas or those serving higher achieving or more advantaged students (Clark et al. 2011).

Researchers have conducted studies to try to discern what makes urban charter schools more successful than nonurban charter schools. The emerging consensus is that urban charter schools tend to use the No Excuses approach (Angrist et al. 2013). No Excuses schools are more likely to employ strict discipline, focus on traditional reading and math, have increased instructional time and have greater selectivity in teacher hiring. Many of the oversubscribed urban charter schools with lottery data are No Excuses schools (Hoxby 2003; Hoxby, Murarka et al. 2009; Angrist et al. 2010; Abdulkadiroğlu et al. 2011; Dobbie and Fryer 2011; Curto and Fryer 2014). Some urban charter schools have not implemented this instructional approach, which partially explains the wide range of estimated effects across urban schools. Note that in the various samples of charter schools used in the studies conducted to date, almost no nonurban charter school has adopted the No Excuses instructional approach (Gleason et al. 2010).

In an effort to explain this apparent divide between urban and nonurban charter schools in Massachusetts, Angrist, Pathak, and Walters (2013) used a lottery-style research design as well as several other empirical methods to analyze Massachusetts charter schools. By controlling for the No Excuses approach in the charter schools, the researchers were able to explain many of the dichotomous findings in the earlier literature between urban and nonurban charter schools. In addition, the researchers found that students with certain demographic characteristics benefited more from the No Excuses approach than others. In particular, urban charter middle schools appear to produce especially large achievement gains for students from low-income households and with low baseline test scores (Angrist et al. 2013).

The literature on charter school effects on student achievement has historically been contentious. In summary, much of the literature using the lottery method has provided strong evidence that certain charter schools are able to improve student achievement. However, when many schools that operate in varying contexts and areas are studied together, even when using the lottery method as Gleason et al. (2010) did, the effects on average tend to be small or zero. Research shows that this low average effect is due to the variability in measured effectiveness across schools. More recent studies that tried to uncover

the source of this variation suggest that No Excuses charter schools that serve disadvantaged students, typically in urban settings, do improve student achievement. Other types of charter schools have not been found to outperform TPS in any consistently measurable way.

### **GRADUATION RATES, COLLEGE ATTENDANCE, AND EARNINGS**

Studies testing the effect of attending charter high schools on outcomes that directly relate to economic impact such as graduation rates, higher education outcomes and wage effects have all come since 2010. This is largely because the first classes of charter school students have only recently begun graduating from high school, so there are limited numbers of charter school alumni for which these outcomes can be measured. Researchers must observe charter students at some point after graduating high school, and even college, to test these effects. The student-level databases must also have been in place for a long period of time to both capture attendance at charter schools and observe the outcomes after high school graduation. The studies that have been able to do this type of analysis have found positive effects from the enrollment in a charter school on these three outcomes.

Some studies have found that enrollment in charter high schools increases the chances of high school graduation and college attendance (Booker et al. 2010; Clark et al. 2011). Unlike test scores, high school graduation and earnings immediately after graduation are one-time events, and any study of the effect that charter schools could have on them cannot rely on multiple observations for a student over time to help control for potential charter school selection bias. To account for potential selection bias, Booker et al. (2010) considered only students who had previously attended a charter middle school. In a follow-up study, similarly designed except with a matching protocol implemented to further correct for any charter selection bias, the authors found similar results for high school graduation and college attendance. In addition, they found that charter enrollment predicted longer college persistence and higher earnings (Booker et al. 2014).

Two lottery-style studies conducted on oversubscribed charter schools in Boston and Harlem found positive effects of charter enrollment on some non-cognitive outcomes (Dobbie and Fryer 2013; Angrist et al. 2014). In these studies, charter schools were found to increase the chances that a student would enroll in a four-year college rather than a two-year college, but they found no evidence that the charter schools increased the likelihood of high school graduation (Angrist et al. 2014). The students who attended Harlem's charter schools were more likely to enroll in college; female students were less likely to become pregnant as a teen; and male students were much less likely to be incarcerated than students who participated in the lottery but attended Harlem's TPS (Dobbie and Fryer 2013).

Studies that look at broader outcomes such as graduation rates and earnings are fairly recent and few in number, and include schools in only Chicago, New York, Boston and Florida. However, they might provide the best evidence that charter schools are having positive economic impacts on communities and individuals through improved academic achievement. The next section examines how the national literature relates to Georgia's experience with charter schools.

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## Georgia's Experience with Start-Up Charter Schools

In this section, we analyze the available data on the effectiveness of Georgia's start-up charter schools by comparing a select group of urban start-up charter schools that use the No Excuses model to nonurban schools and schools that do not use the No Excuses approach.<sup>7</sup> As the national literature points to a link between No Excuses charter schools and increased student achievement, we would expect to find the same in Georgia's start-up charter schools. We categorized 50 start-up charter schools in Georgia as urban No Excuses or other; however, our analysis is limited to 11 schools as those were the only relevant start-up charter schools with available data.<sup>8</sup>

Our initial review suggests that in Georgia, those charter schools that outperform the state average tend to vary in their instructional approach, with some of the leaders employing No Excuses methods while others do not.<sup>9</sup> The link between charter school academic achievement and the No Excuses approach will be examined further in our future report.

To assess whether the 50 start-up charter schools in Georgia could be categorized as No Excuses schools, we checked school websites and materials looking for the following characteristics that Angrist et al. (2013) identified as common among No Excuses schools.

- Uniforms
- Cold-calling on students in the classroom
- Use of instructional drills
- Extended instructional time
- Formal reward systems to shape student behavior
- Hiring Teach for America alumni
- Videotaping lessons to provide teachers with feedback
- Focus on discipline
- High-dosage tutoring

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<sup>7</sup> Start-up charter schools are schools that did not exist prior to being authorized as a charter school. This is in contrast to a conversion charter school, which is usually an existing TPS that is converted into a charter school. The length of operation of the start-up charter schools in this sample varies from over 10 years to just a couple of years.

<sup>8</sup> According to the Georgia Department of Education Annual Charter School report, there were 87 charter schools in 2014-15. Schools were dropped that do not have defined attendance zones or are not start-up charter schools. This excluded career academies, non-traditional high schools, district operated schools, and state charter schools with a state-wide attendance zone. Schools that opened in 2014 or later were also not included due to lack of usable data. This process resulted in the full list of 52 start-up charter schools compiled by the Center for State and Local Finance and the State Charter School Commission for additional research on the economic impacts of charter schools to be conducted in a future study. Two of the schools on that list have recently closed, leaving 50.

<sup>9</sup> The state average includes both charters and traditional public schools, though there are many more traditional public schools than charters.

Angrist et al. (2013) also suggested that No Excuses charter schools do not usually engage in some activities, including:

- Emphasizing social and physical well-being or cultural awareness; and
- Using group projects.

Seven out of the selected 50 Georgia start-up charter schools meet many of these criteria and are all KIPP schools. Thirteen additional schools have some of the criteria and may lean toward the No Excuses model.<sup>10</sup> For the remainder of this report, we categorize all 20 schools as No Excuses schools. The remaining 30 schools did not meet the No Excuses criteria or used teaching practices inconsistent with the No Excuses model.

The achievement outcomes for some of the 50 start-up charter schools above was examined in the recent GOSA studies conducted by Sass. GOSA has issued three reports documenting the achievement of students in 14 state charter schools (Sass 2014, 2015, 2016).<sup>11</sup> The two reports analyzed here are for school years 2012-13 and 2013-14 and include charter schools that serve elementary, middle and high school grades.<sup>12</sup> The reports conclude that in aggregate the charter schools did not have higher student achievement than the Georgia state average, as measured by scores on standardized tests. However, there is variation among the schools and across the subjects tested.

Included in the 14 examined schools are 11 start-up charter schools.<sup>13</sup> We categorized six of those 11 schools as No Excuses schools; they generally serve urban areas that include disadvantaged students. (Three are Ivy Prep schools, and none in this 11-school sample are KIPP schools.) The remaining five schools are nonurban and do not have attributes of the No Excuses model.<sup>14</sup>

Many of the charter schools are comprehensive and include grades K-8 and beyond. In these cases, the elementary and middle school test scores are reported separately in the GOSA reports; it is possible for the elementary school test scores to exceed the state average and not the middle school scores or vice versa. Thus, comprehensive charter schools that include elementary and middle school grades are treated as two schools for our purposes. This yields nine observations of No Excuses elementary and middle schools located in urban areas (No Excuses/urban) and 10 elementary and middle schools that did not fit the No Excuses model in nonurban areas (Other/nonurban), for a total of 19 observations.

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<sup>10</sup> Again, while there is no consistent definition of what the No Excuses model is in the literature, the schools share similar characteristics.

<sup>11</sup> State charter schools can be created if their petition was denied by a local board of education or if the school has a statewide attendance zone. A state charter school is authorized to operate by virtue of a charter contract with the State Charter Schools Commission.

<sup>12</sup> The third report was released in May 2016 for school year 2014-15, as this report was being written. The results are fairly similar to the two earlier reports and are not included here.

<sup>13</sup> Three of the 14 are state-wide virtual schools and thus are not relevant for the analysis here.

<sup>14</sup> There is geographical variation in the populations served by the five schools that we assessed that do not employ No Excuses methods. But, most serve populations outside of core urban areas, for instance in Coweta and Cherokee counties or the rural five-county attendance zone of the Pataula Charter School. For the simple analysis here we classify these five schools as nonurban.

**Table 1. Selected Charter School by Type that Exceeded State Average Public School**

SCHOOL YEAR	NO EXCUSES/ URBAN CHARTER SCHOOL		OTHER/NONURBAN CHARTER SCHOOLS	
	2012-13	2013-14	2012-13	2013-14
Average (over all tested subjects)	3	1	4	2
Reading	4	7	8	10
Math	3	2	2	1
<i>Number of Observations</i>	9	9	10	10

Source: Sass (2014, 2015) and authors' calculations. Data on charter school attributes is available upon request.

Table 1 shows the number of the selected No Excuses/urban and Other/nonurban charter schools that exceeded the state average test scores as determined by Sass (2014, 2015) for two school years, 2012-13 and 2013-14 (the full sample is the 19 observations discussed above). Over all subjects tested, most of the selected charter schools did not do better than the state average in either year, but the results varied by subject tested. In addition, the selected No Excuses/urban schools do not appear to induce greater student achievement than the selected Other/nonurban charter schools.

For illustrative purposes, we discuss the most recent year, 2013-14, again based on the 19 observations discussed above. For instance, of the nine No Excuses/urban schools, one school exceeded the state average in value added measures, as did two of the 10 Other/nonurban charter schools. Results vary across subjects, with the charter schools doing better in some subjects and worse in others than the state average. For instance, in reading, seven of the nine No Excuses/urban charter elementary and middle schools exceeded the state average and all of the 10 Other/nonurban charters did in 2014. However, the charter schools did worse than the state average in math, with only two of the nine No Excuses/urban schools exceeding the standard in 2014 and only one of the 10 Other/nonurban schools.

The simple analysis shown in Table 1 suggests several areas of additional research that the Center for State and Local Finance will take up in a future report. Do urban charter schools generally have a greater impact on student achievement than nonurban charter schools in Georgia? How important is the No Excuses model in improving student achievement and other life outcomes in Georgia?

We next examine some additional economic benefits that are associated with improved academic achievement and higher rates of high school graduation.

## Other Economic Benefits

As was discussed in the previous sections, charter schools can have a positive effect on academic achievement, college attendance, wages and other important young adult life outcomes. Many studies have found a correlation between better academic outcomes and many of these other outcomes. It is important to note that these studies produce simple bivariate correlations and thus do not control for other factors. We briefly explore some of these benefits and how individuals, as well as state and local governments in Georgia, might benefit from better and more education.

Charter school attendance has been linked to increased graduation rates as well as a greater likelihood of attending college. Research by the Bureau of Labor Statics (BLS) shows that high school graduates report lower unemployment rates and have higher median earnings. For instance, the national median weekly earnings for workers with a high school diploma was \$668 in 2014 compared to \$488 for those with less than a high school diploma. College-educated workers had higher wages still, with the size of the difference depending on the degree earned. For those with a bachelor's degree, the national median weekly wage in 2014 was \$1,101. For those with an associate's degree, the national median weekly wage was \$761. Note that these results do not consider other factors that might affect earnings, such as ability, age, gender, race/ethnicity and health.

Several other benefits can be linked to higher academic achievement. Higher incomes result in lower spending on social assistance, which could benefit state and local governments. For instance, in 2012, BLS estimated that nationally benefits received by individuals in income groups that are comparable to the earnings of workers without a high school degree averaged \$1,040 per year. Public assistance for higher wage earners averaged \$385 per year in 2012.<sup>15</sup>

Another benefit of higher graduation rates is lower incarceration rates (Dobbie and Fryer 2013). According to the Georgia Department of Corrections, the annual average cost per inmate totaled roughly \$20,000 in 2015. Again, this is a benefit that would accrue mostly to state and local governments.

Lower rates of incarceration would suggest that fewer crimes are being committed. Lower crime rates would benefit communities. These benefits are harder to quantify but can be substantial. For instance, Heckman et al. (2010) estimates that the benefits to society from the reduction in crime associated with successful early childhood interventions for disadvantaged urban children account for 41 to 66 percent of the program benefits when expressed as an annual rate of return.<sup>16</sup> (For a thorough discussion of the difficulties in estimating these benefits see, Heckman et al. 2010.)

## Conclusion

Table 2 summarizes the findings from the literature discussed within this report. While fully outlined in Table A1 in the appendix, this table provides a snapshot of the mixed findings of the effectiveness of charter schools, organized by the results found in the studies (positive effects versus negative or no effects) and the geography of the schools studied (urban, nonurban, or mixed urban and nonurban schools).<sup>17</sup> The outcomes listed are academic achievement, graduation from high school, wages, college attendance and other. Positive effects mean that the charter schools studied were shown to be a positive influence on the variable of interest; zero/negative effects indicate that the charter schools did not have a

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<sup>15</sup> These benefits included public assistance, supplemental security income and food stamps, which are predominantly federal programs.

<sup>16</sup> This variation is due to assumptions made in the value of statistical life due to declines in the murder rate.

<sup>17</sup> Note that the oversubscribed urban charter schools that have been studied in the literature generally are categorized as No Excuses schools.

measurable effect on the variable of interest or the effect was negative. For instance, the literature generally finds that urban charter schools have a positive effect on academic achievement. This result is indicated by the Yes in the first column of Table 2.

**Table 2. Summary of Charter School Literature Review Results by Geography**

	URBAN		NONURBAN		MIXED GEORGRAPHY	
	POSITIVE	ZERO/ NEGATIVE	POSITIVE	ZERO/ NEGATIVE	POSITIV E	ZERO/ NEGATIVE
Academic achievement	Yes			Yes		Yes
Graduation from high school		Yes			Yes	
Wages					Yes	
College attendance	Yes				Yes	
Other	Yes					

Note: See Table A1 within the appendix for a full listing of the literature reviewed.

Table 2 shows that urban charter schools generally have positive effects on outcomes of interest: academic achievement, college attendance and other. Many of the urban schools studied would likely be classified as No Excuses schools. As shown by Angrist et al. (2013), it is this intersection of the urban disadvantaged student population and the No Excuses model that seems to generate increases in student achievement. Nonurban charter schools generally have zero or negative effects on student achievement compared to TPS. Our literature review identified no carefully done studies that have tried to measure outcomes using nonurban schools exclusively.

Studies classified as mixed geography had varied results. Some studies showed that charter schools had zero or negative effects on academic achievement, but a few studies found that charter schools had positive effects on graduation from high school, wages, and college attendance. Intuitively, these mixed results should come as no surprise. Charter schools were intended to be the testing ground for educational innovation, with each school adopting its own innovation tailored to its students. Thus, it is unlikely that they would all be successful in improving student achievement over TPS.

Preliminary results suggest that Georgia's start-up charter schools may perform in a similar fashion to those studied nationally. Some evidence suggests that Georgia charter schools in the aggregate do not have a positive effect on student achievement when compared to TPS. But some charter schools do outperform TPS in the various subjects tested. It is not clear based on the simple classification undertaken here whether the urban No Excuses model is more effective in Georgia than other types of charter schools or TPS. A future report will examine the economic impact of Georgia's start-up charter schools, including measures of academic achievement, while controlling for various charter school qualities as well as locations throughout the state. Using a much broader sample of charter schools in both urban and nonurban locations that apply different teaching methods, that future study's goal is to further understand how charter schools can have positive economic impacts on both students and the communities they serve.

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## Appendix: Summary of Selected Literature

The following is an annotated bibliography of recent studies of the effectiveness of charter schools. The studies included in this appendix were, with one exception, published in academic journals and use empirical techniques that allow causal inferences regarding the effect of charter schools.

Abdulkadiroğlu et al. (2011) used student assignment lotteries to estimate the effect of charter school attendance on student achievement in Boston. The effects for students who won the admissions lottery were large and significant, with middle school students' math test scores increasing by 0.40 standard deviations and ELA scores increasing by 0.25 standard deviations. High school students also had improved test scores, although the effects were not as large. The authors also evaluated a related alternative, Boston's pilot schools. Pilot schools have some of the independence of charter schools but are in the Boston Public School District and are covered by some collective bargaining provisions. The lottery estimates for pilot school students were mostly small and statistically insignificant, with some statistically significant negative effects. The authors suggested that the No Excuses style of most of the charter schools in the study may have played a role in the results. Pilot schools do not usually employ the No Excuses approach.

Angrist et al. (2010) evaluated the only KIPP school in New England at the time, KIPP Academy Lynn located in Lynn, Massachusetts, a city north of Boston with a low median income. The KIPP Lynn middle school served about 300 students in grades 5-8 and opened in 2004. The study used the 2005-08 admissions lotteries to control for potential selection bias and then compared the results of lottery winners who were accepted to KIPP Lynn to those that were not. The authors tested both groups of students and found that the characteristics of lottery winners and losers were similar. The analyses suggested that KIPP Lynn generated relatively large test score gains for lottery winners, estimated at 0.35 standard deviations for math and 0.12 standard deviations for ELA. The authors were optimistic that these were not isolated results, as KIPP runs many charter schools around the country that follow the same No Excuses model. In addition, other charter schools in the Boston area have adopted the No Excuses model.

Angrist et al. (2013) used a lottery-style research design as well as several other empirical methods to analyze Massachusetts charter schools. The authors' goal was to explain the apparent divide in performance between urban and nonurban charter schools. The researchers found considerable variation between the effectiveness of urban charter schools and nonurban charter schools. Estimates for urban charter middle schools suggested these schools generate gains of 0.32 standard deviations in math test scores and 0.15 standard deviations in ELA test scores per year enrolled. Nonurban middle schools did not appear to be effective at boosting student achievement when compared to TPS, with a decline of 0.12 standard deviations per year in math and 0.14 standard deviations per year in ELA. High school lottery results for urban schools were similar to the statewide results for middle schools, showing gains in math and ELA. Estimates for nonurban charter high schools were small, negative and not statistically

significantly different from zero. Note that the state sample used in this study included only two nonurban high schools.

The researchers went on to show that urban charter schools tended to embrace the No Excuses model of teaching. They identified five key characteristics of the No Excuses model: emphasis on discipline, school uniforms, cold-calling, strict adherence to school-wide standards and the use of Teach for America alumni. Controlling for the No Excuses approach explained much of the variation in achievement between urban and nonurban charter schools. Also, the researchers found that students with certain demographic characteristics benefited more from the No Excuses approach than others. In particular, urban charter middle schools appeared to produce especially large achievement gains for students from low-income households and those with low baseline test scores.

Angrist et al. (2014) sought to test whether the gains observed in student achievement on standardized tests at some Massachusetts charter schools persist and contribute to improved outcomes linked to human capital and higher future earnings. As in earlier work on Massachusetts charter schools, the research design used the randomized enrollment lotteries at oversubscribed charter schools as a control for important unobservable student and family characteristics. The estimates suggested that the positive effects of the charter schools studied were persistent. Charter school attendance was found to have several key effects:

- Raising the probability that students passed state exams required for high school graduation
- Increasing the likelihood that students qualified for exam-based college scholarships
- Increasing SAT scores
- Increasing the frequency of AP test-taking with modest gains in scores
- Shifting students away from attending two-year institutions and toward four-year institutions and programs

The authors noted that these charter schools were remarkably effective for subgroups that have been difficult to serve, including boys, special education students, and students with low achievement when starting high school.

Bifulco and Ladd (2006) estimated the impact of charter schools on students in charter schools and students in nearby TPS, in North Carolina. They used a fixed effects study design to control for unobserved student characteristics. They found that students had smaller gains in achievement in charter schools than they would have had in public schools. The negative estimates of the effects of attending a charter school were found to be neither substantially biased nor substantially offset by positive impacts of charter schools on the performance of students in TPS. They found evidence to suggest that about one-third of the negative effect of charter schools could be attributed to high rates of student turnover.

Bifulco and Ladd (2007) used student panel data to examine the effect of charter schools in North Carolina on racial segregation and black-white test score gaps. The study found that North Carolina's system of charter schools had increased the racial isolation of both black and white students and had widened the achievement gap. It also found that the relatively large negative effects of charter schools on

the achievement of black students was linked to racial isolation, as the charter schools were less racially diverse than the schools the black students left.

Booker et al. (2007) studied the performance of five cohorts of students in Texas to see how charter school attendance affected math and reading test scores. The authors were careful to control for school mobility effects and to distinguish movement to a charter school from movement within and between traditional public school districts. They found that students experienced poor test score growth in their initial year in a charter school, but that this was followed by recovery in subsequent years. They estimated that students recovered from this disruption within approximately three years. The authors suggested that the failure to account for the initial drop off and adjustment period in test scores among charter school students may have influenced the findings of previous studies on charter school academic performance.

Booker et al. (2008) tested for a competitive effect of charter schools by looking for changes in student achievement in TPS following the entry of charter schools into the market. The study used an eight-year panel of data on individual student test scores of public school students in Texas to evaluate the achievement impact of charter schools. Booker's model included student/campus fixed effects and controlled for campus demographics and peer group characteristics as well as student and family background characteristics. The author found a positive and significant effect of charter school market entrance on student outcomes for those who remained in TPS.

Booker et al. (2011) focused on charter schools in both Chicago and Florida to address several issues relevant to high school students. The authors had to adopt a research strategy that would allow them to estimate the impact that attending a charter high school had on one-time events as opposed to student achievement, which can be measured many times in a student's academic lifetime using standardized tests. The authors used the enrollment in charter schools in the eighth grade as their control for student unobservable characteristics, reasoning that students who chose to attend charter schools prior to high school were more like each other than they were like students who attended a TPS in all grades. Some of these charter school eighth graders went on to a charter high school, while others enrolled in a TPS. The authors compared the ACT scores, graduation rates and college enrollment of these two groups. They found that for charter eighth graders, continuing into a charter high school appeared to increase ACT scores, improve the probability of graduating by 7-15 percentage points and improve the probability of enrolling in college by 8-10 percentage points. The authors cautioned that because all of the charter high schools studied included middle school grades, it was possible that the positive outcomes could be attributable to the combined middle/high school configuration. Note that the authors also used a fixed effects value added approach to test student achievement and found that, on average, charter schools' effectiveness in raising student performance on standardized tests was similar to that of TPS.

Booker et al. (2014) examined two long-term outcomes for students who graduated from charter schools: college persistence and earnings. This study was one of the first to estimate charter schools' effects on earnings in early adulthood, alongside effects on educational attainment. Using data from Florida, this study confirmed previous research that students attending charter high schools were more likely to

graduate from high school and enroll in college. The study also found that students attending charter high schools were more likely to persist in college and that in their mid-20s such students earned higher wages.

Clark et al. (2011) presented findings from the National Center for Education Evaluation and Regional Assistance study originally published by Gleason et al. (2010). The paper summarized previous results of the study and found that charters tend to have positive impacts for more disadvantaged students in urban areas and negative impacts for the more advantaged students in nonurban areas.

Cremata et al. (2013) conducted one of the most extensive studies of charter schools to date, which was published by the Center for Research on Education Outcomes at Stanford University. The study was in part a follow-up to their 2009 national study that covered 16 states plus Washington, D.C. (This study was not published in an academic journal.) The study employed a virtual control record methodology that matched each charter student to a TPS student who was similar along observable characteristics. Importantly, one of the items used for matching students was a baseline test score, which the authors included so that they could compare the achievement of charter and TPS students with similar levels of prior achievement.

Covering schools in 27 states, the study found that 56 percent of charter schools had academic growth that was not statistically different than that of TPS in reading, and 40 percent of charter schools had similar growth to that of TPS in math. A quarter of the charters outperformed TPS in reading and 29 percent in math. Nineteen percent of charters underperformed TPS in reading and 31 percent underperformed in math. The study was also able to track charter effectiveness over time by comparing 2013 findings to 2009 findings for schools in 16 states. Like Sass (2006), this study provided evidence that as charter schools mature their students' achievement tends to improve.

Dobbie and Fryer (2011) examined the Harlem Children's Zone (HCZ), which combined community programs with charter schools. The study sought to test the causal impact of HCZ charter schools on educational outcomes. Using both a lottery and instrumental variables research design, the authors found that attending an HCZ charter school had a positive effect on student achievement. The results showed that students attending the charter elementary school gained approximately 0.2 standard deviations in both math and ELA test scores per year. Students in the charter middle school gained about 0.2 standard deviations in math test scores per year.

Dobbie and Fryer (2013a) studied 39 charter schools in New York City to try to determine what inputs are correlated with school effectiveness, measured by student achievement on standardized tests. The authors analyzed many different school characteristics to determine their correlation with school effectiveness. They found that five characteristics common to schools termed No Excuses schools by researchers were correlated with school effectiveness, explaining about 45 percent of the variation across schools: frequent teacher feedback, the use of data to guide instruction, high-dosage tutoring, increased instructional time and high expectations. The authors found no correlation between school effectiveness and several commonly used input measures such as class size, per-pupil expenditure, teacher certification and teacher training.

Dobbie and Fryer (2013b) estimated the effects of high-performing charter schools on human capital, risky behaviors and health outcomes using survey data from the Promise Academy in the Harlem Children's Zone. Six years after the random admissions lottery, students who attended the Promise Academy middle school scored 0.283 standard deviations higher on a nationally normed math achievement test and were 14.1 percentage points more likely to enroll in college. Female students who attended the Promise Academy were 12.1 percentage points less likely to become pregnant in their teens, and male students were 4.3 percentage points less likely to be incarcerated. The authors found that attending the Promise Academy had little impact on self-reported health. According to the authors, some evidence suggests that high-performing schools may be sufficient to significantly improve human capital and reduce certain risky behaviors among poor students and young adults.

Gleason et al. (2010) conducted the first large-scale randomized trial of the effectiveness of charter schools in multiple states and different types of communities. It included 2,330 students who applied for admissions lotteries to 36 charter schools across 15 states. The study found that, on average, charter schools were no more successful than nearby TPS in boosting student behavior, achievement and attendance. However, charter school success varied widely, with those located in large urban areas being the most successful. The study also found that charter schools were more effective for lower income and lower achieving students and less effective for higher income and higher achieving students. Overall, parents and students who won entry into a charter school were more likely to be satisfied with their school than those who did not and had to attend another school.

Hanushek et al. (2007) investigated the quality of charter schools in Texas. They used several empirical approaches, including a fixed effects value added model, to control for student unobserved characteristics. Measuring achievement in math and reading, they found that average school quality in the charter school sector was not significantly different from that in TPS after an initial start-up period of roughly four to five years.

Hoxby and Rockoff (2004) analyzed the achievement of students in a group of charter schools in the Chicago school system. At the time, the group included elementary, middle and high schools and served predominantly minority and disadvantaged students. Each school used randomized lotteries to admit applicants when oversubscribed. The authors had access to a rich data set that allowed them to examine applicants who won admission through the lottery and those who did not, and address lottery issues like noncompliance, attrition and reapplication. Finally, they examined whether the charter school treatment effect depended on a student's grade level, initial achievement and the number of years the school had been operating. The primary results were that children who were accepted into the charter school system in elementary school improved on math test scores by 6-7 percentile points and by 5-6 percentile points in reading. (Note that the study used scores on the Iowa test of basic skills; thus, the percentile point measure is relative to national norms.) The results for other students in middle and high school grades were mixed.

Hoxby and Murarka (2009) analyzed almost all of the 47 charter schools operating in New York City in 2005-06. The schools tended to be located in disadvantaged and minority neighborhoods and to serve

students who were substantially poorer than the average public school student in New York City. Most of the applicants were admitted by lottery, as the schools were generally oversubscribed. The authors were careful to test that the students accepted by the lottery were no different in observable characteristics from the students who were not. The authors found that for each year of charter school attendance, student test scores in math would be expected to improve by 0.09 standard deviations and reading by 0.04 standard deviations per year. The charter school policy that was the most highly correlated with greater achievement was a longer school year, up to 220 days at some schools.

Imberman (2011) used a long panel with broad grade coverage spanning elementary through high school and a fixed effects study design to test whether charter school attendance affected cognitive and noncognitive skill formation. Schools that began as charters (start-up charters) generated improvements in discipline and attendance, which were used in the study as measures of noncognitive skills. Charter schools did not improve test scores, with the sole exception of middle school math. The author concluded that charter schools improved noncognitive but not cognitive skills. However, these improvements faded when students returned to TPS. Charters that converted from regular public schools had little impact on either skill type.

Ni and Rorrer (2011) used longitudinal student-level data from 2004 to 2009 to evaluate Utah charter school effectiveness. They used both a student-matching protocol and a student fixed effects model. Both methods produced similar results, finding that charter schools on average performed slightly worse than TPS. This result was driven by the low effectiveness of newly opened charter schools as well as high student mobility. However, as charter schools matured, they became at least as effective as TPS.

Sass (2006) used longitudinal data covering all public school students in Florida to study the performance of charter schools and their competitive impact on TPS. Controlling for student-level fixed effects, he found that achievement was initially lower in charter schools. However, by their fifth year of operation, charter schools reached the average test scores of TPS in math and produced higher reading achievement scores. Among charters, those targeting at-risk and special education students demonstrated lower student achievement. Charter schools managed by for-profit entities performed no differently on average than charter schools run by nonprofits. Controlling for preexisting TPS quality, competition from charter schools was associated with modest increases in math scores and unchanged reading scores in nearby TPS.

Zimmer et al. (2012) analyzed charter school achievement effects using a fixed effects-type methodology across seven locations: Chicago, Denver, Milwaukee, Philadelphia, San Diego, Ohio and Texas. To address concerns in previous research, they conducted sensitivity analyses that examined whether students who switched from a TPS to a charter school experienced a dip in achievement before entering the charter school and whether they had differential annual gains as compared with students who did not switch schools. In addition, they conducted an alternative analysis focused exclusively on charter middle and high schools in which all students switched schools. Overall, the authors found mixed results for charter school effects. Comparing students' performance while attending charter schools relative to the performance of the same students while attending TPS, they found that students performed similarly

across the two settings in most locations. This was true whether the researchers included all charter schools or just the charter middle or high schools.

**Table A1. Charter School Literature Reviewed, Grouped by Findings and Geography**

<b>ACADEMIC ACHIEVEMENT</b>	<b>EFFECT</b>	<b>GEOGRAPHY</b>
<b><i>Fixed Effects Studies</i></b>		
Bifulco and Ladd (2006)	Zero/Negative	Mixed Geography
Bifulco and Ladd (2007)	Zero/Negative	Mixed Geography
Booker et al. (2007)	Zero/Negative	Mixed Geography
Hanushek et al. (2007)	Zero/Negative	Mixed Geography
Imberman (2011)	Zero/Negative	Mixed Geography
Ni and Rorrer (2012)	Zero/Negative	Mixed Geography
Zimmer and Buddin (2006)	Zero/Negative	Mixed Geography
Zimmer et al. (2012)	Zero/Negative	Mixed Geography
<b><i>Lottery Studies</i></b>		
Abdulkadiroğlu et al. (2011)	Positive	Urban
Angrist et al. (2010)	Positive	Urban
Angrist et al. (2013)	Positive	Urban
Curto and Fryer (2014)	Positive	Urban
Dobbie and Fryer (2011)	Positive	Urban
Dobbie and Fryer (2013b)	Positive	Urban
Gleason et al. (2010)	Positive	Nonurban and Mixed Geography
Hoxby and Murarka (2009)	Positive	Urban
Hoxby and Rockoff (2004)	Positive	Mixed Geography
<b>GRADUATION FROM HIGH SCHOOL</b>	<b>EFFECT</b>	<b>GEOGRAPHY</b>
Angrist et al. (2014)	Zero/Negative	Urban
Booker et al. (2011)	Positive	Mixed Geography
Clark et al. (2011)	Positive	Mixed Geography
Dobbie and Fryer (2013b)	Zero/Negative	Urban
<b>WAGES</b>	<b>EFFECT</b>	<b>GEOGRAPHY</b>
Booker et al. (2014)	Positive	Urban
<b>COLLEGE ATTENDANCE</b>	<b>EFFECT</b>	<b>GEOGRAPHY</b>
Angrist et al. (2014)	Positive	Urban
Booker et al. (2011)	Positive	Mixed Geography
Booker et al. (2014)	Positive	Mixed Geography
Dobbie and Fryer (2013b)	Positive	Urban
<b>OTHER</b>	<b>EFFECT</b>	<b>GEOGRAPHY</b>
Dobbie and Fryer (2013b)	Positive	Urban

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